**To:** kathleen.knight@ct.gov[kathleen.knight@ct.gov]; paul.farrell@ct.gov[paul.farrell@ct.gov]; paul.bodner@ct.gov[paul.bodner@ct.gov]; wendy.jacobs@ct.gov[wendy.jacobs@ct.gov]; kurt.kebschull@ct.gov[kurt.kebschull@ct.gov]; pete.babich@ct.gov[pete.babich@ct.gov]; Jaimeson.Sinclair@ct.gov[Jaimeson.Sinclair@ct.gov]; michael.geigert@ct.gov[michael.geigert@ct.gov]; mark.wert@state.ma.us[mark.wert@state.ma.us]; Azin.Kavian@state.ma.us[Azin.Kavian@state.ma.us]; Glenn.Keith@state.ma.us[Glenn.Keith@state.ma.us]; Tom Downs[Tom.Downs@maine.gov]; jeff.s.crawford@maine.gov[jeff.s.crawford@maine.gov]; Tom.Graham@maine.gov[Tom.Graham@maine.gov]; Michele.Roberge@des.nh.gov[Michele.Roberge@des.nh.gov]; jeffrey.underhill@des.nh.gov[Jeffrey.Underhill@des.nh.gov]; Michael.Fitzgerald@des.nh.gov[Michael.Fitzgerald@des.nh.gov]; Sharon.Davis@dep.nj.gov[Sharon.Davis@dep.nj.gov]; Judy.Rand@dep.nj.gov[Judy.Rand@dep.nj.gov]; robert.bielawa@dec.ny.gov[robert.bielawa@dec.ny.gov]; scott.griffin@dec.ny.gov[scott.griffin@dec.ny.gov]; Diana.Rivenburgh@dec.ny.gov[Diana.Rivenburgh@dec.ny.gov]; rob.sliwinski@dec.ny.gov[rob.sliwinski@dec.ny.gov]; Barbara.H.Morin@health.ri.gov[Barbara.H.Morin@health.ri.gov]; Bennet.Leon@vermont.gov[Bennet.Leon@vermont.gov]; Jeff.Merrell@vermont.gov[Jeff.Merrell@vermont.gov]; Simcox, Alison[simcox.alison@epa.gov]; McWilliams, Anne K.[mcwilliams.anne@epa.gov]; Arnold, Anne[Arnold.Anne@epa.gov]; Burkhart, Richard[burkhart.richard@epa.gov]; Conroy, David[Conroy.Dave@epa.gov]; Biton, Leiran[biton.leiran@epa.gov]; Judge, Robert[Judge.Robert@epa.gov]; McConnell, Robert[mcconnell.robert@epa.gov]; Ruvo, Richard[Ruvo.Richard@epa.gov]; Greene, Cynthia[Greene.Cynthia@epa.gov]; Wong, Shutsu[Wong.Shutsu@epa.gov]; Kelly, Bob[Kelly.Bob@epa.gov]
**Cc:** pmiller@nescaum.org[pmiller@nescaum.org]
**From:** George Allen
**Sent:** Tue 10/4/2016 4:24:47 PM
**Subject:** materials for Oct. 5 10am APC call
Agenda-Nescaum October 5 APC Quarterly Call.docx

Hi everyone; the agenda for this call is attached.

October 5, 2016 10 to 11 am, 877-594-8353, 170-427-22#

Materials for the meeting are at:
https://drive.google.com/open?id=0B4duMFtoHVUESGd5U3M1TUlJQTQ

Depending on timing we may not get past item 5. The info on exceptional events at the bottom is for future reference; there will be a Nescaum call for interested states on this at a date TBA that I will sent out to this group.
-- George

George Allen, NESCAUM
89 South St., Suite 602
Boston, MA 02111
Tel. 617-259-2035 [direct]

**To:** kurt.kebschull@ct.gov[kurt.kebschull@ct.gov]; paul.bodner@ct.gov[paul.bodner@ct.gov]; pete.babich@ct.gov[pete.babich@ct.gov]; wendy.jacobs@ct.gov[wendy.jacobs@ct.gov]; michael.geigert@ct.gov[Michael.Geigert@ct.gov]; Kiernan Wholean[Kiernan.Wholean@ct.gov]; rama.tangirala@dc.gov[rama.tangirala@dc.gov]; Robert.Clausen@state.de.us[Robert.Clausen@state.de.us]; Mark Prettyman[Mark.Prettyman@state.de.us]; glenn.pacheco@state.ma.us[glenn.pacheco@state.ma.us]; steven.coughlin@state.ma.us[steven.coughlin@state.ma.us]; michael.woodman@maryland.gov[michael.woodman@maryland.gov]; molla.sarros@maryland.gov[molla.sarros@maryland.gov]; george.aburn@maryland.gov[george.aburn@maryland.gov]; brian.hug@maryland.gov[brian.hug@maryland.gov]; jennifer.hains@maryland.gov[jennifer.hains@maryland.gov]; hannah.ashenafi@maryland.gov[hannah.ashenafi@maryland.gov]; Tom Downs[Tom.Downs@maine.gov]; William Longfellow[William.Longfellow@maine.gov]; david.healy@des.nh.gov[david.healy@des.nh.gov]; jeffrey.underhill@des.nh.gov[Jeffrey.Underhill@des.nh.gov]; judy.rand@dep.nj.gov[judy.rand@dep.nj.gov]; Shan.He@dep.nj.gov[Shan.He@dep.nj.gov]; sharon.davis@dep.nj.gov[sharon.davis@dep.nj.gov]; eric.zalewsky@dec.ny.gov[eric.zalewsky@dec.ny.gov]; michael.ku@dec.ny.gov[michael.ku@dec.ny.gov]; winston.hao@dec.ny.gov[winston.hao@dec.ny.gov]; margaret.valis@dec.ny.gov[margaret.valis@dec.ny.gov]; senolan@pa.gov[senolan@pa.gov]; kdalal@pa.gov[kdalal@pa.gov]; droble@pa.gov[droble@pa.gov]; Darren Austin[darren.austin@dem.ri.gov]; doris.mcleod@deq.virginia.gov[doris.mcleod@deq.virginia.gov]; jlin@deq.virginia.gov[jlin@deq.virginia.gov]; Kristen.Sturnpf@deq.virginia.gov[Kristen.Sturnpf@deq.virginia.gov]; Michael.Kiss@deq.virginia.gov[Michael.Kiss@deq.virginia.gov]; Thomas.Ballou@deq.virginia.gov[Thomas.Ballou@deq.virginia.gov]; Dan.Riley@vermont.gov[Dan.Riley@vermont.gov]; heidi.hales@vermont.gov[heidi.hales@vermont.gov]; aring1@umd.edu[aring1@umd.edu]; Kayin, Serpil[Kayin.Serpil@epa.gov]; McConnell, Robert[mcconnell.robert@epa.gov]; Burkhart, Richard[burkhart.richard@epa.gov]; Biton, Leiran[biton.leiran@epa.gov]; Kelly, Bob[Kelly.Bob@epa.gov]; Wieber, Kirk[Wieber.Kirk@epa.gov]; Forde, Raymond[Forde.Raymond@epa.gov]; Huang, Gavin[huang.gavin@epa.gov]; Schmitt, Ellen[Schmitt.Ellen@epa.gov]; ellsworth, todd[ellsworth.todd@epa.gov]; Timin, Brian[Timin.Brian@epa.gov]; Houyoux, Marc[Houyoux.Marc@epa.gov]; Jefferson, Catrice[Jefferson.Catrice@epa.gov]; Julie McDill[jmcdill@marama.org]; swierman@marama.org[swierman@marama.org]; smccusker@marama.org[smccusker@marama.org]; ahmadi@nescaum.org[ahmadi@nescaum.org]; pmiller@nescaum.org[pmiller@nescaum.org]; Wick Havens[WHavens@otcair.org]; David Foerter[dfoerter@otcair.org]; emily.bull@maryland.gov[emily.bull@maryland.gov]
**Cc:** frank.gao@state.de.us[frank.gao@state.de.us]; glenn.keith@state.ma.us[glenn.keith@state.ma.us]; mark.wert@state.ma.us[mark.wert@state.ma.us]; diane.nelson@maryland.gov[diane.nelson@maryland.gov]; kathy.wehnes@maryland.gov[kathy.wehnes@maryland.gov]; roger.thunell@maryland.gov[roger.thunell@maryland.gov]; Timothy Wallace[timothy.wallace@maryland.gov]; joel.dreessen@maryland.gov[joel.dreessen@maryland.gov]; husain.waheed@maryland.gov[husain.waheed@maryland.gov]; martha.e.webster@maine.gov[martha.e.webster@maine.gov]; michael.sheehan@dec.ny.gov[michael.sheehan@dec.ny.gov]; rob.sliwinski@dec.ny.gov[rob.sliwinski@dec.ny.gov]; afleck@pa.gov[afleck@pa.gov]; karen slattery[karen.slattery@dem.ri.gov]; Sonya Lewis-Cheatham[sonya.lewis-cheatham@deq.virginia.gov]; bennet.leon@vermont.gov[bennet.leon@vermont.gov]; sehrman@eng.umd.edu[sehrman@eng.umd.edu]; tcanty@atmos.umd.edu[tcanty@atmos.umd.edu]; dgoldb@atmos.umd.edu[dgoldb@atmos.umd.edu]; Arnold, Anne[Arnold.Anne@epa.gov]; Conroy, David[Conroy.Dave@epa.gov]; Leon-Guerrero, Tim[Leon-Guerrero.Tim@epa.gov]; Chow, Alice[chow.alice@epa.gov]; Possiel, Norm[Possiel.Norm@epa.gov]; Andy Bodnarik[ABodnarik@otcair.org]; Kromeklia Bryant[kbryant@otcair.org]; Shyamala

Rajan[srajan@otcair.org]
**From:** Joseph Jakuta
**Sent:** Mon 3/27/2017 1:41:06 PM
**Subject:** RE: Follow Up: Modeling Committee Call 3/23
OTC_Modeling_Committee_Spring_2017 03102017.pptx

Attached are the draft slides that some have requested.

Joseph

**From:** Joseph Jakuta
**Sent:** Thursday, March 23, 2017 2:57 PM
**To:** 'Kurt.Kebschull@ct.gov' <Kurt.Kebschull@ct.gov>; 'paul.bodner@ct.gov' <paul.bodner@ct.gov>; 'Pete.Babich@ct.gov' <Pete.Babich@ct.gov>; 'wendy.jacobs@ct.gov' <wendy.jacobs@ct.gov>; 'Michael.Geigert@ct.gov' <Michael.Geigert@ct.gov>; 'Kiernan.Wholean@ct.gov' <Kiernan.Wholean@ct.gov>; 'rama.tangirala@dc.gov' <rama.tangirala@dc.gov>; 'Robert.Clausen@state.de.us' <Robert.Clausen@state.de.us>; 'Mark.Prettyman@state.de.us' <Mark.Prettyman@state.de.us>; 'glenn.pacheco@state.ma.us' <glenn.pacheco@state.ma.us>; 'steven.coughlin@state.ma.us' <steven.coughlin@state.ma.us>; 'michael.woodman@maryland.gov' <michael.woodman@maryland.gov>; 'molla.sarros@maryland.gov' <molla.sarros@maryland.gov>; 'george.aburn@maryland.gov' <george.aburn@maryland.gov>; 'brian.hug@maryland.gov' <brian.hug@maryland.gov>; 'jennifer.hains@maryland.gov' <jennifer.hains@maryland.gov>; 'hannah.ashenafi@maryland.gov' <hannah.ashenafi@maryland.gov>; 'tom.downs@maine.gov' <tom.downs@maine.gov>; 'William.Longfellow@maine.gov' <William.Longfellow@maine.gov>; 'david.healy@des.nh.gov' <david.healy@des.nh.gov>; 'jeffrey.underhill@des.nh.gov' <jeffrey.underhill@des.nh.gov>; 'judy.rand@dep.nj.gov' <judy.rand@dep.nj.gov>; 'Shan.He@dep.nj.gov' <Shan.He@dep.nj.gov>; 'sharon.davis@dep.nj.gov' <sharon.davis@dep.nj.gov>; 'eric.zalewsky@dec.ny.gov' <eric.zalewsky@dec.ny.gov>; 'michael.ku@dec.ny.gov' <michael.ku@dec.ny.gov>; 'winston.hao@dec.ny.gov' <winston.hao@dec.ny.gov>; 'margaret.valis@dec.ny.gov' <margaret.valis@dec.ny.gov>; 'senolan@pa.gov' <senolan@pa.gov>; 'kdalal@pa.gov' <kdalal@pa.gov>; 'droble@pa.gov' <droble@pa.gov>; 'darren.austin@dem.ri.gov' <darren.austin@dem.ri.gov>; 'doris.mcleod@deq.virginia.gov' <doris.mcleod@deq.virginia.gov>; 'jlin@deq.virginia.gov' <jlin@deq.virginia.gov>; 'Kristen.Stumpf@deq.virginia.gov' <Kristen.Stumpf@deq.virginia.gov>; 'Michael.Kiss@deq.virginia.gov' <Michael.Kiss@deq.virginia.gov>; 'Thomas.Ballou@deq.virginia.gov' <Thomas.Ballou@deq.virginia.gov>; 'Dan.Riley@vermont.gov' <Dan.Riley@vermont.gov>; 'heidi.hales@vermont.gov' <heidi.hales@vermont.gov>; 'aring1@umd.edu' <aring1@umd.edu>; 'kayin.serpil@epa.gov' <kayin.serpil@epa.gov>; 'mcconnell.robert@epa.gov' <mcconnell.robert@epa.gov>; 'burkhart.richard@epa.gov' <burkhart.richard@epa.gov>; 'biton.leiran@epa.gov'

<biton.leiran@epa.gov>; 'kelly.bob@epa.gov' <kelly.bob@epa.gov>; 'Wieber.Kirk@epa.gov' <Wieber.Kirk@epa.gov>; 'forde.raymond@epa.gov' <forde.raymond@epa.gov>; 'huang.gavin@epa.gov' <huang.gavin@epa.gov>; 'Schmitt.Ellen@epa.gov' <Schmitt.Ellen@epa.gov>; 'ellsworth.todd@epa.gov' <ellsworth.todd@epa.gov>; 'timin.brian@epa.gov' <timin.brian@epa.gov>; 'Houyoux.Marc@epamail.epa.gov' <Houyoux.Marc@epamail.epa.gov>; 'jefferson.catrice@epa.gov' <jefferson.catrice@epa.gov>; 'jmcdill@marama.org' <jmcdill@marama.org>; 'swierman@marama.org' <swierman@marama.org>; 'smccusker@marama.org' <smccusker@marama.org>; 'ahmadi@nescaum.org' <ahmadi@nescaum.org>; 'pmiller@nescaum.org' <pmiller@nescaum.org>; Wick Havens <WHavens@otcair.org>; David Foerter <dfoerter@otcair.org>; Joseph Jakuta <JJakuta@otcair.org>; 'emily.bull@maryland.gov' <emily.bull@maryland.gov>
**Cc:** 'frank.gao@state.de.us' <frank.gao@state.de.us>; 'glenn.keith@state.ma.us' <glenn.keith@state.ma.us>; 'mark.wert@state.ma.us' <mark.wert@state.ma.us>; 'diane.nelson@maryland.gov' <diane.nelson@maryland.gov>; 'kathy.wehnes@maryland.gov' <kathy.wehnes@maryland.gov>; 'roger.thunell@maryland.gov' <roger.thunell@maryland.gov>; 'timothy.wallace@maryland.gov' <timothy.wallace@maryland.gov>; 'joel.dreessen@maryland.gov' <joel.dreessen@maryland.gov>; 'husain.waheed@maryland.gov' <husain.waheed@maryland.gov>; 'martha.e.webster@maine.gov' <martha.e.webster@maine.gov>; 'michael.sheehan@dec.ny.gov' <michael.sheehan@dec.ny.gov>; 'rob.sliwinski@dec.ny.gov' <rob.sliwinski@dec.ny.gov>; 'afleck@pa.gov' <afleck@pa.gov>; 'karen.slattery@dem.ri.gov' <karen.slattery@dem.ri.gov>; 'Sonya.Lewis-Cheatham@deq.virginia.gov' <Sonya.Lewis-Cheatham@deq.virginia.gov>; 'bennet.leon@vermont.gov' <bennet.leon@vermont.gov>; 'sehrman@eng.umd.edu' <sehrman@eng.umd.edu>; 'tcanty@atmos.umd.edu' <tcanty@atmos.umd.edu>; 'dgoldb@atmos.umd.edu' <dgoldb@atmos.umd.edu>; 'arnold.anne@epa.gov' <arnold.anne@epa.gov>; 'conroy.dave@epa.gov' <conroy.dave@epa.gov>; 'leon-guerrero.tim@epa.gov' <leon-guerrero.tim@epa.gov>; 'chow.alice@epa.gov' <chow.alice@epa.gov>; 'possiel.norm@epa.gov' <possiel.norm@epa.gov>; Andy Bodnarik <ABodnarik@otcair.org>; Kromeklia Bryant <kbryant@otcair.org>; Shyamala Rajan <srajan@otcair.org>
**Subject:** Follow Up: Modeling Committee Call 3/23

Dear Modeling Committee,

Attached are the notes from today's call. Don't forget that feedback on the presentation is due by April 5 COB.

Also if you could fill out the schedule for the April call reschedule by COB 3/27.
http://doodle.com/poll/kt3a6486y5urn9xg

Joseph Jakuta

Program Manager

OTC / MANE-VU

202.508.3839

444 North Capitol Street NW #322

Washington, DC 20001

Website:www.otcair.org

Twitter: @OzoneOTC

**To:** kathleen.knight@ct.gov[kathleen.knight@ct.gov]; paul.farrell@ct.gov[paul.farrell@ct.gov]; paul.bodner@ct.gov[paul.bodner@ct.gov]; wendy.jacobs@ct.gov[wendy.jacobs@ct.gov]; kurt.kebschull@ct.gov[kurt.kebschull@ct.gov]; pete.babich@ct.gov[pete.babich@ct.gov]; Jaimeson.Sinclair@ct.gov[Jaimeson.Sinclair@ct.gov]; michael.geigert@ct.gov[michael.geigert@ct.gov]; Kiernan.Wholean@ct.gov[Kiernan.Wholean@ct.gov]; mark.wert@state.ma.us[mark.wert@state.ma.us]; Azin Kavian[azin.kavian@state.ma.us]; Glenn.Keith@state.ma.us[Glenn.Keith@state.ma.us]; Tom Downs[Tom.Downs@maine.gov]; jeff.s.crawford@maine.gov[jeff.s.crawford@maine.gov]; Tom.Graham@maine.gov[Tom.Graham@maine.gov]; Michele.Roberge@des.nh.gov[Michele.Roberge@des.nh.gov]; jeffrey.underhill@des.nh.gov[Jeffrey.Underhill@des.nh.gov]; Michael.Fitzgerald@des.nh.gov[Michael.Fitzgerald@des.nh.gov]; Sharon.Davis@dep.nj.gov[Sharon.Davis@dep.nj.gov]; Judy.Rand@dep.nj.gov[Judy.Rand@dep.nj.gov]; robert.bielawa@dec.ny.gov[robert.bielawa@dec.ny.gov]; scott.griffin@dec.ny.gov[scott.griffin@dec.ny.gov]; Diana.Rivenburgh@dec.ny.gov[Diana.Rivenburgh@dec.ny.gov]; rob.sliwinski@dec.ny.gov[rob.sliwinski@dec.ny.gov]; karen slattery[karen.slattery@dem.ri.gov]; Barbara.H.Morin@health.ri.gov[Barbara.H.Morin@health.ri.gov]; Bennet.Leon@vermont.gov[Bennet.Leon@vermont.gov]; Jeff.Merrell@vermont.gov[Jeff.Merrell@vermont.gov]; Simcox, Alison[simcox.alison@epa.gov]; McWilliams, Anne K.[mcwilliams.anne@epa.gov]; Arnold, Anne[Arnold.Anne@epa.gov]; Burkhart, Richard[burkhart.richard@epa.gov]; Conroy, David[Conroy.Dave@epa.gov]; Biton, Leiran[biton.leiran@epa.gov]; Judge, Robert[Judge.Robert@epa.gov]; McConnell, Robert[mcconnell.robert@epa.gov]; Ruvo, Richard[Ruvo.Richard@epa.gov]; Greene, Cynthia[Greene.Cynthia@epa.gov]; Wong, Shutsu[Wong.Shutsu@epa.gov]; Kelly, Bob[Kelly.Bob@epa.gov]
**Cc:** pmiller@nescaum.org[pmiller@nescaum.org]; crudisill@nescaum.org[crudisill@nescaum.org]
**From:** George Allen
**Sent:** Tue 1/3/2017 7:45:39 PM
**Subject:** Agenda for Wed. Jan. 4 10-1130 am quarterly APC call

Hi everyone; here's the call-in info and Agenda for tomorrow's APC 10am call. We have 90 minutes booked.
-- George

877-594-8353
Ex. 6 - Personal Privacy

Agenda:

1. State Updates

2. SO2 Data Requirements Rule: January 13, 2017 deadline for modeling; Revised Designation Recommendation submittal if desired by state

3. 2008 Ozone NAAQS Attainment Demonstration SIP

4. 2015 Ozone NAAQS Implementation Rule: Comments due 1-19-2017

5. 2015 Ozone NAAQS Notice of Data Availability: Preliminary Interstate Ozone Transport Modeling Data [more info below]

6. Final revisions to the Regional Haze Rule (December 14, 2016)

7. Comments on EPA Inventory Guidance (due 1-16-2017)

8. Comments on PM2.5 Precursor Guidance (due 1-31-2017)

9. Annual Meeting Planning - March? Location?

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#5. Notice of Data Availability - Preliminary Interstate Ozone Transport Modeling Data for the 2015 Ozone NAAQS, signed 12/28/16. Comments must be received on or before 90 days after publication in the Federal Register [~ 1st week in April, tbd]
EPA has completed preliminary interstate ozone transport modeling relevant for the 2015 ozone national ambient air quality standard (NAAQS). This information may help states develop "good neighbor" state implementation plans for the 2015 ozone air quality standards. The Clean Air Act's "good neighbor" provision requires states to develop plans that ensure they do not contribute to downwind states' failure to attain or maintain air quality standards. As part of a Notice of Data Availability (NODA), the Agency is providing an opportunity for public review of this modeling data, including projected ozone concentrations and contributions for 2023, as well as projected emissions, including emissions from the power sector, that were used for this modeling. The notice and additional information is available at:
https://www.epa.gov/airmarkets/notice-data-availability-preliminary-interstate-ozone-transport-modeling-data-2015-ozone
Pre-Pub PDF:
https://www.epa.gov/sites/production/files/2016-12/documents/2015_o3_naaqs_transport_aq_modeling_noda_final_12-29-16_web_0.pdf

NESCAUM
www.nescaum.org

Northeast States for Coordinated Air Use Management
89 South Street, Suite 602 Boston, MA 02111
Phone 617-259-2000 Fax 617-742-9162
*Arthur N. Marin, Executive Director*

# NESCAUM Attainment and Planning Committee Quarterly Call
## October 5, 2016 10 to 11 am

**877-594-8353,** Ex. 6 - Personal Privacy

Meeting materials:
https://drive.google.com/open?id=0B4duMFtoHVUESGd5U3M1TUlJQTQ

1. State Updates (CT ME MA NH NY NJ RI VT)

2. Summary of September Nescaum Dirs mtg (Nescaum)
File: NESCAUM Directors Mtg Sept2016 action items notes.pdf

3a. Upcoming round of designations for SO2 (EPA R1-Leiran B)
https://www.epa.gov/sites/production/files/2016-07/documents/areadesign.pdf

3b. Update on work being done toward the SO2 DDR:
January 13, 2017 deadline for modeling results (NY-Bob B)

4a. 2016 O3 season recap (Anne McWilliams EPA-R1, states)
File: Air Quality during the Summer of 2016 10-04-16.pptx
https://www3.epa.gov/region1/airquality/o3exceed-16.html
http://www.maine.gov/dep/ftp/DEP_OZONE/OTC/2016/

4b. "Ozone Designation Recommendations" submitted by states to EPA, due Oct. 1
[NY CT NJ RI; others?]

5. "Final CSAPR Update" issued September 7, 2016 (EPA)
File: CSAPR update.pptx
https://www.epa.gov/airmarkets/final-cross-state-air-pollution-rule-update

6. 2012 PM implementation rule finalized July 29 (EPA)
https://www.epa.gov/pm-pollution/pm25-naaqs-final-sip-requirements-rule-july-2016
Design Value Tables: https://www.epa.gov/air-trends/air-quality-design-values

7. Lead NAAQS finalized September 16 (no change)

For a future call: Revisions to the 2007 Exceptional Events Rule, finalized September 16
https://www.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events and
https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_guidance_9-16-16_final.pdf

NESCAUM Members:
Connecticut Bureau of Air Management, Anne Gobin
Maine Bureau of Air Quality Control, Marc Cone
Massachusetts Bureau of Waste Prevention, Christine Kirby
New Hampshire Air Resources Division, Craig Wright
New Jersey Division of Air Quality, Francis Steitz
New York Division of Air Resources, Steve Flint
Rhode Island Office of Air Resources, Douglas McVay
Vermont Air Quality & Climate Division, Heidi Hales

May 25-26, 2016 wildfire O3?  Files: 2 recent papers. Brey ES&T, and Dreessen JAWMA

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# Modeling Committee Update

## OTC Committee Meeting

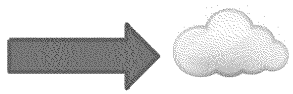
April 11, 2017

Washington, DC

ED_001361_00001219

# Overview

1. Monitored Results
2. Ozone NAAQS Schedule
3. Enhanced Monitoring Plan (EMP)
4. OTC 2011 Modeling Platform
   a) TSD
   b) Inventory
   c) Modeling
      i. Comparison of modeling for monitored grid cell vs 3x3 cluster
      ii. CMAQ vs CAMx

Cloud in Corner Indicates Slide use only in State Committee Meeting 

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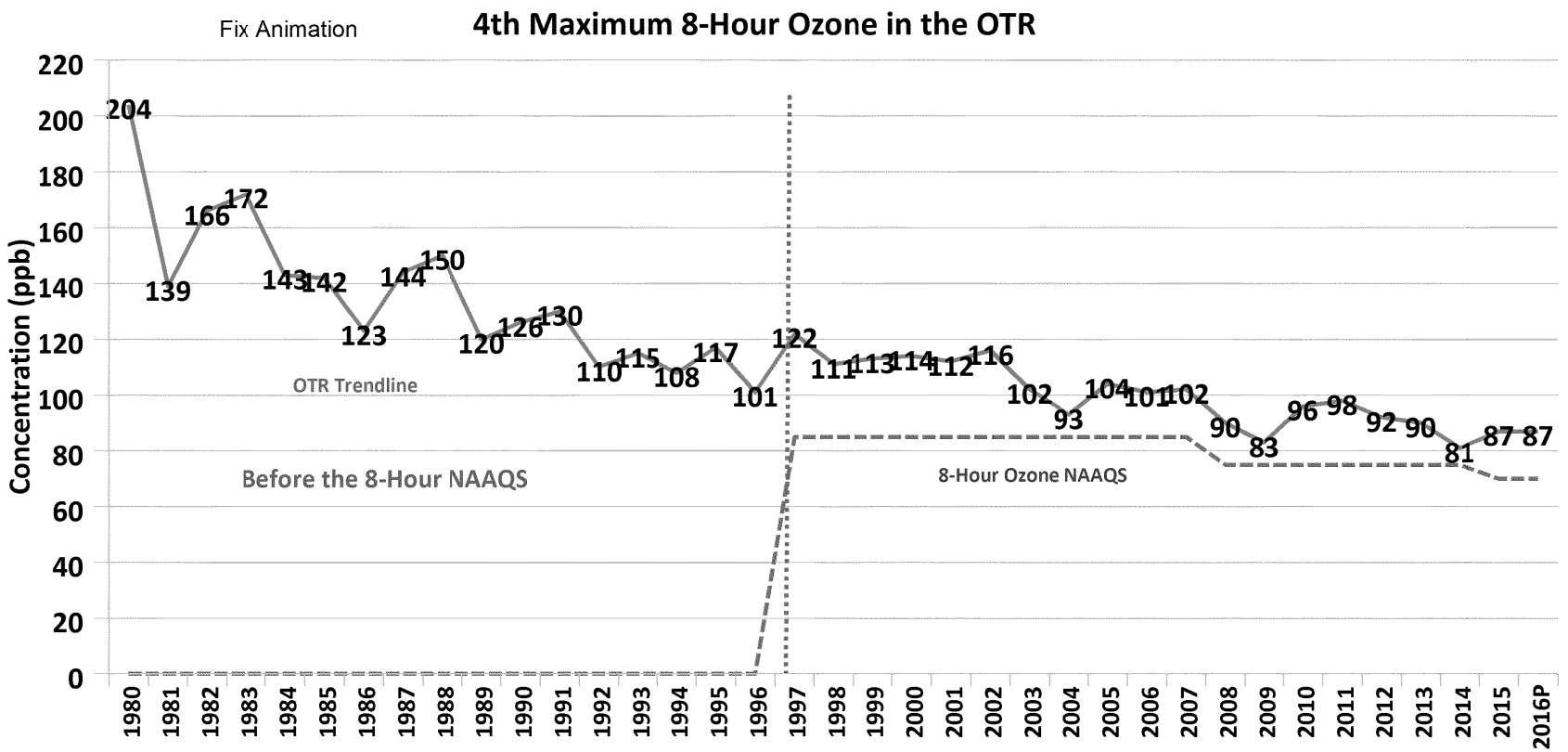
# Ozone Trends in the OTR



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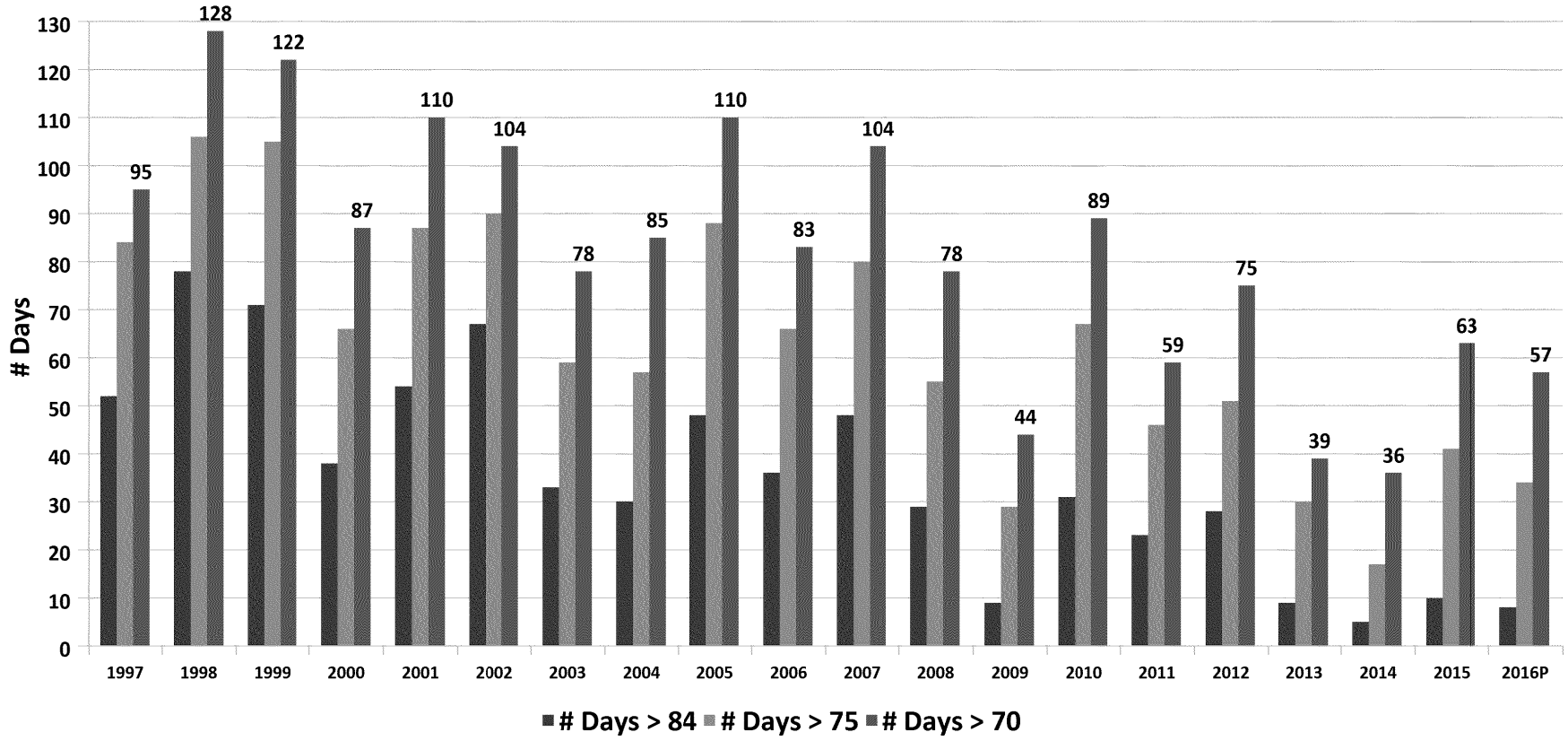
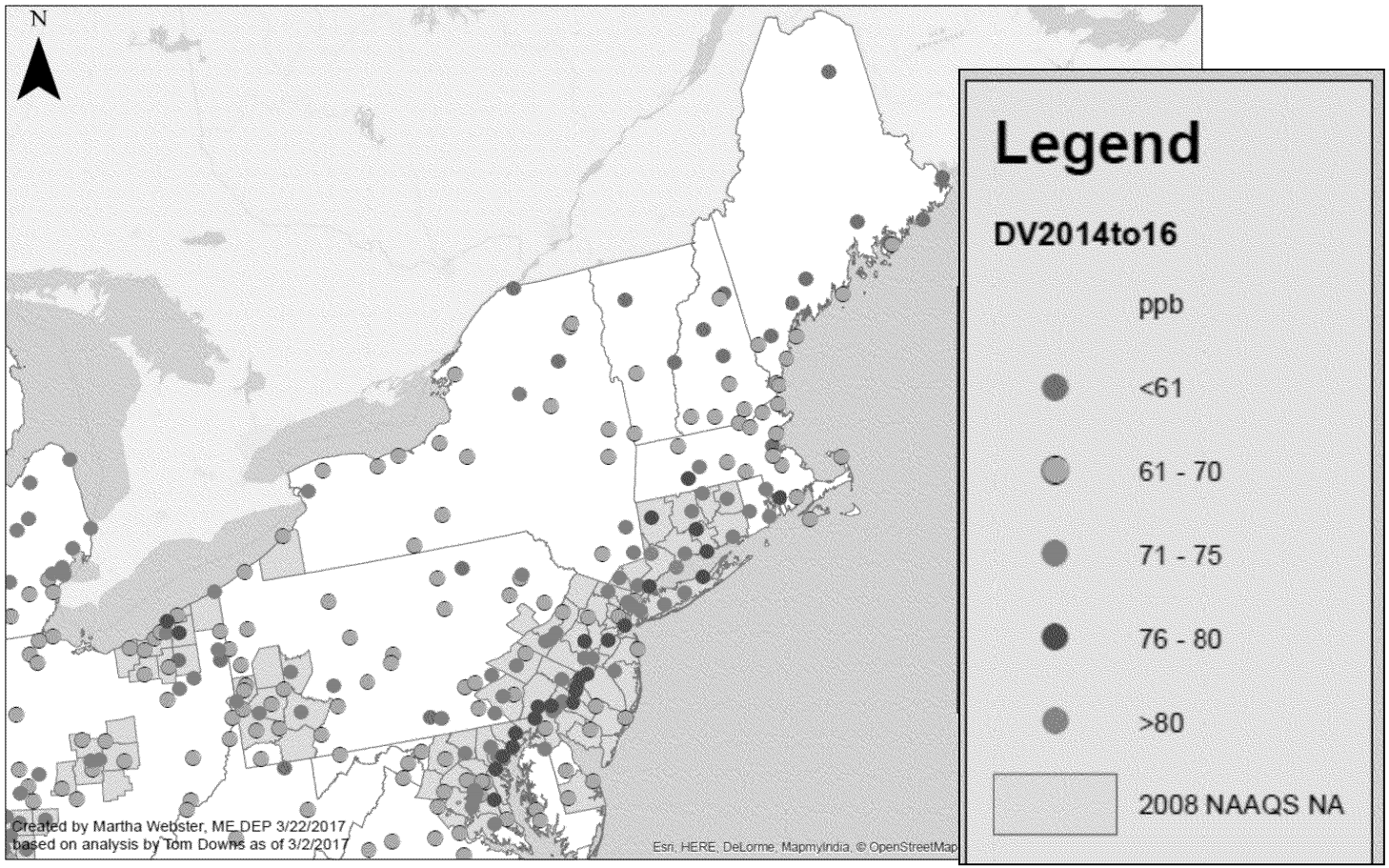
# Trends for OTR Exceedance Days



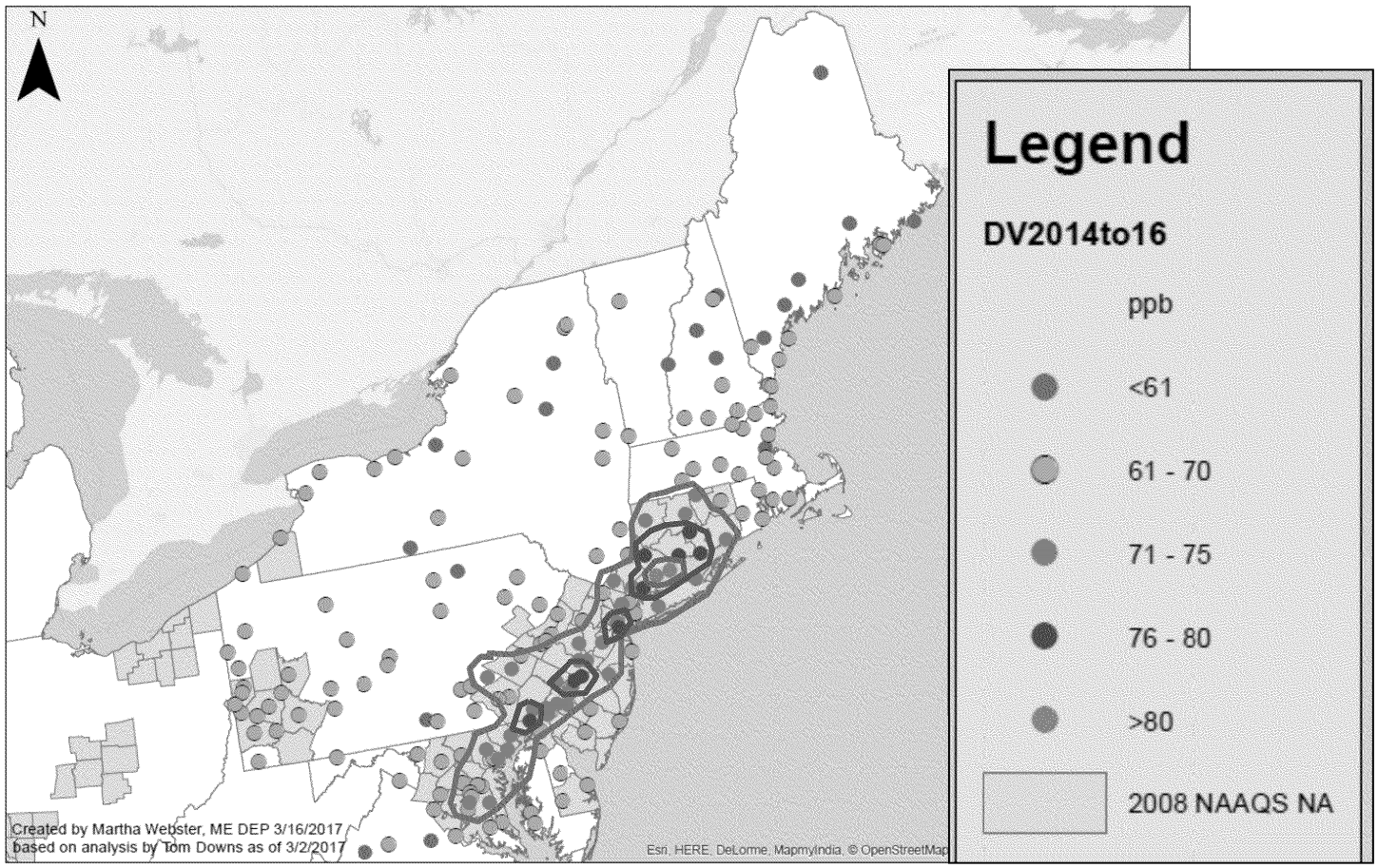
ED_001361_00001219

# 2016 4th High 8hr Ozone Value (Preliminary)



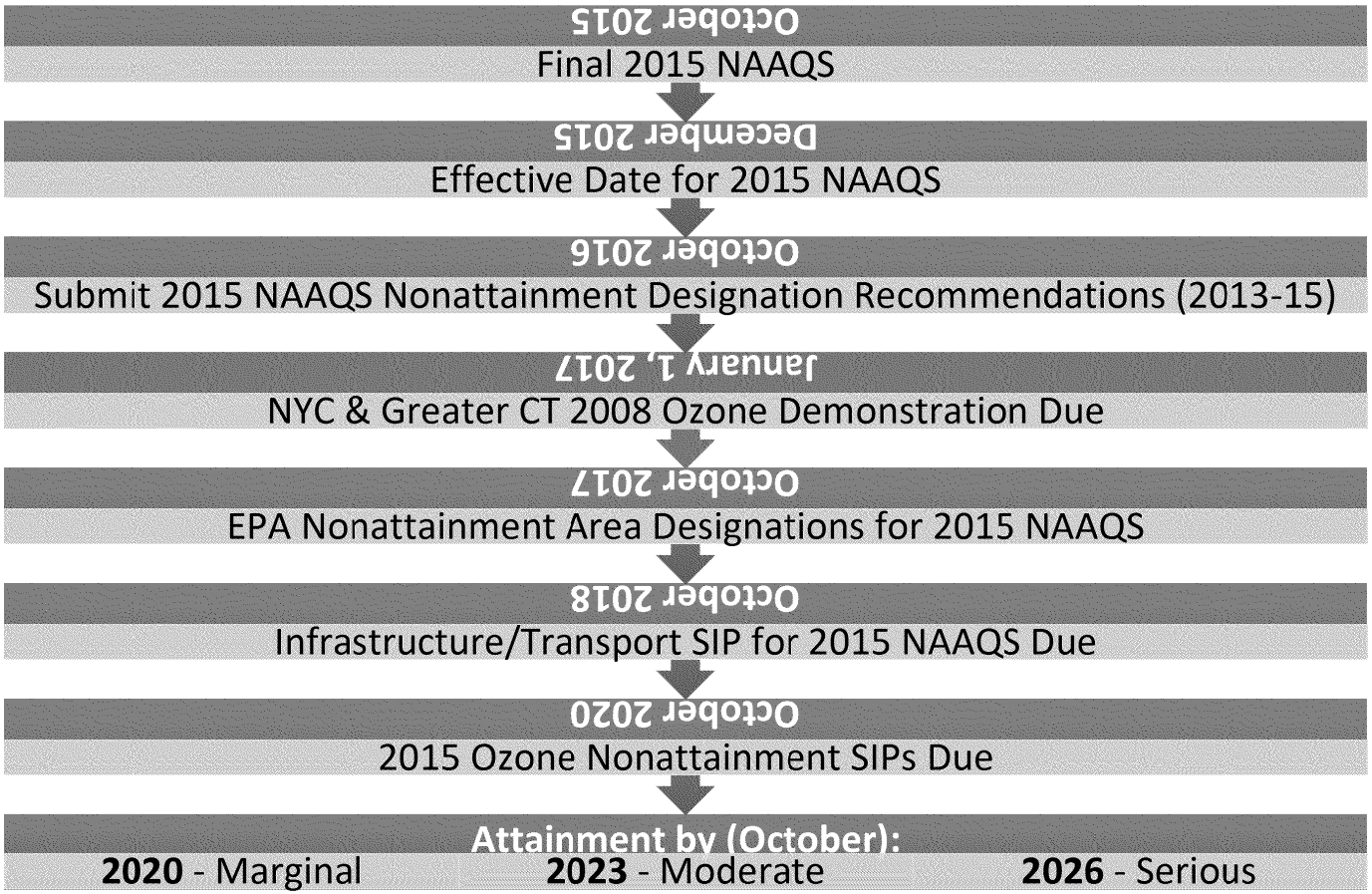
ED_001361_00001219

# 2014-16 8hr Ozone Preliminary Design Value



ED_001361_00001219

# Ozone Planning Timeline



ED_001361_00001219

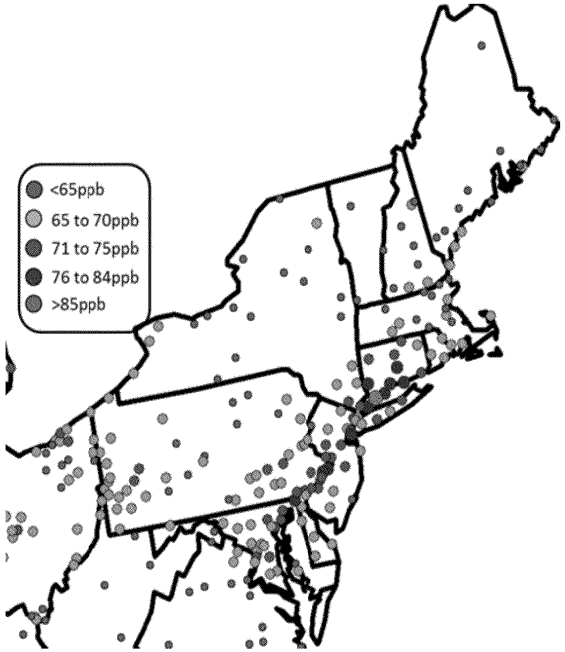
# Enhanced Monitoring Plans (EMP)

- Individual States in the OTR required to submit an EMP as part of the 2015 Ozone NAAQS process
- Plans are due to EPA in 2018
- Effort underway to coordinate between the states and EPA through OTC workgroup
  - Gain regional benefits from plans
  - More knowledge on transport
  - More knowledge of air/sea affect on ozone
  - Information to improve model performance
- Will be future updates at OTC meetings and opportunity for comment

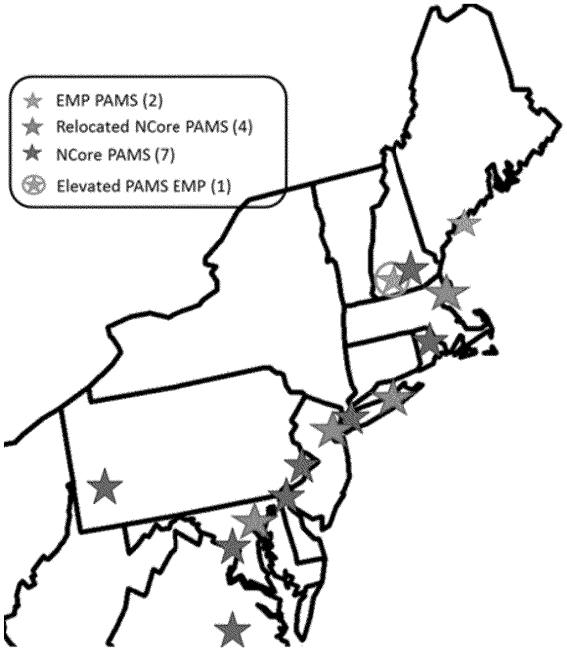
ED_001361_00001219

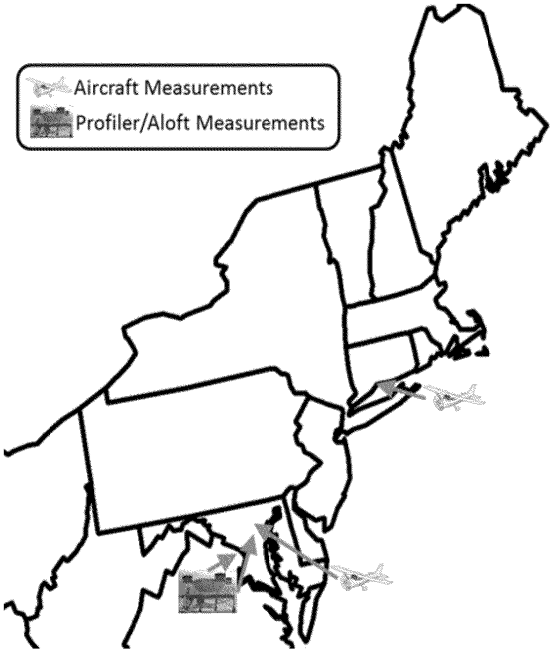
# Enhanced Monitoring Plans (EMP)

## Design Values




## Preliminary state suggestions



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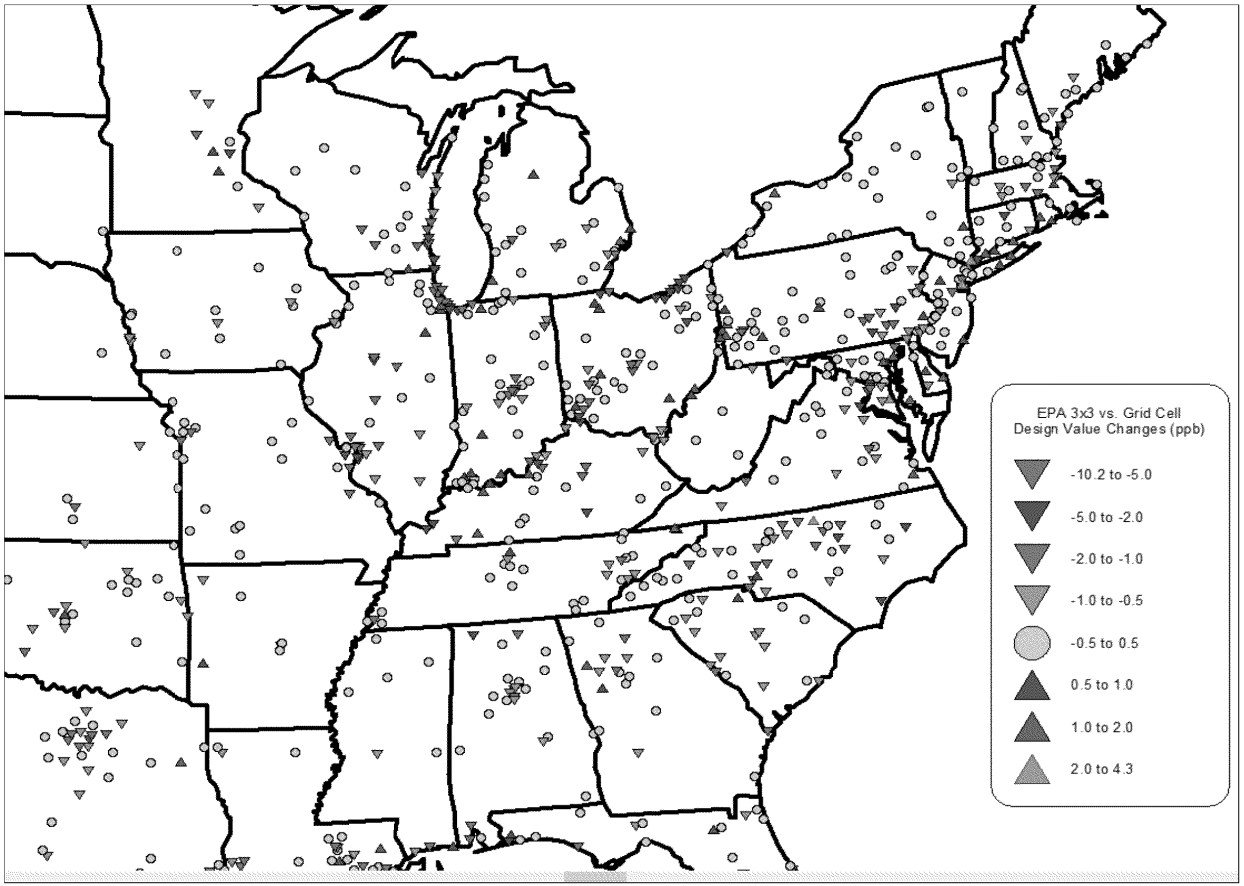
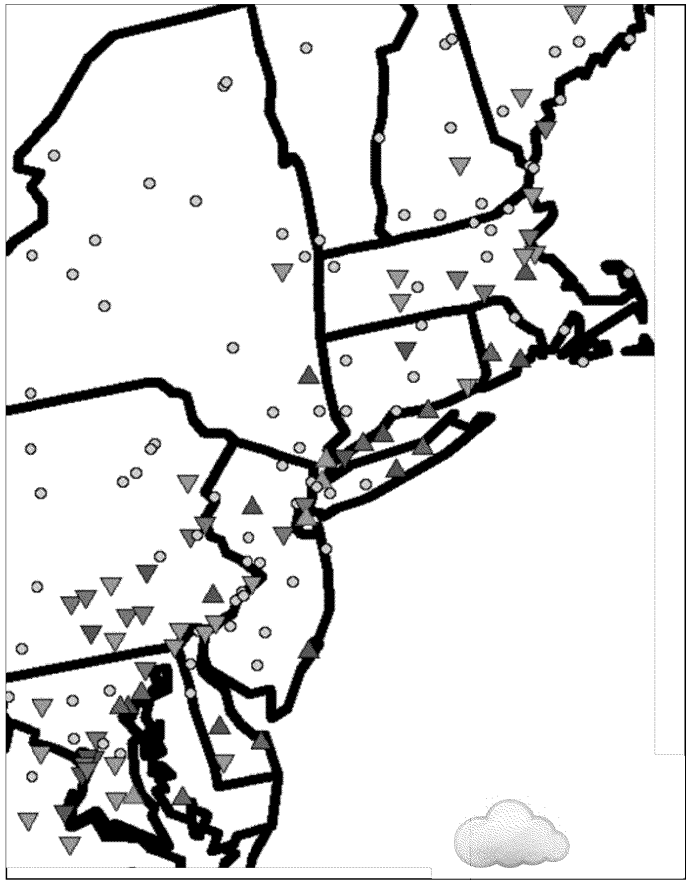
# EPA Modeled 2018 Effect on Design Values

## Changing from Monitor Grid Cell to 3x3 Grid Cell Cluster Calculations



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# Recent Modeling

- Comparison between photochemical models

(Insert)

ED_001361_00001219

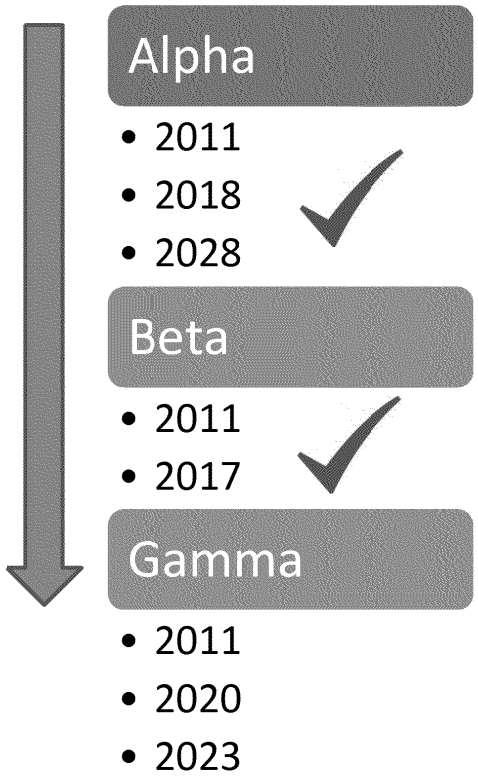
# Current OTC 2020/2023 Modeling

## Modeling intended to provide early direction and SIP support

- 2020 interpolated projection (2008 NAAQS Serious Nonattainment)
  - Interpolation between Bata 2017 and EPA 2023 inventories
  - Includes EPA MOVES modeling for 2023
  - IPM data to be replaced with ERTAC for EGUs
  - CSAPR2 Cap estimated adjustment factor
- 2023 projection (2015 NAAQS Moderate Nonattainment)
  - EPA 2023 inventory
  - IPM data to be replaced with ERTAC for EGUs
  - CSAPR2 Cap estimated adjustment factor

ED_001361_00001219

# Near-Term OTC/MARAMA Emission Inventories




- Gamma Inventory Improvements are Beginning
  - Project future year to **2023 & 2020**
  - Upgrade to **ERTAC v2.6**
  - 2023 Mobile: EPA MOVES & Nonroad
  - 2020 Mobile: 2017->2023 Interpolation
  - Remove rules no longer considered OTB
  - EMF Growth for point and maybe area
  - For 2020 some sectors interpolated
  - Other updates for 2011/2023 from EPA v6.3
- Review by States & Stakeholders to Follow

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# Gamma Inventory Photochemical Modeling Plan

Beta Modeling Complete and Documented

## 2011 Gamma Emission Inventory Base Case

- To ensure consistent inventories

## 2023 Gamma Emission Inventory Base Case

- For use in transport modeling

## 2020 Gamma emission Inventory Base Case

- For use in Serious 2008 NAAQS Ozone SIPs

## Update Documentation

ED_001361_00001219

# Conclusions/Next Steps

- The 2016 ozone season has brought similar ozone exceedances as 2015 in the OTR
- Enhanced Monitoring Plans (EMPs) are being discussed
- Emission inventory projections to 2020 and 2023 are being prepared for transport and attainment SIP support
  - Initial modeling will be performed with an interpolated inventory
  - Improved Gamma emission inventories should become available during summer/fall 2017
- OTC modeling indicates that:
  - CMAQ performs reasonably well when modeled values for monitor grid cells are compared to monitored data
  - CMAQ and CAMx perform comparably

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# Questions

- Committee Chair:
  - Jeff Underhill (NH)
    jeffrey.underhill@des.nh.gov (603) 271-1102
- Modeling Lead:
  - Mike Ku (NY)
    michael.ku@dec.ny.gov (518) 402-8402
- Emissions Inventory Lead:
  - Julie McDill (MARAMA)
    jmcdill@marama.org (443) 901-1882
- OTC Committee Lead:
  - Joseph Jakuta
    jjakuta@otcair.org (202) 508-3839

name,id,metstation
due west,450010001,KAND
bushy park,450150002,KCHS
cape romain,450190046,KCHS
ashton,450290002,KOGB
congaree bluff,450790021,KCAE
hillcrest,450450016,KGSP
north spartanburg,450830009,KGSP
parklane,450790007,KCAE
trenton,450370001,KCAE
wolf creek,450770003,KGSP
sandhill,450791001,KCAE
clemson,450770002,KGSP

**To:** Carlson, Albion[Carlson.Albion@epa.gov]
**Cc:** cara.keslar@wyo.gov[cara.keslar@wyo.gov]
**From:** Leif Paulson
**Sent:** Thur 6/22/2017 9:52:56 PM
**Subject:** 2017 Network Plan
2017_Network_Plan_Package.7z

Good Afternoon Albion,

The Wyoming DEQ-AQD Ambient Monitoring Program presents its annual 2017 Network Plan to EPA Region VIII as required by 40 CFR Part 58.10. Attached please find a zip file with extension .7z containing the 2017 Network Plan, a signed cover letter to EPA Region VIII from AQD Administrator Nancy Vehr, and public notice affidavits from various newspapers in Wyoming acknowledging the advertisement of a 30 day public comment period for the 2017 Network Plan. A hard copy of these files is being mailed to Ms. Morales in the EPA Region VIII office as well. Please let me know if there are any questions regarding the documents. Thank you.

-Leif

**Leif O. Paulson, Ph.D.**
Monitoring Group Data Manager
Wyoming Department of Environmental Quality
Air Quality Division
Phone: (307)777-7817
**NEW Fax**: (307)635-1784
E-mail: leif.paulson@wyo.gov
WyVisNet: http://www.wyvisnet.com/

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

**To:** Compher, Michael[compher.michael@epa.gov]
**Cc:** Robert.Hodanbosi@epa.ohio.gov[Robert.Hodanbosi@epa.ohio.gov]; paul.koval@epa.ohio.gov[paul.koval@epa.ohio.gov]; McEvoy, Chad[mcevoy.chad@epa.gov]; Cynthia.Dewulf@epa.ohio.gov[Cynthia.Dewulf@epa.ohio.gov]
**From:** Tom.Sattler@epa.ohio.gov
**Sent:** Wed 11/2/2016 8:21:24 PM
**Subject:** RE: Toledo 03 Low Service and Cooley Canal

Michael,

Thanks to you and Jesse for the quick assessment of the Toledo sites. A statement about no longer having a low service site and utilizing the Cooley Canal site as our official

Toledo area NAAQS 03 site has been inserted into the revised network plan for your approval.

As to the section 2 (c), combining of the two sites, if I understand it correctly we would just pick up where we left off so to speak with a rolling 3 year avg., is that correct?

Meaning we wouldn't have to start over with the new site. As the 2017 year progresses our 03 number from the Cooley Canal site is avg. with the data from the Low Service site to get our 3 year average?

Tom

**From:** Compher, Michael [mailto:compher.michael@epa.gov]
**Sent:** Wednesday, November 02, 2016 4:00 PM
**To:** Sattler, Tom <Tom.Sattler@epa.ohio.gov>
**Cc:** Hodanbosi, Robert <Robert.Hodanbosi@epa.ohio.gov>; Koval, Paul <paul.koval@epa.ohio.gov>; McEvoy, Chad <mcevoy.chad@epa.gov>
**Subject:** RE: Toledo 03 Low Service and Cooley Canal

Tom,

Thanks for bringing this to our attention. Jesse McGrath, in our monitoring group, reached out

to Carol Eggert at Toledo to obtain the data and he did an assessment of the comparability of ozone concentrations from the two sites over the last several weeks when both Cooley and Low Service sites operated. As you also determined, the data compares well, so we are comfortable with the Cooley site being a replacement for Low Service. Please include this network change in your annual network plan that is going out for public inspection. Our approval of your network plan will then serve as the official approval of this network modification.

Also, as you are probably aware, Low Service is the design value site for the Toledo area. Because it collected data through the entire CY16 ozone season, we have a complete ozone data record for the 3-year period for Low Service to make final designations for the 2015 standard. As part of the ozone 2015 NAAQS revision, there is a new provision (copied and highlighted below) allowing you to formally request combining the data record for the two sites for calculating design values (e.g. 2015-2017). Our discussions with OEPA and Toledo last Spring identifying Cooley as the best alternate monitoring location included the factors listed in 2 (c) below, so we can discuss whether or not OEPA would like to now request a site combination for the data.

40 CFR 50

## Appendix U to Part 50—Interpretation of the Primary and Secondary National Ambient Air Quality Standards for Ozone

### 2. Selection of Data for use in Comparisons With the Primary and Secondary Ozone NAAQS

(a) All valid hourly $O_3$ concentration data collected using a federal reference method specified in Appendix D to this part, or an equivalent method designated in accordance with part 53 of this chapter, meeting all applicable requirements in part 58 of this chapter, and submitted to EPA's Air Quality System (AQS) database or otherwise available to EPA, shall be used in design value calculations.

(b) All design value calculations shall be implemented on a site-level basis. If data are reported to EPA from collocated monitors, those data shall be combined into a single site data record as follows:

(i) The monitoring agency shall designate one monitor as the primary monitor for the site.

(ii) Hourly $O_3$ concentration data from a secondary monitor shall be substituted into the site data record whenever a valid hourly $O_3$ concentration is not obtained from the primary monitor. In the event that hourly $O_3$ concentration data are available for more than one secondary monitor, the hourly concentration values from the secondary monitors shall be averaged and substituted into the site data record.

(c) In certain circumstances, including but not limited to site closures or relocations, data from two nearby sites may be combined into a single site data record for the purpose of calculating a valid design value. The appropriate Regional Administrator may approve such combinations after taking into consideration factors such as distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries, and terrain features.

Michael Compher

Chief, Air Monitoring and Analysis Section

Region 5 Air and Radiation Division

U.S. Environmental Protection Agency

Phone: 312-886-5745

**From:** Tom.Sattler@epa.ohio.gov [mailto:Tom.Sattler@epa.ohio.gov]
**Sent:** Monday, October 31, 2016 2:35 PM
**To:** McEvoy, Chad <mcevoy.chad@epa.gov>
**Cc:** Robert.Hodanbosi@epa.ohio.gov; Compher, Michael <compher.michael@epa.gov>; paul.koval@epa.ohio.gov
**Subject:** Toledo 03 Low Service and Cooley Canal

Chad,

Attached is the letter we submitted requesting to run the Low Service and Cooley Canal Ozone sites for comparison. After a year or so of operating and if Cooley Canal compared to Low Service it was assumed that that the Low Service site would be shut down. We have just been informed that the room that the monitoring equipment is housed in will be renovated and turned into a secured/locked area for the water plant and our equipment needs to go. We have about 2.5 months of data and preliminary data shows that the Cooley Canal area is the same or higher in concentration for 03. The water plant is undergoing a multi-million dollar project so at this point all we know is that we have to move. So, the question is, do we have enough data that USEPA would feel secure with us stopping the Low Service site now and using the Cooley Canal site as our 03 NAAQS site.

Tom Sattler

Acting Air Monitoring Manager

Ohio Environmental Protection Agency

Division of Air Pollution Control

Phone# 419-373-3116

tom.sattler@epa.ohio.gov

Ohio Environmental Protection Agency

**To:** Compher, Michael[compher.michael@epa.gov]; McEvoy, Chad[mcevoy.chad@epa.gov]; Qazzaz, Bilal[qazzaz.bilal@epa.gov]; D'Agostino, Kathleen[dagostino.kathleen@epa.gov]; Holly.Kaloz@epa.ohio.gov[Holly.Kaloz@epa.ohio.gov]; Jennifer.VanVlerah@epa.ohio.gov[Jennifer.VanVlerah@epa.ohio.gov]
**From:** Limaye, Vijay
**Sent:** Wed 6/28/2017 1:53:39 PM
**Subject:** RE: Ohio EE discussion
Flowchart_EEguidance_9-16-16.pdf

Holly and Jennifer, we'll call you at Ex. 6 - Personal Privacy

Attached is a flowchart from the 2016 EE Guidance that will help to guide our discussion on the process moving forward.

Vijay

-----Original Appointment-----
**From:** Limaye, Vijay
**Sent:** Friday, June 23, 2017 12:03 PM
**To:** Compher, Michael; McEvoy, Chad; Qazzaz, Bilal; D'Agostino, Kathleen; Holly.Kaloz@epa.ohio.gov; Jennifer.VanVlerah@epa.ohio.gov
**Subject:** Ohio EE discussion
**When:** Wednesday, June 28, 2017 11:00 AM-12:00 PM (UTC-06:00) Central Time (US & Canada).
**Where:** R5Metcalfe-ConfRm-R1016B/R5-Metcalfe---10th-Floor

Holly and Jennifer, please let us know a good number to reach you on Wednesday.

**To:** Compher, Michael[compher.michael@epa.gov]
**From:** David.Ambrose@epa.ohio.gov
**Sent:** Wed 6/7/2017 6:47:39 PM
**Subject:** FW: Exceptional Event Discussion

Jesse,

Do you know if the issue with defining an exceptional event in AQS has been resolved.

**From:** Ambrose, David
**Sent:** Wednesday, June 07, 2017 2:37 PM
**To:** 'McGrath, Jesse' <mcgrath.jesse@epa.gov>
**Subject:** RE: Exceptional Event Discussion

**From:** McGrath, Jesse [mailto:mcgrath.jesse@epa.gov]
**Sent:** Wednesday, May 31, 2017 4:08 PM
**To:** Ambrose, David <David.Ambrose@epa.ohio.gov>; Van Vlerah, Jennifer <Jennifer.VanVlerah@epa.ohio.gov>; Kaloz, Holly <Holly.Kaloz@epa.ohio.gov>; Compher, Michael <compher.michael@epa.gov>
**Cc:** Chapman, Chris <Chapman.Chris@epa.gov>
**Subject:** RE: Exceptional Event Discussion

Dave, Jennifer, and Holly,

There is an issue with creating the event definition and associating the raw data with the event in AQS. We talked to Chris Chapman, of the AQS team, and have not been able to resolve the issue.

There doesn't seem to be a hard deadline for flagging the values in AQS, the rule seems to assume they are flagged before the submittal however.

Because this is a technical issue we will be as flexible as possible on the any deadline for

flagging values, but still submit the demonstration today. Please say in your email which values might be flagged, even if that's a broad statement.

We'll work to resolve this quickly.

Thank you,

Jesse

**From:** David.Ambrose@epa.ohio.gov [mailto:David.Ambrose@epa.ohio.gov]
**Sent:** Wednesday, May 31, 2017 1:26 PM
**To:** McGrath, Jesse <mcgrath.jesse@epa.gov>
**Subject:** RE: Exceptional Event Discussion

Jesse,

I will need to call you about requesting EE on these data in AQS. I have never done so before. I'll try to do on my own before calling if necessary.


## Dave Ambrose

Ohio EPA

Division of Air Pollution Control

Air Monitoring Group

614-644-3620

david.ambrose@epa.ohio.gov

**Web Page** http://epa.ohio.gov/

**From:** McGrath, Jesse [mailto:mcgrath.jesse@epa.gov]
**Sent:** Wednesday, May 31, 2017 2:12 PM
**To:** Van Vlerah, Jennifer <Jennifer.VanVlerah@epa.ohio.gov>; Kaloz, Holly <Holly.Kaloz@epa.ohio.gov>
**Cc:** lwagner@idem.in.gov; Ambrose, David <David.Ambrose@epa.ohio.gov>; Compher, Michael <compher.michael@epa.gov>
**Subject:** RE: Exceptional Event Discussion

I'm sorry. I'm in IDEM contact mode.

Dave Ambrose should be able to do that and can call me with any questions.

Please send the demonstration to Michael Compher at compher.michael@epa.gov , copied here, and copy me.

Thank you,

Jesse

**From:** McGrath, Jesse
**Sent:** Wednesday, May 31, 2017 1:06 PM
**To:** 'Jennifer.VanVlerah@epa.ohio.gov' <Jennifer.VanVlerah@epa.ohio.gov>; Holly.Kaloz@epa.ohio.gov
**Cc:** Lisa Wagner <lwagner@idem.in.gov>
**Subject:** RE: Exceptional Event Discussion

Yes, the process is simple and Lisa should be able to do it.

If you need to call me and I can walk you through.

312-886-1532

Thank you,

Jesse

**From:** Jennifer.VanVlerah@epa.ohio.gov [mailto:Jennifer.VanVlerah@epa.ohio.gov]
**Sent:** Wednesday, May 31, 2017 12:46 PM
**To:** McGrath, Jesse <mcgrath.jesse@epa.gov>; Holly.Kaloz@epa.ohio.gov
**Subject:** RE: Exceptional Event Discussion

Jesse, do we have to flag something by COB today in AQS? We aren't monitoring folks so I'd have to get them involved. Still not sure if Bob wants to go this route but getting my ducks in a row.

Jennifer Van Vlerah

Manager, SIP, Inventory and Rulemaking

Ohio EPA Division of Air Pollution Control

614-644-3696

**From:** McGrath, Jesse [mailto:mcgrath.jesse@epa.gov]
**Sent:** Wednesday, May 31, 2017 12:31 PM
**To:** Kaloz, Holly <Holly.Kaloz@epa.ohio.gov>
**Cc:** Van Vlerah, Jennifer <Jennifer.VanVlerah@epa.ohio.gov>
**Subject:** RE: Exceptional Event Discussion

Thanks, please call me at 1 ET/12 CT at 312-886-1532. It should be quick.

**From:** Holly.Kaloz@epa.ohio.gov [mailto:Holly.Kaloz@epa.ohio.gov]
**Sent:** Wednesday, May 31, 2017 11:28 AM
**To:** McGrath, Jesse <mcgrath.jesse@epa.gov>
**Cc:** Jennifer.VanVlerah@epa.ohio.gov
**Subject:** RE: Exceptional Event Discussion

I'm available all day. Jenny is currently in a meeting, but looking at her calendar it appears she might be available between 1-2pm ET, and between 3-3:30pm ET.

**From:** McGrath, Jesse [mailto:mcgrath.jesse@epa.gov]
**Sent:** Wednesday, May 31, 2017 12:23 PM
**To:** Kaloz, Holly <Holly.Kaloz@epa.ohio.gov>
**Cc:** Van Vlerah, Jennifer <Jennifer.VanVlerah@epa.ohio.gov>
**Subject:** RE: Exceptional Event Discussion

Holly and Jennifer, we'll need to talk today. What times are you available?

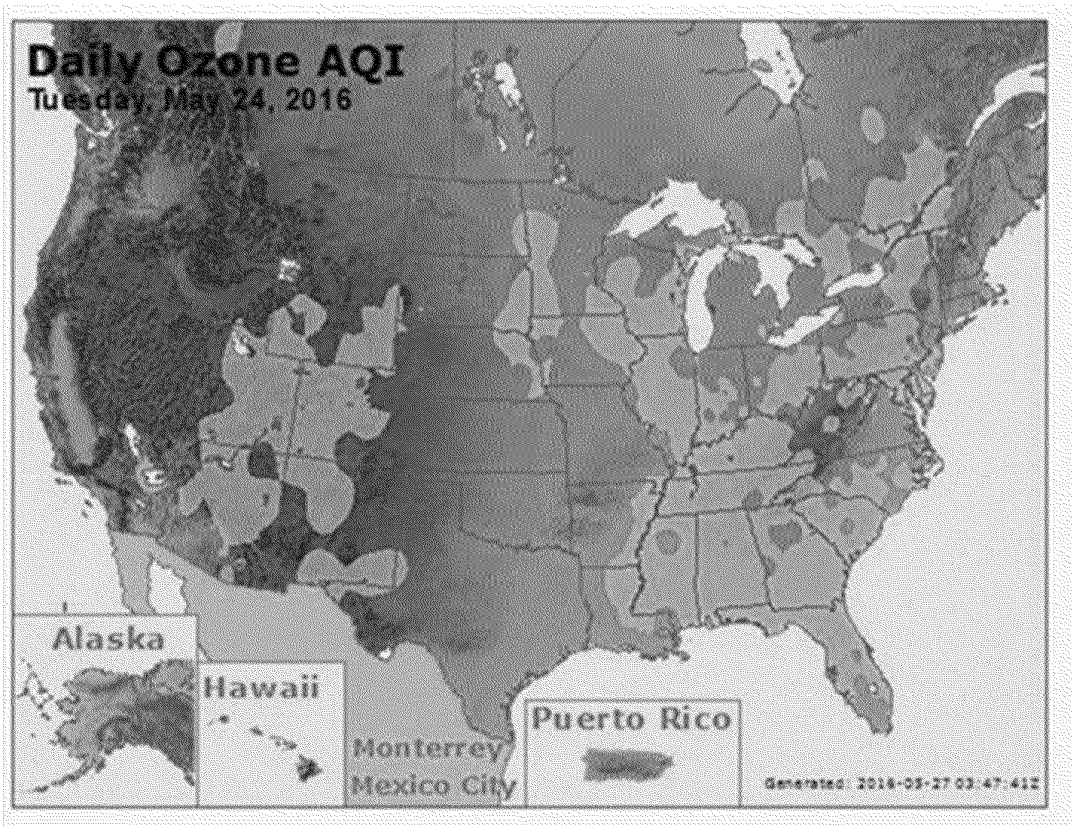
**From:** Holly.Kaloz@epa.ohio.gov [mailto:Holly.Kaloz@epa.ohio.gov]
**Sent:** Wednesday, May 31, 2017 10:18 AM
**To:** McGrath, Jesse <mcgrath.jesse@epa.gov>
**Cc:** Jennifer.VanVlerah@epa.ohio.gov
**Subject:** RE: Exceptional Event Discussion

Hi Jesse,

We would like to discuss deadlines for submitting an Exceptional Event (EE) demonstration for the elevated ozone and PM2.5 likely caused by the Fort McMurray (Canada) wildfire in May 2016. It is our understanding that Connecticut, Pennsylvania and Maryland are submitting EE

demonstrations for this wildfire. The Fort McMurray fire is described in section 2.4 (p. 12-13) of Connecticut's draft EE demonstration at http://www.ct.gov/deep/lib/deep/air/ozone/2016_exceptional_event_request/may_2016_ozone_exceptional_eve

The Ozone AQI from 5/24/16 shows a potential impact at monitors in both the Cleveland and Cincinnati areas:




An excel spreadsheet showing the impact of excluding ozone and PM2.5 data from May 24 and 25, 2016 is attached. We anticipate this may be refined (either with additional or fewer impacted monitors) as we conduct further analysis. This exceptional event may affect Ohio's recommended designations under the 2015 ozone standard, contingency measure triggers under the 2008 ozone standard, and redesignations for both PM2.5 and ozone standards.

It appears the deadline for EE demonstrations for 2016 data -- for the purposes of designations under the 2015 ozone standard -- is May 31, 2017 (today), per 40 CFR 50.14(c)(2)(iv) and Table 2, section (D). Will the current pause in implementation of the 2015 standard enable USEPA to establish an alternate deadline? Also, it appears 40 CFR 50.14(c)(2)(i)(B) indicates USEPA may establish a different due date for the demonstration submittal for other purposes, such as redesignations, contingency measure triggers for the 2008 ozone standard, etc.

We'd like to discuss the process and deadlines for submitting an EE demonstration. We are currently available:

•□□□□□ Friday, June 2, anytime

•□□□□□ Monday, June 5, 9am-10:30am

•□□□□□ Tuesday, June 6, anytime

Thanks!
Holly

Holly Kaloz
Ohio Environmental Protection Agency

Division of Air Pollution Control
50 W. Town St., Suite 700

Columbus, Ohio 43215

Tel: 614-644-3632
e-mail: holly.kaloz@epa.ohio.gov

**From:** McGrath, Jesse [mailto:mcgrath.jesse@epa.gov]
**Sent:** Tuesday, May 30, 2017 1:27 PM
**To:** McEvoy, Chad <mcevoy.chad@epa.gov>; Van Vlerah, Jennifer <Jennifer.VanVlerah@epa.ohio.gov>; Summerhays, John <Summerhays.John@epa.gov>; Persoon, Carolyn <persoon.carolyn@epa.gov>; Kaloz, Holly <Holly.Kaloz@epa.ohio.gov>
**Subject:** RE: Exceptional Event Discussion

Yes, Jennifer can you send me a description and set up a time this week to talk?

Thank you,

Jesse

**From:** McEvoy, Chad
**Sent:** Tuesday, May 30, 2017 12:12 PM
**To:** Jennifer.VanVlerah@epa.ohio.gov; Summerhays, John <Summerhays.John@epa.gov>; Persoon, Carolyn <persoon.carolyn@epa.gov>; Holly.Kaloz@epa.ohio.gov
**Cc:** McGrath, Jesse <mcgrath.jesse@epa.gov>
**Subject:** RE: Exceptional Event Discussion

My coworker, Jesse McGrath, works on Exceptional Events and would be a good resource.

Chad McEvoy

US EPA Region 5

Chicago IL

(312) 886-6084

**From:** Jennifer.VanVlerah@epa.ohio.gov [mailto:Jennifer.VanVlerah@epa.ohio.gov]
**Sent:** Tuesday, May 30, 2017 11:34 AM
**To:** Summerhays, John <Summerhays.John@epa.gov>; Persoon, Carolyn <persoon.carolyn@epa.gov>; McEvoy, Chad <mcevoy.chad@epa.gov>
**Cc:** Holly.Kaloz@epa.ohio.gov
**Subject:** Exceptional Event Discussion

Hey all, we are wondering who we would talk to about exceptional events, getting an alternative deadline (for our analysis), etc. We have an event we are interested in pursuing….same one CT and some other states are pursuing from May 2016.

Thanks, Jen

Jennifer Van Vlerah

Manager, SIP, Inventory and Rulemaking

Ohio EPA Division of Air Pollution Control

614-644-3696

**To:** Compher, Michael[compher.michael@epa.gov]
**Cc:** McGrath, Jesse[mcgrath.jesse@epa.gov];
Jennifer.VanVlerah@epa.ohio.gov[Jennifer.VanVlerah@epa.ohio.gov];
Robert.Hodanbosi@epa.ohio.gov[Robert.Hodanbosi@epa.ohio.gov]
**From:** Holly.Kaloz@epa.ohio.gov
**Sent:** Wed 5/31/2017 8:50:47 PM
**Subject:** Ohio's demonstration for the May 2016 Canadian wildfire Exceptional Event
Att B1 - ozone DV_Ohio2016.pdf
Att B2 - PM2.5 DV_CuyahogaLorain2016.pdf
Att B3 - Ozone2012_2017CleveCinci.pdf
Att B4 - PM252012_2017CuyaLorain.pdf
May 2016 exceptional event.docx
Att A - EE table.xlsx

Michael,

Attached for your review is Ohio EPA's Exceptional Event demonstration pursuant to 40 CFR 50.14 showing that the plume from the Canadian wildfire which took place in May 2016 near Fort McMurray, Alberta adversely affected ozone and PM2.5 data in a regulatory significant way at several monitors in Ohio. Ohio intends to run the public comment period concurrently with U.S. EPA's review. Ohio EPA will follow with a final submittal following U.S. EPA's review and the public comment period.

Jesse McGrath has notified us that there is currently an issue in AQS which is not allowing the data to be appropriately flagged. When the issue is resolved, Ohio EPA will flag the following data as an exceptional event:

- All ozone data for the entire month of May 2016 for all monitors in the following counties:
  - Cleveland nonattainment area:
    - Ashtabula
    - Cuyahoga
    - Geauga
    - Lake
    - Lorain
    - Medina
    - Portage
    - Summit
  - Cincinnati nonattainment area:
    - Butler
    - Clermont
    - Clinton
    - Hamilton
    - Warren

- All PM2.5 data for the entire month of May 2016 for all monitors in Cuyahoga and Lorain counties.

Thanks,

Holly

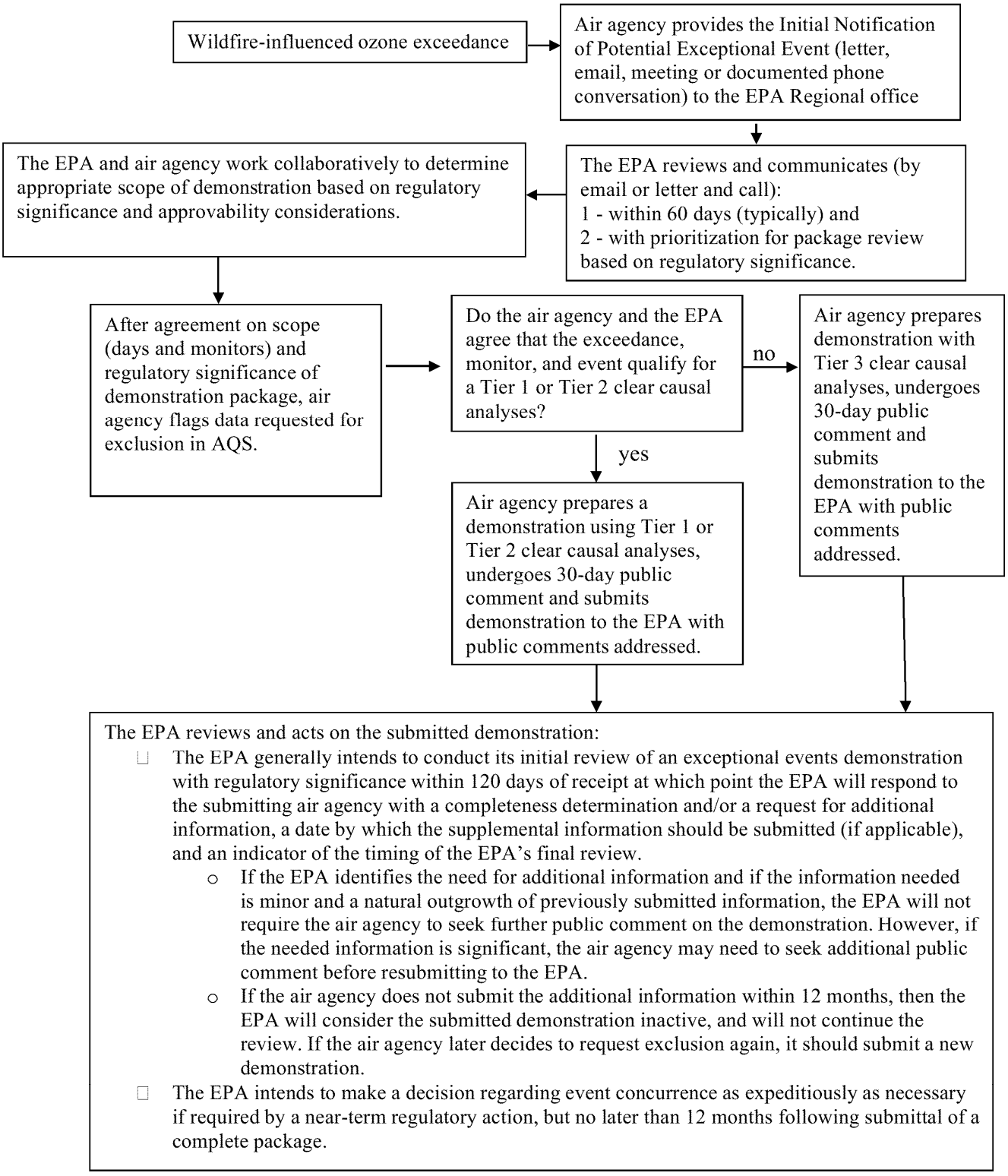
Holly Kaloz
Ohio Environmental Protection Agency

Division of Air Pollution Control
50 W. Town St., Suite 700

Columbus, Ohio 43215

Tel: 614-644-3632
e-mail: holly.kaloz@epa.ohio.gov

**Figure 1: Flowchart for the recommended process for air agencies' preparation, submission, and review of exceptional events demonstrations for wildfire influences on $O_3$, including communications with EPA Regional offices.**



# SLT Call Notes August 24, 2016

## R5 Topics

**New Air Toxics and Assessment Branch Chief**
Katie Siegel has started her position as the new Air Toxics and Assessment Branch Chief. This Branch Chief position is organizationally in-between our Monitoring Section Chief, Michael, and our Air Division Director. This position also oversees the work of our Toxics and Global Atmospheres Section and Indoor and Voluntary Programs Section.

Katie started her career as an Environmental Scientist in EPA's enforcement branch. Katie left EPA in 2009 to enroll in Yale University's joint MBA/Master of Environmental Management degree program. While there, she created the Yale Environment Review, and served as the publication's inaugural Editor-in-Chief. She served a summer with the White House Council on Environmental Quality, where she was a member of the Interagency Climate Change Adaptation Task Force. After graduation, Katie moved into consulting, where she worked in strategic planning for process improvements with electrical utilities. Katie subsequently moved to the clothier Eileen Fisher, Inc., where she developed and tracked environmental goals as part of the company's Vision 2020 sustainability initiative.

Katie can be reached at: 312-886-3006, or siegel.kathryn@epa.gov

**Ambient Air Monitoring Conference Feedback**
Those who attended the conference were asked to provide feedback, good or bad, and were asked to respond to the survey they received via email on August 17th (subject line: Final Attendee List and Online Evaluation Form for National Ambient Air Monitoring Conference) A number of people remarked that they appreciated the breakout sessions and would like to see that continue and expand.

**Round Robin**
Metals results were sent out to participating labs and call to discuss them is scheduled for September 7 from 10-11 central time. ERG is ready to prepare the VOC/carbonyl canisters for a round robin. If you haven't done so already, please email Jackie Nwia if your lab is interested in participating in the VOC/Carbonyl round robin @ nwia.jacqueline@epa.gov.

**NPAP and Level II Ozone Certifications**
National Performance Evaluation Program Annual Decision memo – Memo was forwarded to SLT's on 8/4. R5 is requesting the completed attachment 2 be returned to us by September 5th.

Standard Reference Photometer – Please schedule annual ozone verification with Scott. Jason asked about lower points on the verification to line up with the new PE concentrations in CFR.

Scott made RTP aware that we would like the lowest points possible on the SRP to SRP verification. The lowest point run at during the verification was 7 ppb. When Scott gets the SRP back he will work on getting as low a point as the SRP will generate and use that point for verifications. See the attached SRP 6 verification report.

For additional information contact Scott Hamilton at hamilton.scott@epa.gov

**Exceptional Events Workshops**

In anticipation of the upcoming release of revisions to the Exceptional Events Rule and the final Wildfire/Ozone Exceptional Events Implementation Guidance. EPA recently announced two upcoming Exceptional Events Implementation Workshops to be held in November of 2016. The workshop dates are November 8 in Denver, CO (western state focus) and November 30 in Dallas, TX. The intended audience is Federal, state, local and tribal air and land management agency staff with responsibility for developing, submitting and reviewing exceptional events demonstrations. We are encouraging R5 states to attend the workshop in Dallas, which we also plan to attend. The presentation materials will be made available, but they won't have remote attendance or recordings of the workshops.

The purpose of the workshops is to:

- Provide an overview of the Exceptional Events Rule revisions with a focus on scope and process changes
- Discuss the application of the rule revisions and implementation guidance to select event and pollutant combinations
- Foster a collegial environment for shared goals and objectives, including effective implementation of the revised Exceptional Events Rule

For additional information contact Jesse McGrath at mcgrath.jesse@epa.gov

## SLT Topics

Note from WDNR to Region 5 BAM operators:

Hello BAM operators,
As the network will potentially be relying more heavily on BAM operation in the future, it is a possibility that the frequency of 72hr background checks and BAM down tube maintenance will increase.
Instead of loosening the rooftop seal and elevating the tube to drop the cleaning string, a jack beneath the bam so it could simply be lowered from inside the monitoring enclosure to gain access to the tube.

Below is a link to the hydraulic lift table:

https://www.grainger.com/product/GRAINGER-APPROVED-Portable-Hydraulic-Lift-Table-4ZD19?functionCode=P2IDP2PCP

Grainger has agreed to drop the price by 50% percent if these are ordered in bulk. This will have to be negotiated state by state.

WDNR will report out on the comparison of the 72hr background tests being performed internally vs. externally and the performance of the lift system to ensure it doesn't slowly drift downwards.

**VSCC Adaptors**

OAQPS will order adaptors for agencies who received VSCCs earlier in the year but need an additional adaptor to make it fit into the units. Please send notice to Chad McEvoy if your agency needs/wants the adaptors; the number of adaptors needed should match the number of VSCCs requested earlier this year.

Special Note: There is a work around for this problem: Michigan puts the VSCC and some other components in a different sequence which closes the gap. OAQPS is aware that some agencies do this, and initially had no problems with this. In the next couple of weeks they plan to talk to their counterparts in ORD to verify again that this isn't a problem.
Also, a new contract will need to be established with a new vendor supplying the adaptors.

These two items may slow the process somewhat, but every indication I (Chad) have gotten from OAQPS is that agencies that want/need the adaptors will get them.

For additional information contact Chad McEvoy at mcevoy.chad@epa.gov

**Report Out**

IL- Nothing to report.

IN- Nothing to report.

MI-MDEQ had 3 people attend the conference and thought it was worthwhile. MDEQ asked folks to consider choosing the "Central" option when responding to the survey. They felt that the central location contributed to the high turnout in St. Louis.

MN- Nothing to report.

OH-Nothing to report.

WI-Nothing to report.

LADCO-Not present

Cleveland- Nothing to report.

Toledo- Nothing to report.

SWOAQA-Nothing to report.

RAPCA- Nothing to report.

CCDEC-Nothing to report.

Canton-Nothing to report. EPA remarked on the great job Linda Morckel did presenting Canton's data validation process/spreadsheet. The spreadsheet should be posted on AMTIC soon.
Akron- Not present.
Mahoning- Not present
Portsmouth- Not to report.
Lake County-Not present.
Mille Lac- Not present.
Fond du Lac- Not present.
Bad River- Not present.
Forest County-Not present.
Little River Band of Ottawa- Nothing to report.
Prairie Island Indian Community- Not present.
Ho-Chunk-Not present.

**Next Call—September 28, 2016—10-11 CT**

Ohio Environmental Protection Agency

State of Ohio Environmental Protection Agency
Division of Air Pollution Control

# May 2016 Canadian Wildfire Ozone and $PM_{2.5}$ Exceptional Event Analysis

Prepared by:
The Ohio Environmental Protection Agency
Division of Air Pollution Control

**DRAFT FOR PUBLIC COMMENT**
**May 2017**

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## Introduction

The following is Ohio EPA's Exceptional Event (EE) demonstration showing that the plume from the Canadian wildfire which took place in May of 2016 near Fort McMurray, Alberta adversely affected ozone and PM2.5 data in a regulatory significant way at several monitors in Ohio. The following monitors (six ozone and one PM2.5) were affected such that the data from May 24-25, 2016 should be excluded from regulatory determinations:

| Parameter | Area | Monitor ID | Site Name | County |
|---|---|---|---|---|
| Ozone | Cleveland | 39-035-0034 | District | Cuyahoga |
| | | 39-035-5002 | Mayfield | Cuyahoga |
| | | 39-055-0004 | Notre Dame | Geauga |
| | | 39-085-0003 | Eastlake | Lake |
| | | 39-093-0018 | Sheffield | Elyria |
| | Cincinnati | 39-017-0018 | Midd | Butler |
| PM2.5 | Cleveland | 39-035-0065 | Harvard Yards | Cuyahoga |

40 CFR 50.14 establishes the procedures for submitting an exceptional event demonstration. Specifically, 40 CFR 50.14(c)(3)(iv) states: "The demonstration to justify data exclusion must include:

(A) A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s);

(B) A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation;

(C) Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section. The Administrator shall not require a State to prove a specific percentile point in the distribution of data;

(D) A demonstration that the event was both not reasonably controllable and not reasonably preventable; and

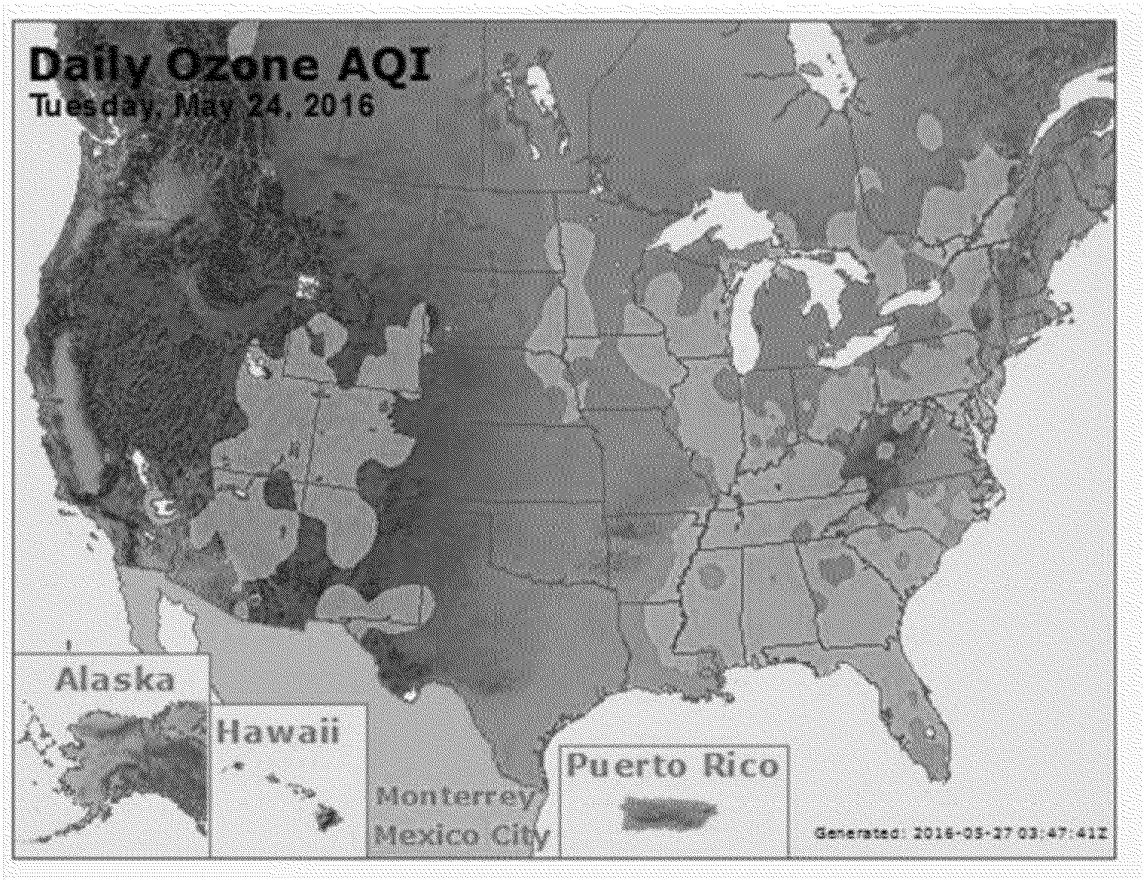
(E) A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event.

## Exceptional Event Demonstration

### A. Narrative Conceptual Model

The Fort McMurray fire is described in section 2.4 (p. 12-13) of Connecticut's draft EE demonstration at http://www.ct.gov/deep/lib/deep/air/ozone/2016_exceptional_event_request/may_2016_ozone_exceptional_event_analysis_draft_for_public_comment.pdf. Satellite photos and plume analysis are shown in section 3 of Connecticut's draft EE demonstration.

The Ozone AQI from May 24, 2016 showed a potential impact at monitors in both the Cleveland and Cincinnati areas:




**B. Effect on Air Quality and Clear Causal Relationship**

***Regulatory Significance***

The exceptional events rule applies to data showing an exceedance of a standard which may affect regulatory determinations regarding attainment designation status or other action by the Administrator. While the wildfire plume was regional in nature and was observable over the State during the event, it did not cause all monitors to exceed the standard throughout the event. Nor were all the exceedances such that they would likely affect attainment designation status or other EPA actions.

Attainment designation status is determined by design values derived from monitored values. For ozone the design value is determined by taking the three-year average of the fourth highest 8-hour maximum daily average monitored ozone level. For PM2.5, the design value is determined by taking the three-year average of the annual average.

Attachment A compares current 2016 design values (based on 2014-2016 data), calculated with and without the inclusion of data from of the event (specifically, May 24 and 25, 2016). The ozone table also shows the 2017 critical 4th-high value for ozone, which is the fourth highest annual 8-hour average value that would produce a 2017 design value that violates the 2008 ozone NAAQS, triggers contingency measures under the 2008 ozone NAAQS, or violates the 2015 ozone NAAQS. The PM2.5 table shows the 2017 critical annual average that would produce a 2017 design value that violates the 2012 PM2.5 NAAQS. The difference in critical values is shown in the final columns. Where there is a difference in critical value, there may be a regulatory significance to excluding data from the event. The monitors identified in Attachment A (six ozone and one PM2.5) were affected such that the data from May 24-25, 2016 should be excluded from regulatory determinations.

***Clear Causal Relationship***

Connecticut's draft EE demonstration performs a thorough analysis of the exceptional event. Much of this analysis also extends to Ohio, including the Cleveland and Cincinnati areas. Ohio EPA herein incorporates the following sections of Connecticut's draft EE demonstration at http://www.ct.gov/deep/lib/deep/air/ozone/2016_exceptional_event_request/may_2016_ozone_exceptional_event_analysis_draft_for_public_comment.pdf:

- Section 4.5 Regional Monitored Data (PM2.5 Chemical Speciation)
- Section 5. Meteorological Conditions
- Section 6. HYSPLIT Trajectory Analysis
- Section 8. NOAA CMAQ Model Predictions

The Connecticut analysis demonstrates a clear causal relationship that can also be attributed to impacted monitors in Ohio, especially given the trajectory of the impact shown in the Connecticut analysis.

## C. Comparison to Historical Monitoring Data

The Ohio EPA air monitoring network meets the minimum monitoring requirements for criteria pollutants as put forth in Title 40 Part 58 of the Code of Federal Regulations (CFR), Appendix D. A detailed description of the monitoring network are provided in the Ohio 2016-2017 Ohio Air Monitoring Network Plan (http://epa.ohio.gov/dapc/ams/amsmain.aspx#126983982-air-monitoring-plan).

All air monitoring data is retrieved from the U.S. EPA's Air Quality System (AQS) at https://www.epa.gov/aqs. Attachments B1 and B2 contain the AQS 2014-2016 Design Value reports for ozone and PM2.5, respectively. Attachments B3 and B4 contain all raw data for the relevant monitors from 2002 to current for ozone and PM2.5, respectively. Ozone and PM2.5 data from May 24-25, 2016 exceeds the historical norm. The trajectory of impact shown in Connecticut's analysis supports this determination.

## D. Not reasonably Controllable or Preventable

The May 2016 Fort McMurray wildfire was both not reasonably controllable and not reasonably preventable.

## E. A Natural Event

The May 2016 Fort McMurray wildfire was a natural event.

## Public Participation

Ohio published solicitation for public comment concerning the May 2016 Canadian Wildfire Ozone and PM2.5 Exceptional Event Analysis in the widely distributed county publication on _____. The public comment period closed on _____. Appendix A includes a copy of the public notice. This public comment period will run concurrent with U.S. EPA's review of the demonstration.

## Summary

Ohio EPA's Exceptional Event (EE) demonstration shows that the May 2016 Fort McMurray wildfire adversely affected ozone and PM2.5 data in a regulatory significant way, such that ozone and PM2.5 data from May 24-25, 2016 for the following monitors should be excluded from regulatory determinations:

| Parameter | Area | Monitor ID | Site Name | County |
|---|---|---|---|---|
| Ozone | Cleveland | 39-035-0034 | District | Cuyahoga |
| | | 39-035-5002 | Mayfield | Cuyahoga |
| | | 39-055-0004 | Notre Dame | Geauga |
| | | 39-085-0003 | Eastlake | Lake |
| | | 39-093-0018 | Sheffield | Elyria |
| | Cincinnati | 39-017-0018 | Midd | Butler |
| PM2.5 | Cleveland | 39-035-0065 | Harvard Yards | Cuyahoga |



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**From:** Tom Moore
**Location:** 800-768-2983 access code 4918837
**Importance:** Normal
**Subject:** WRAP Technical Steering Committee call
**Categories:** Low Priority
**Start Date/Time:** Thur 9/8/2016 4:30:00 PM
**End Date/Time:** Thur 9/8/2016 5:30:00 PM
WRAP Technical Planning Meeting Oct12-13_(Sept8_2016draft).docx
WRAP_WorkGroup Co-Chair status Sept7_2016.xlsx
2016-08-25_State-FederalAQ_WGconf call summary_draft.docx
EPA_PotentialSectors_for_RegionalHazeModelingSourceApportionmentBTiminAugust2016.xlsx
EPAYear2023_EmissionsModelingProjectionsSectorSummary2016Aug25JVukovich.xlsx
State-FederalAQ_WG_Action plan update_2016_08_30.docx
WesternBackgroundOzoneAnalysisTaskReport_Sept8_2016.docx

;;
When: Thursday, September 08, 2016 10:30 AM-11:30 AM (UTC-07:00) Mountain Time (US & Canada).
Where: Ex. 6 - Personal Privacy
Note: The GMT offset above does not reflect daylight saving time adjustments.
*~*~*~*~*~*~*~*~*~*~*

Draft Agenda

1. Welcome and roll call – Patrick and Julie

2. Review and discuss draft agenda for Oct. 12-13 meeting and logistics (attached) – Tom and all

- Current status of Board approval of Work Groups' Co-Chairs (attached)

- Overview of State-Federal Air Quality Technical Working Group materials (4 files attached)

3. Background Ozone analysis task for 2017 WRAP Workplan (attached) - Tom and all

4. Schedule next TSC call - all

++++++++++++++++++++++

Ongoing major topics
Workplan implementation and forming Work Groups
Regional Haze
Ozone background and transport
Placeholder topics when convenient

- WRAP TSC should be briefed on the impending O&G Methane Emissions ICR so they can task the WRAP O&G Work Group to develop recommendations for the WRAP Board.
- Exceptional Events Rulemaking and Wildfire/Ozone Guidance
- Interstate Transport 'Good Neighbor' Provision for the 2015 Ozone and 2012 Fine Particulate Matter NAAQSs under Clean Air Act Section 110(a)(2)(D)(i)(I) (2012 $PM_{2.5}$ = https://www3.epa.gov/airquality/particlepollution/implement.html)
- Fire and Smoke emission inventory needs

# California Baseline Ozone Transport Study (CABOTS) Group Meeting

Date/Time: April 19 (Wednesday) 10:00 am - 2:30 pm PDT  Location: ARB CR 510
Dial-in number: Ex. 6 - Personal Privacy  Participant Passcode: [redacted]
For Access to GoToWebinar, please register at:
https://attendee.gotowebinar.com/register/6989187879078678273

**I. CABOTS Projects Update (10:00 am – 12:15 pm)**

a. Introductions (~5 minutes)

b. SJSU ozonesonde measurements (Sen, ~30 minutes)

c. NOAA TOPAZ lidar measurements (Andy and Chris, ~30 minutes)

d. UCD residual layer ozone and Chews Ridge measurements (Ian, ~30 minutes)

e. NASA AJAX flights (Laura, ~30 minutes)

f. Others (Ira Leifer, ~10 minutes)

**II. Lunch Break (12:15 – 1:00 pm)**

**III. New Research Activities on Background Ozone (1:00 – 2:30 pm)**

a. Summary of the Background Ozone Assessment Meeting in Denver (Tom Moore, ~15 minutes)

b. Research plan of the NASA HAQAST background ozone tiger team (Jessica Neu, ~15 minutes)

c. BAAQMD Meteorological and Air Quality Simulation of CABOTS Period (Saffet and BAAQMD staff, ~40 minutes)

d. BAAQDM-ARB-CRC joint project: Improving West Coast Ozone Boundary Conditions for Regional Air Quality Models (Saffet, ~10 minutes)

e. Discussions and Next Steps (~10 minutes)

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# SJSU ozonesonde measurements

**Sen Chiao**
Department of Meteorology and Climate Science
Center for Applied Atmospheric Research and Education
San José State University, San José, CA, USA

SAN JOSÉ STATE UNIVERSITY

CAARE

# Updates

- Continue on CABOTS 2016 BBY and HMB sondes

- Ozonesondes during spare the air periods
  - Summer (Sept to Oct): 8 sondes
  - Winter (Dec to Feb): 5 sondes + 3 tethered sondes

- Ozonesondes for April and May
  - Eight sondes to be released from South San Jose

- Investigate for Stratospheric - Tropospheric Exchanges

- The Origins and Future Behavior of Transpacific Ozone in The Eastern Pacific

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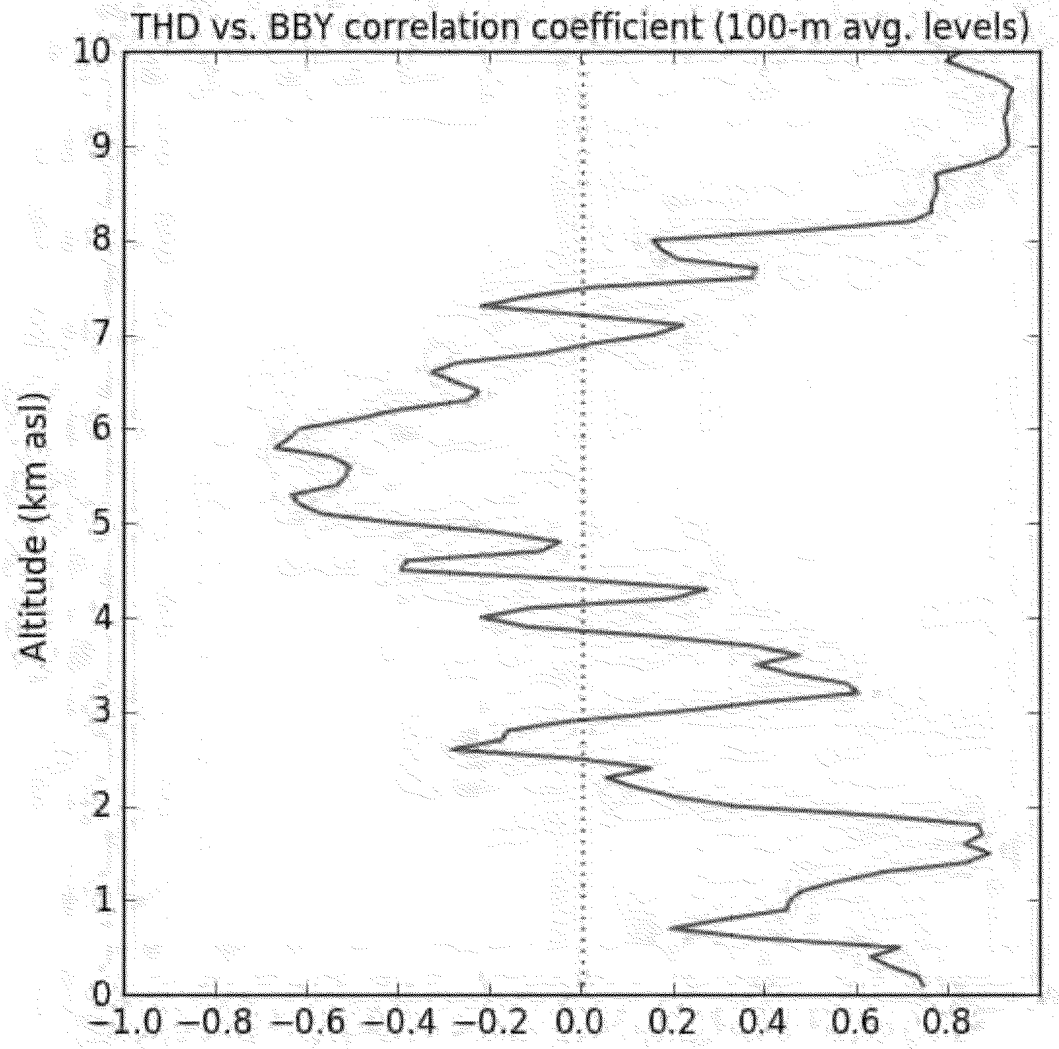
# THD vs BBY (9 sondes at THD during CABOST)

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# Winter Spare the Air: Ozonesonde measurements

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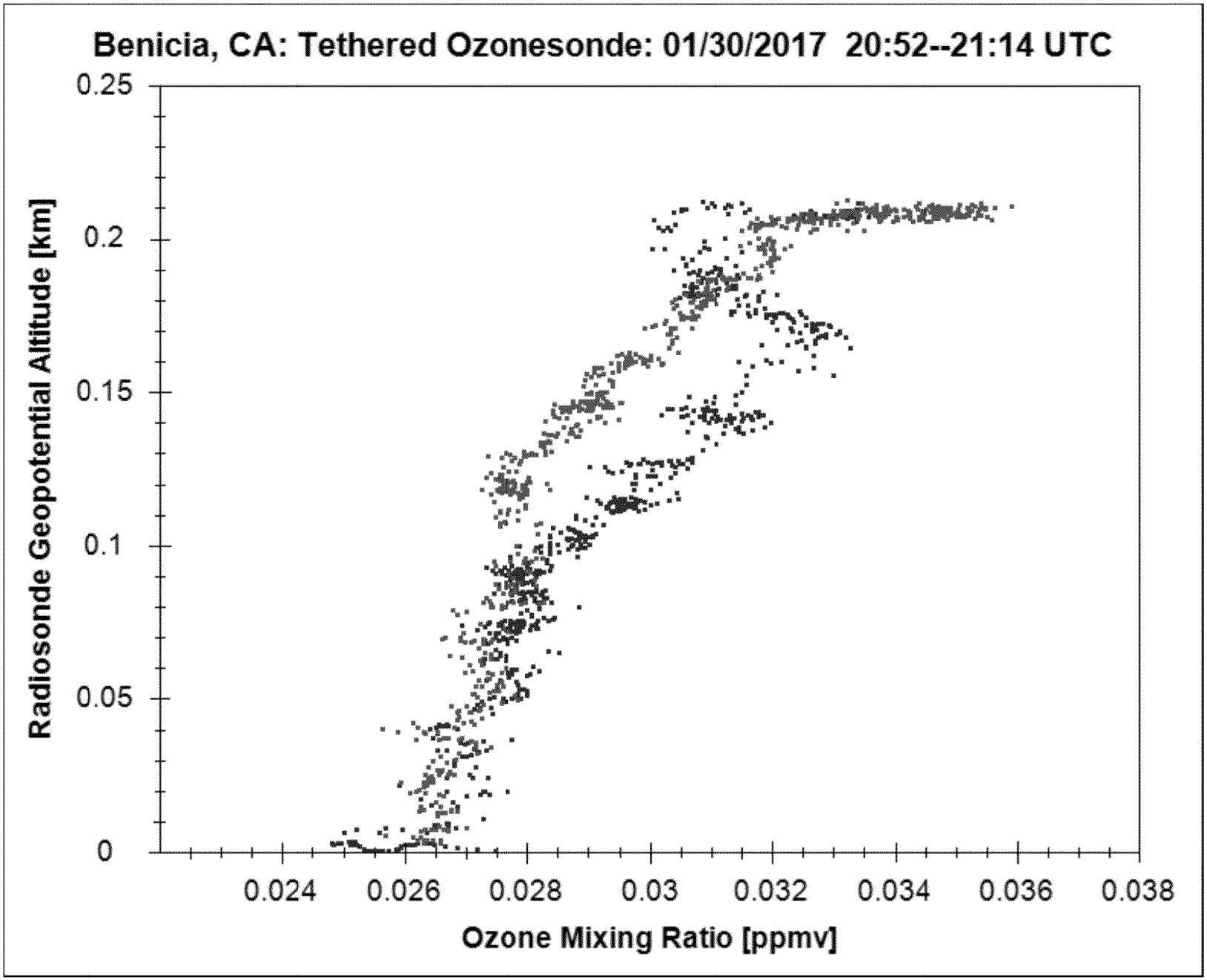

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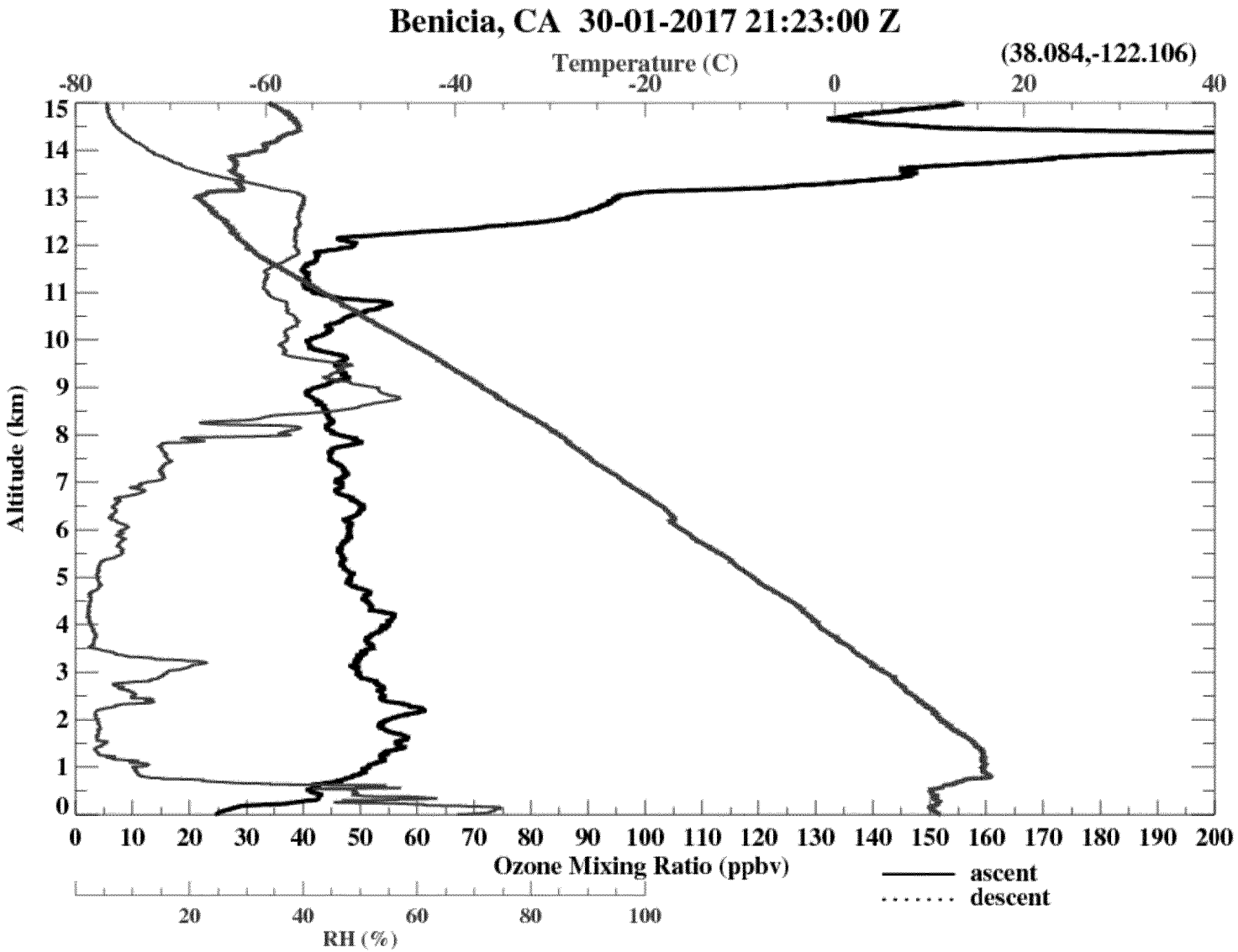
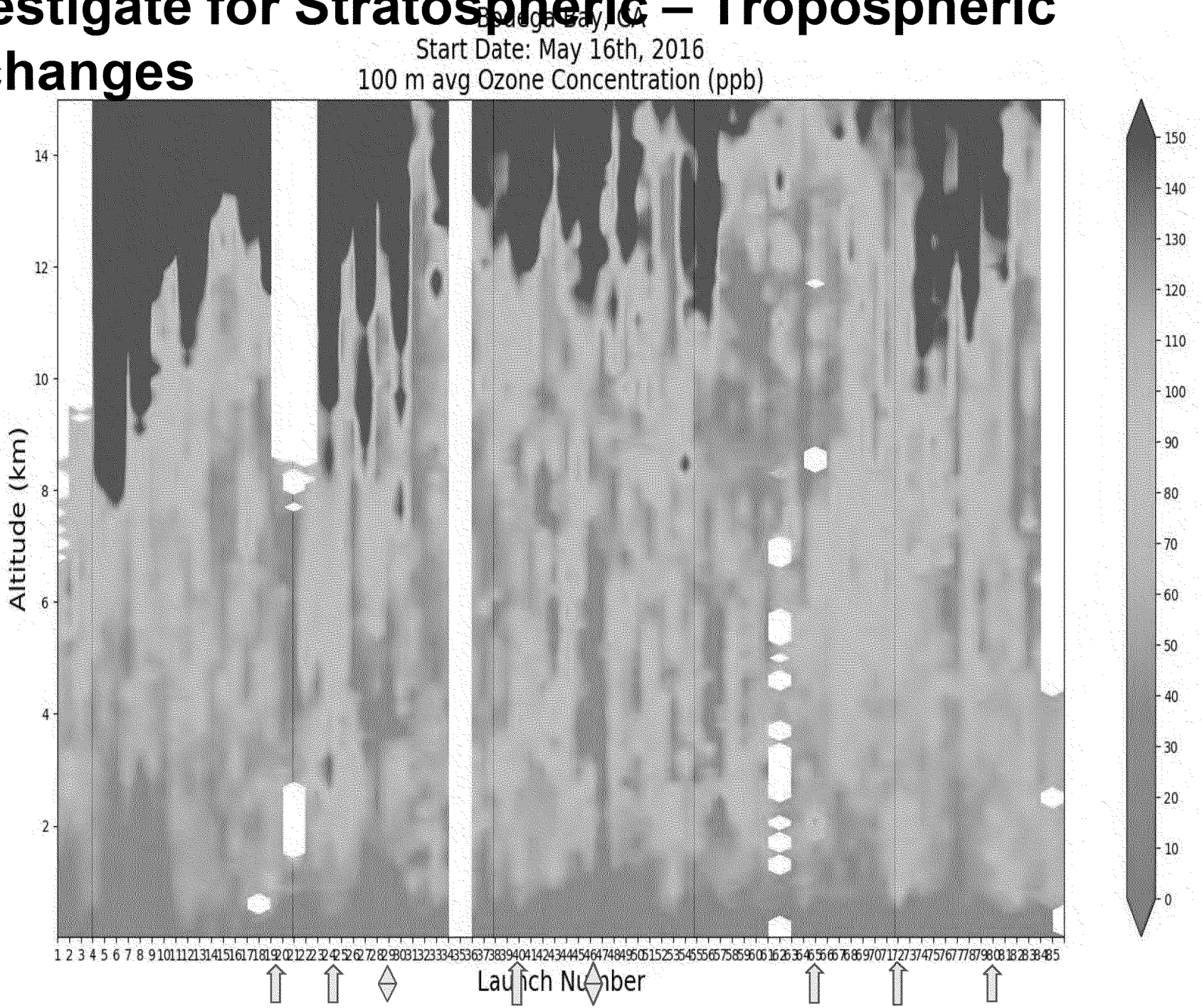


# Investigate for Stratospheric – Tropospheric Exchanges

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# Investigate for Stratospheric – Tropospheric Exchanges

## Possible cases:

| | | |
|---|---|---|
| June 4 | #19 | 90 ppb @ 1km |
| June 11 | #24 | 145 ppb@ 3km |
| June 17 | #29 | 65 ppb @2km, 100 ppb at 8km |
| | | |
| June 30 | #40 | 80 ppb @1km, 100 at 4km |
| July 7 | #46 | 85 ppb @ 3 and 8km |
| July 27 | #65 | 125ppb at 2km |
| August 3 | #72 | 100ppb at 1km (Cold Fire) |
| August 11 | #80 | 95ppb at 1.5km |

# Wildfire Influence cases

1. Soberanes Fire, Monterey County
   - July 27th ozonesonde profiles
   - HMB and BBY
2. Cold Fire, Yolo County
   - Aug. 3rd ozonesonde profile
   - BBY

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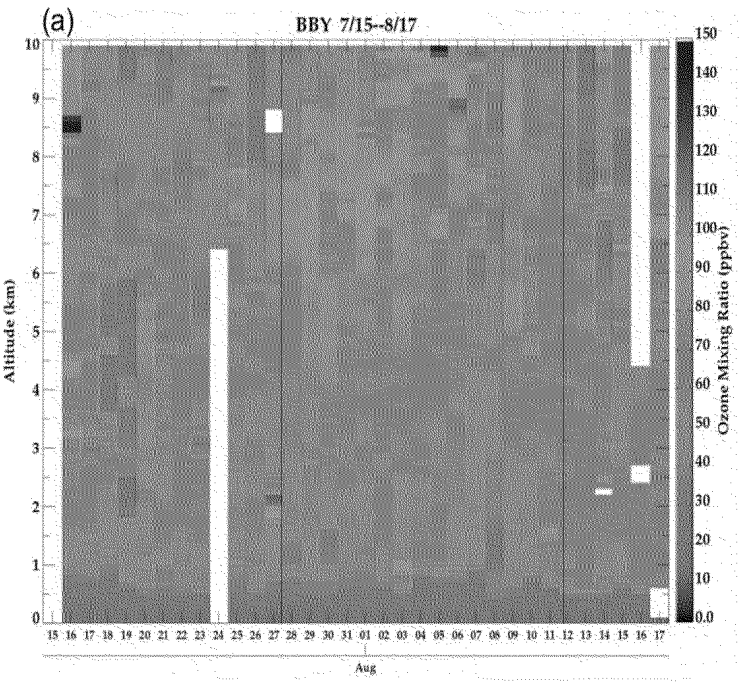


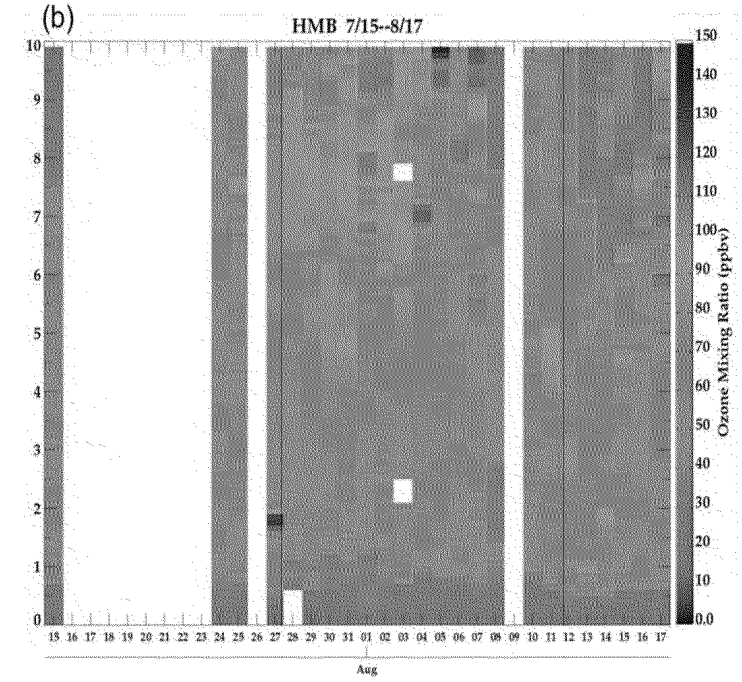


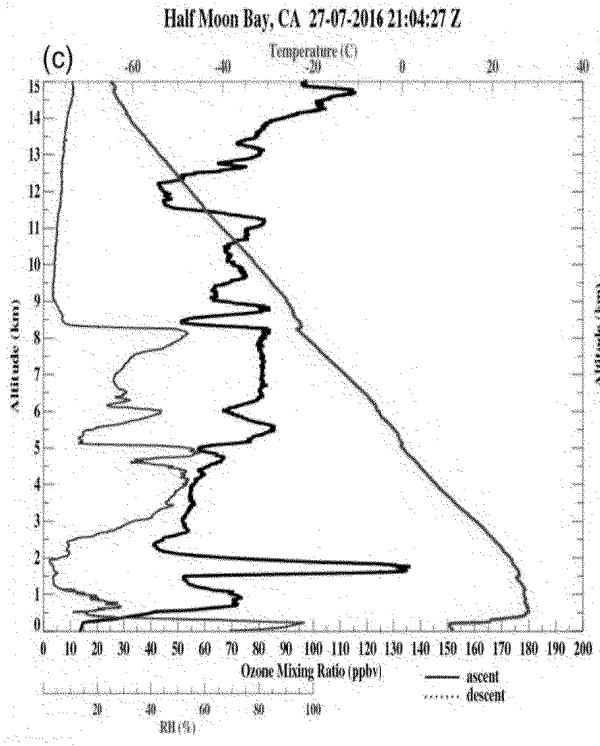


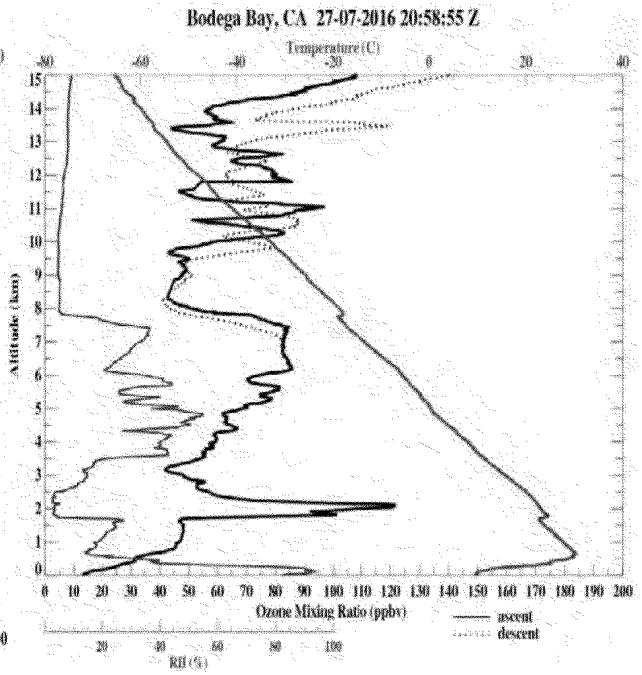


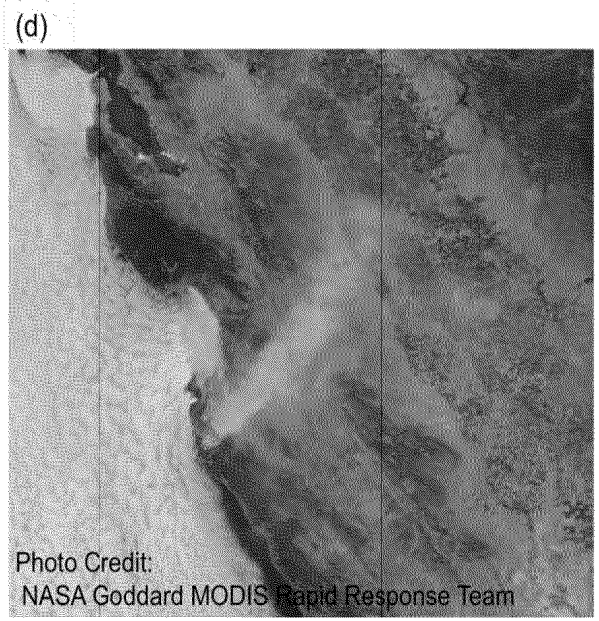


(a-b) BBY and HMB vertical O3 profiles From 7/15-8/17. (c) HMB and BBY ozonesonde profile for 7/27. (d) Visible Satellite image of the Soberanes Fire smoke plume on July 27th south and east of Monterey Bay.

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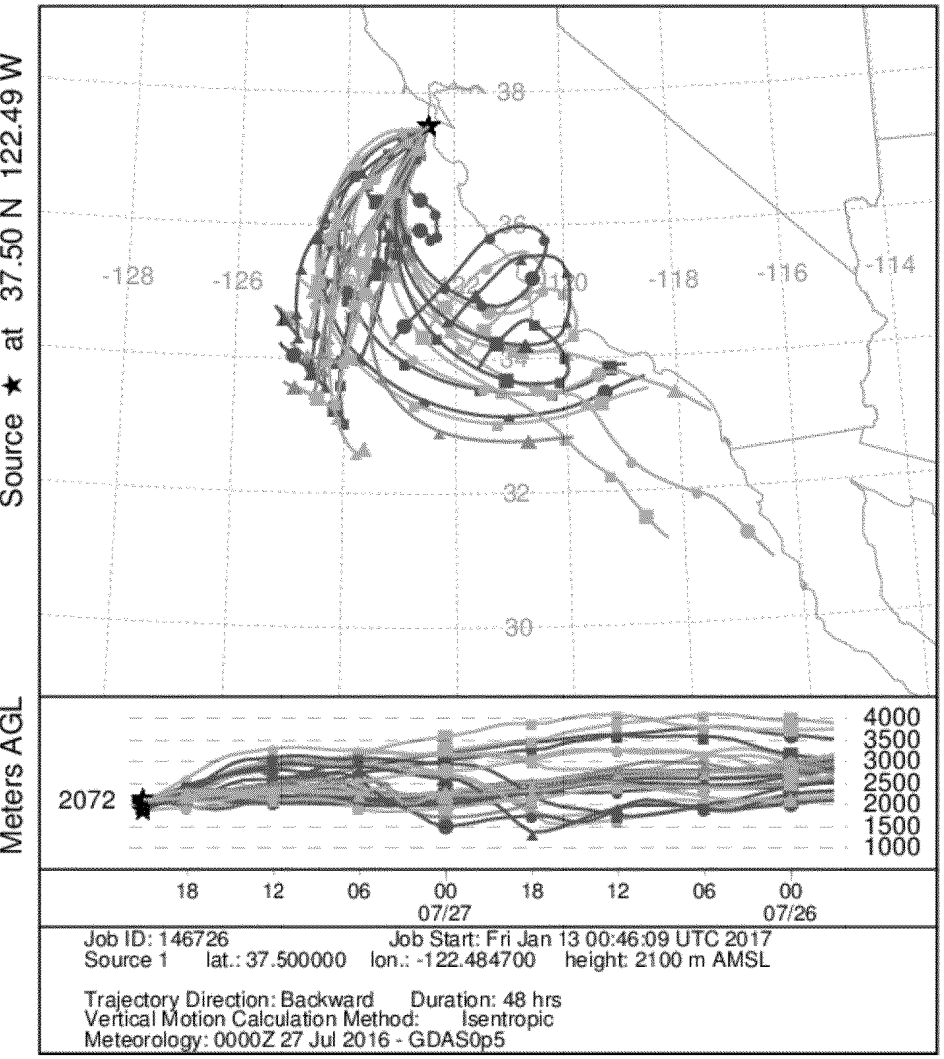
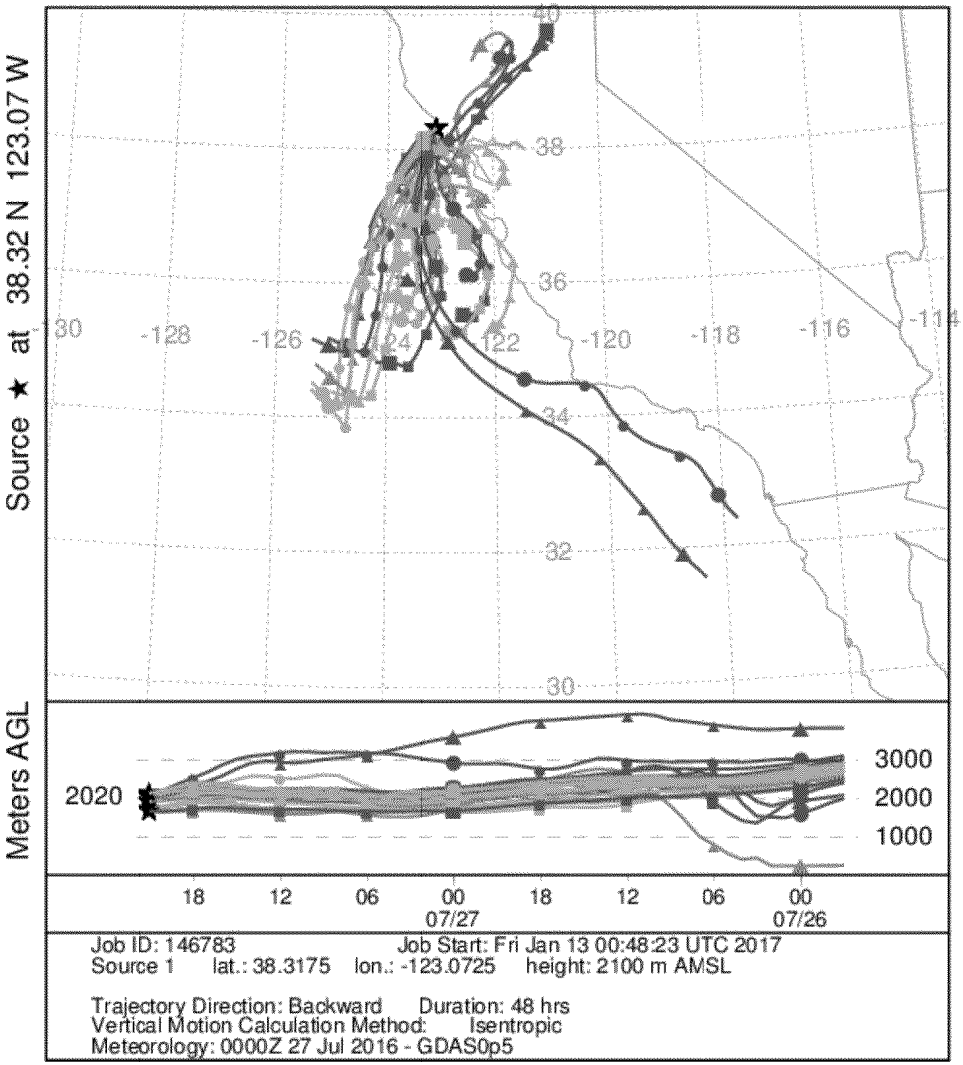
NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 27 Jul 16
GFSG Meteorological Data




Job ID: 146726 Job Start: Fri Jan 13 00:46:09 UTC 2017
Source 1 lat.: 37.500000 lon.: -122.484700 height: 2100 m AMSL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Isentropic
Meteorology: 0000Z 27 Jul 2016 - GDAS0p5

NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 27 Jul 16
GFSG Meteorological Data




Job ID: 146783 Job Start: Fri Jan 13 00:48:23 UTC 2017
Source 1 lat.: 38.3175 lon.: -123.0725 height: 2100 m AMSL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Isentropic
Meteorology: 0000Z 27 Jul 2016 - GDAS0p5

# Case 2: Cold Fire 8/3/2016

- Yolo County
- Aug. 2-12
- 5,731 acres
- $100,000 in damage

(*CalFire*)

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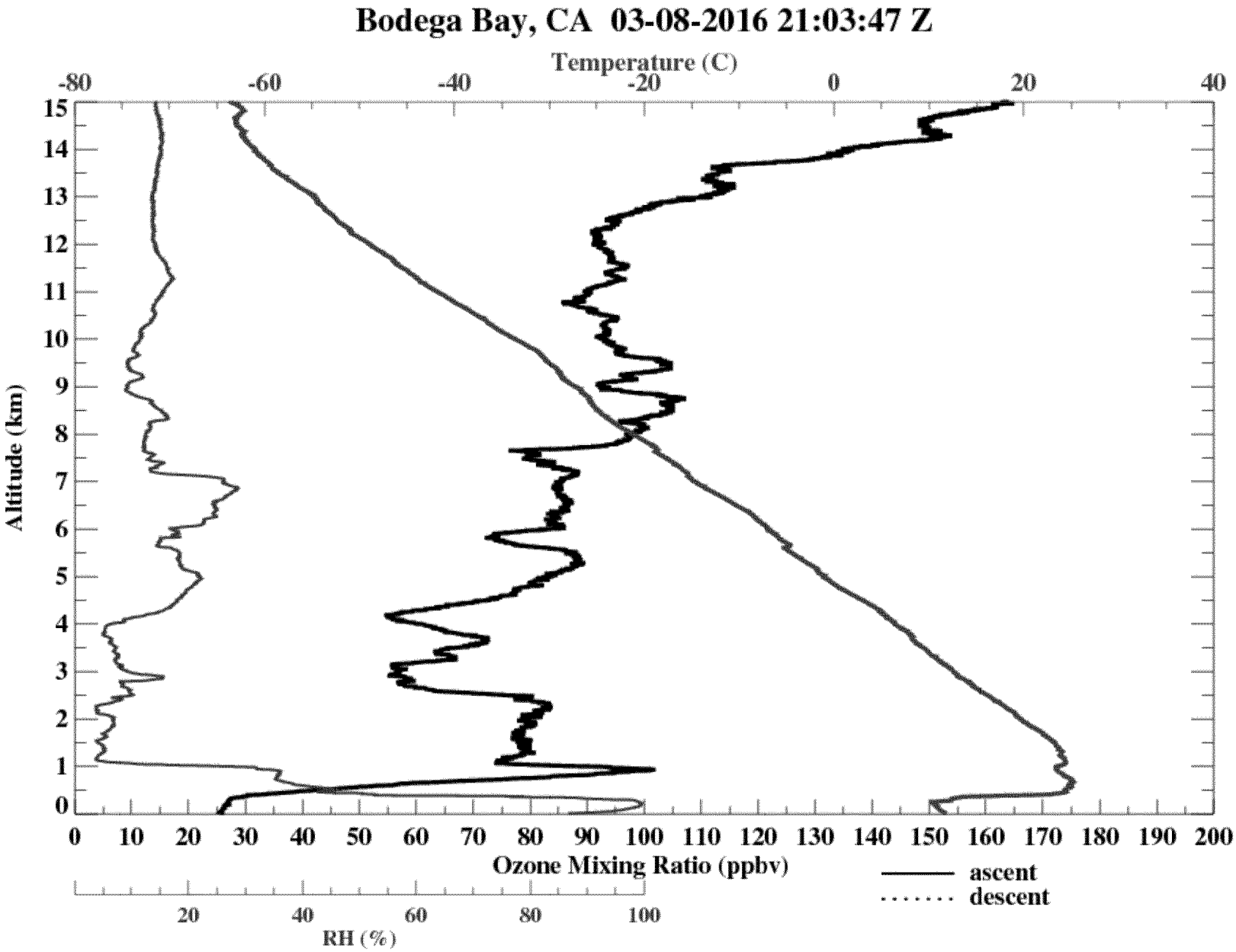
# 8/3 BBY, Possible Influence from Cold Fire

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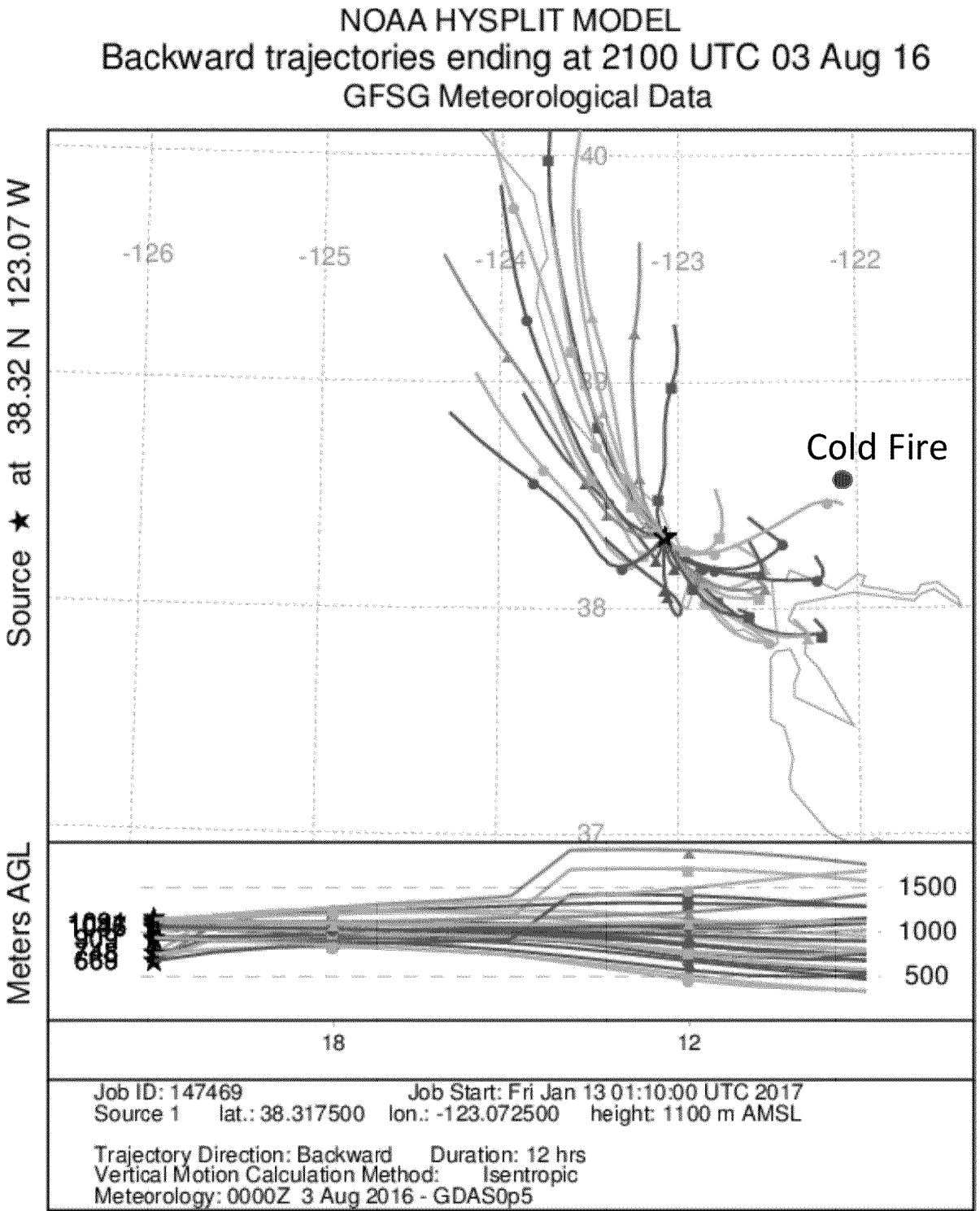

# Summary

- Continue on CABOTS data analysis
  1. Long range transport
  2. Stratospheric – Tropospheric Exchanges
  3. WRF-Chem modeling (near real-time)
  4. Updated Trends of Warm Season Free Tropospheric Background and Median Surface Ozone in California
- Summer/Winter Spare the Air ozonesondes QC
- April –May ozonesonde measurements
- CABOTS BAMS manuscript

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# Stratospheric influence on surface ozone in the San Joaquin Valley during CABOTS


Andrew O. Langford

Raul J. Alvarez II, Guillaume Kirgis, Christoph J. Senff

NOAA ESRL CSD and CIRES, U. of Colorado


$O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$ $O_3$

CABOTS Science Meeting

Sacramento, CA, April 19, 2017

ED_001361_00003686

# Acknowledgements


This talk incorporates data and model results from:

| | | |
|---|---|---|
| • TOPAZ: | A. Weickmann, R. Marchbanks<br>S. Sandberg | NOAA/ESRL/CSD |
| • BBY ozonesondes: | S. Chiao, A. Eiserloh | (SJSU) |
| • AJAX: | L. Iraci, E. Yates et al. | (NASA Ames) |
| • TMF lidar | T. Leblanc | (NASA/JPL) |
| • Surface ozone | J. Burley | (WMRC) |
| • RAP-Chem: | M. Pagowski | (NOAA ESRL/GSD) |

NOAA Health of the Atmosphere and Climate Programs
NASA Tropospheric Ozone Network (TOLNet)
California Air Resources Board (CARB)


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# Question

**Did stratosphere-to-troposphere transport (STT) contribute to high surface ozone ($O_3$) in the San Joaquin Valley during CABOTS?**

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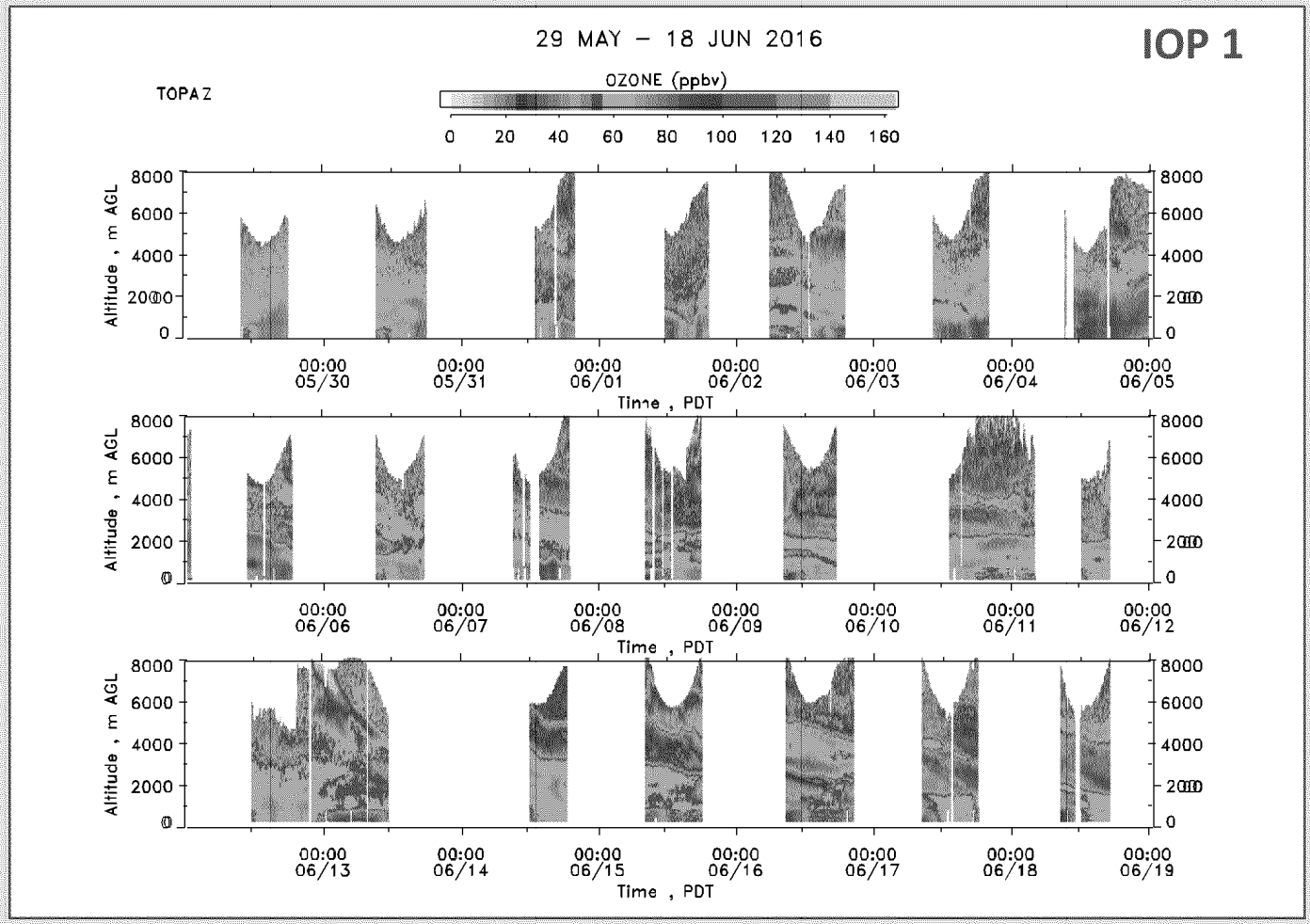
# NOAA/ESRL TOPAZ lidar (Visalia Municipal Airport)




**212 hours of lidar observations from May 29 to June 19**

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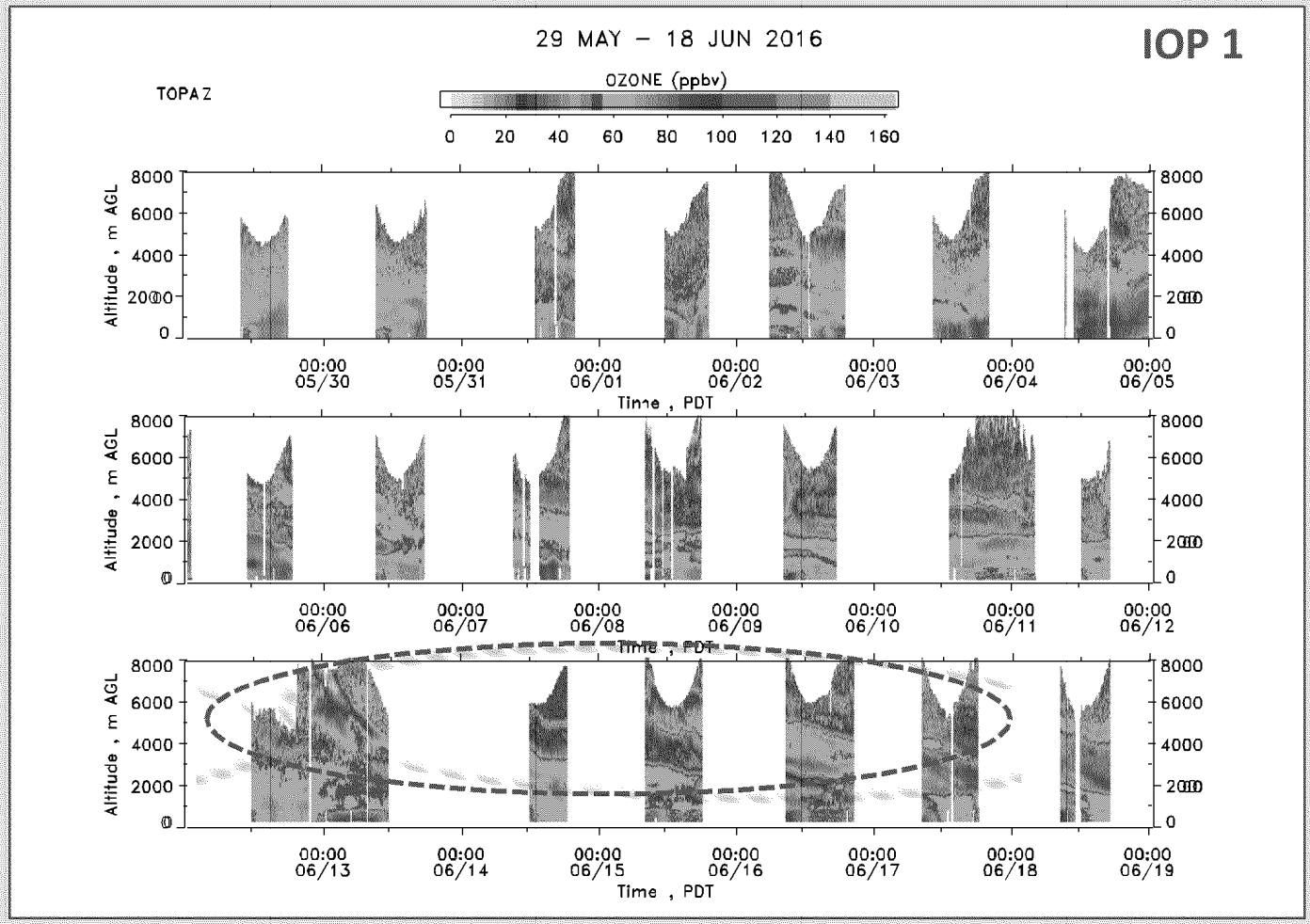
# NOAA/ESRL TOPAZ lidar (Visalia Municipal Airport)




**High (and low) ozone layers above Visalia on June 13-16**

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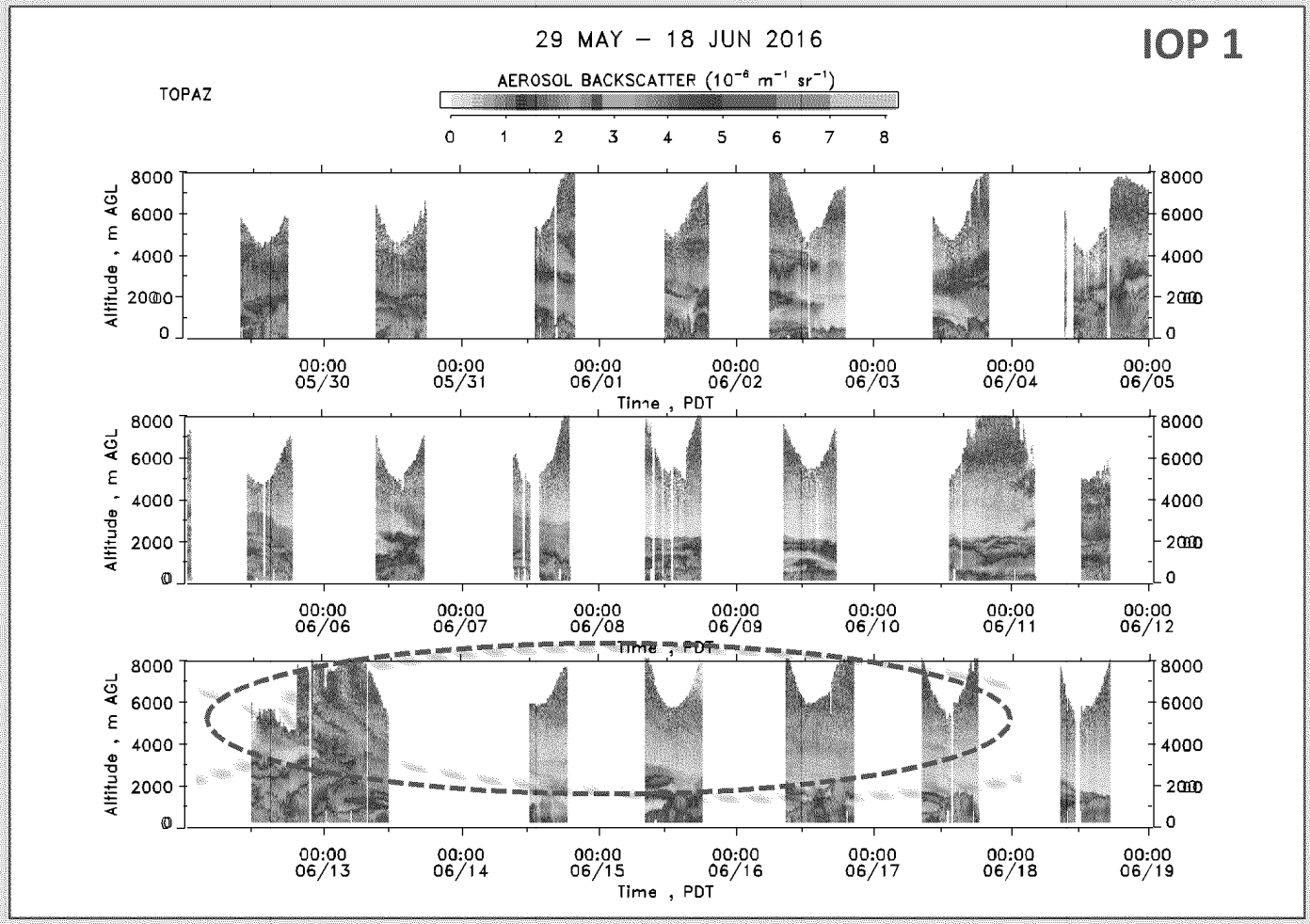
# NOAA/ESRL TOPAZ lidar (Visalia Municipal Airport)




**Accompanied by very low aerosol loadings**

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# Synoptic Overview

## North American Reanalysis (NARR) 350 hPa




Jet streak




**00 UT June 12** — **1. Elongated trough off California coast**




Jet streak




**00 UT June 17** — **2. Deep low above Pacific Northwest**

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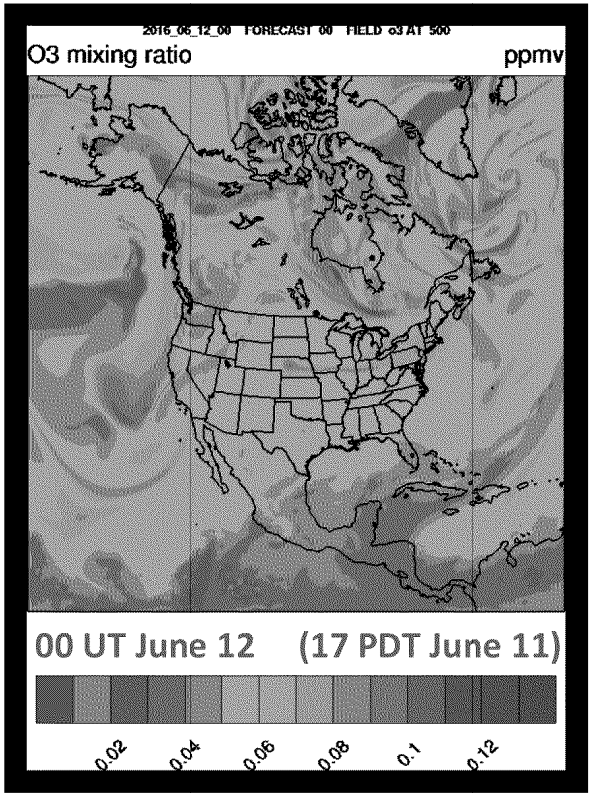
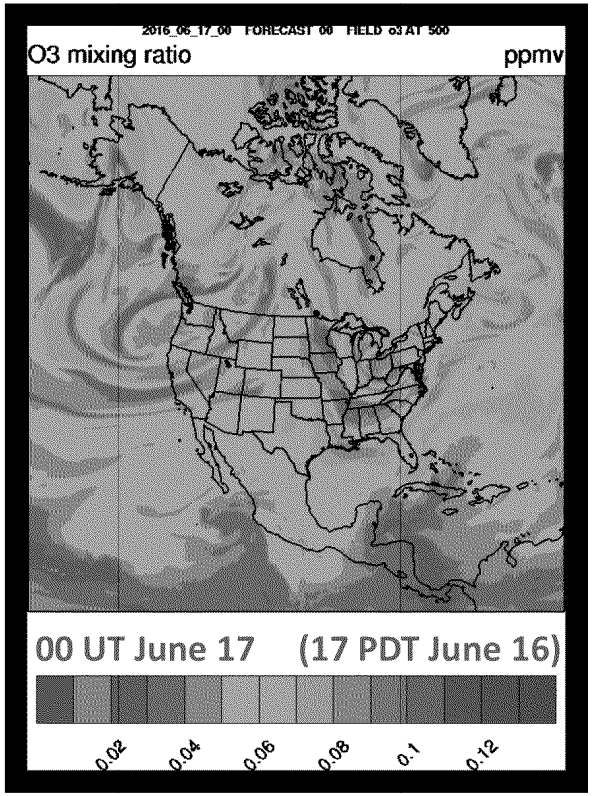
# NOAA RAP-Chem 13 km model analyses

Mariuz Pagowski (NOAA/ESRL/GSD)

## 500 hPa (≈5.5 km asl)




Strong North-to-South gradients over California

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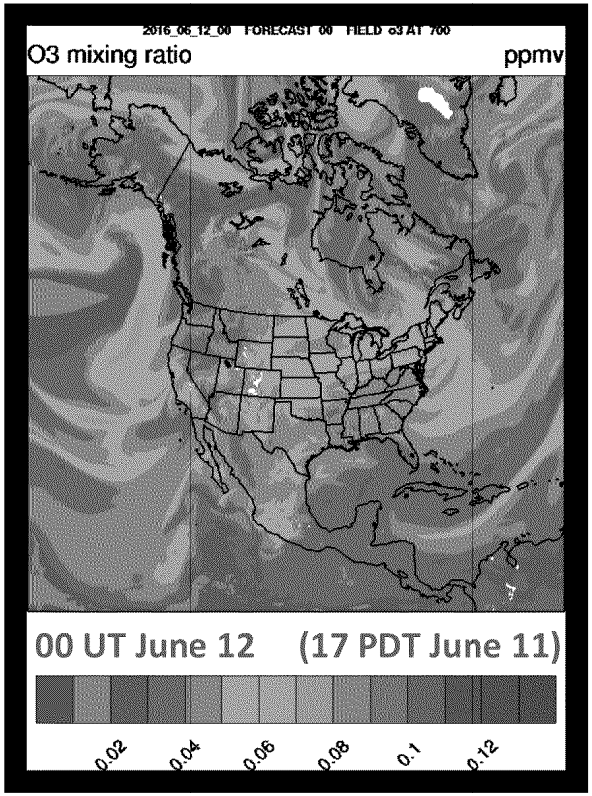
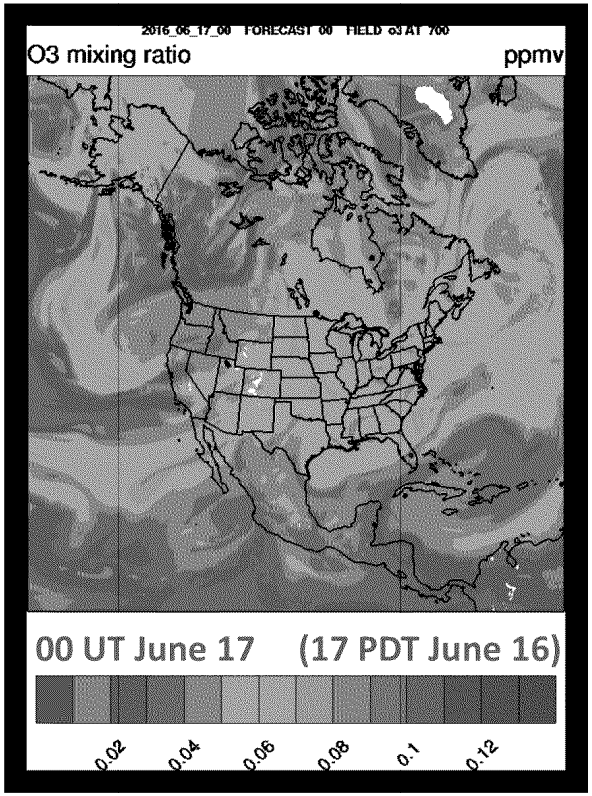
# NOAA RAP-Chem 13 km model analyses

Mariuz Pagowski (NOAA/ESRL/GSD)

## 700 hPa (≈3.1 km asl)




Strong North-to-South gradients over California

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# Comparison to Bodega Bay ozonesondes

Sen Chiao and A.J. Eiserloh (SJSU)




North-south gradients also evident in observations

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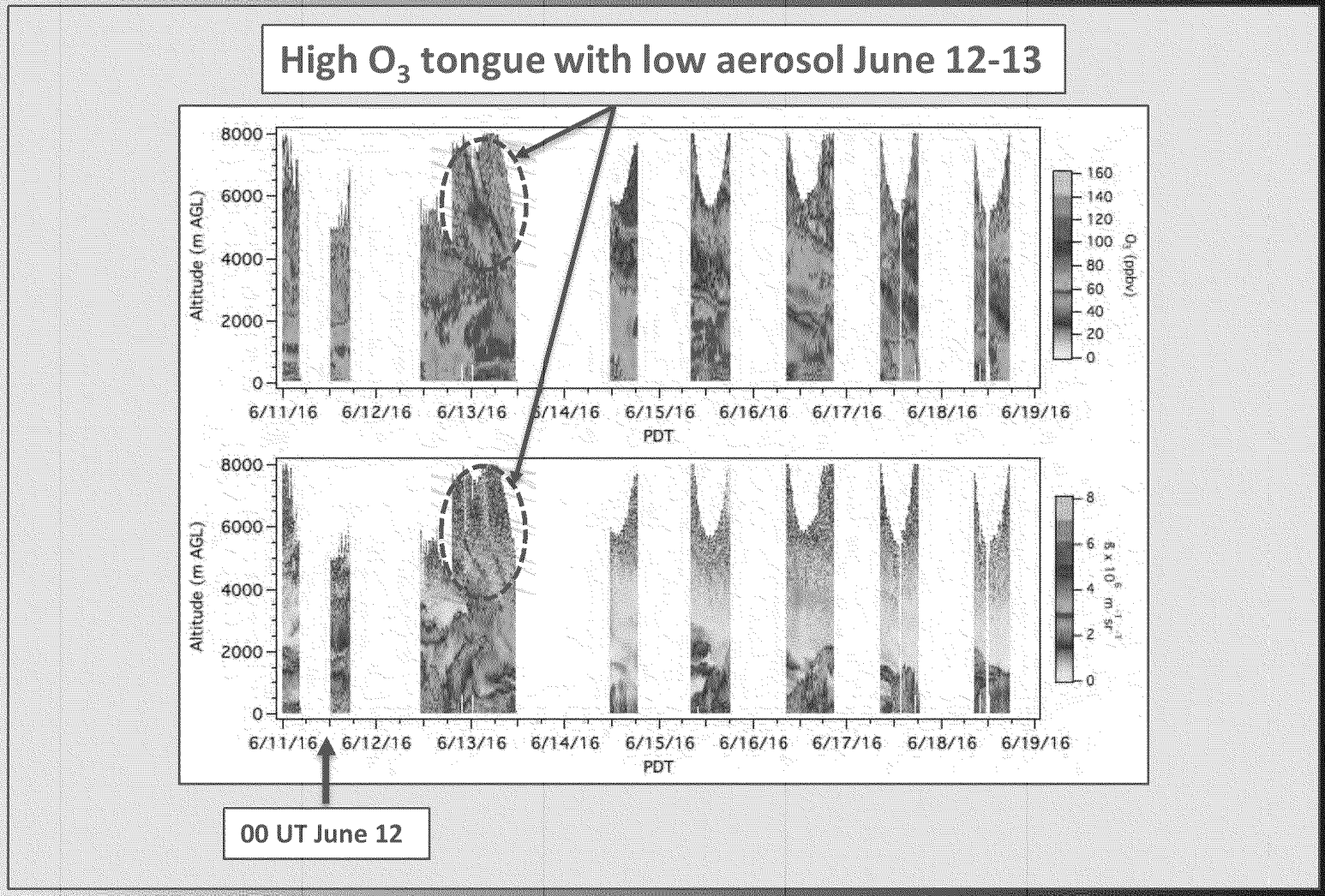
# TOPAZ lidar measurements in Visalia

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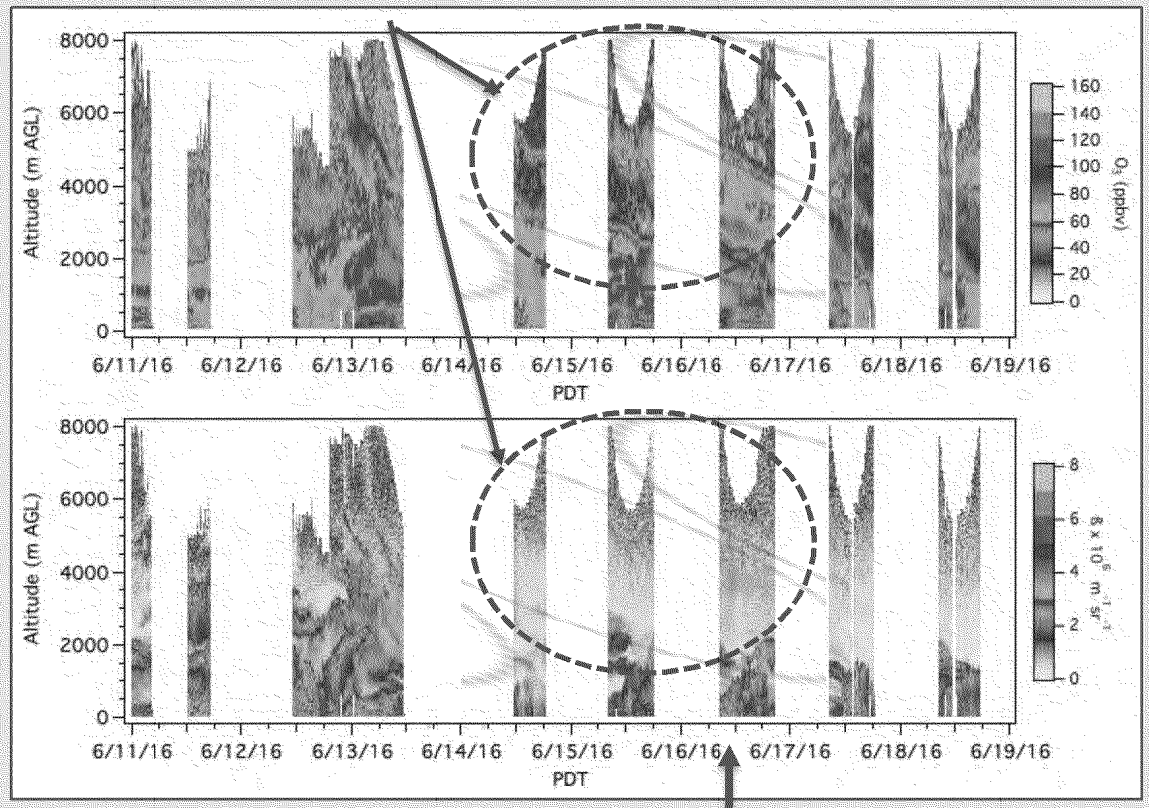
# TOPAZ lidar measurements in Visalia

## High/low $O_3$ layers with no aerosol June 14-16




00 UT June 17

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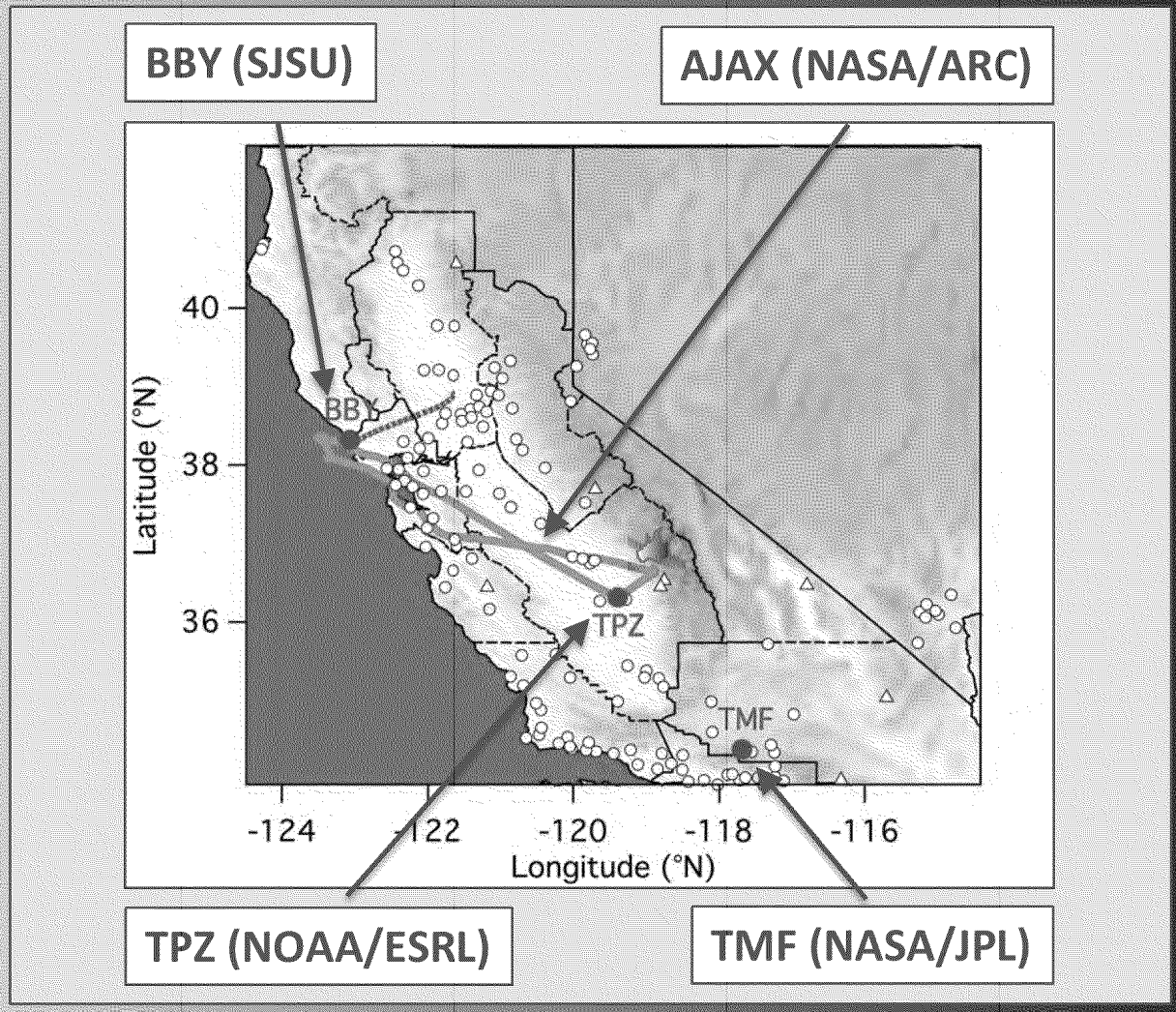
# Vertical ozone profiles on June 14-15, 2016

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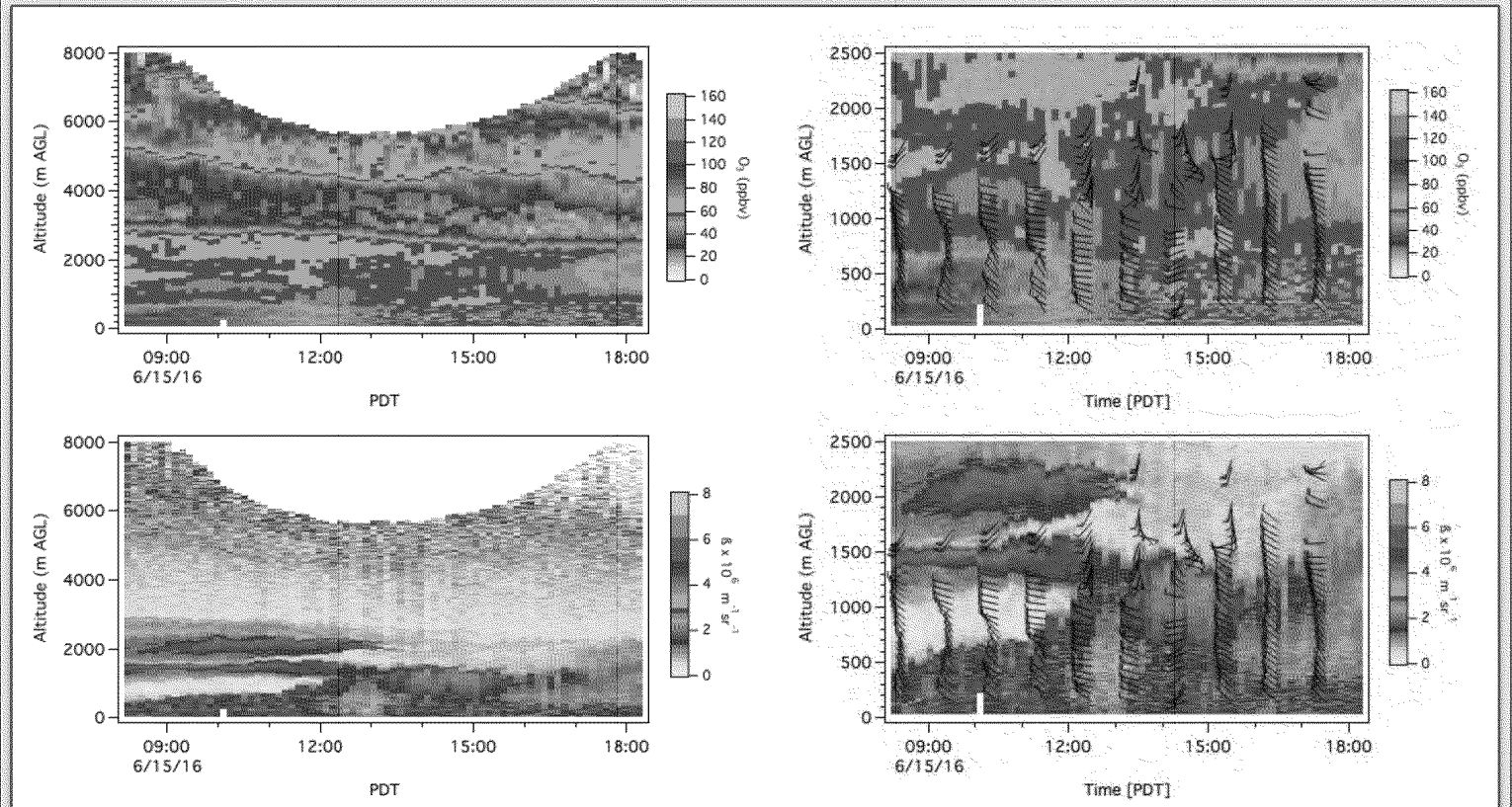
# TOPAZ measurements June 15




Persistent westerly flow in the lower troposphere

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# AJAX measurements June 15




Marine FT

UT/LS

Asia ?

BB (Goliath)

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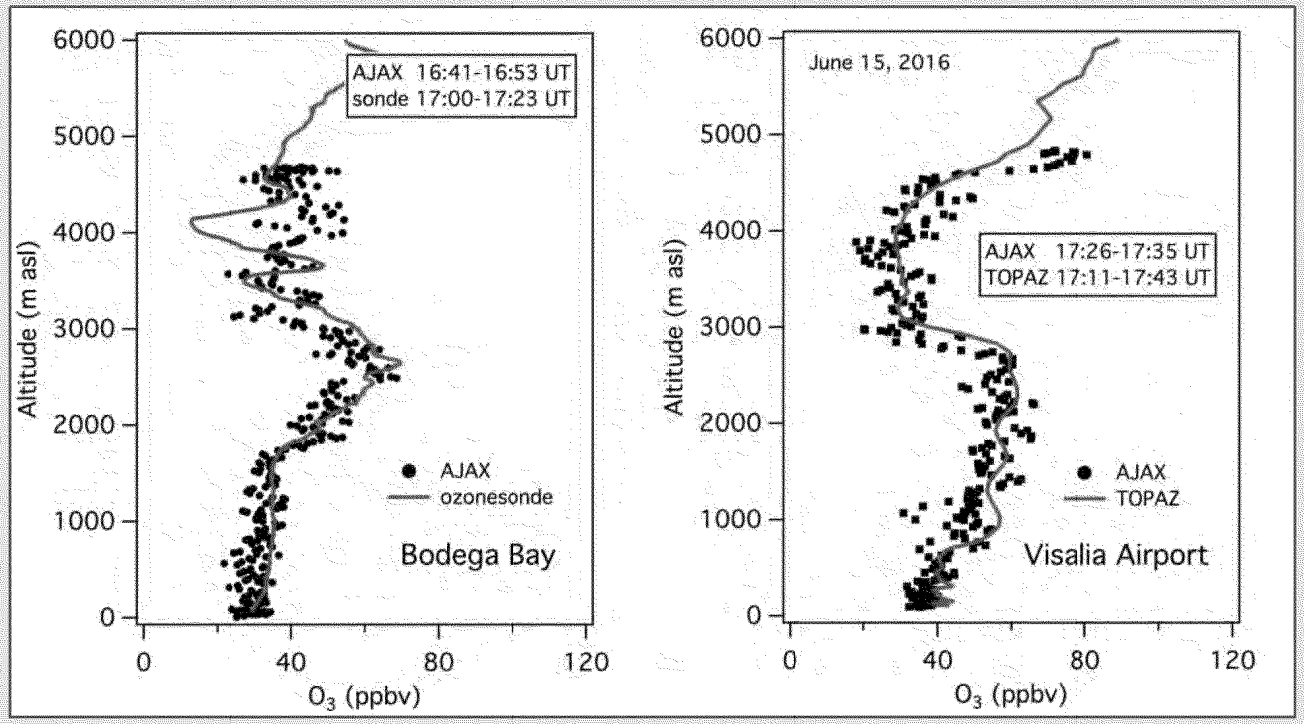
# Profile comparisons on June 15, 2016

**Profiles separated by ≈400 km and <1 hour**




**Excellent agreement with both ozonesonde and lidar**

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# Table Mountain Facility ozone lidar

T. Leblanc NASA/JPL and TOLNet




$O_3$ >120 ppbv between 5 and 6 km asl on night of June 14

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# BBY, TPZ, and TMF profiles on June 14-15 2016

Profiles separated by ≈630 km and up to 5 hours




All three profiles show >100 ppbv of $O_3$ between 3 and 7 km asl

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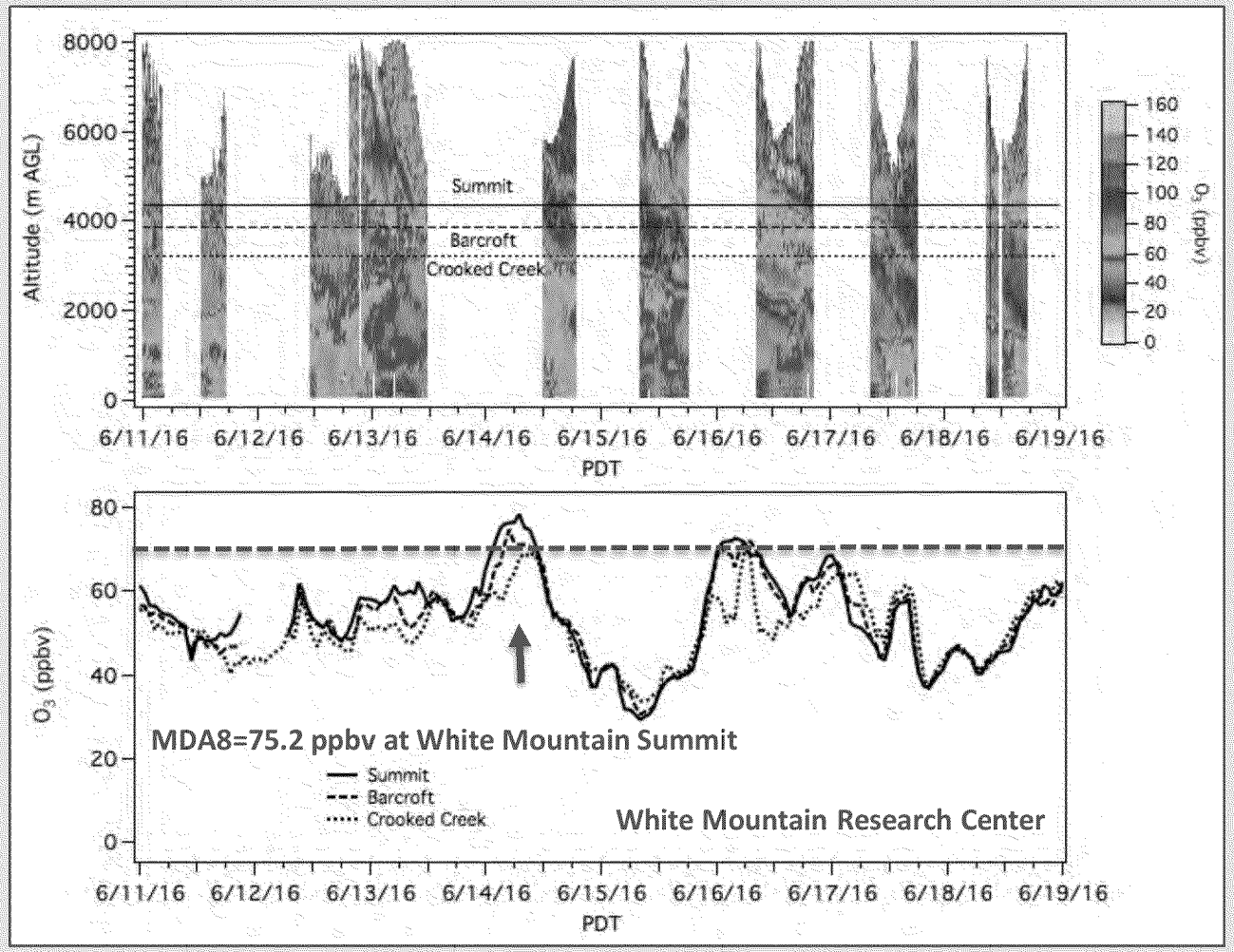
# Impact on surface ozone

Joel Burley (WMRC)




Direct impacts at high elevation White Mountain sites

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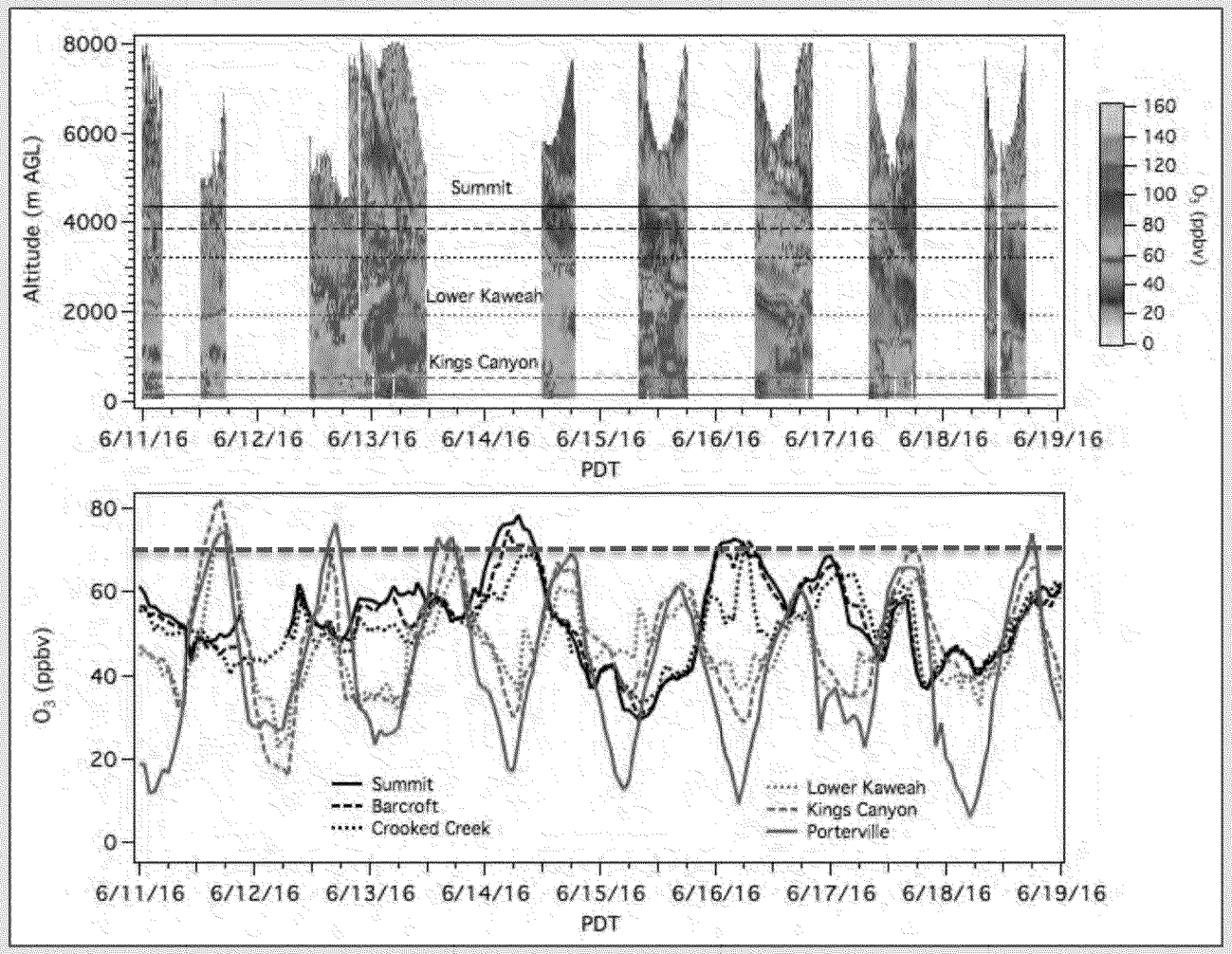
# Impact on surface ozone




**Ozone *decreases* at lower elevation sites**

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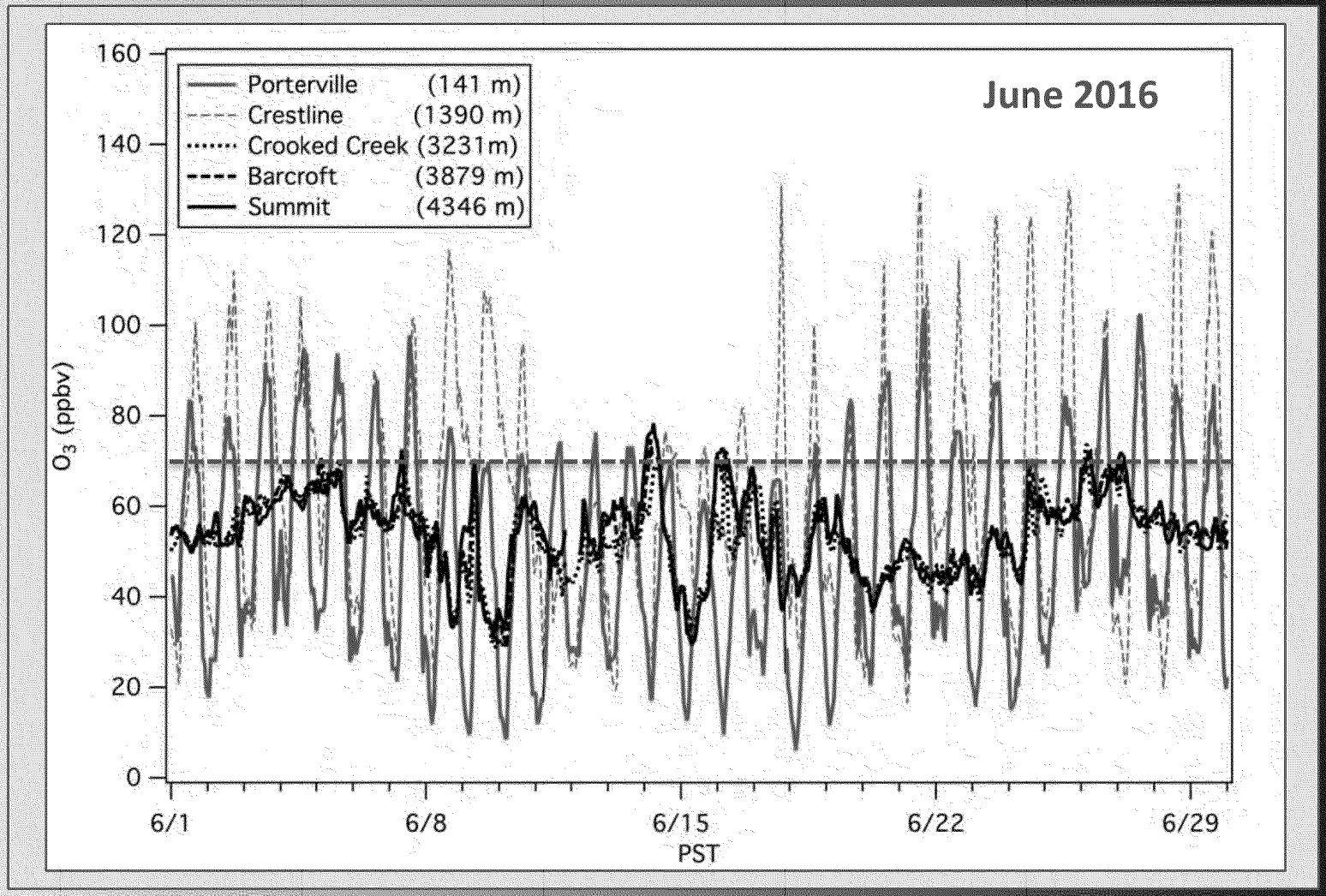
# Surface impacts extend south to SoCAB




Dramatic *decrease* in ozone at Crestline

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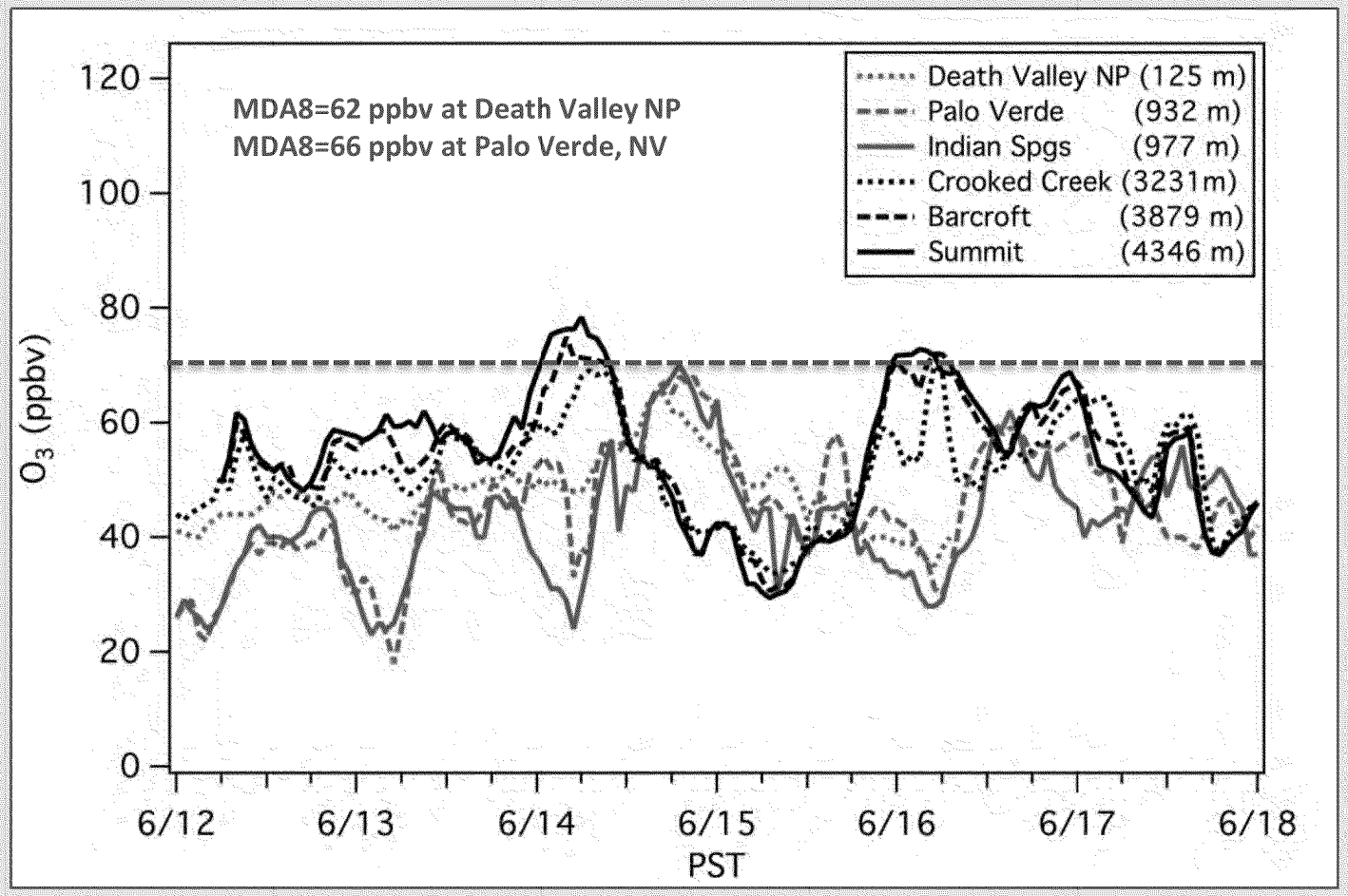
# Surface impacts extend east to Las Vegas




Highest $O_3$ during late afternoon (mixed layer entrainment)

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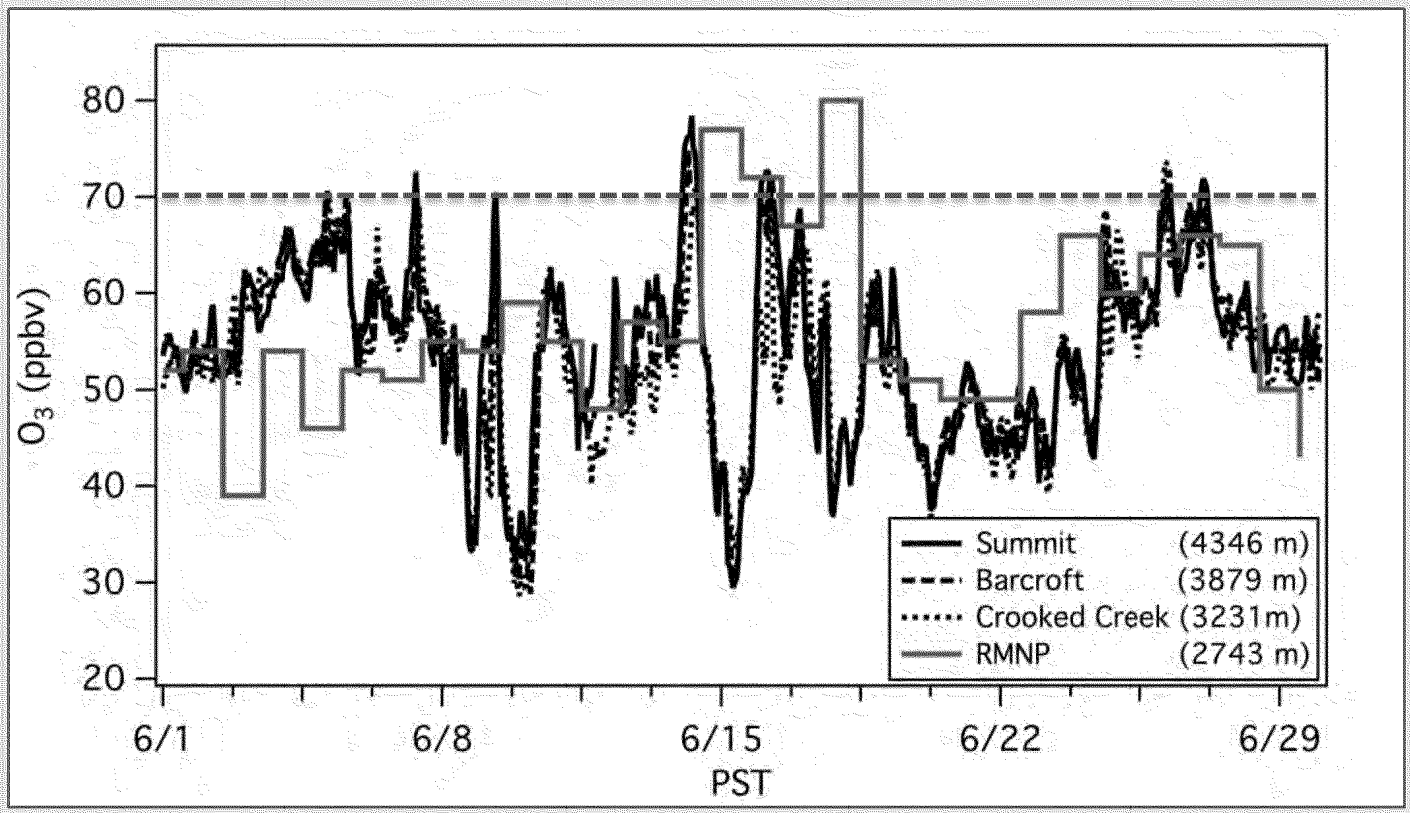
# …and even to Colorado




**2015 NAAQS exceeded at Rocky Mountain NP in Colorado 1-2 days later**

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# Summary

- Back-to-back stratospheric intrusions passed over CA in mid June 2016.
- Surface ozone *increased* and exceeded the 2015 NAAQS of 70 ppbv at high (>4 km asl) elevation sites.
- Surface ozone *decreased* at lower (<2 km asl) elevation sites in the SJV and SoCAB.
- Entrainment by deep mixed layers increased surface ozone at low elevation CA and NV sites east of the Sierra Nevada the following afternoon.

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# Conclusion

**Stratosphere-to-troposphere transport (STT) *did not* contribute to high surface ozone ($O_3$) in the San Joaquin Valley during CABOTS.**

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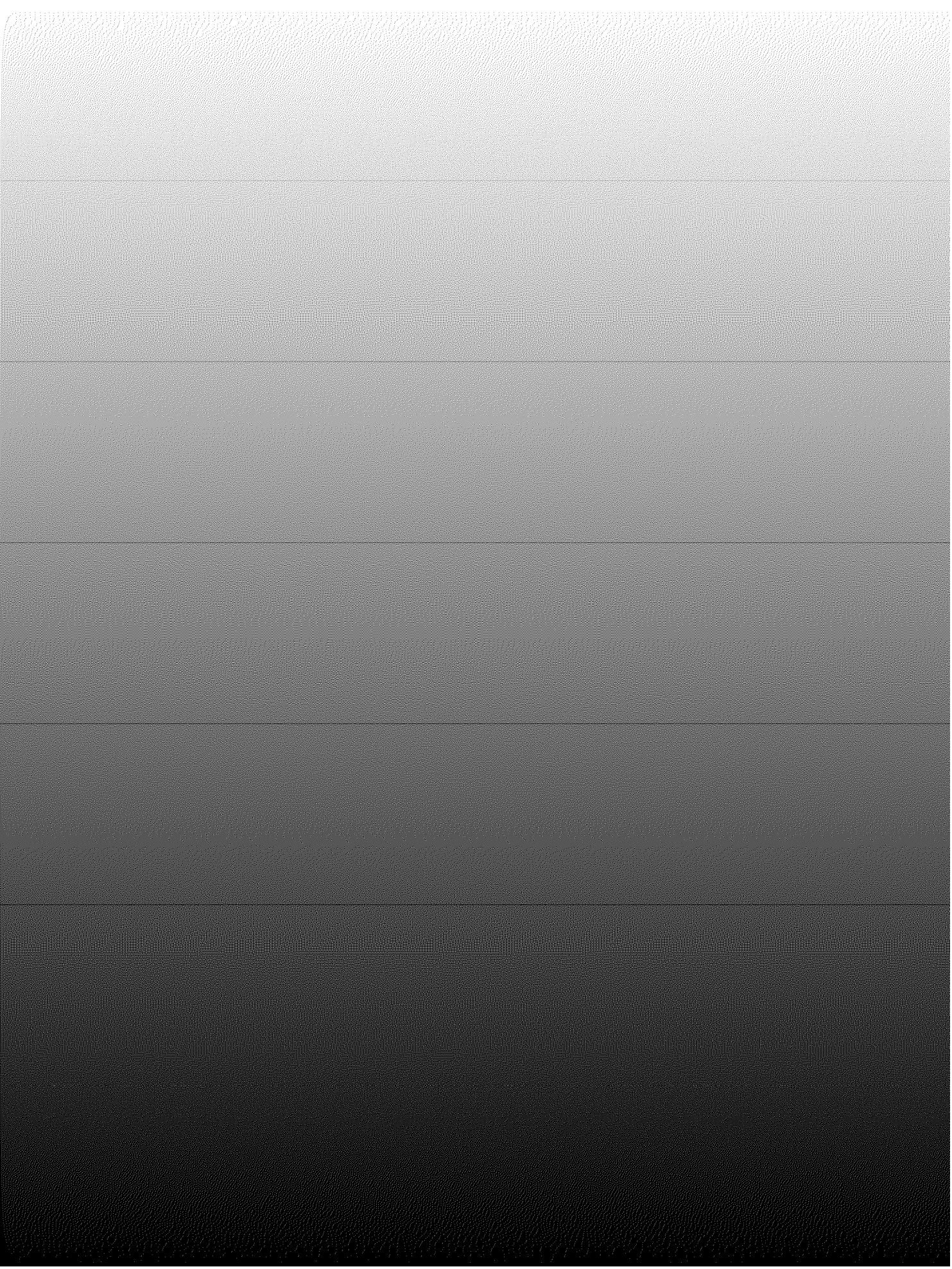

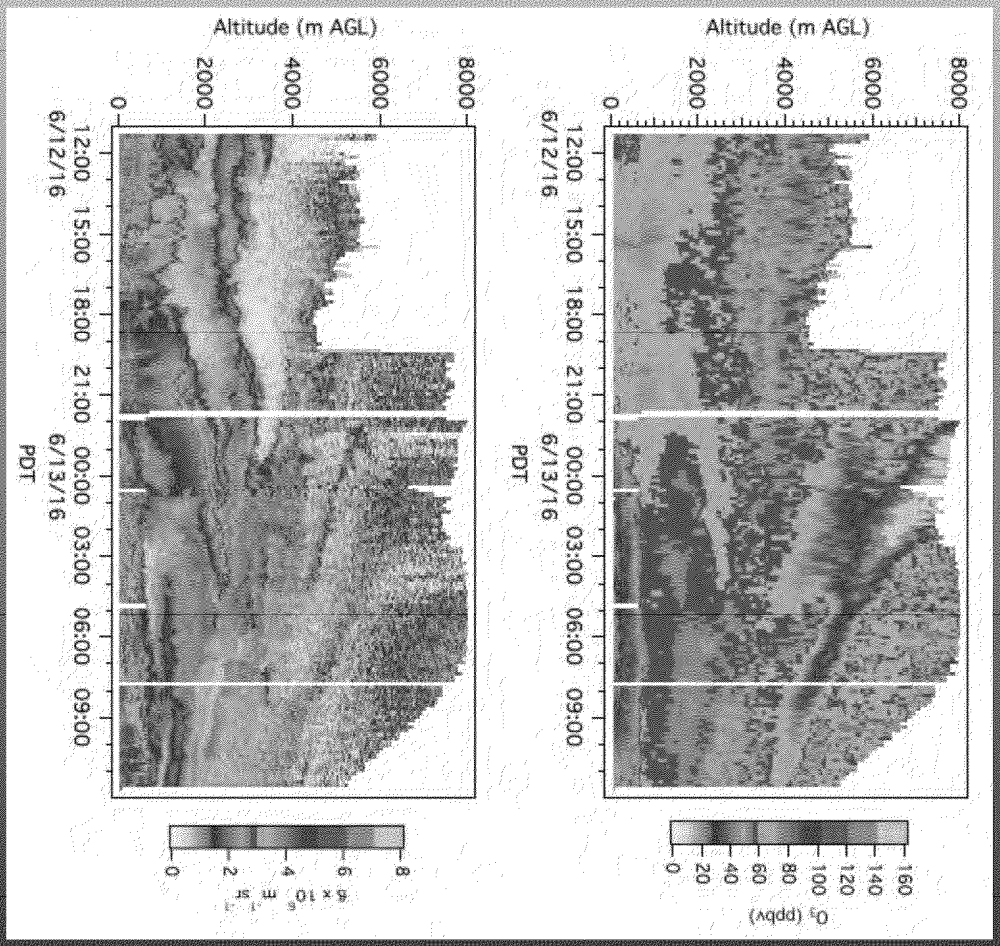


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# NOAA RAP-Chem 13 km model analyses

Mariuz Pagowski (NOAA/ESRL/GSD)

| 500 hPa | 700 hPa | 850 hPa | sfc |
|---|---|---|---|
|  |  |  |  |
|  |  |  |  |



00 UT June 12 (17 PDT June 11)

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# NOAA RAP-Chem 13 km model analyses

Mariuz Pagowski (NOAA/ESRL/GSD)




00 UT June 17 (17 PDT June 16)

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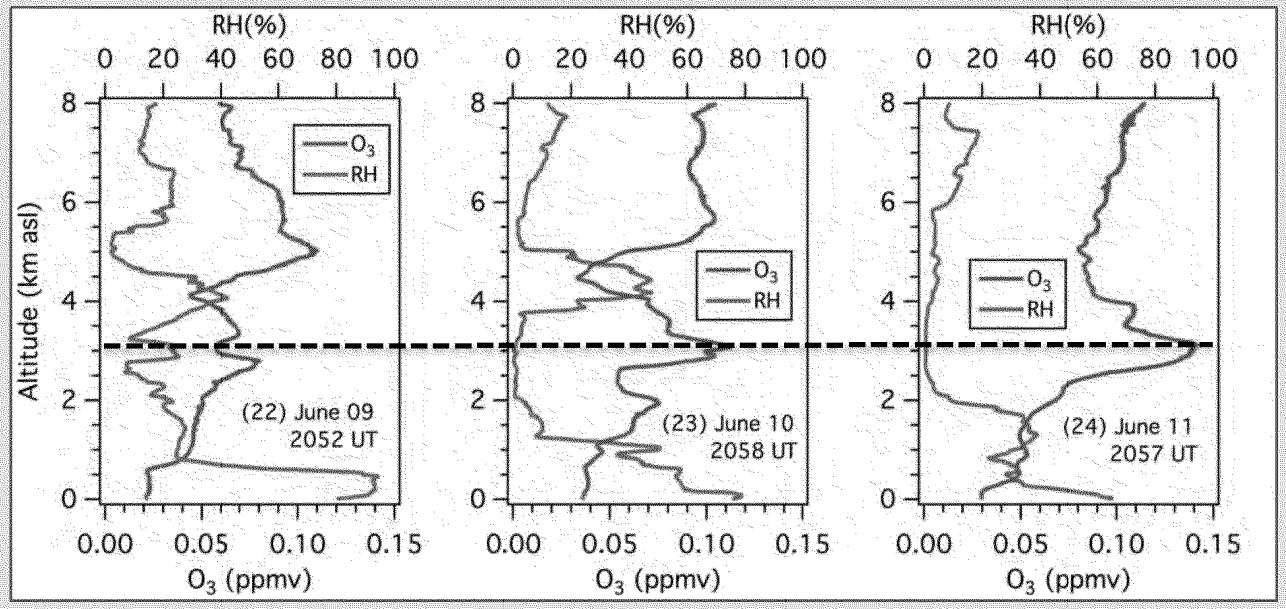
# Bodega Bay ozonesonde profiles

Sen Chiao and A.J. Eiserloh (SJSU)




**Dry air with >140 ppbv of ozone at 3 km asl (≈700 hPa) on June 11**

Chiao, S., A. J. Eiserloh, 2017: An Investigation of High-Ozone Episodes during the California Baseline Ozone Transport Study (CABOTS), The 13th Symposium of the Urban Environment, AMS annual meeting, 22-26 January, 2017

Eiserloh, A., S. Chiao, J. Clark, S. Cauley, J. Spitze, M. Roberts, 2016: California Baseline Ozone Transport Study (CABOTS): Ozonesonde Measurements, AGU Fall Meeting, San Francisco, 12 -16 December 2016

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# Bodega Bay ozonesonde profiles

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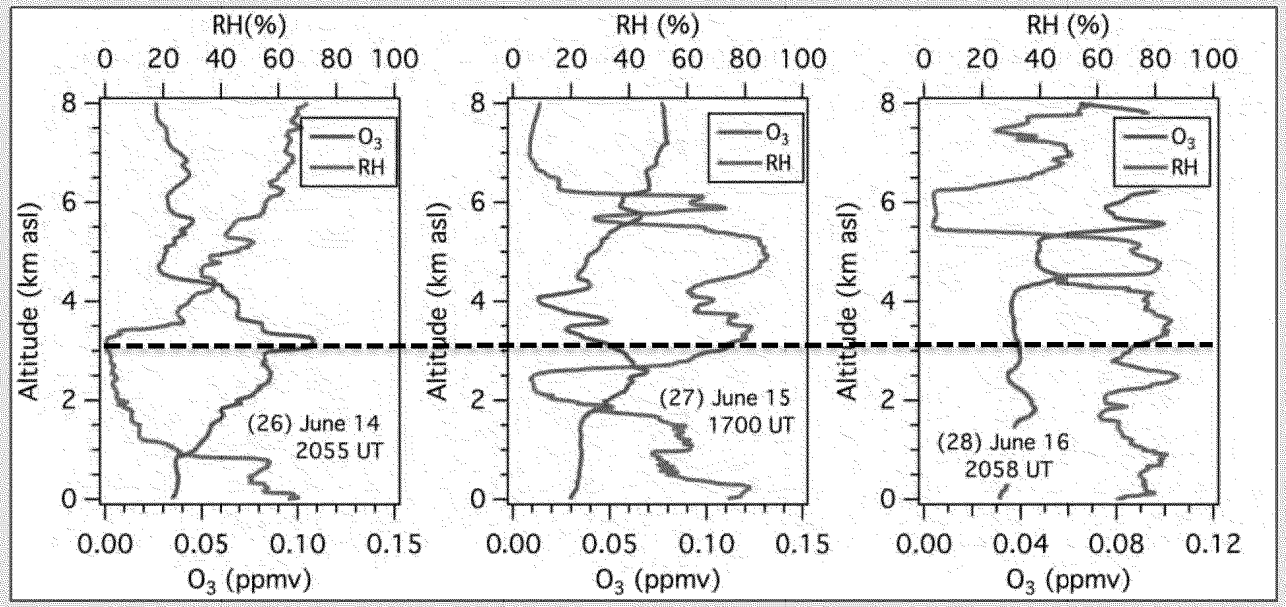


**Dry air with 110 ppbv of ozone at 3 km asl (≈700 hPa) on June 14**

Chiao, S., A. J. Eiserloh, 2017: An Investigation of High-Ozone Episodes during the California Baseline Ozone Transport Study (CABOTS), The 13th Symposium of the Urban Environment, AMS annual meeting, 22-26 January, 2017

Eiserloh, A., S. Chiao, J. Clark, S. Cauley, J. Spitze, M. Roberts, 2016: California Baseline Ozone Transport Study (CABOTS): Ozonesonde Measurements, AGU Fall Meeting, San Francisco, 12 -16 December 2016

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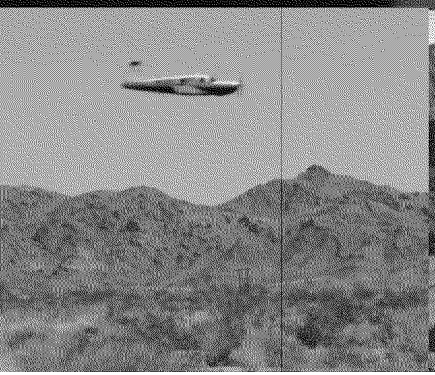
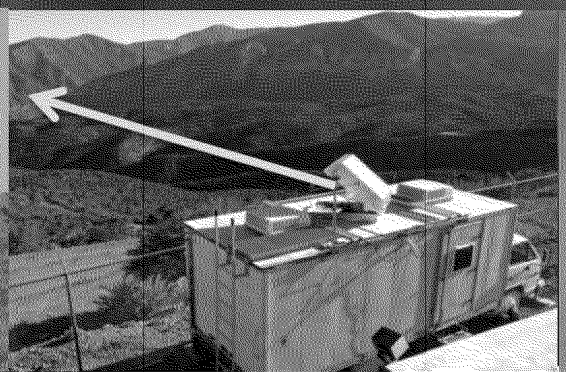
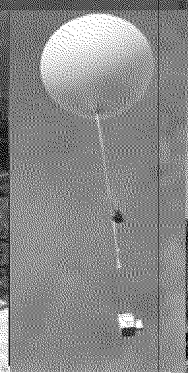
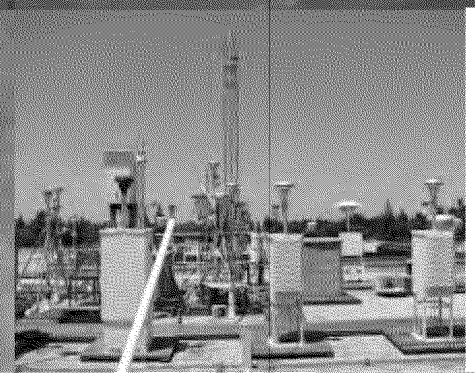
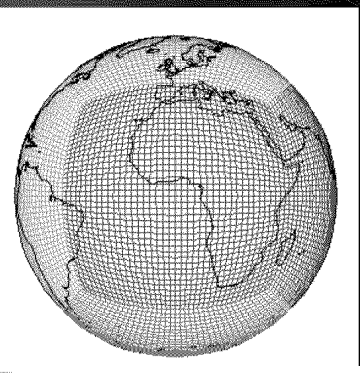
# CABOTS Observations from Chews Ridge & Aircraft

# California Baseline Ozone Transport Study (CABOTS)
# Science Meeting 19 April 2017



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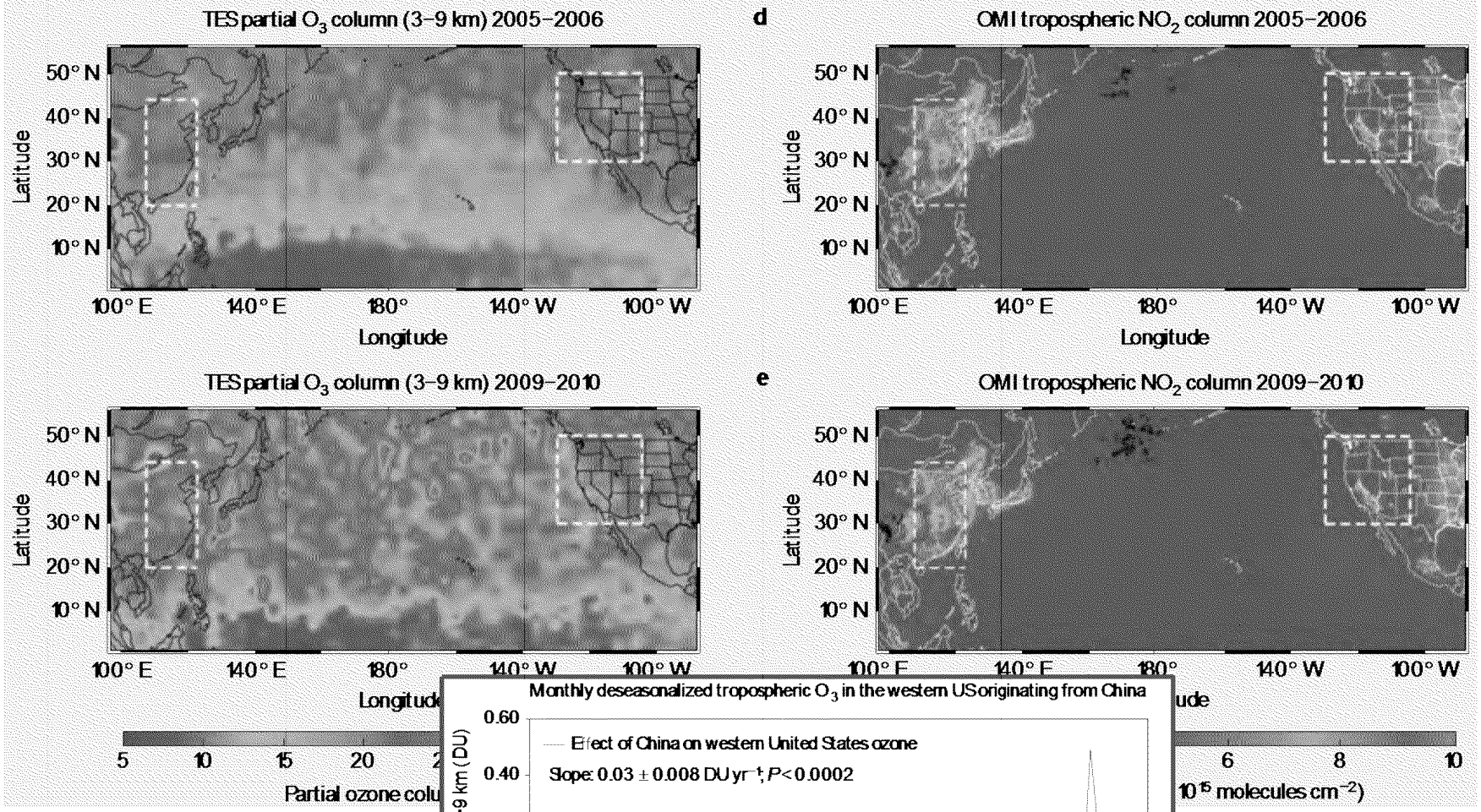
# a e e a a con rms grow o s an x 3' Coarse transport model shows influence on US West Coast




*source*: *Verstraetenet al., 2015*

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ironmental Protection Agency
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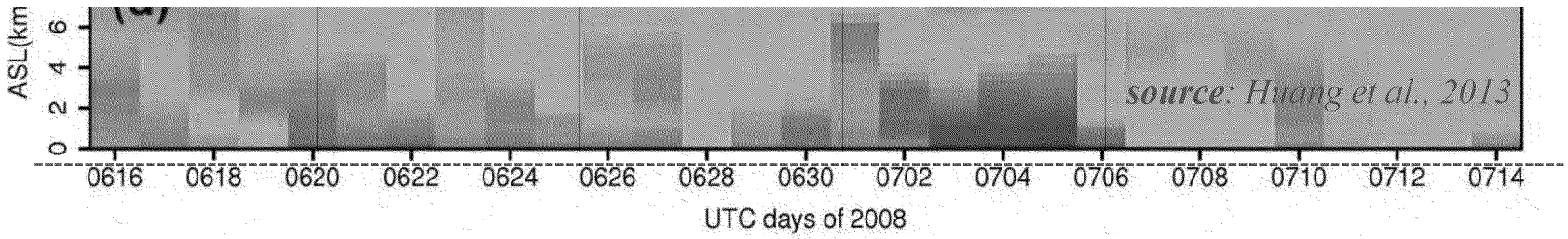
# Chemical transport models are imprecise in capturing the details of $O_3$ violations even aloft

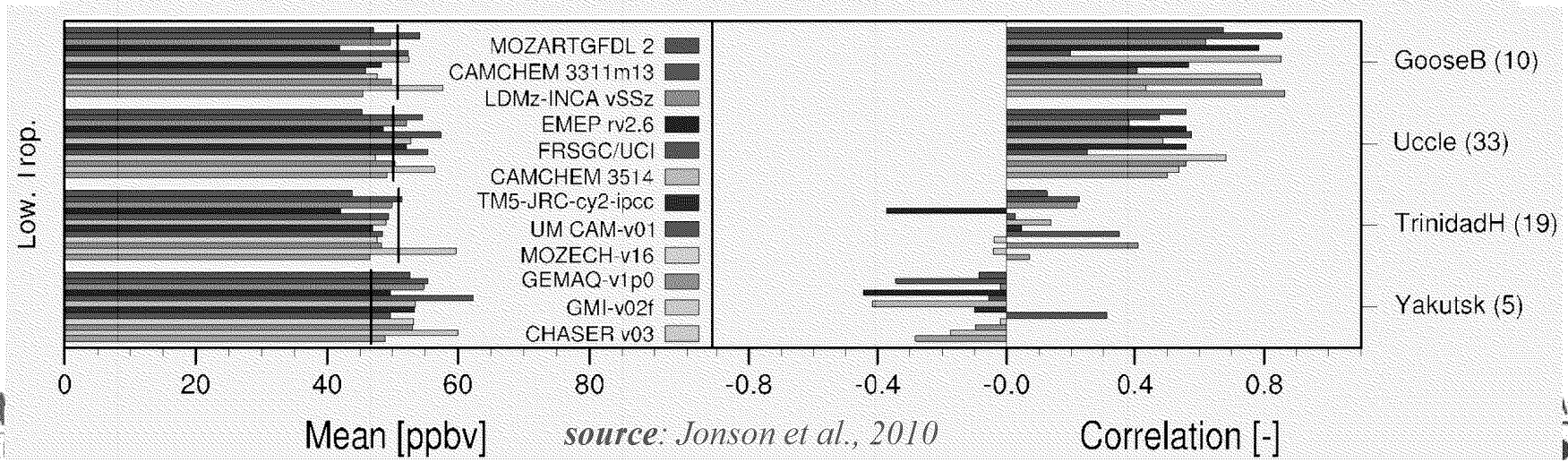



***source**: Huang et al., 2013*

STEM 60km modeled THD $O_3$ at 18UTC by day

Mt. Happo (1.85 km)

***source**: Lin et al., 2010*




***source**: Jonson et al., 2010*

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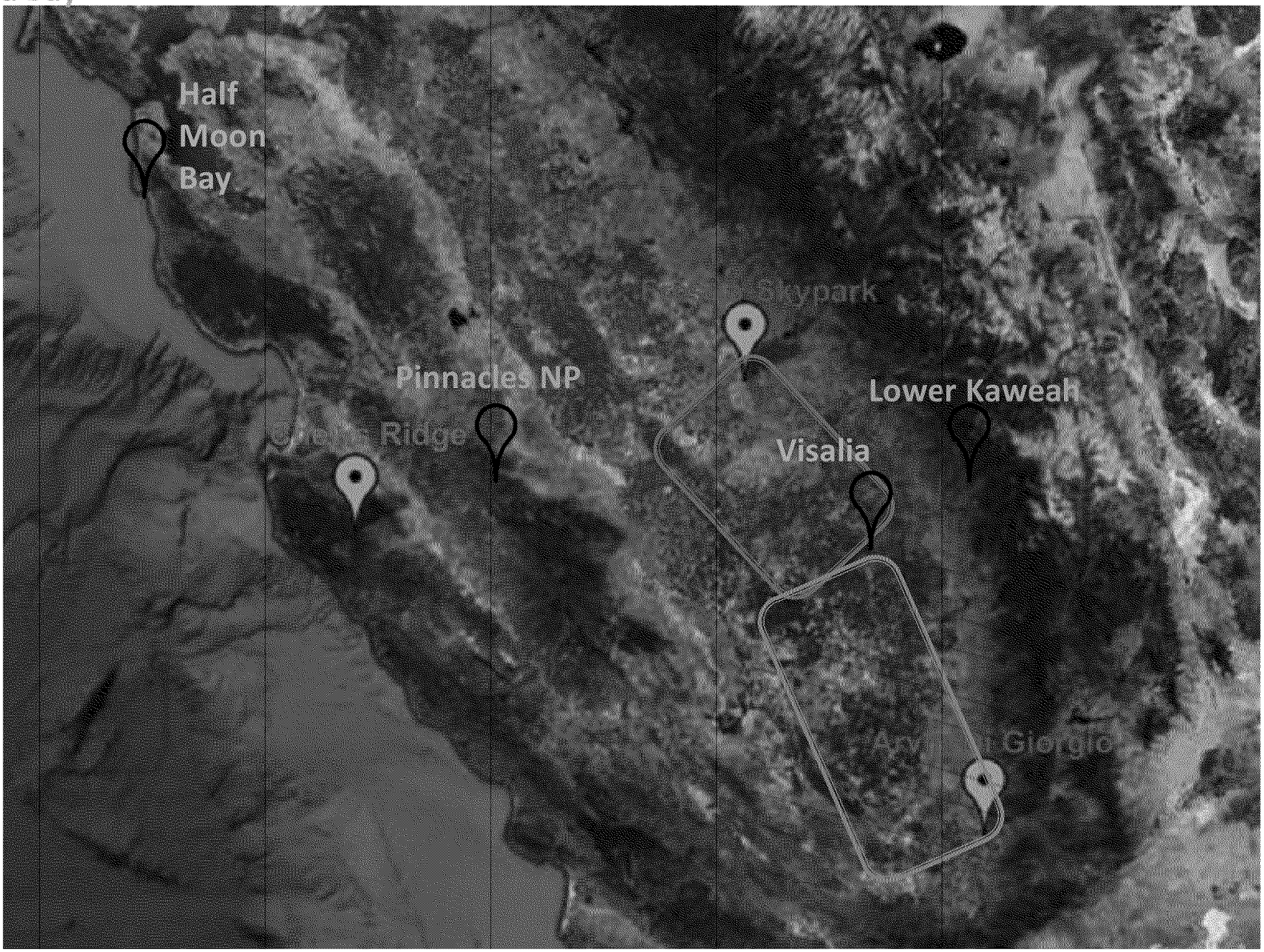
# Study focus: Southern San Joaquin Valley



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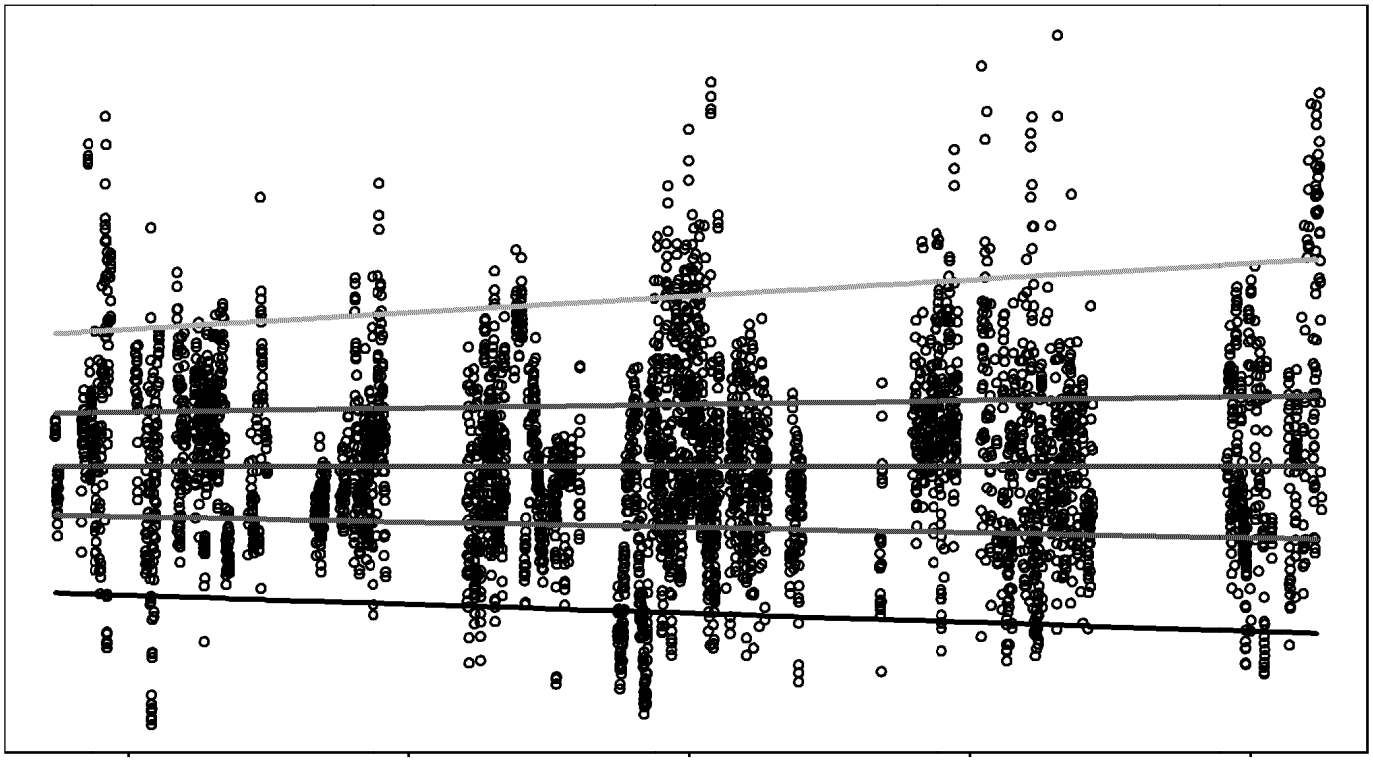
# Long term quantile trends in $O_3$ at Chews Ridge (nighttime onshore data only)



2.1 ppb/yr (95%)

**0.5 ppb/yr (75%)**
Statistically insignificant (50%)
-0.7 ppb/yr (25%)
-1.1 ppb/yr (5%)



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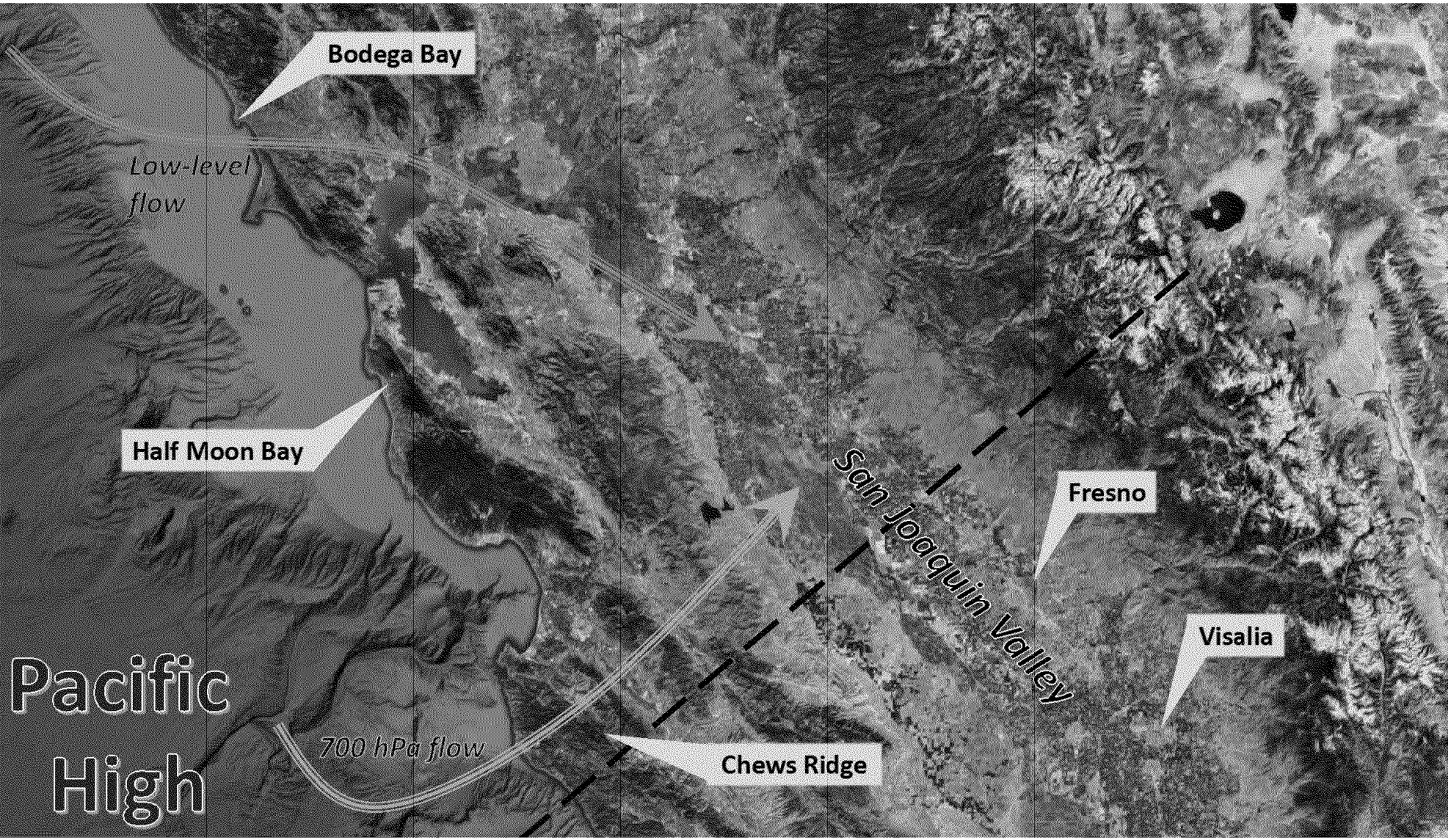
# Airflow & Geography of CABOTS

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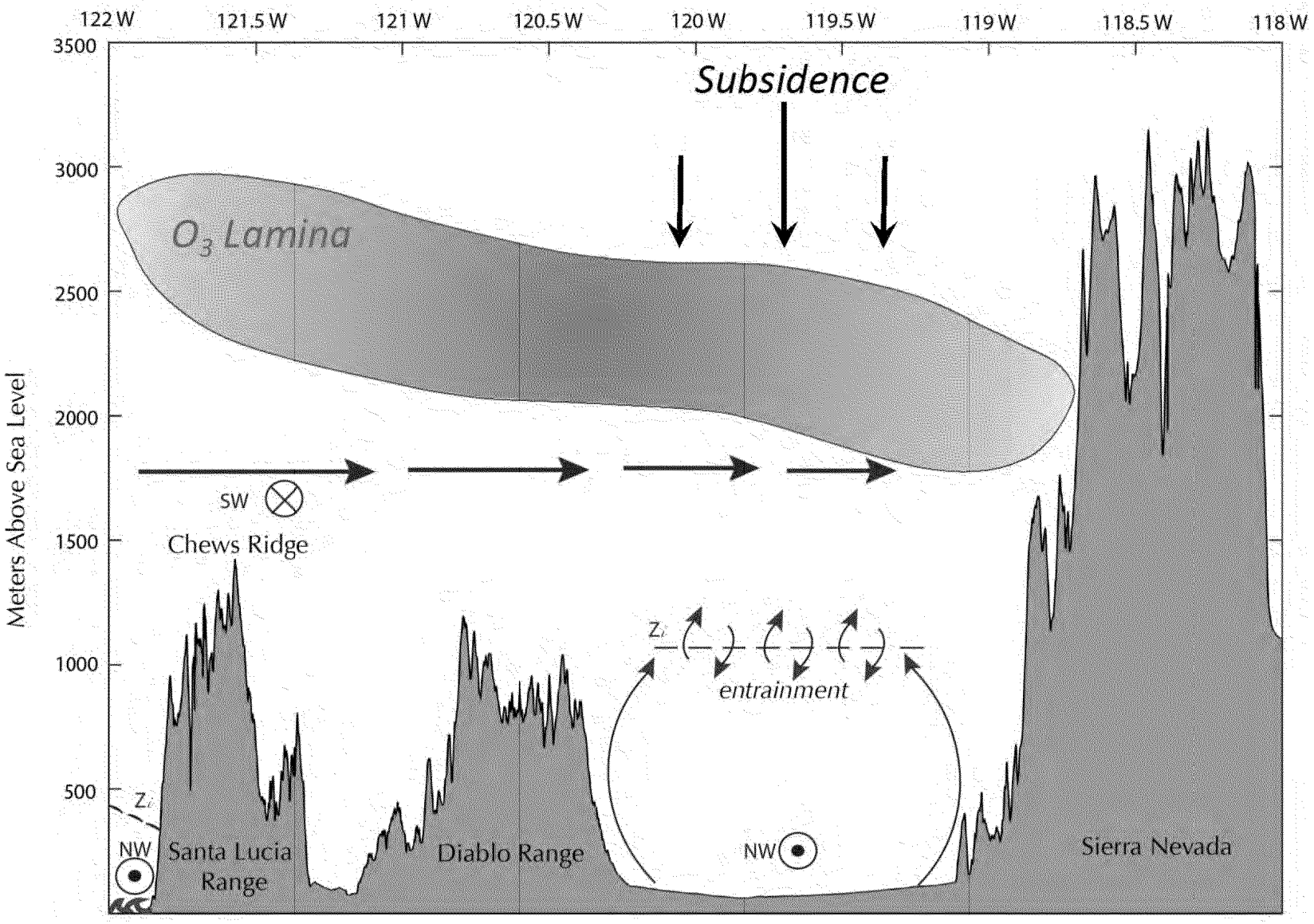
# Cartoon Schematic of Transport to SJV



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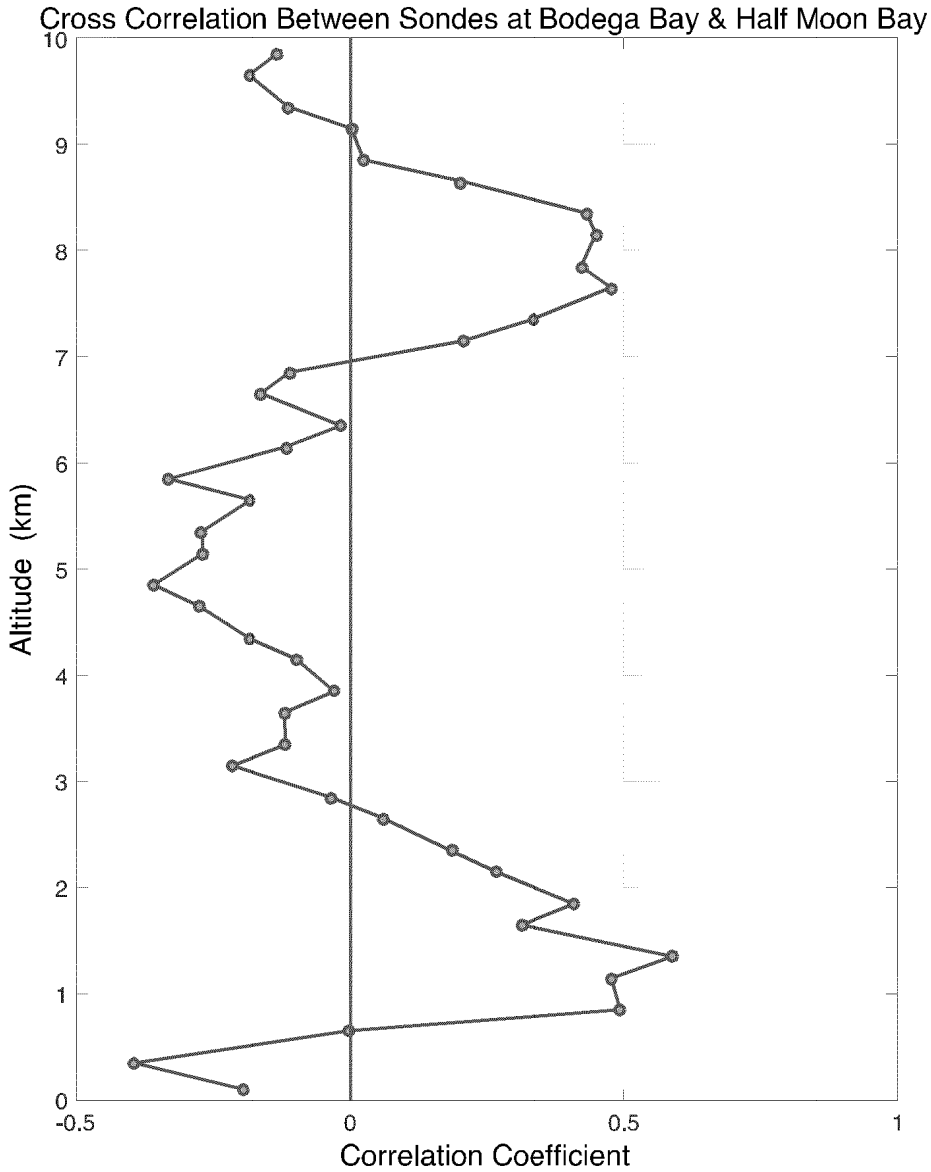
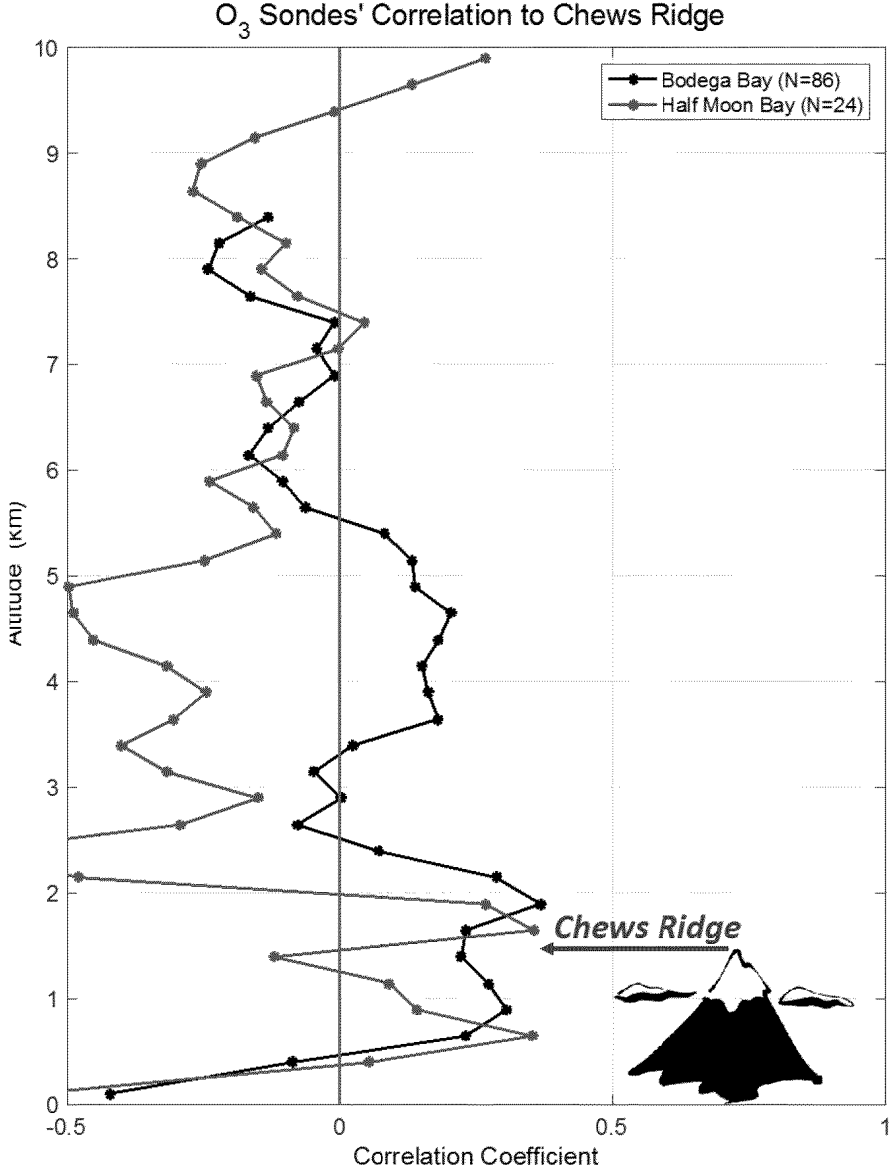
# SJSU $O_3$-sonde correlations BBY-HMB-Chews Ridge

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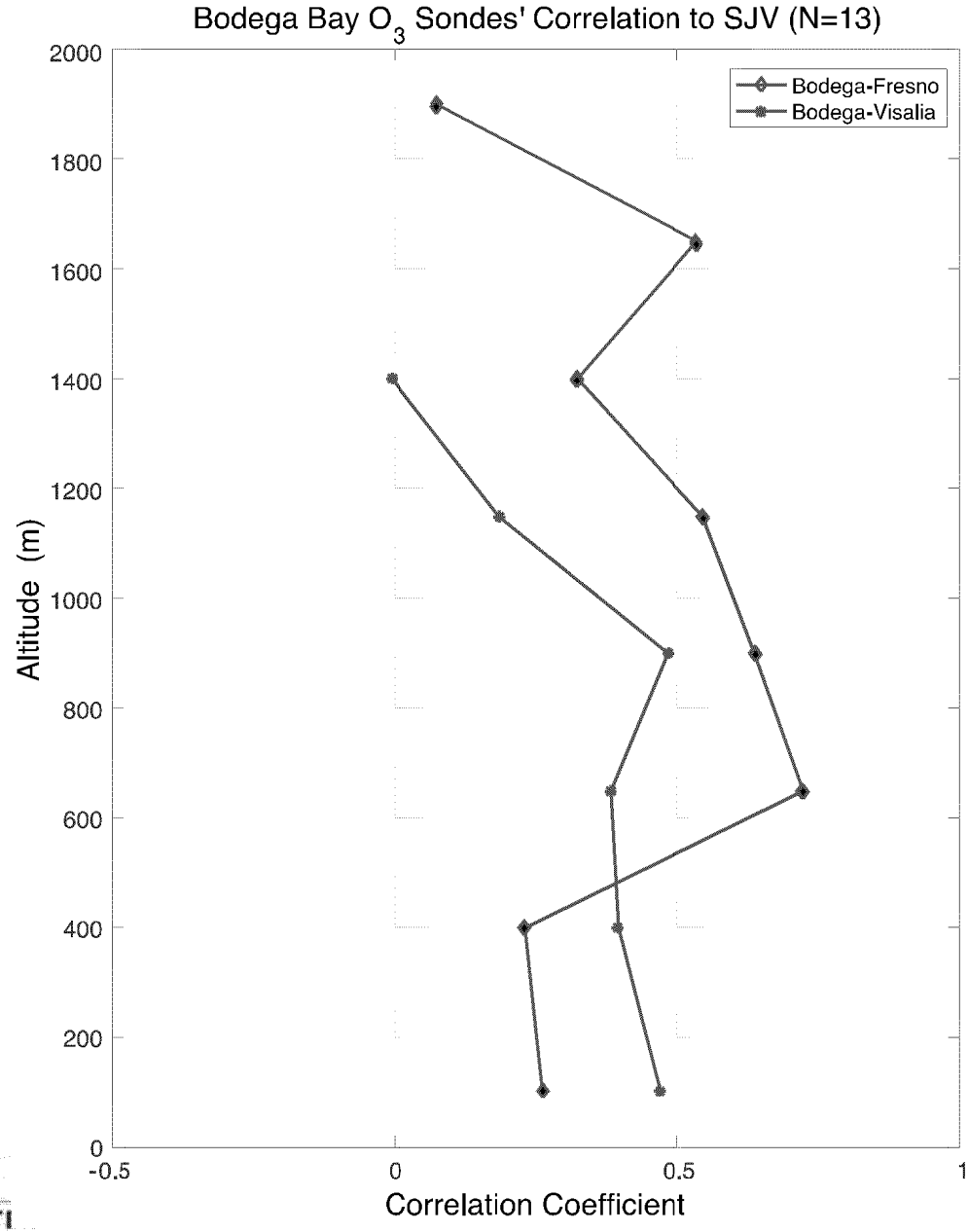
# BBY $O_3$-sonde correlation to SJV

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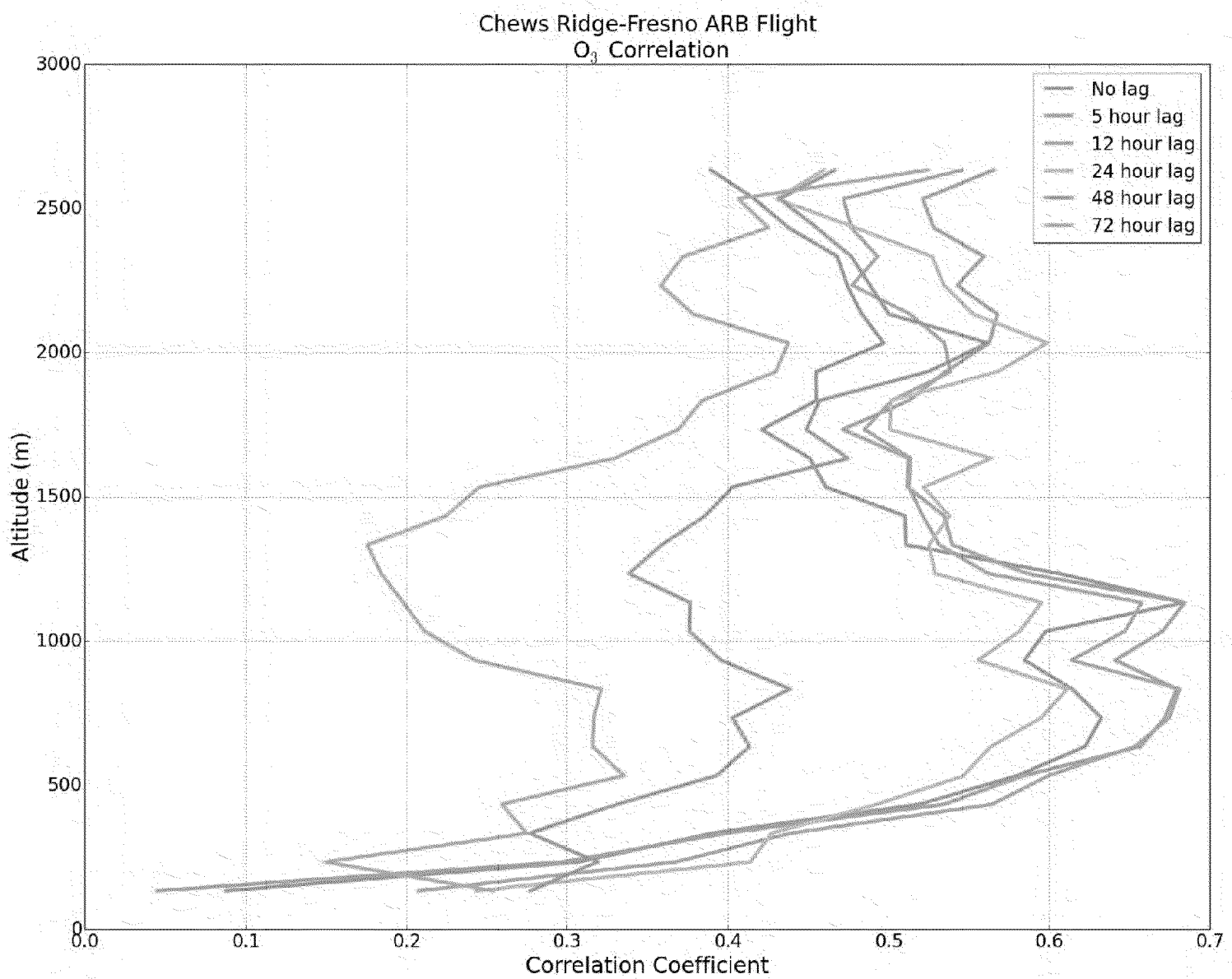
# Chews $O_3$ correlated to $O_3$ observed above the SJV boundary layer by ARB APOB profiles




**Source**: from 200 daily a.m. aircraft profiles over Fresno during summers of 2012/13. Data courtesy of Dartanion Mims, CARB.

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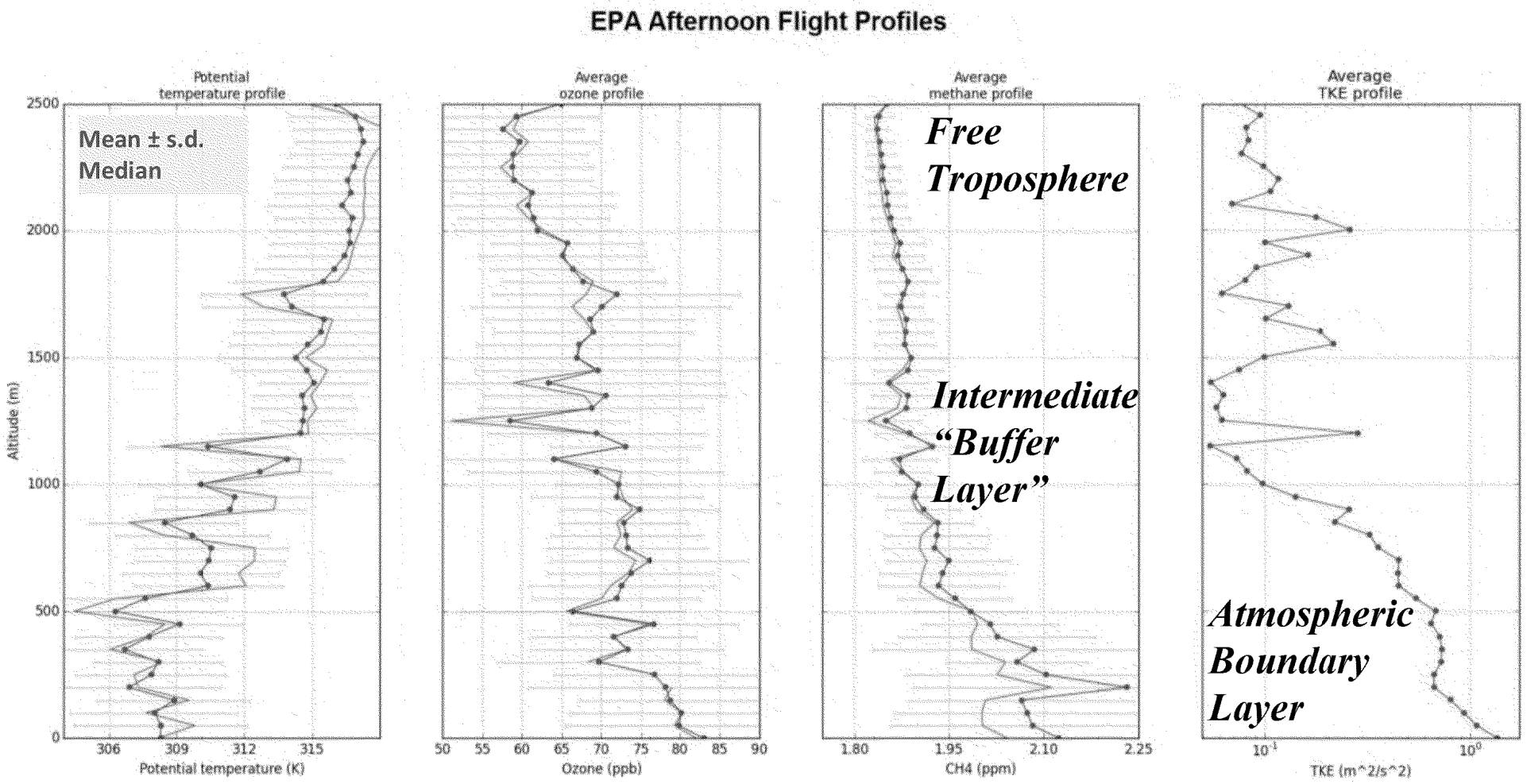
# Average Profiles from EPA/BAAQMD Flights 27-29 July & 4-6 August, 2016

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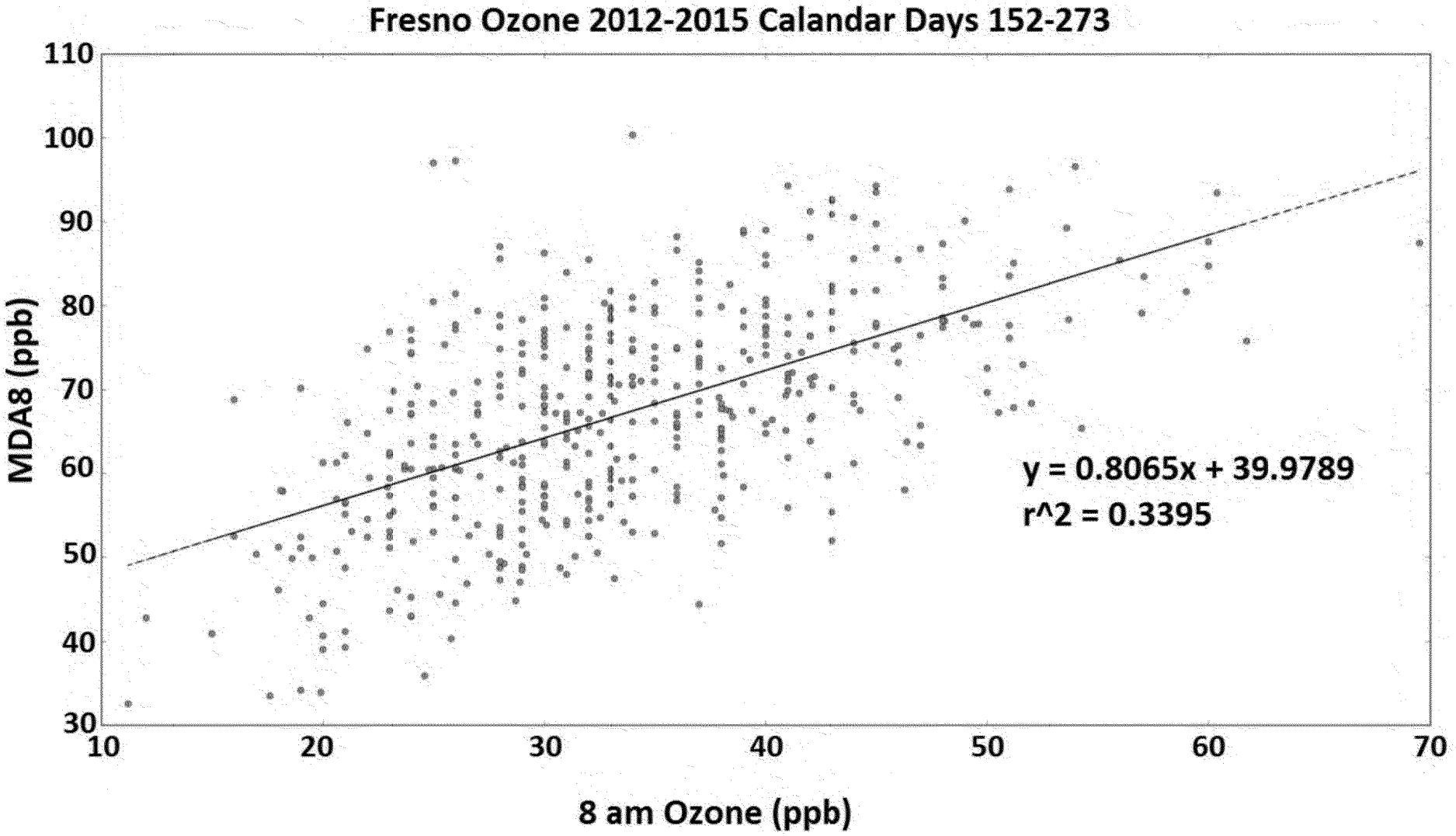
# Ozone from fumigation by the residual layer (08:00) strongly correlated to the afternoon's MDA8 value



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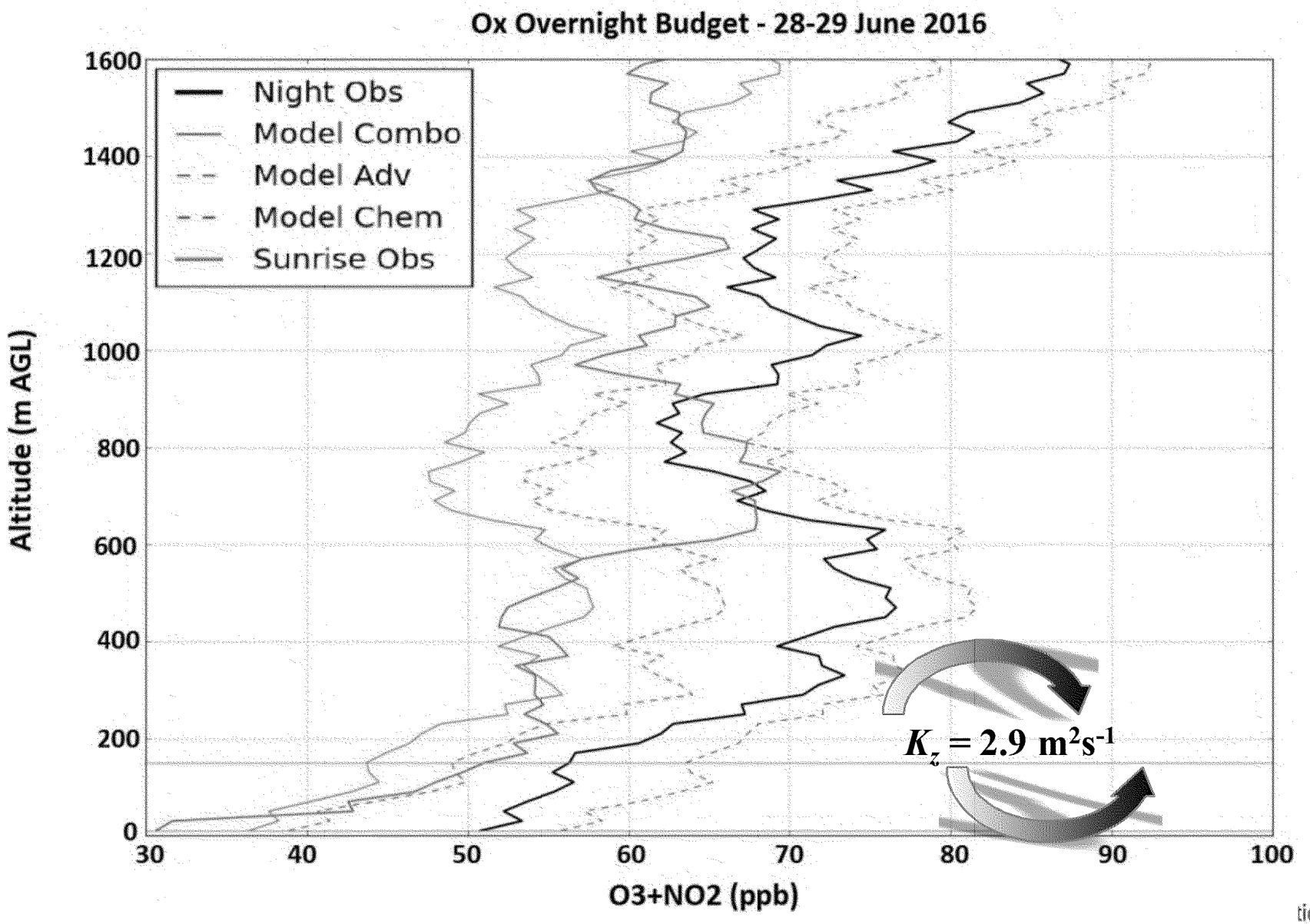
# Overnight Evolution of $O_x$ can Determine Nocturnal Mixing Rate, Eddy Diffusivity: $K_z$



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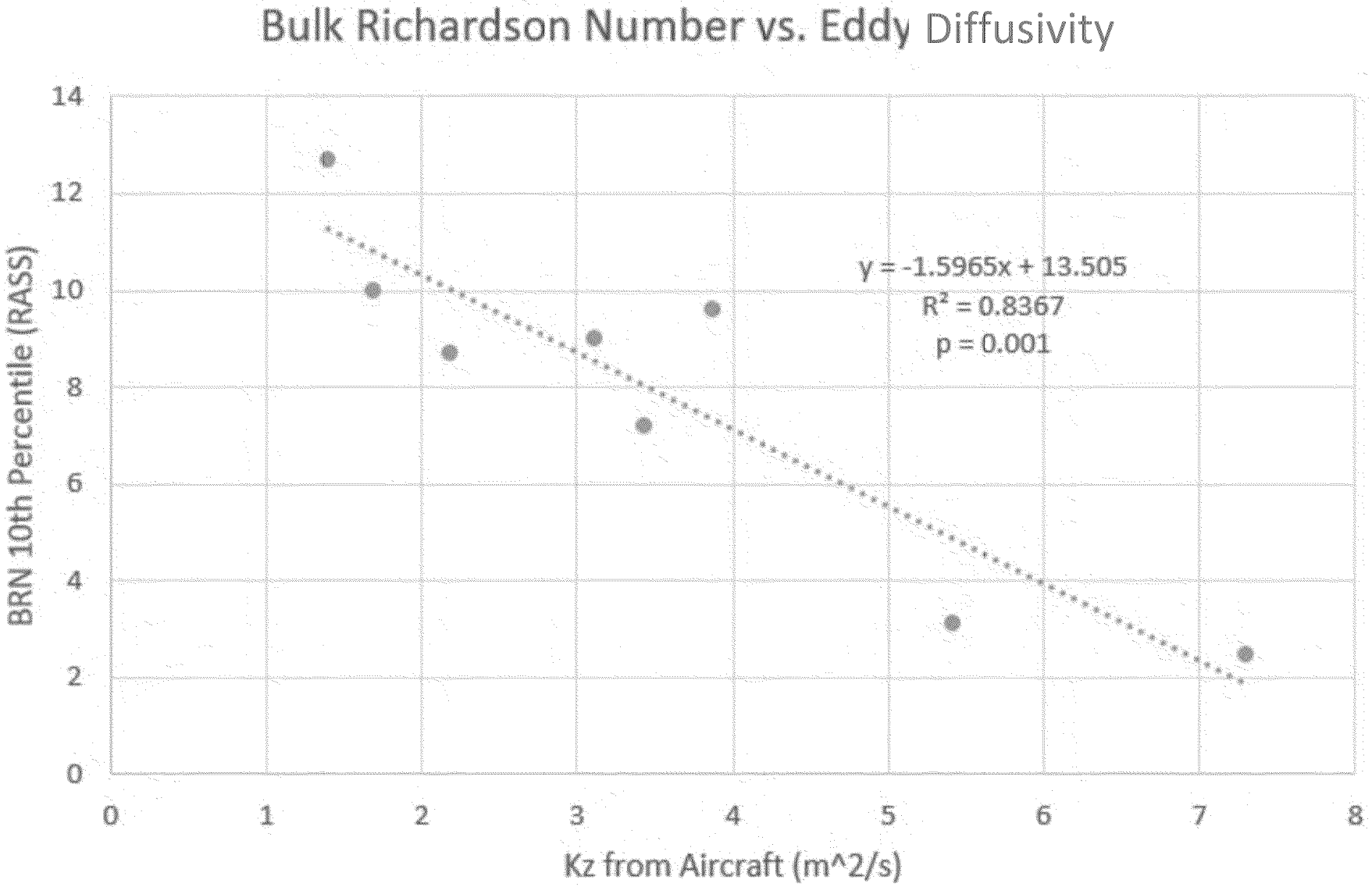
# Overnight mixing modulated by the nocturnal jet strength
# Simple parameterization of eddy diffusivity from Richardson #



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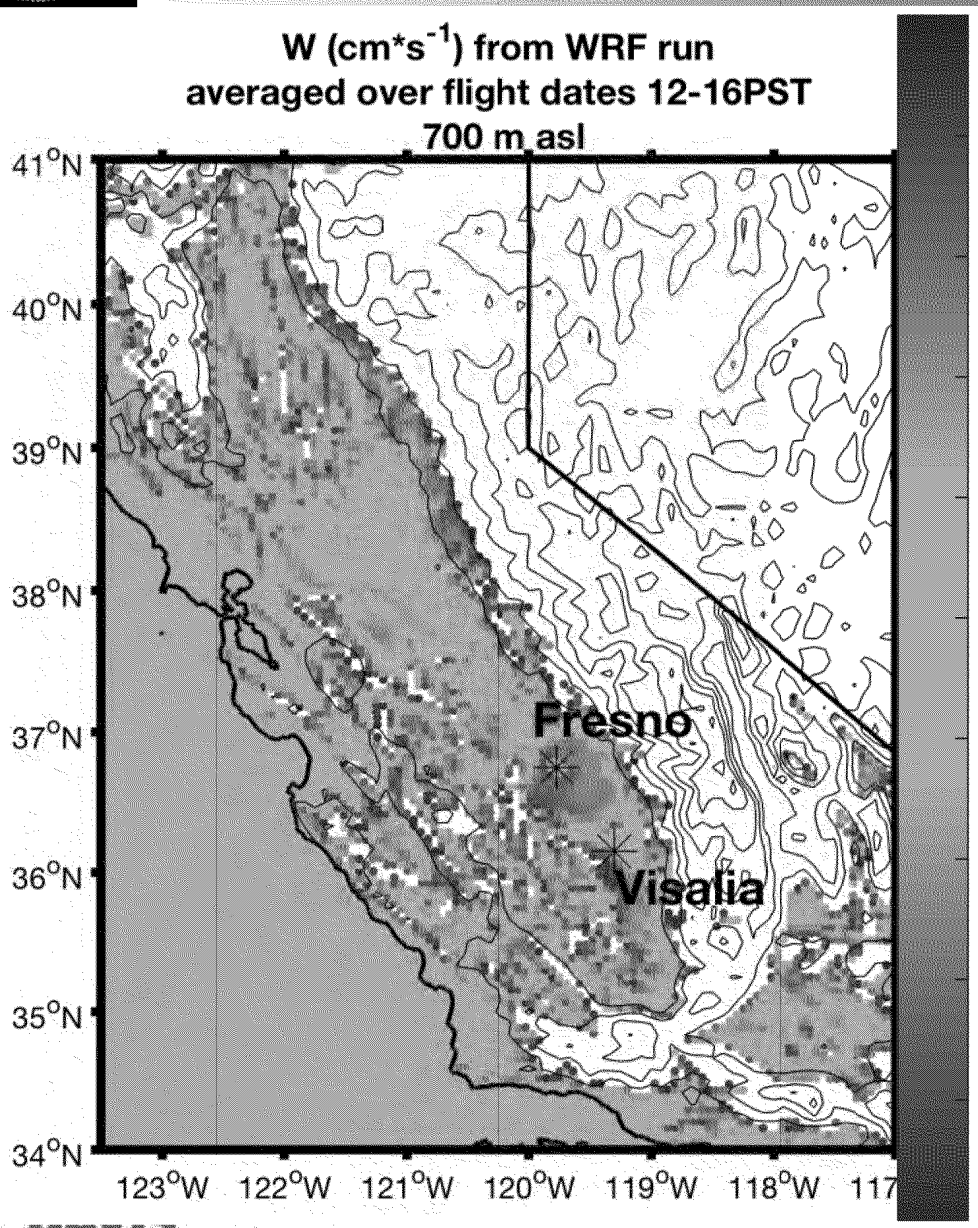
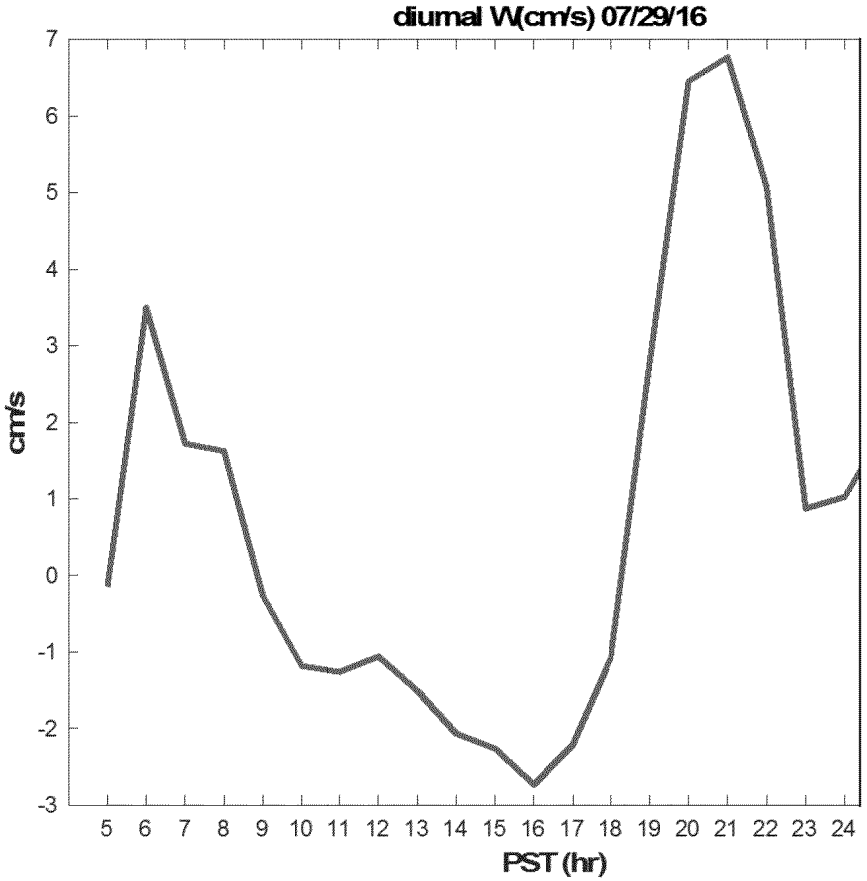
# WRF modeling by S. Chen's Group helps to constrain our estimates of entrainment velocity: 4.3 +/- 0.9 cm/s

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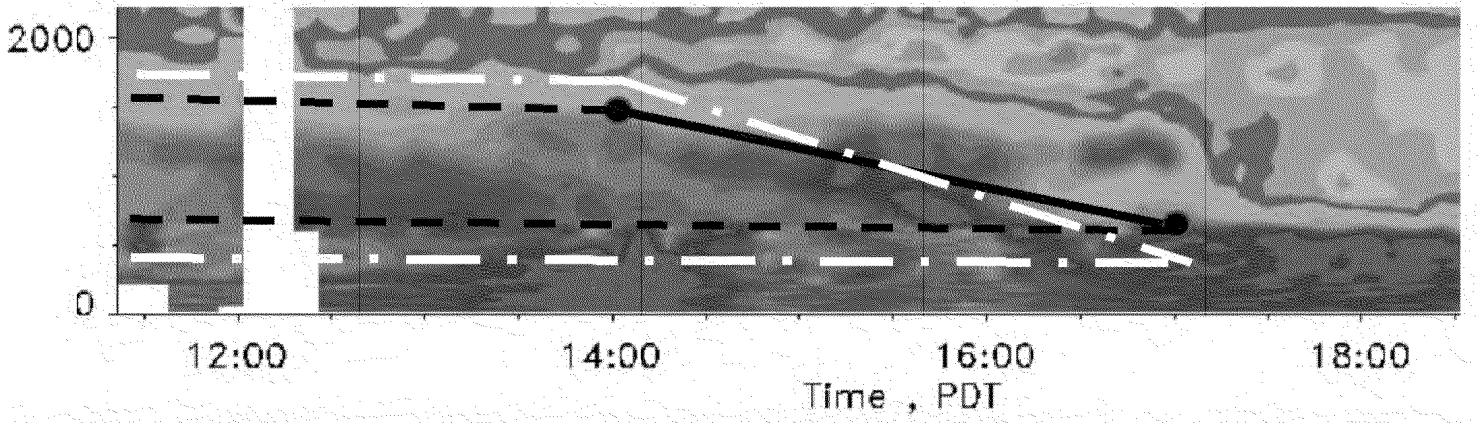
# WRF modeling by S. Chen's Group helps to interpret "subsidence" in TOPAZ figures




$$W = \left(-\frac{830m}{3\ hr}\right) = \frac{-276m}{hr} = -7.68\ cm\ s^{-1}$$

*std dev is 4.6 $cm\ s^{-1}$

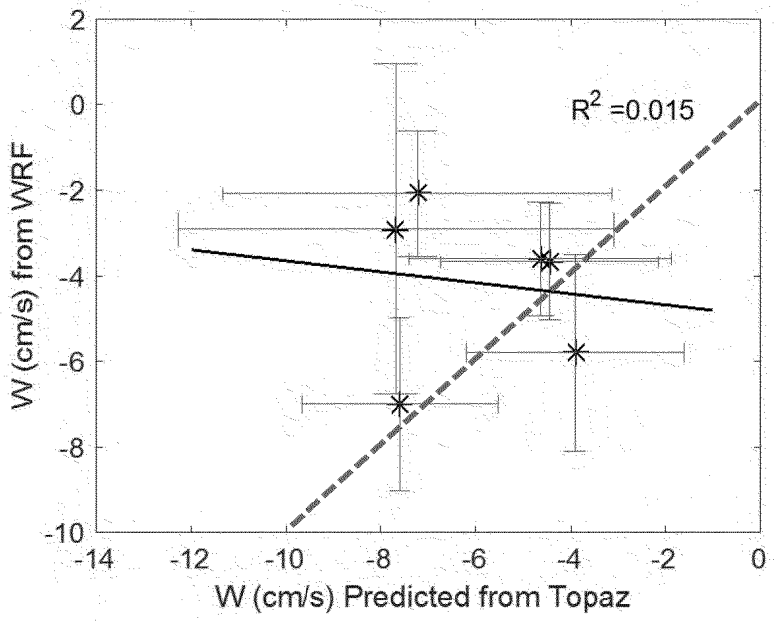



**Fig.** (Above) Here is an example of estimated subsidence from TOPAZ ozone layers on 08/04/2016. The black line is the estimated height change while the white line is an estimated error in that measurement.

**Fig.** (left) Shows the poor correlation we have found between the WRF predicted subsidence and that which was determined from what appear to be subsiding ozone layers in the TOPAZ data. WRF data is selected right above Visalia in the range of 800 to 1500m and then averaged. Clearly we need some way to account for advection of ozone at height to really determine what the ozone at height is doing. Presumably these layers are not simply laminar and have some structure or tilt.



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# Chews Ridge Data During Soberanes Fire
# July 22 – October 15, 2016: 85 days, 535 km

Photo Credit: Chris Reed



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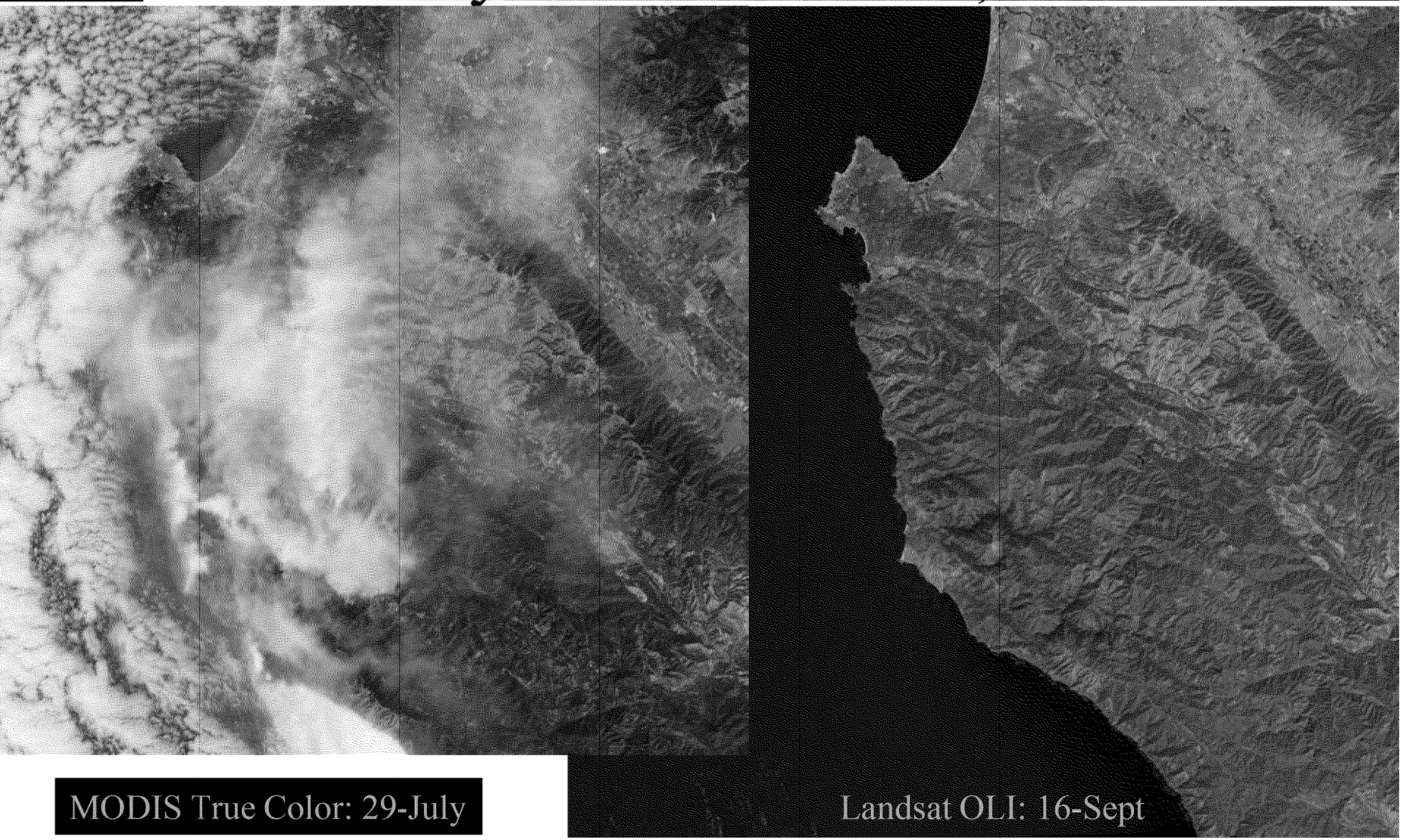
# Chews Ridge Data During Soberanes Fire
# July 22 – October 15, 2016



MODIS True Color: 29-July

Landsat OLI: 16-Sept

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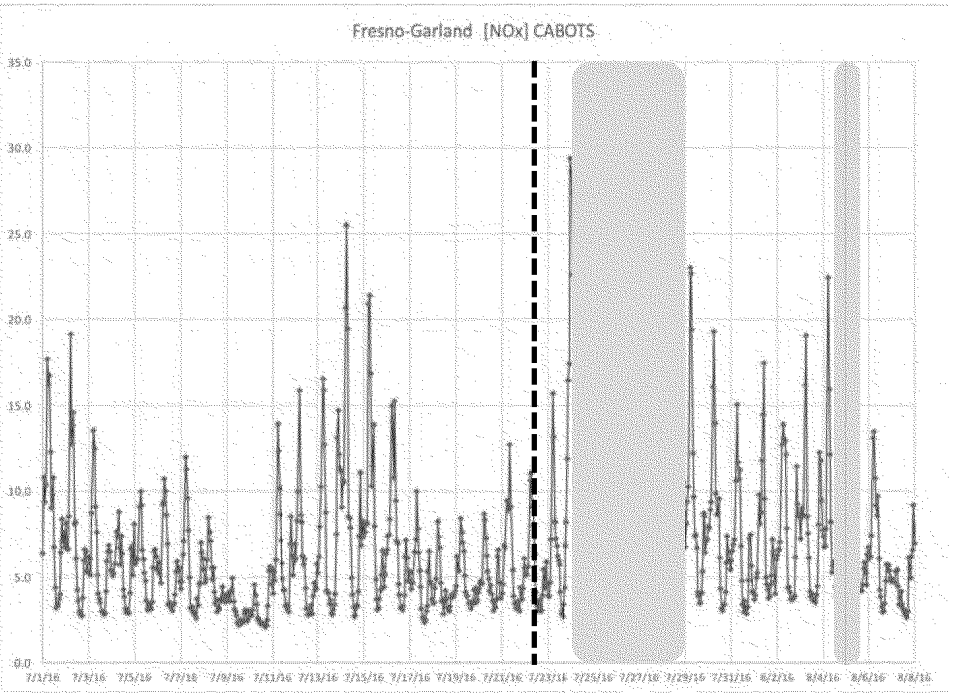
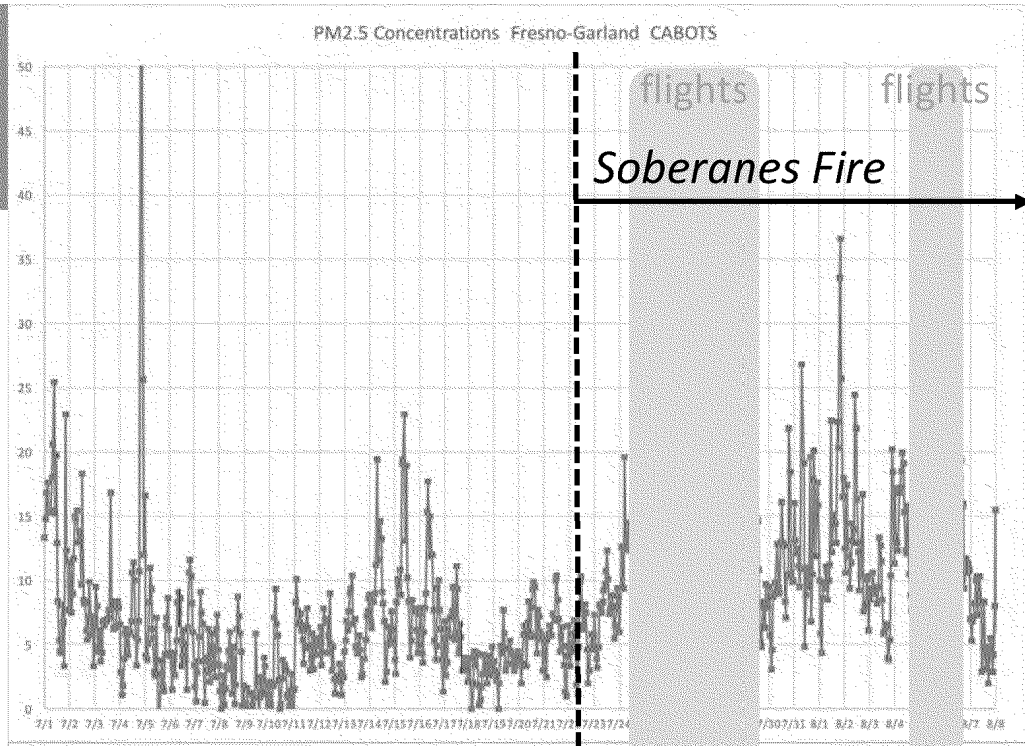
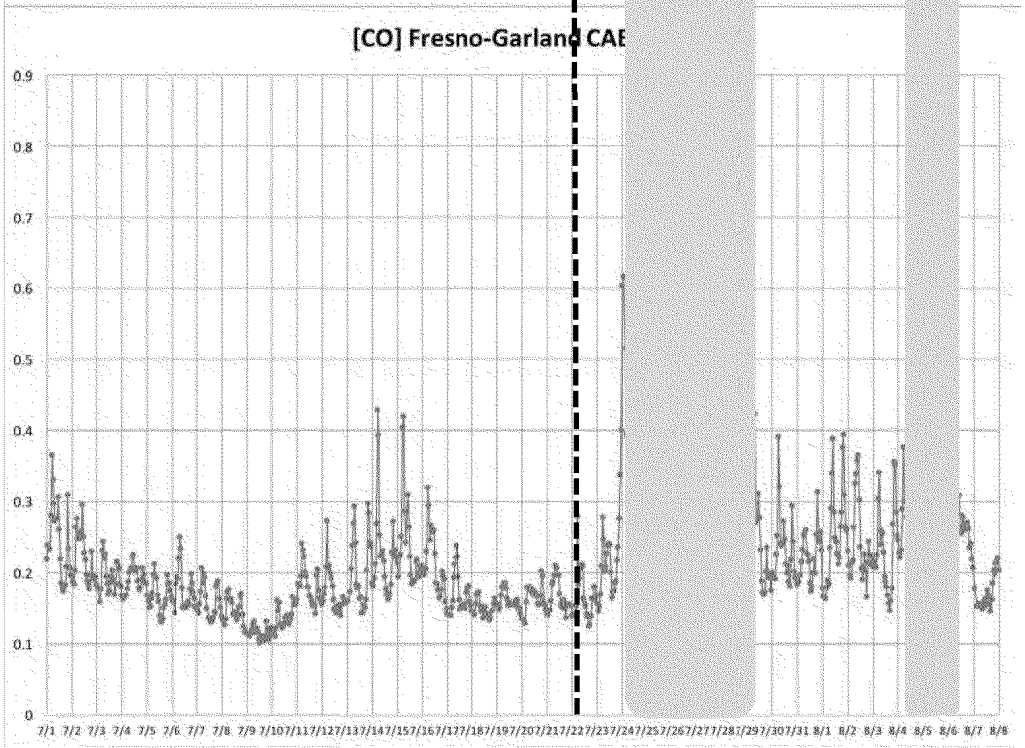
# Soberanes Fire Influence on SJV surface AQ

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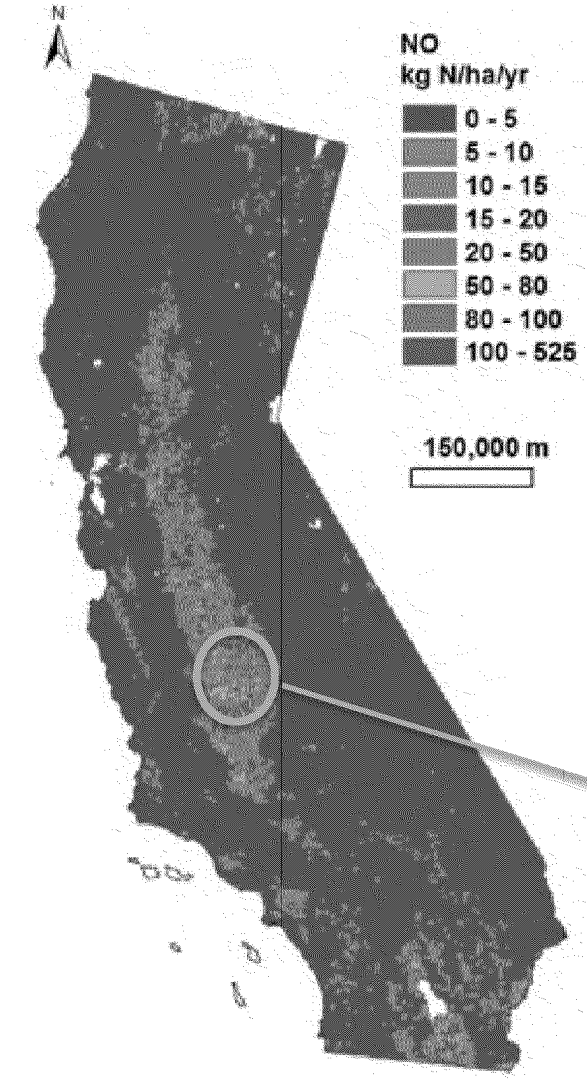
# $NO_x$ Emission Estimates from Afternoon EPA Airborne Budgets

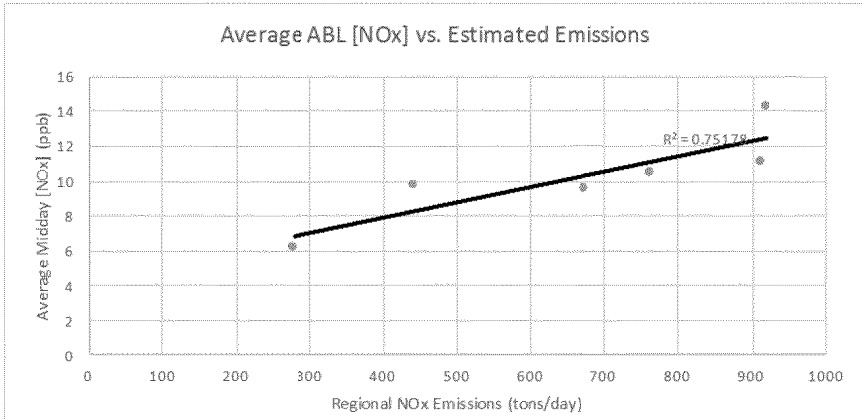



*(ppb/hr)*

| | | | | | | Emissions (tons/d) |
|---|---|---|---|---|---|---|
| **7/27/16** | 0.76 | 0.12 | -0.8 | -3.6 | 9.7 | **442** |
| **7/28/16** | 1.65 | -0.25 | -2.5 | -3.0 | 11.1 | **913** |
| **7/29/16** | 4.14 | 0.18 | -0.6 | -4.6 | 14.3 | **920** |
| | | | | | | |
| **8/4/16** | -0.47 | 0.08 | -0.3 | -2.5 | 6.2 | **278** |
| **8/5/16** | 0.76 | 0.19 | -1.2 | -3.5 | 9.5 | **674** |
| **8/6/16** | 0.86 | -0.01 | -1.5 | -2.9 | 10.4 | **762** |
| **average** | **1.28** | **0.05** | **-1.1** | **-3.4** | **10.2** | **665** |
| **std. dev.** | **1.6** | **0.2** | **0.8** | **0.7** | **2.6** | **259** |

Estimated Soil NOx = **530 tons/d**

CARB NOx Emissions: Kings+Tulare+Fresno+ Madera = **138 tons/d**




Estimates of NO emissions from California soils (natural and cropland) generated by using stable isotopic modelling and IMAGE model.

[from Almaraz et al., to be submitted to PNAS]

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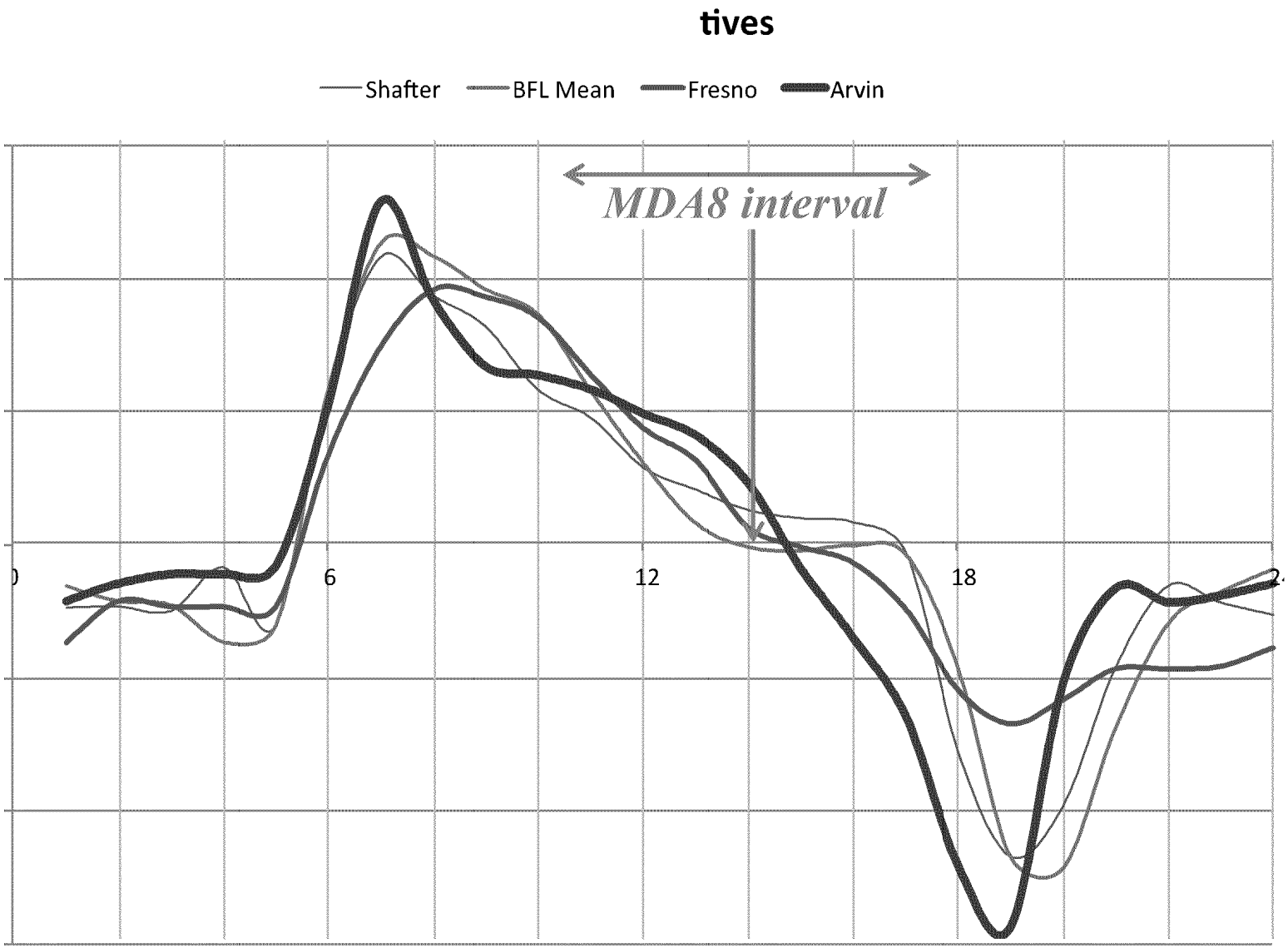
# Current Lines of Research

| Topic: | Preliminary Results: |
|---|---|
| ○ Estimating vertical mixing from midnight to sunrise flight data. *Caputi et al., in preparation.* | ○ Overnight **eddy diffusivity values, $K_z$, range from 1.5-7.5 $m^2/s$**. *Parameterization with overnight bulk Ri #* |
| ○ Careful budgeting of $NO_x$ in the ABL between Fresno/Visalia to regional emissions of $NO_x$, indicative of strong ag soils source in SJV *Almaraz et al., in preparation* | ○ Preliminary **$E_{NOx}$ range 280 – 920 tons/d**. *CARB inventory <140 tons/d* *ag soil NOx ~ 500 tons/d* |
| ○ Chews Ridge data set being finalized for submission to CABOTS. $O_3/NO_x$ in wildfires. *Asher in support of AJAX team*. | ○ CABOTS data is a very unique time series of varying (Soberanes) wildfire influence. *Hypothesis: net $P_{O3}$ in effluent?* |
| ○ Budgets of $O_3$ and $CH_4$ and boundary layer height to improve understanding of local production & ABL dynamics. *Trousdell et al., in preparation* | ○ Preliminary P(O3) range **3.5 – 16 ppb/hr** Brune et al. (2016): **3– 15 ppb/hr** Pusede et al. (2014): **10 – 26 ppb/hr** |
| ○ Modeling residence times of 3 layer system (ABL, Buffer Layer, FT) and how nocturnal transport affects the Residual layer. | ○ Preliminary residence time of 'buffer layer' is ~36 hours. |

# Diurnal pattern of SJV surface $O_3$




PST (hour)



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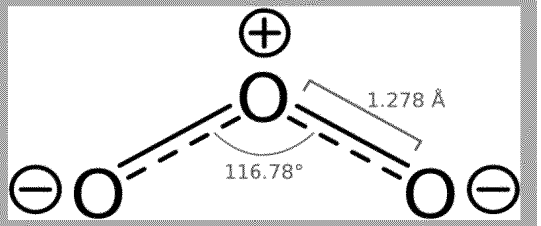
# Background $O_3$ Scientific Assessment Workshop
## Denver, March 28-29, 2017

**Tom Moore, WESTAR-WRAP**



High ozone day in Gothic, Colorado

High ozone day in western U.S.

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# Definitions

- **U.S. background $O_3$ (USBO): $O_3$ formed from all natural sources plus anthropogenic sources in countries outside the U.S. , plus impacts from $CH_4$.**
- **North American Background (NAB) is defined as $O_3$ formed from all natural sources plus anthropogenic sources in countries outside North America, plus impacts from $CH_4$.**
- **USB and NAB must be determined using chemical transport models or source apportionment.**
- **Baseline $O_3$: $O_3$ measured at relatively remote sites that have little or no recent influence from US domestic emissions.**
- **Non-Controllable $O_3$ sources (NCOS): These are sources of $O_3$, or its precursors, that could not be reasonably controlled by domestic legislation. Examples of NCOS are intrusions of stratospheric air or emissions from wildfires.**
- **All of the terms above can be expressed as seasonal, monthly or daily means, maximum daily 8-hour averages (MDA8) or using other statistical metrics.**

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# Goals for this assessment

- Summarize key spatial and temporal patterns of baseline $O_3$.
- Review published work on USBO for the continental U.S. and summarize consistent and robust patterns.
- Identify discrepancies between estimates of USBO and, if possible, the causes for these discrepancies.
- Examine different approaches used to get USBO and evaluate strengths/weaknesses of these approaches.
- Examine evidence for NCOS and their role in daily and seasonal $O_3$ concentrations.
- Review methods to quantify NCOS and evaluate strengths/weaknesses of each approach.
- Develop a set of recommendations for future research in this area.
- Emphasis on new research since 2011 since NAS and UT-Austin assessments.

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# BOSA Core Team

- Prof. Dan Jaffe (University of Washington)
- Dr. Owen Cooper (University of Colorado /NOAA ESRL)
- Prof. Arlene Fiore (Columbia University)
- Dr. Barron Henderson (EPA OAQPS)
- Prof. Daven Henze (University of Colorado)
- Dr. Andrew Langford (NOAA-ESRL)
- Dr. Meiyun Lin (Princeton University / NOAA GFDL)
- Mr. Tom Moore (WESTAR-WRAP)
- Dr. Gail Tonnesen (EPA Region 8)
- Prof. Ted Russell (Georgia Institute of Technology)

**Our goal is submission of critical review paper to EST or other journal by end of Summer 2017.**

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# Why does background $O_3$ matter?

- Background $O_3$ represents the endpoint in health and ecosystem risk analysis or cost-benefit analyses as emissions are reduced;
- Knowledge on background $O_3$ is needed to set reasonable and achievable air quality standards;
- Knowledge on background $O_3$ and non-controllable sources is needed to determine when exceedances might be beyond local control.
- A model's ability to capture baseline ozone indicates that we are capturing the key processes and increases our confidence in assessing reduction strategies for $O_3$ as well as other air pollutants.

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# National Academy of Sciences (2009) selected findings on $O_3$

- **Baseline concentrations of tropospheric $O_3$ have risen above pre-industrial levels by 40 - 100%.**
- **'Imported' pollution mixes to the surface and contributes to increased concentrations of $O_3$ over populated regions, with detrimental impacts on human health and ecosystems.**
- **U.S. NAAQS $O_3$ violations are caused primarily by domestic emissions, but concentrations are augmented by the changing baseline and episodic non-domestic sources. The influence of imported $O_3$ will become more acute if the US NAAQS continues to get tighter and background concentrations increase due to increasing emissions in developing countries.**

| Changing $O_3$ NAAQS: |
|---|
| 1979: 120 ppb -1 hr |
| 1997: 85 ppb - 8 hr |
| 2008: 75 ppb - 8 hr |
| 2015: 70 ppb - 8 hr |

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# UT Panel: Policy and Research Findings on $O_3$ (McDonald-Buller 2011)

**Research recommendations:**

- Multi-model comparisons;
- Better integration of modeling and baseline observations (obs at "Relatively remove sites");
- Observations on commercial aircraft in the U.S.

**Policy recommendations:**

- Clarity on definition of background $O_3$;
- Need for improved knowledge on BGO including spatial and inter-annual variability and significance w.r.t. standards;
- Better communication between federal and state agencies on BGO.

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# Goals for the Denver Workshop

- **Provide a forum for broader input to the assessment from all knowledgeable experts;**
- **Provide a forum for discussion of key uncertainties;**
- **Identify new methods and tools that the core group might not be aware of;**
- **Identify specific scientific publications that we may have missed;**
- **Make specific recommendations for future research that the committee should consider.**

- **Approximately 150 participants (~50% in-person/~50% online);**
- **18 oral presentations+ handful of posters;**
- **Extensive time for discussion.**

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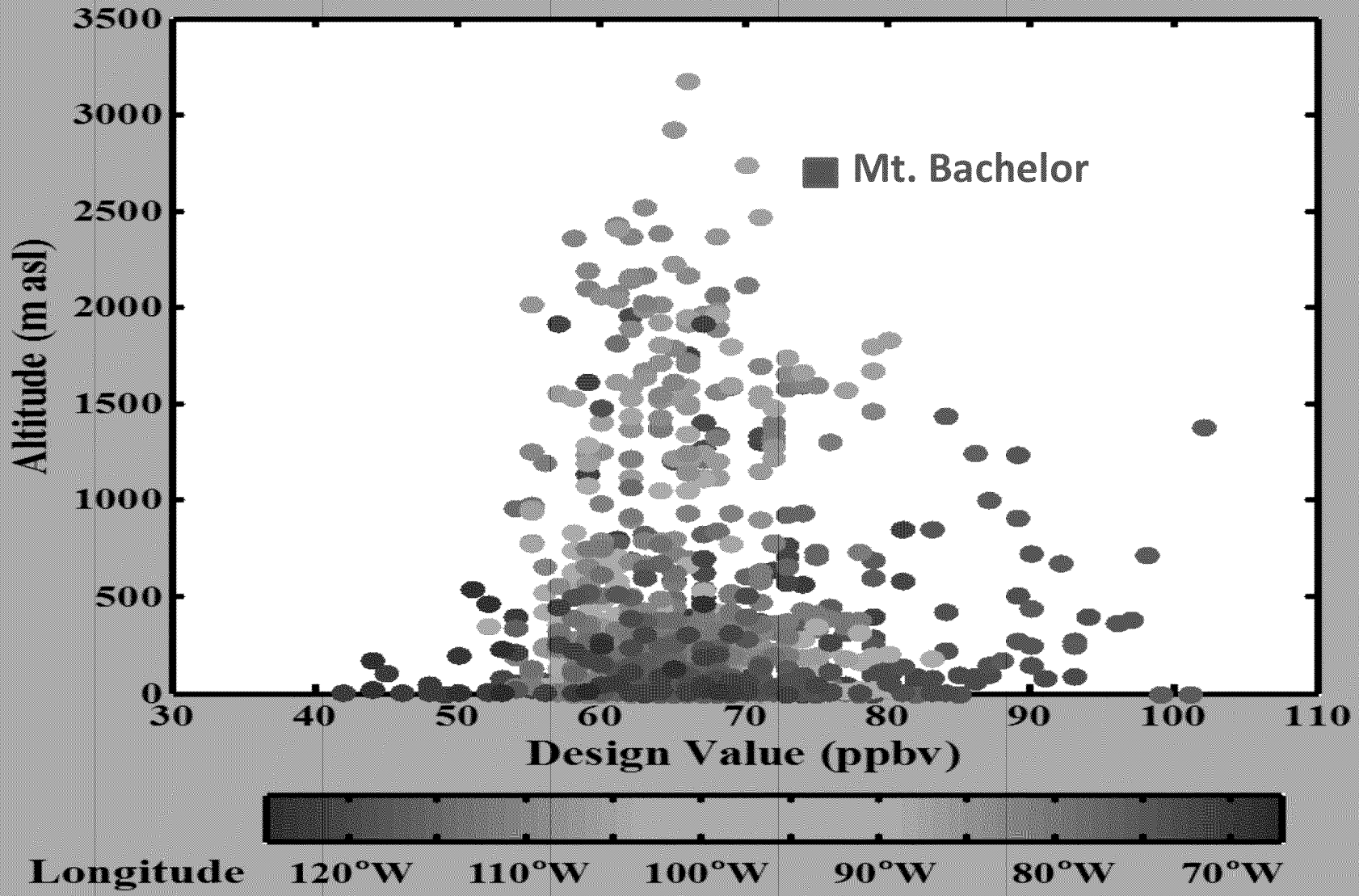
# Current US Design Values vs Altitude




Design Values for 2013-2015 (3-year average of annual 4th highest)

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# Key questions/controversies

- All models have uncertainties and biases. Can we develop an estimate of uncertainty for model derived estimates of USBO? What are the assumptions made in using "relative response" method and are these assumptions valid?
- Trends in $O_3$ are complex and depend on location and period of record. Can we reconcile observed trends with changes in emissions, climate, wildfires, etc? Why are there strong downward trends at California sites, but essentially no trends at sites downwind?
- Regional modeling of controllable sources depends critically on boundary conditions. So propagation of boundary uncertainties can cause significant problems for regional modeling.
- We generally assume that USBO requires a model. David Parrish presented a method that derives USBO from observations and gets much higher values, eg USBO DVs of 60-72 for sites in California. Is this reasonable? What assumptions are inherent in this approach?
- NCOS include stratospheric influence, wildfires and international transport. Models are starting to show good progress for capturing strat influence on surface $O_3$, but not from wildfires. How can we improve our estimates of NCOS on a daily basis?
- While current satellites have little sensitivity to key species in the BL, how can we utilize current and future satellite data to improve our estimates of $O_3$ sources?

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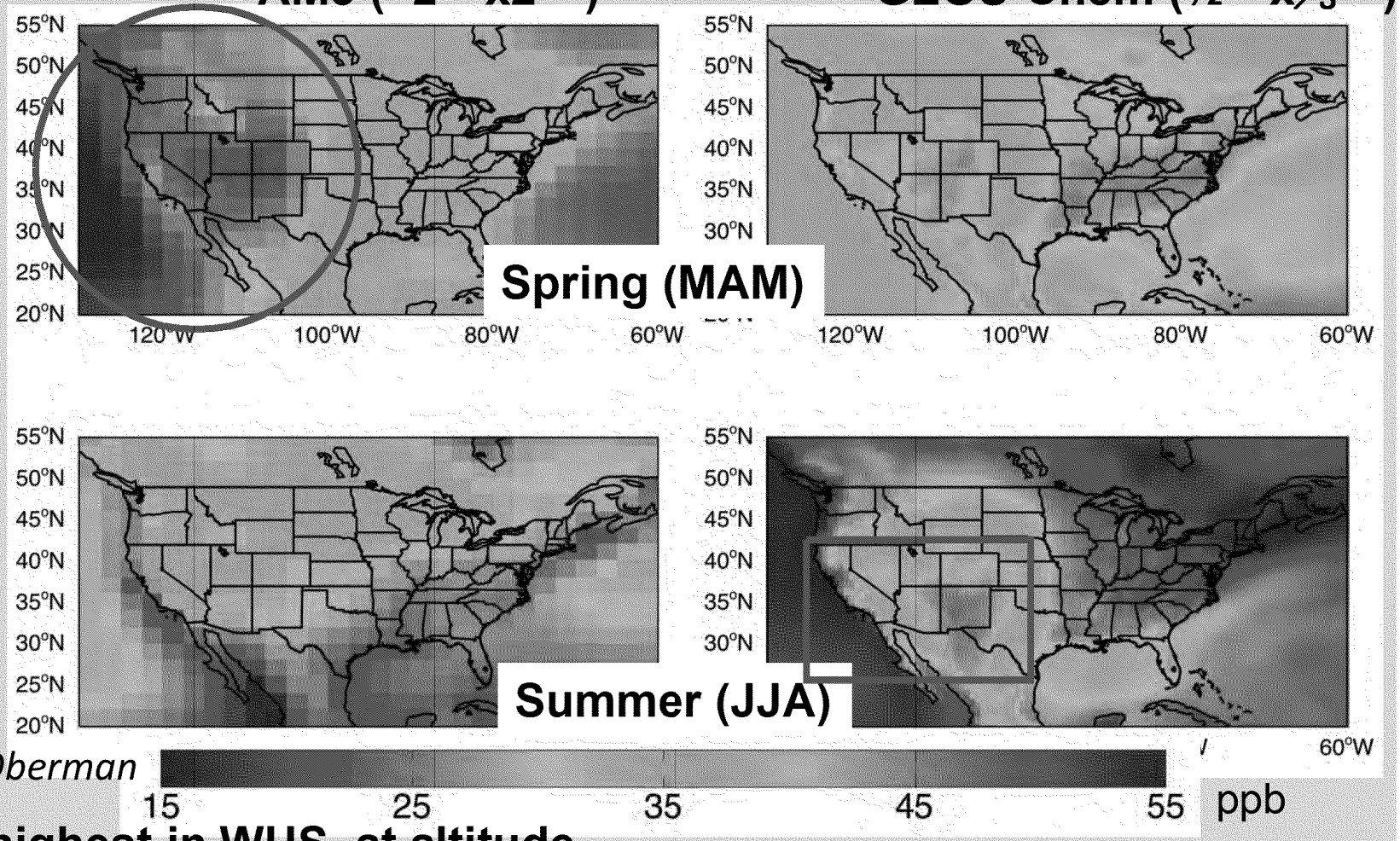
# Model estimates of North American background for 2006: zero out method (from Arlene Fiore, Columbia)

AM3 (~2 ° x2 ° )

GEOS-Chem (½ ° x⅔ ° )

AM3: More $O_3$-strat + PBL-FT exchange? Too high over some regions

GC: More lightning $NO_x$ (~10x over SWUS; too high)




*J. Oberman*

- Usually highest in WUS, at altitude
- Differences/uncertainty associated with influences from lightning $NO_x$, fires, stratosphere, isoprene chemistry

*Fiore et al., Atm. Env., 2014*

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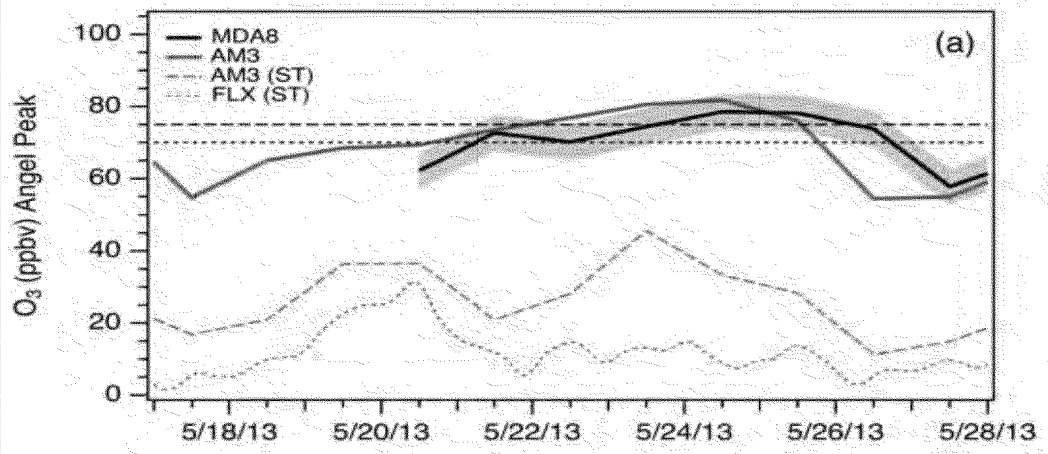
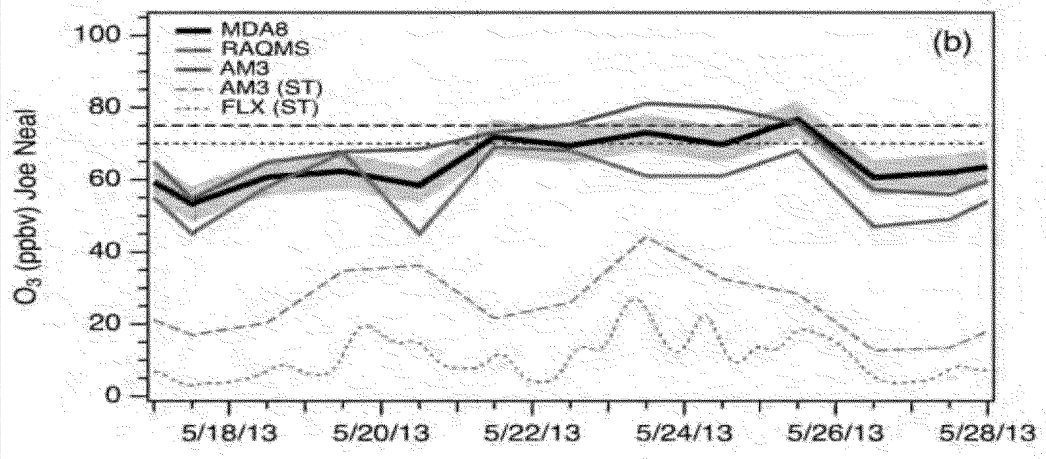
# Las Vegas Ozone Study (LVOS)

From Andy Langford, NOAA




**RAQMS and AM3 bracket the observed values.**

**AM3 and FLEXPART find STT contribution of 20-40 ppbv on May 24-25.**

NOAA/NESDIS **RAQMS** model (Brad Pierce) and NOAA/GFDL **AM3** model (Meiyun Lin)
**FLEXPART** (Jerome Brioude and Stephanie Evan)

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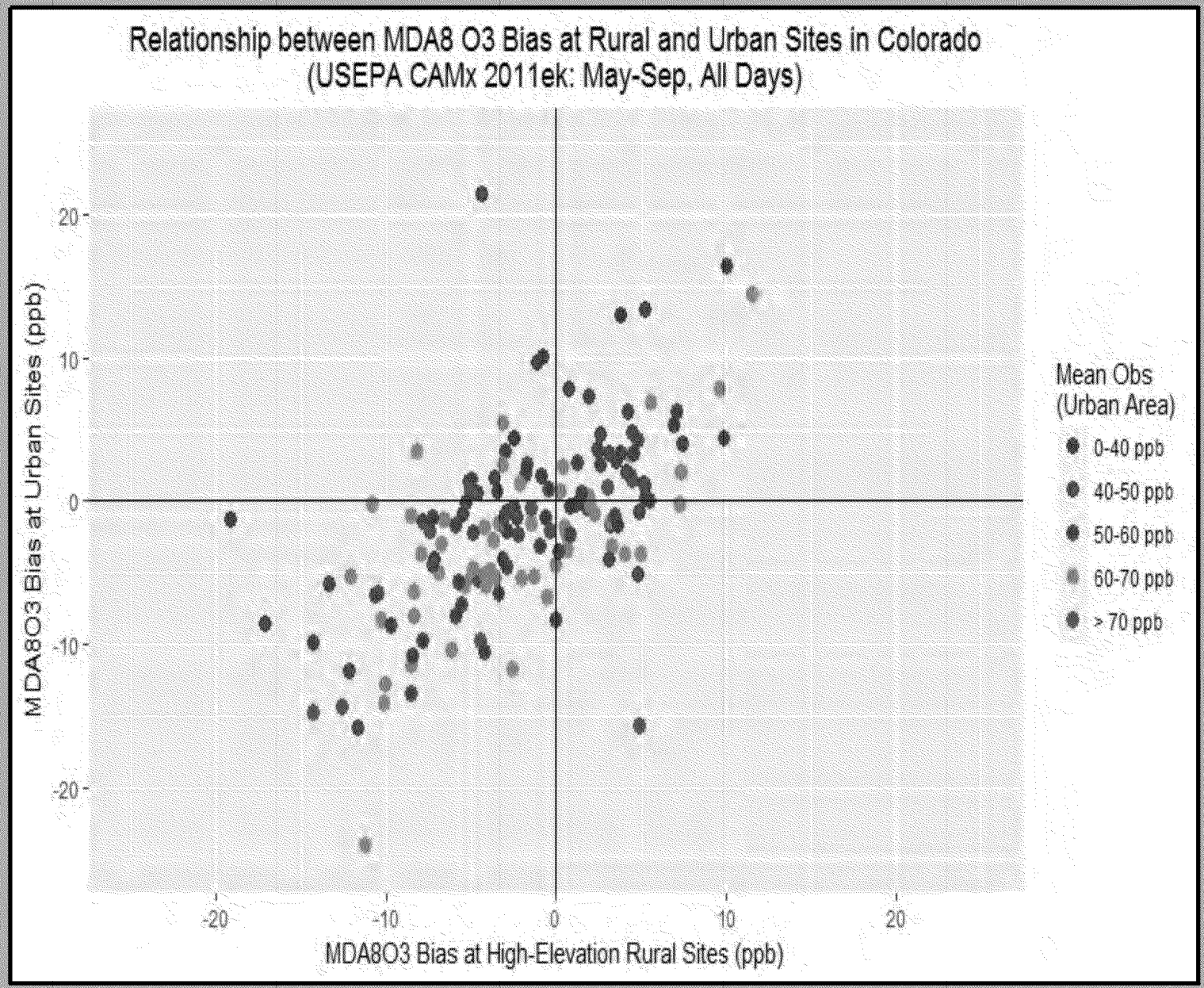
# Simultaneous model bias at rural-urban sites in regional models simulations show that “background“ like cause the observed bias (Barron Henderson, EPA)

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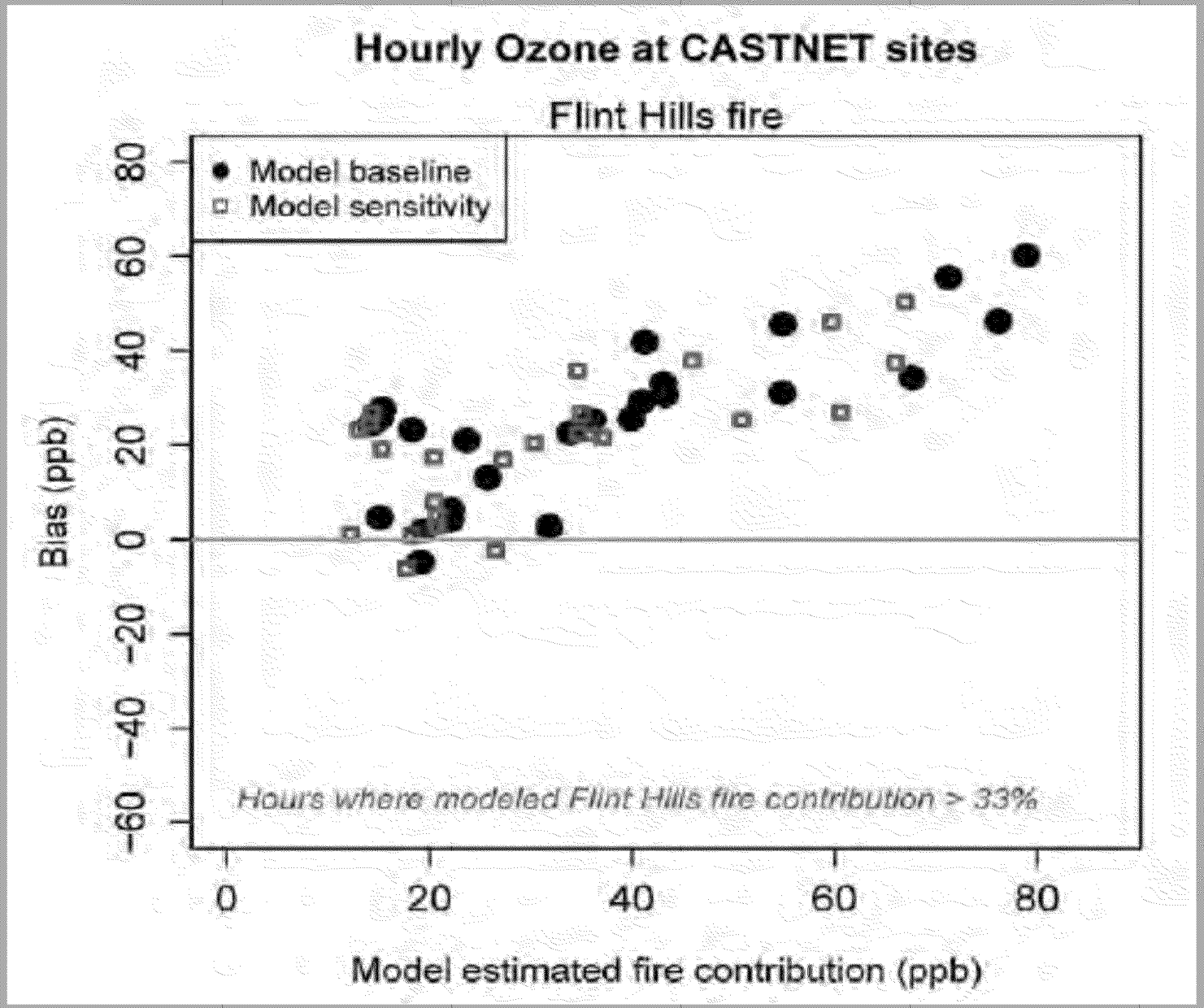
# WRF model over-predictions of O3

## Baker et al 2016




**Sensitivity runs (in blue) used reduced photolysis rates, but this had little impact on over-prediction.**

**This reflects complexity substantial complexity in modeling smoke plumes.**

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# Fires, HMS Smoke and PM2.5 for Aug 20, 2015

Graphics from AIRNOW-Tech site.

PM2.5 with HMS smoke product.

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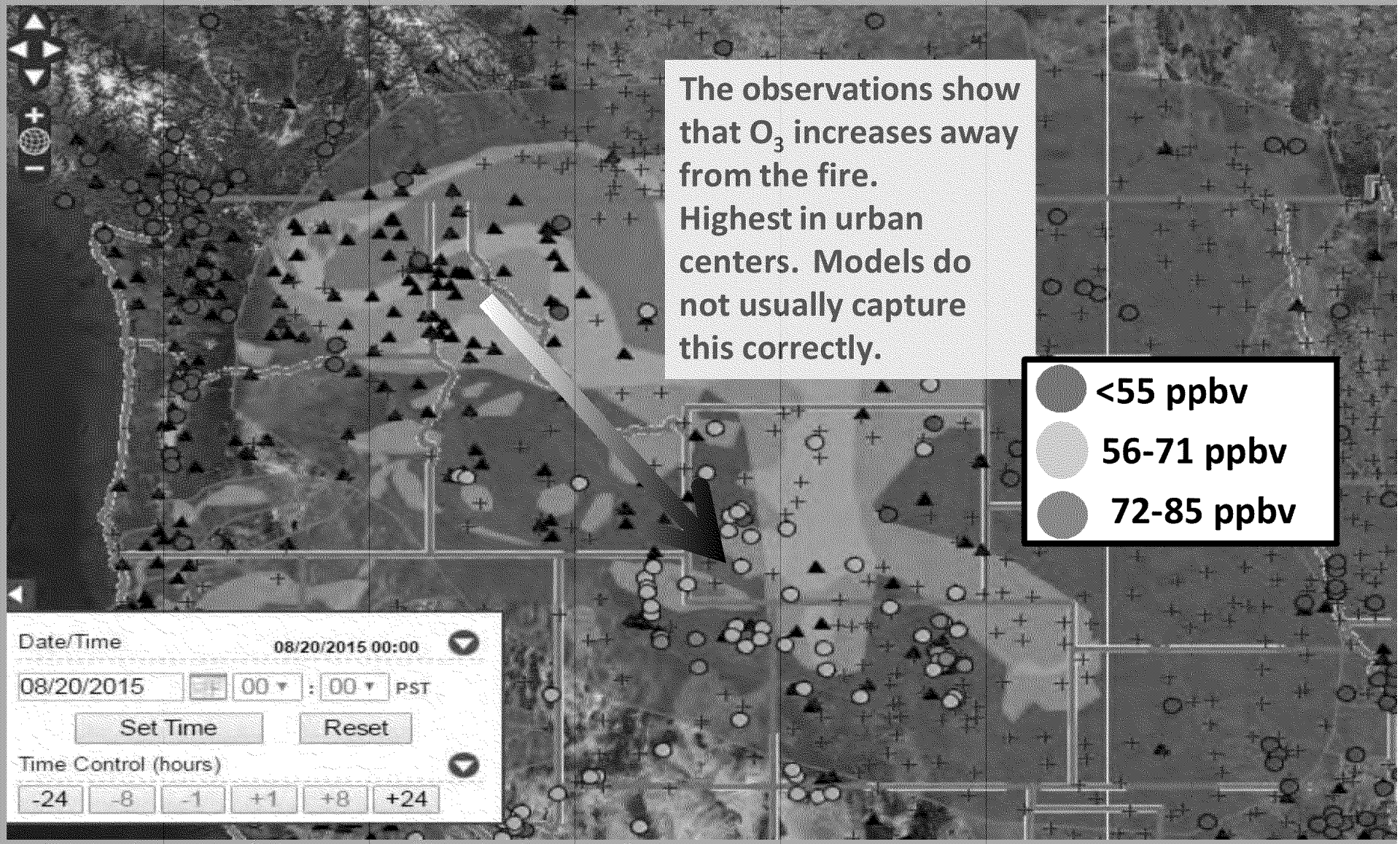
# MDA8 $O_3$ for 8/20/15 with HMS Smoke overlay




Work of Dan Jaffe, University of Washington

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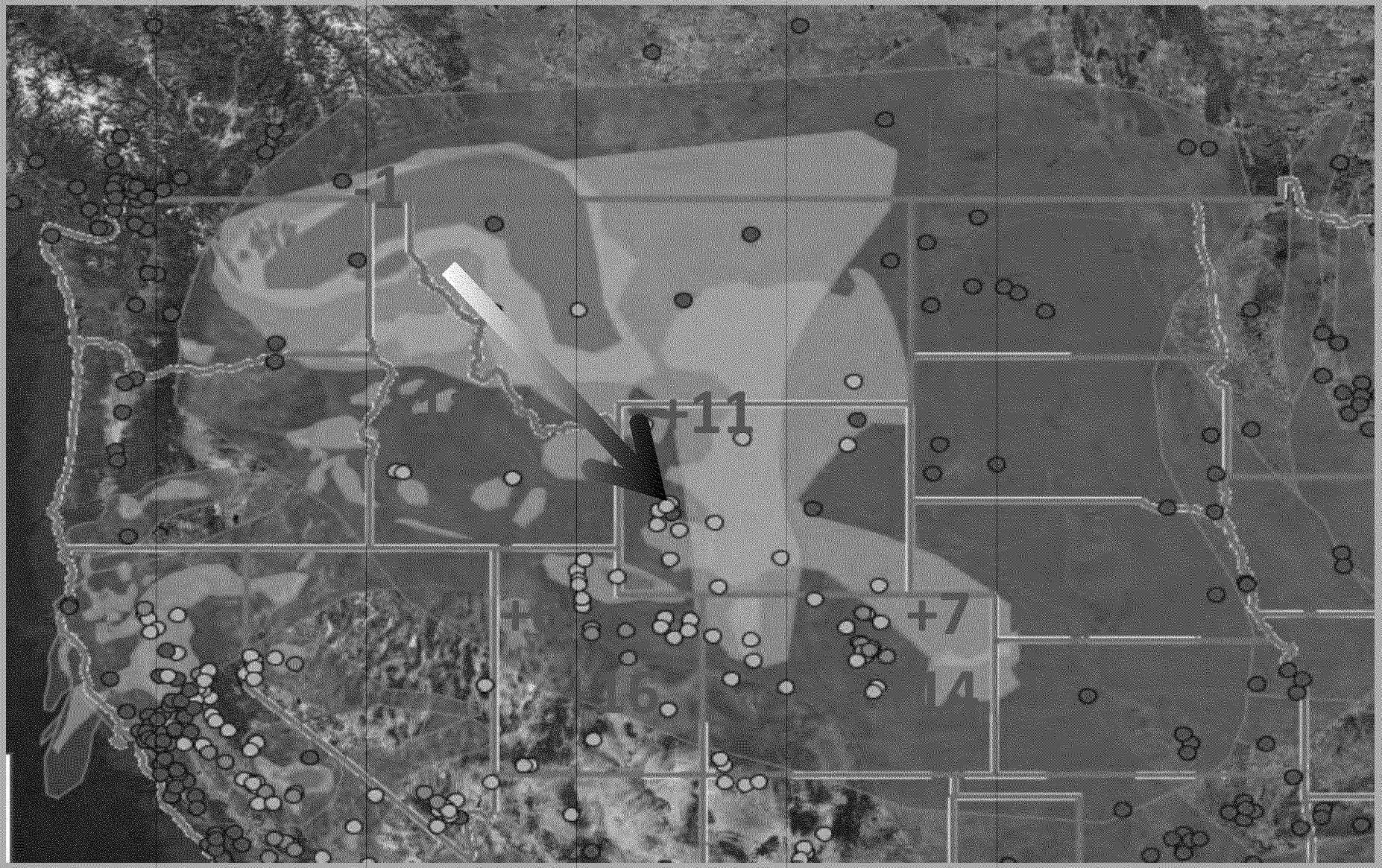
# Estimated wildfire contribution to MDA8 for Aug. 20, 2015




The wildfire $O_3$ is estimated using a "Generalized Additive Model" (GAM) that calculates $O_3$ as a function of numerous meteorological variables. The residual is an estimate of the additional $O_3$ that is not considered by the model (Gong, Jaffe et al 2017)

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# BG $O_3$ Assessment: draft summary recommendations

1. Continue to improve observation network:
   a) Low cost improvements;
   b) Improvements requiring larger investments;
2. Better coordination within and between experimentalists and modeling groups;
3. Improved use of existing data to evaluate, for example, key discrepancies in our understanding of USBO, statistical relationships between tracers and meteorological conditions, etc.
4. Targeted studies on background $O_3$;
5. Continue to improve models;
6. Models should be extensively evaluated with observations that are most relevant to the application;
7. Need for planning and integration of future satellite observations;
8. Need further development of integrated air quality management systems.

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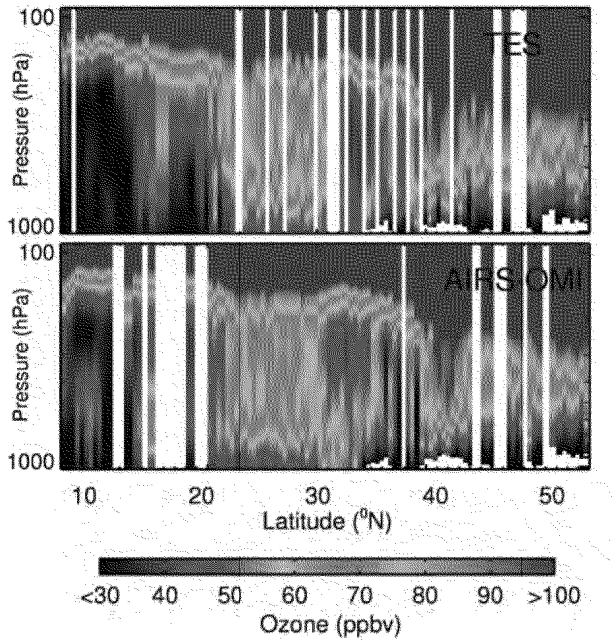
# Satellite-based products and tools to support quantification and attribution of background ozone

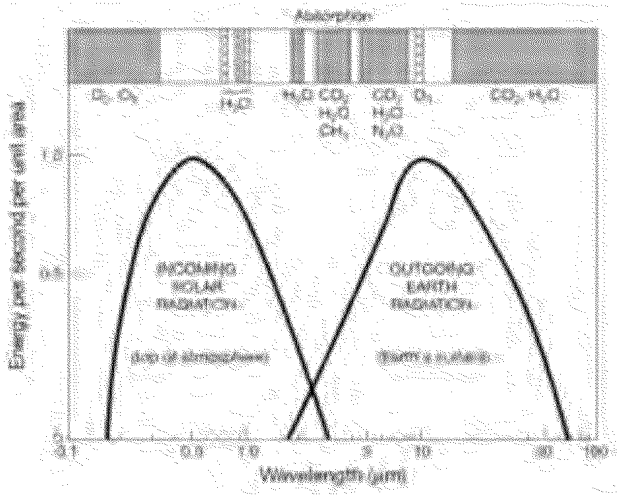
Jessica Neu
NASA Health and AQ Applied Science Team

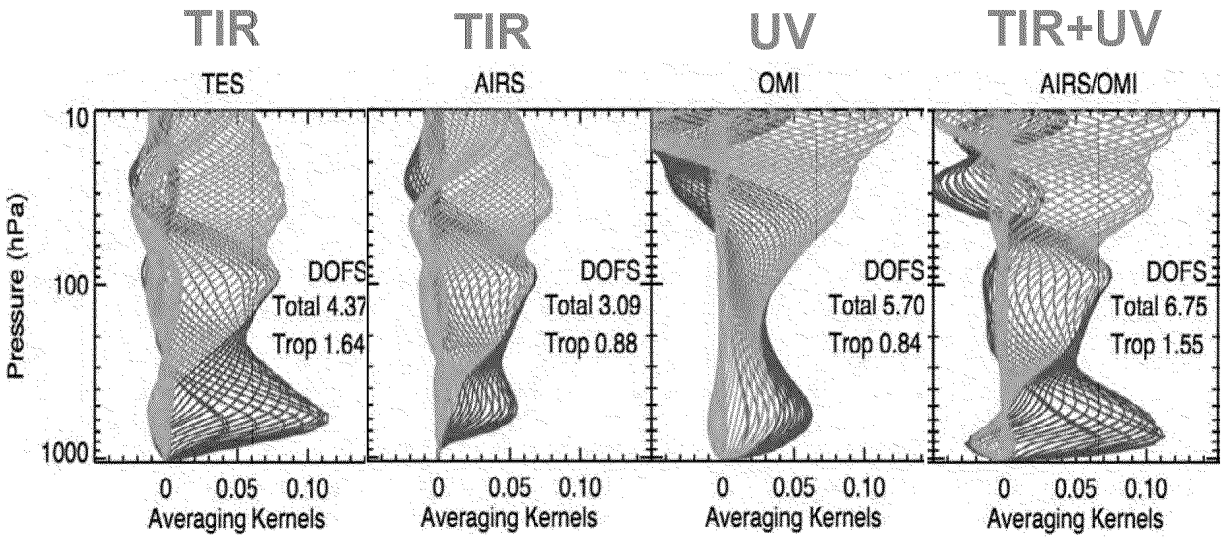


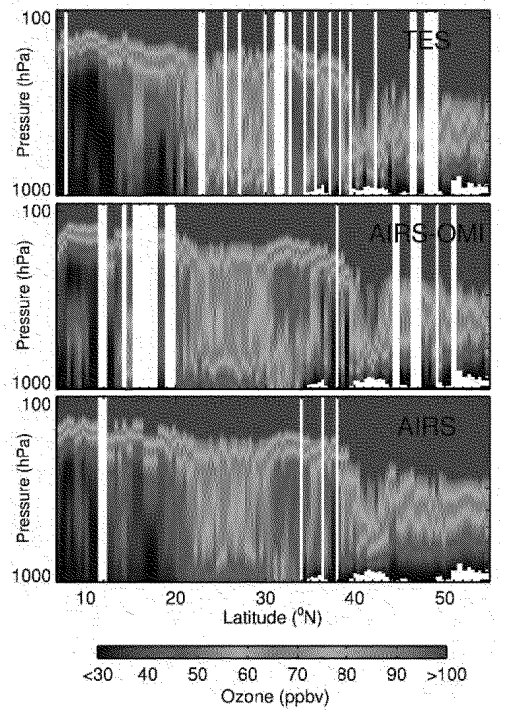
# Satellite Measurements of Tropospheric Ozone – Vertical Sensitivity

Tropospheric Ozone is measured from space via reflected UV radiation or absorption of TIR emission

Averaging Kernels reflect the sensitivity of ozone measurements at a particular pressure level to ozone variations at all other levels



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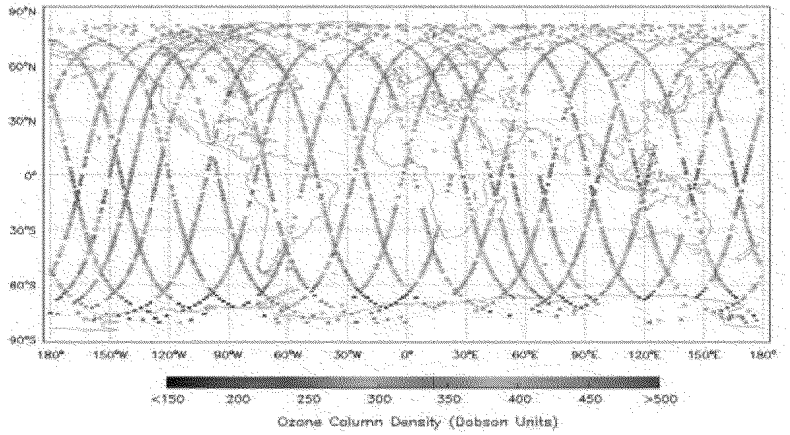
# Satellite Measurements of Tropospheric Ozone – Spatial Sampling

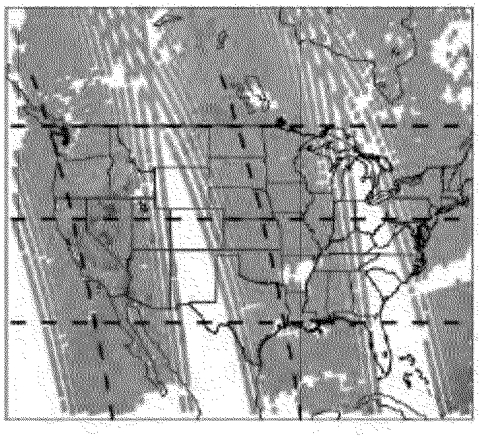
## TES Sampling



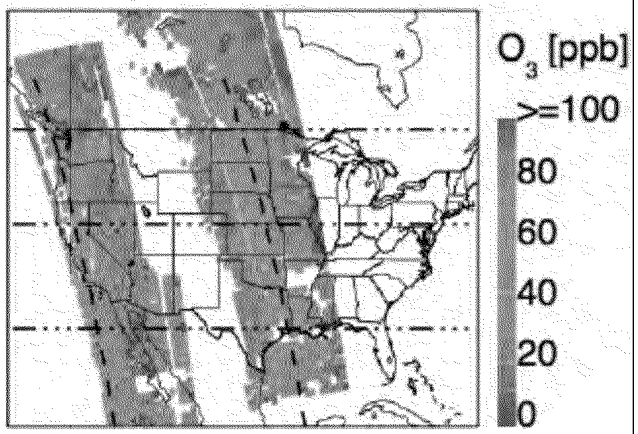

TES measures ozone with a single nadir pixel and 16-day repeat cycle. TES global measurements stopped in 2011 and it now makes regional and megacity observations.

AIRS and OMI are swath instruments that provide dense spatial coverage. Since 2011, OMI has been affected by deterioration of some of the rows of its detectors, resulting in poor data quality over part of the swath.

## AIRS Sampling



## OMI Sampling



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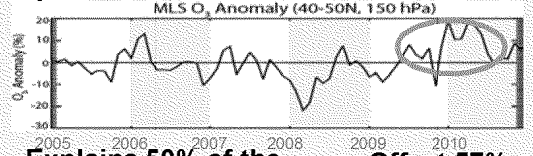
# Long-Range Transport from Eastern China to the Western US

Variability in the stratospheric contribution to tropospheric ozone is very important for understanding regional decadal-scale trends in tropospheric ozone.

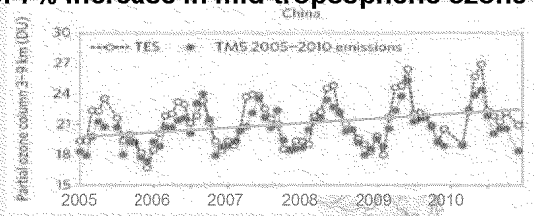
Half of the increase in mid-tropospheric ozone over Eastern China from 2005-2010 can be explained by an increase in downward transport from the stratosphere, largely driven by the 2009-2010 Easterly QBO / El Niño

## Drivers of Regional Ozone Changes

**MLS: Apparent trend in stratosphere-to-troposphere ozone transport due to 2009-2010 El Niño / Easterly QBO**



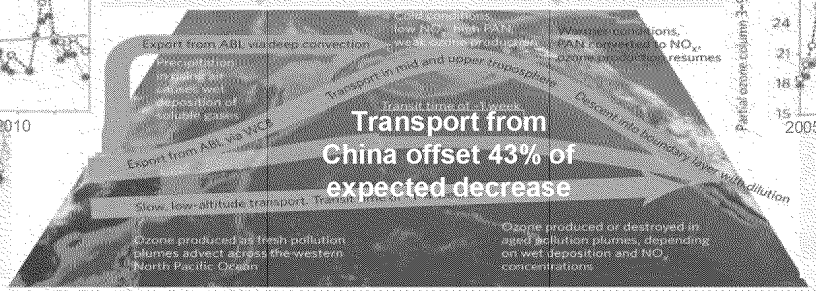

**TES: 7% Increase in mid-tropospheric ozone**



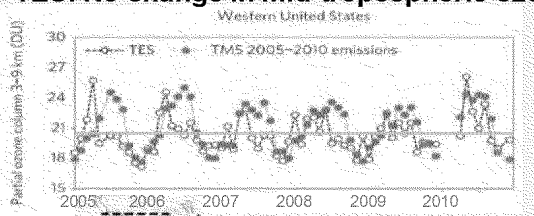

**OMI: 21% increase in $NO_x$ emissions. Explains 50% of the ozone increase.**

**Explains 50% of the ozone increase**

**Offset 57% of expected ozone decrease**




**TES: No change in mid-tropospheric ozone**




**OMI: 21% decrease in $NO_x$ emissions. Should have given a 2% decrease in ozone**

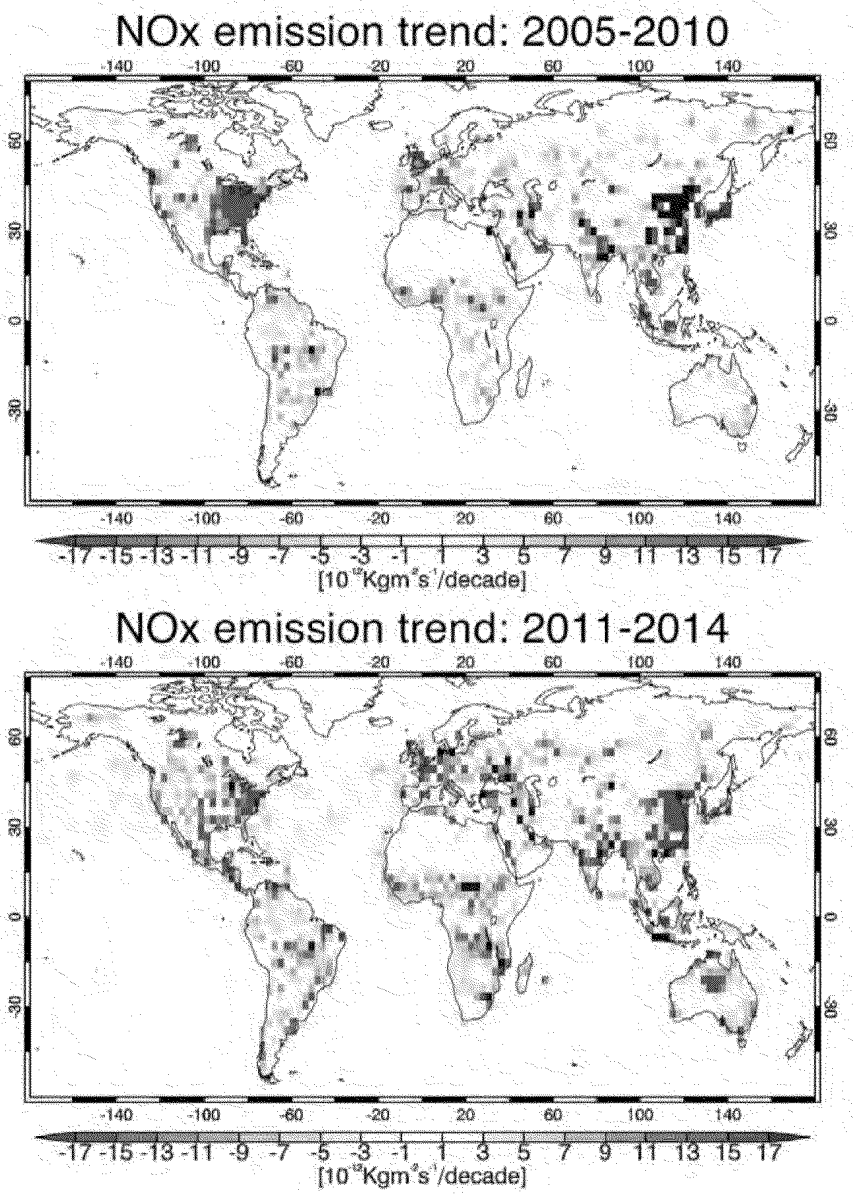
Verstraeten et al., *Nature Geoscience*, 2015

# Emissions changes since 2010

Satellite measurements of $NO_2$ are used to inform $NO_x$ emissions through either mass balance or assimilation

OMI $NO_2$ measurements indicate that $NO_x$ emissions began decreasing throughout much of Asia in 2011.

Latest results indicate that Chinese emissions dropped below 2005 levels in 2015.




Miyazaki et al., ACPD



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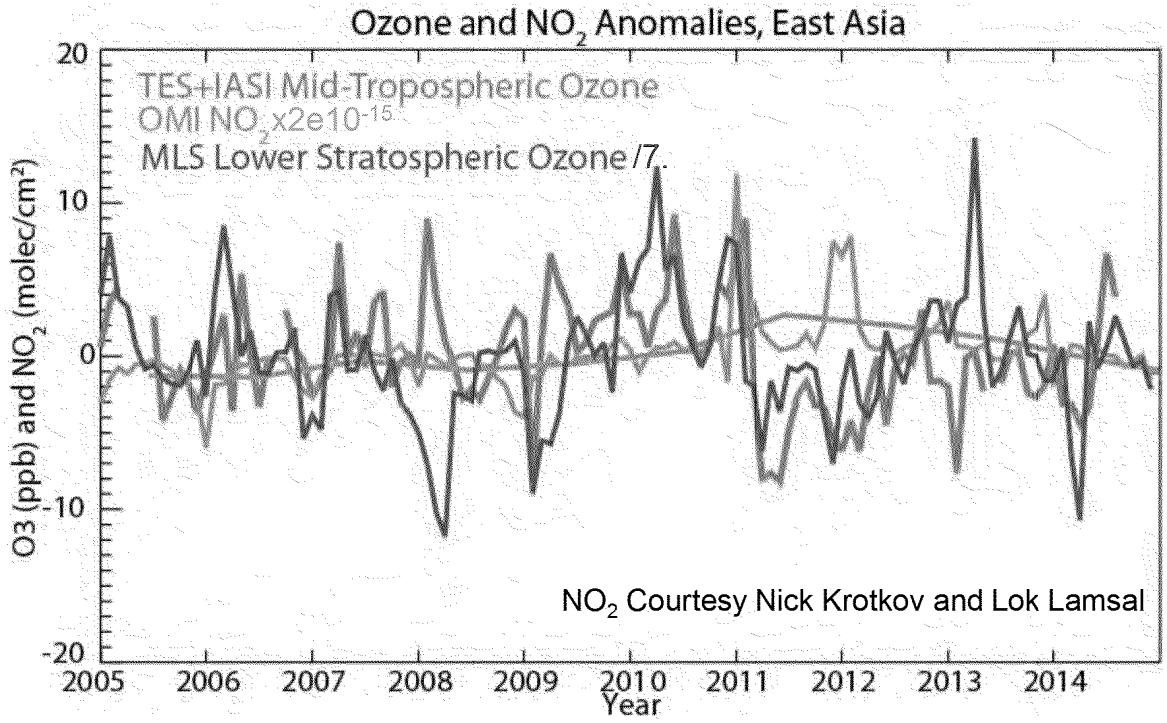
# 2005-2014 Tropospheric Ozone: Emissions and Stratospheric Variability




OMI $NO_2$ over Eastern China declined from 2011-2014. $NO_x$ emissions derived from mass balance indicate a decrease in emissions from the North China Plain

The rapid drop in ozone in 2011 appears to be of stratospheric origin.

What was responsible for this change in stratospheric ozone, and what role have emission decreases played in the decline in ozone over Eastern China?



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# HAQAST-Funded Activities

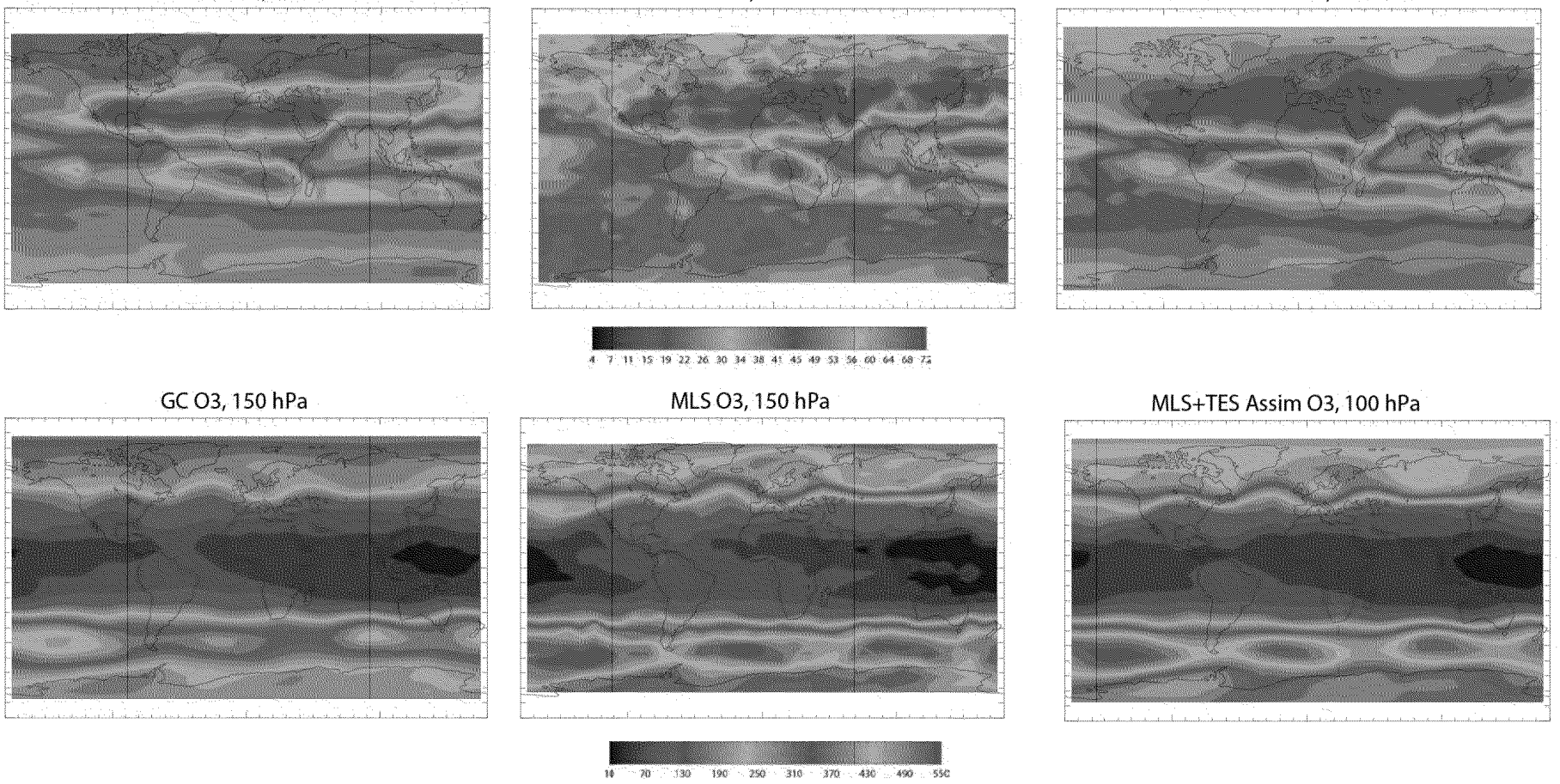
1. Develop a set of satellite-based analyses aimed at supporting quantification and attribution of changes in background ozone in the Western US. We will analyze the relationship between the observed changes in mid-tropospheric ozone and changes in surface ozone in the Western US from 2005-2014 and the attribution of those changes in long-range transport and STE.

2. Use assimilated satellite measurements to generate ozone lateral and upper boundary conditions for regional models. This work will improve the accuracy of these models and their estimates of the contribution of background ozone to high ozone days and thus support development of air quality management policies.

2. Exploit our group's unique capability to generate regional maps of tropospheric ozone profiles from a combination of AIRS and OMI to identify and quantify ozone associated with long-range transport, stratospheric intrusions, and wildfires to aid in exceptional event analysis.

# 3-Dvar Assimilation of Ozone in GEOS-Chem

| | GEOS-Chem Free Running | Observations | Reanalysis |
|---|---|---|---|
| 510 hPa | GC O3 w/TES AK, 510 hPa | TES O3, 510 hPa | MLS+TES Assim O3, 510 hPa |
| 150 hPa | GC O3, 150 hPa | MLS O3, 150 hPa | MLS+TES Assim O3, 100 hPa |




We have generated a 3-Dvar joint assimilation of TES and MLS ozone using the GEOS-Chem model for 2005-2010.



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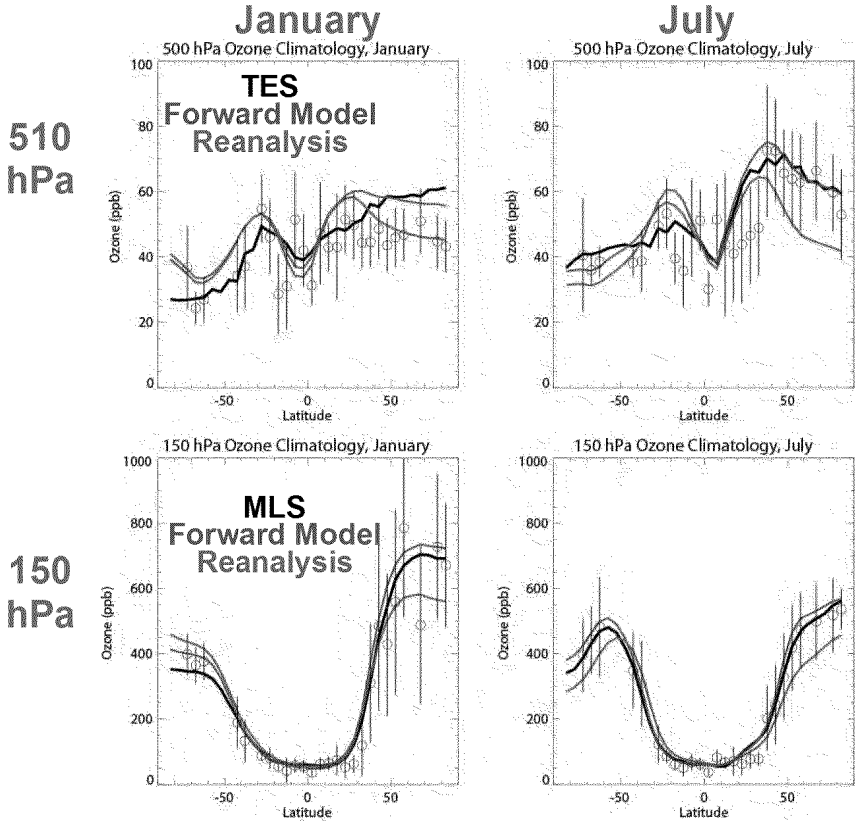
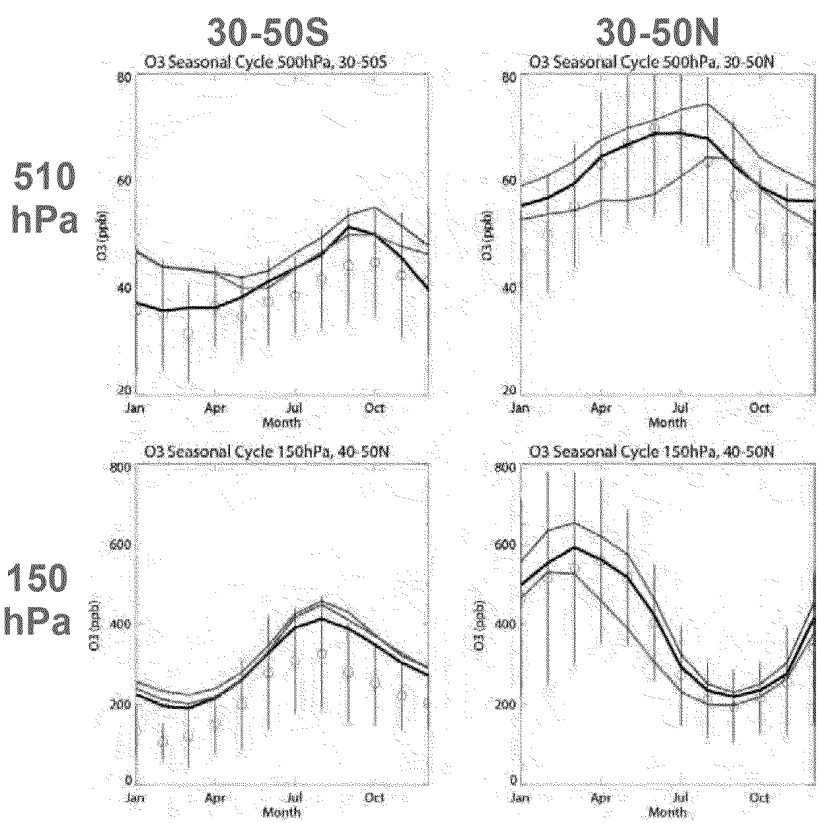
# Evaluation of the Assimilation

## Climatological (2005-2010) Zonal Mean Ozone on Pressure Surfaces




## Climatological (2005-2010) Ozone Seasonal Cycle in Midlatitudes




The largest changes are in the Northern Hemisphere mid- and high-latitudes, and the reanalysis is generally in better agreement with the sondes.

The shape of the NH seasonal cycle is much-improved, particularly during spring in both the troposphere and lower stratosphere



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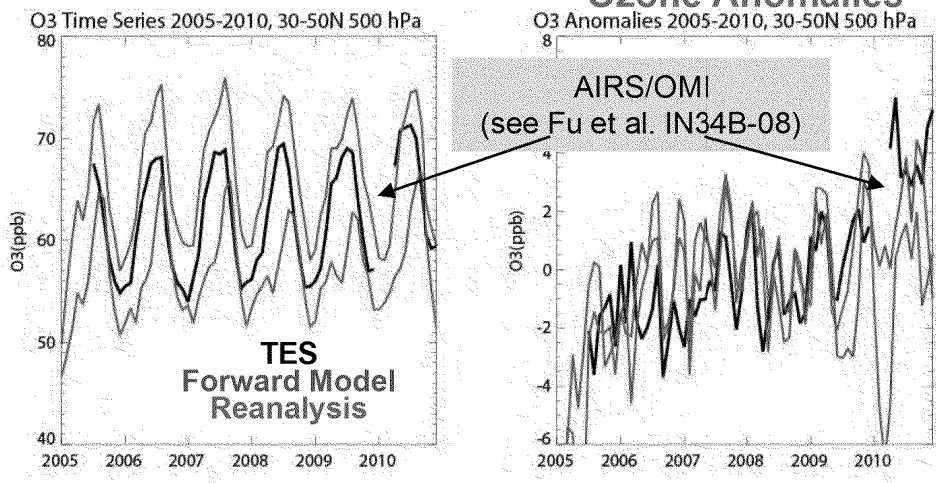
# Using the Assimilation to Investigate Variability in STE

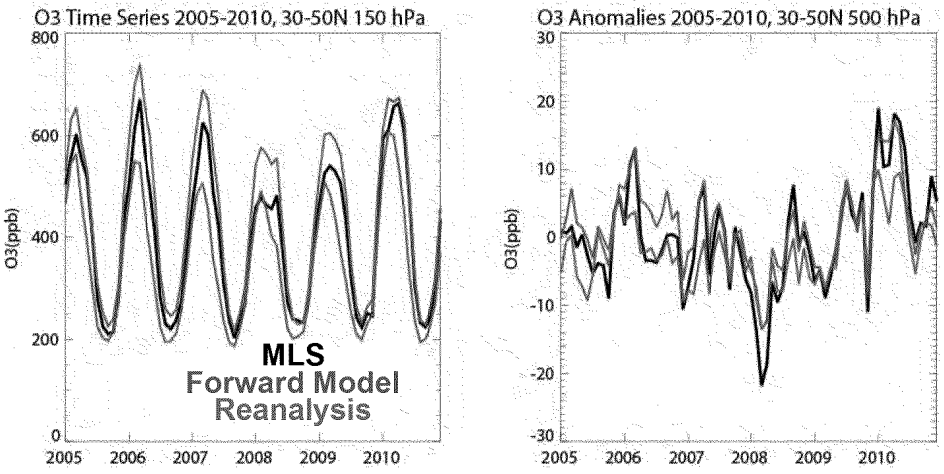
## Ozone Time Series

## Deseasonalized Ozone Anomalies

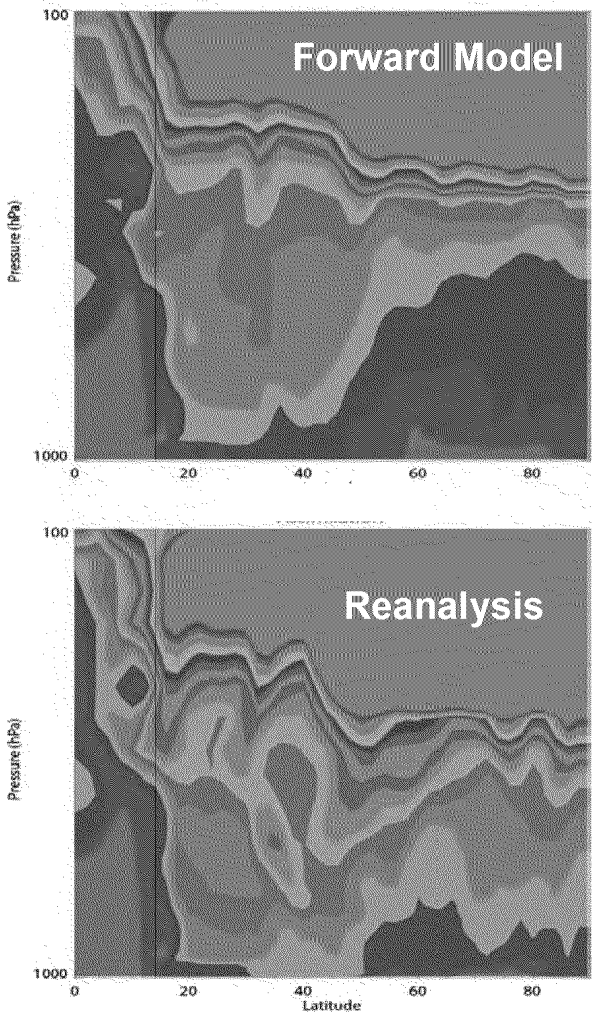
510 hPa




150 hPa




## Ozone Cross-Section




The TES data gap in early 2010 limits the usefulness of the reanalysis for addressing tropospheric ozone variability and trends.

The reanalysis contains observationally-driven small-scale STE features



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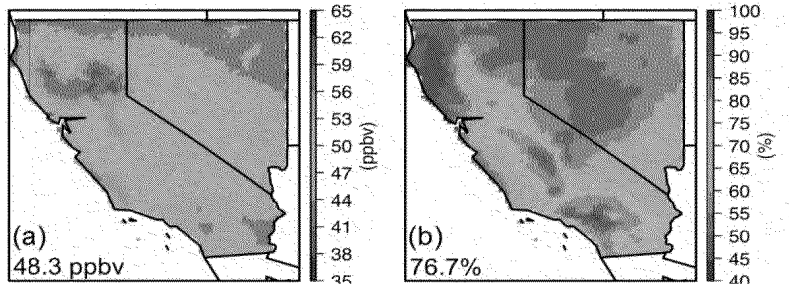
# Multi-scale Assimilation for Quantifying Background Ozone

The TES assimilation was used to drive a regional model in which OMI $NO_2$ was assimilated [Huang et al., 2015].

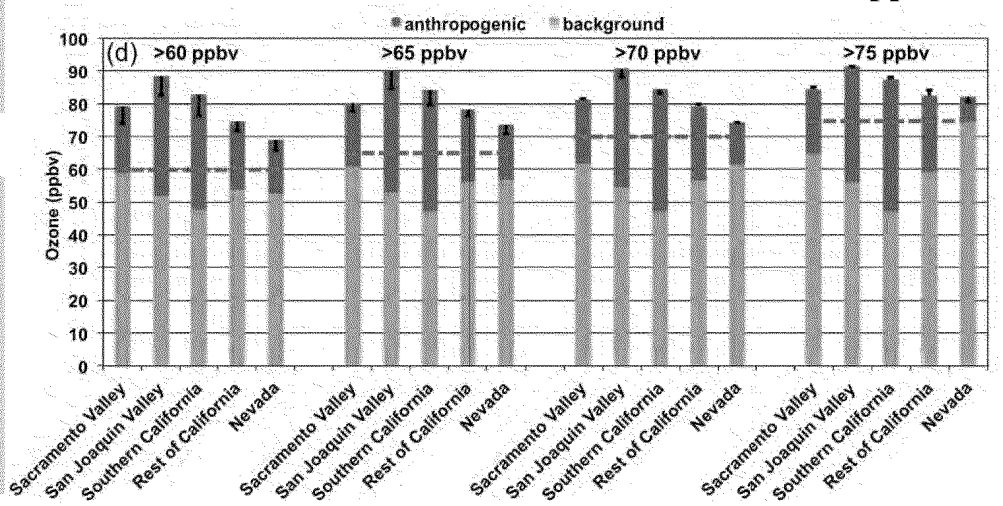
Background ozone was ~77% of total ozone for 2008, when there were anomalously high wildfire emissions. TES and OMI indicate a larger role for non-local pollution (+3.3 ppb) and a smaller role for wildfires (-5.7 ppb) than seen in the free-running model.

Outside Southern California, less than 15 ppb of local anthropogenic ozone can be generated without violating a 70 ppb threshold in a high background ozone year such as this one.

**Mean Background Ozone and its Contribution to Total Surface Ozone as Constrained by TES and OMI**




**Contribution of Background and Anthropogenic Ozone to Exceedances for Ozone Standards from 60 to 75 ppb**



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# HAQAST Tiger Team Proposal on Background Ozone

| Deliverable | AM3 | GEOS-Chem | RAQMs |
|---|---|---|---|
| Boundary Conditions From Satellite-Evaluated Models | Fiore | Neu[c], Henze[c] | Pierce[c] |
| Boundary Conditions from Satellite-Informed Models | | Neu[c](OMI $NO_2$, AIRS $O_3$, MLS $O_3$); Henze[c] (OMI $NO_2$) | Pierce[c] (OMI $NO_2$, $O_3$, AIRS CO, MLS $O_3$, MODIS AOD) |
| Background Ozone (U.S. Anthropogenic Emissions set to 0) | Fiore | Neu (Standard model)<br>Neu (OMI $NO_2$, MLS $O_3$)<br>Henze (OMI $NO_2$) | |

The Tiger Team proposal aims to provide boundary conditions from satellite-evaluated and satellite-informed global models to regional modelers. We hope the CABOTS measurements can be used for evaluating the improvement provided by assimilation.



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# Ozone Simulation During CABOTS Period

BAAQMD Staff

Saffet Tanrikulu, Jeff Matsuoka, Yiqin Jia and Su-Tzai Soong

April 19, 2017

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# Goal

- Simulate Base-case ozone
- Evaluate and improve model performance
- Investigate ozone reductions from planned and adopted emission controls?
- Investigate relative contributions of locally generated vs transported ozone
- Quantify intercontinental ozone transport

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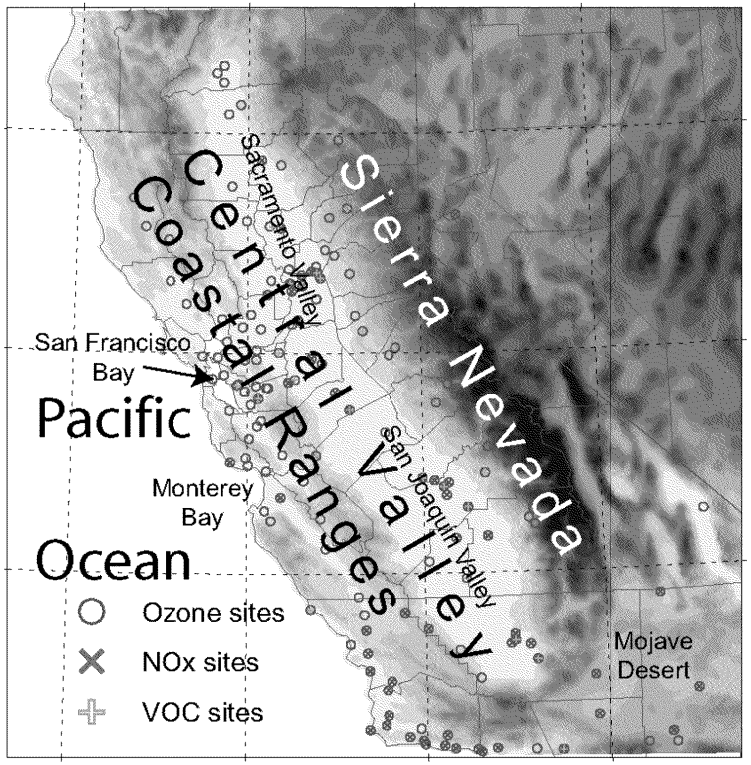
# Ozone Simulation

Presentation:

- Emissions inventory preparation: Jeff Matsuoka
- Meteorological simulation: Yiqin Jia
- Air quality simulation: Steve Soong




CABOTS Modeling Domain, the same as CCOS/CRPAQS domain

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# Emissions Inventory Preparation

## Geographic Extent

- Same domain as 2000 Central California Ozone Study (CCOS)
- 185 x 185, with 4km x 4km grid resolution
- No Nevada emissions

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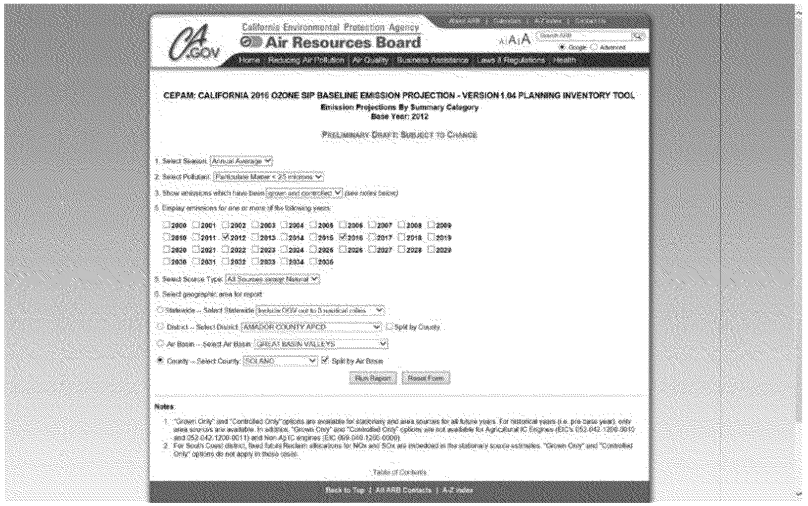
# Sources of Emissions Data

- Downloaded 2016 data which ARB developed for Ozone SIP
- Supplemented with detailed point source information from BAAQMD permit data
  - Used CCOS detailed information for point sources outside Bay Area
- Biogenic emissions from CCOS (2000) ARB inventory, adjusted for Temperature
  - Evaluating MEGAN, BEIS3



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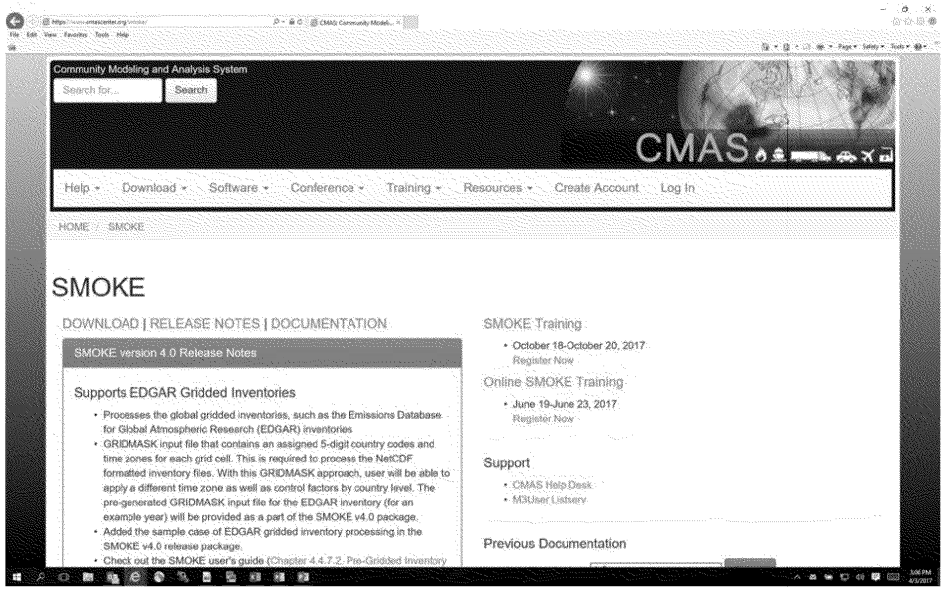
# SMOKE Model

- US EPA emissions processing model
- Prepares spatially allocated, chemically speciated hourly emissions for direct input into CMAQ
- Generates custom reports for QA/QC



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# Bay Area 2016 Annual Average Anthropogenic Emissions

| 2016 (tons per day) | CO | NOX | SO2 | TOG | NH3 | PM2_5 | PM10 |
|---|---|---|---|---|---|---|---|
| Area | 76.2 | 20.9 | 0.5 | 244.1 | 19.5 | 20.3 | 61.3 |
| Nonroad | 359.2 | 120.1 | 3.4 | 48.4 | 0.1 | 4.3 | 4.8 |
| Mobile | 335.0 | 95.8 | 0.7 | 47.9 | 5.5 | 4.7 | 10.0 |
| Stationary | 29.3 | 33.8 | 21.3 | 222.6 | 5.0 | 8.6 | 12.8 |
| TOTAL | 799.7 | 270.6 | 26.0 | 563.0 | 30.1 | 37.8 | 88.9 |

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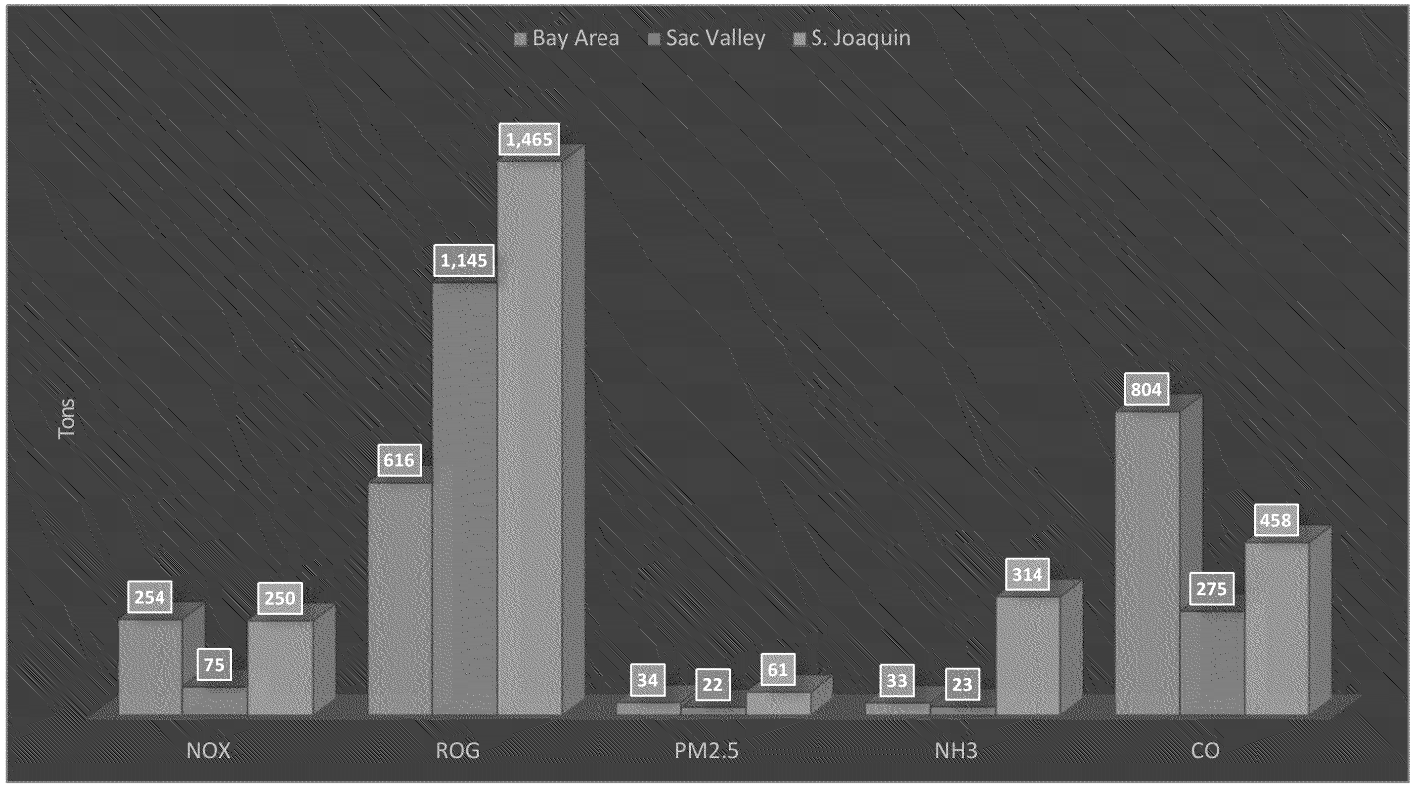
# Total Processed Emissions by Region
# Sept. 26, 2016



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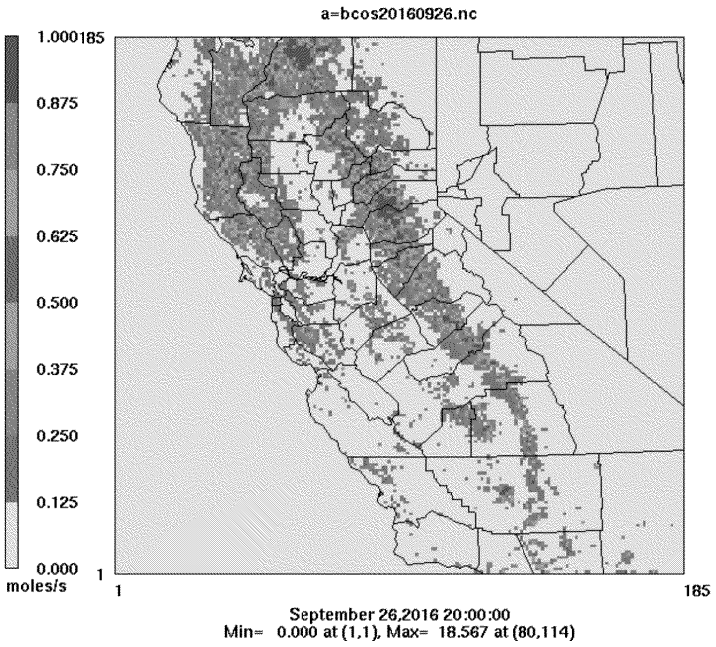
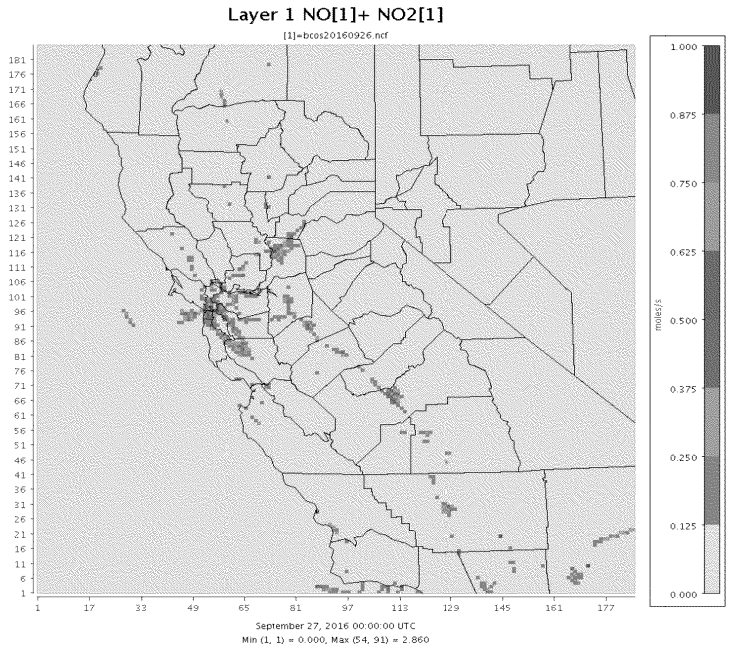
# Distributions of ROG and NOx emissions Sept. 26, 2016



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# Summary

- Emissions data were mainly obtained from ARB Ozone SIP inventory.
- The SMOKE model was used to process annual average county-level emissions into CMAQ model-ready format for May 15 – Oct 15, 2016.
- Future improvements: biogenic emissions, update detailed point source information outside Bay Area

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# Meteorological Modeling

WRF Modeling Basics

- WRF version 3.8
- CCOS/CRPAQS domain:
  - Three nested domains: 36km (91x95); 12km (157x151); 4km (190x190)
  - 4km domain covers central and portions of northern California
- NCEP North America Mesoscale (NAM) 12 km Analysis was used as the first guess input
- NCEP ADP Global Surface and Upper Air Observational Weather Data were used for objective analysis

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# WRF Configuration -- Physics

- Morrison (two moments) microphyscis (mp_physcis = 10)
- RRTM short and long wave radiation scheme (ra_lw_physics=4)
- Multi-scale Kain-Fritsch cumulus scheme (cu_physics=11)
- Noah Land Surface Model (sf_surface_physics=2)
- YSU PBL scheme (bl_pbl_physics=1)
- Single-layer urban canopy model (sf_urban_physics=1)

Some of the selected options have been rigorously tested

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# WRF Configuration -- FDDA Options

- Surface Analysis FDDA was on the 36 and 12 km domains with 3-hourly interval
- 3-D Analysis FDDA was on the 36 and 12 km domains with 6-hourly interval
- No boundary FDDA of temperature and humidity; observation FDDA of wind only

These options also have been previously tested

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# Structure of Mass Production Run

- May to October, 2016
- Five-day chunk with one day overlapped between each chunk
- An example for a month long run (start dates and hours):

  2016-05-01_12, 2016-05-05_12, 2016-05-09_12, 2016-05-13_12,

  2016-05-17_12, 2016-05-21_12, 2016-05-25_12, 2016-05-29_12

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# Model Evaluation

- Observations used: AQS, BAAQMD Met Network, NCDC observation and CABOTS Ozonesonde data
- Sample METSTATstatistics

| | | 6/02 | 6/03 | 6/04 | 6/05 | 6/06 | 6/07 | 6/08 | 6/09 | 6/10 | 6/11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind Spd | Bias | -0.33 | -0.18 | 0.18 | -0.06 | -0.75 | -0.74 | -0.68 | -0.04 | -0.17 | -0.32 |
| Wind Spd | Gross Error | 1.37 | 1.12 | 1.32 | 1.53 | 1.71 | 1.75 | 1.75 | 1.64 | 1.53 | 1.27 |
| Wind Spd | RMSE | 1.77 | 1.49 | 1.66 | 1.93 | 2.23 | 2.4 | 2.44 | 2.2 | 2.13 | 1.75 |
| Wind Spd | IOA | 0.64 | 0.72 | 0.73 | 0.69 | 0.72 | 0.67 | 0.69 | 0.68 | 0.73 | 0.75 |
| Wind Dir | Bias | -4.88 | -7.03 | -12.43 | -8.27 | -5.98 | -4.99 | -0.68 | -5.96 | -0.95 | -11.78 |
| Wind Dir | Gross Error | 39.32 | 46.84 | 42.62 | 29.6 | 22.83 | 17.13 | 15.64 | 19.9 | 26.8 | 45.73 |
| Temprtr | Bias | 0.81 | -0.52 | 1.14 | -1.12 | 0.81 | -0.69 | -1.36 | -1.01 | -0.2 | 0.98 |
| Temprtr | Gross Error | 1.64 | 2.3 | 2.16 | 1.74 | 1.46 | 1.47 | 1.6 | 1.31 | 1.4 | 1.93 |
| Temprtr | RMSE | 2.04 | 2.84 | 2.63 | 2.33 | 1.86 | 1.76 | 1.87 | 1.61 | 1.7 | 2.39 |
| Temprtr | IOA | 0.97 | 0.96 | 0.95 | 0.96 | 0.96 | 0.95 | 0.91 | 0.94 | 0.94 | 0.95 |
| Humdity | Bias | -1.08 | -0.78 | -1.35 | -1.06 | -0.49 | -0.52 | -0.02 | -0.12 | 0.26 | 0.38 |
| Humdity | Gross Error | 1.15 | 1.12 | 1.45 | 1.16 | 0.65 | 0.63 | 0.48 | 0.53 | 0.57 | 0.86 |
| Humdity | RMSE | 1.49 | 1.48 | 1.81 | 1.39 | 0.82 | 0.78 | 0.61 | 0.62 | 0.72 | 1.06 |
| Humdity | IOA | 0.52 | 0.69 | 0.62 | 0.61 | 0.64 | 0.59 | 0.54 | 0.5 | 0.8 | 0.7 |

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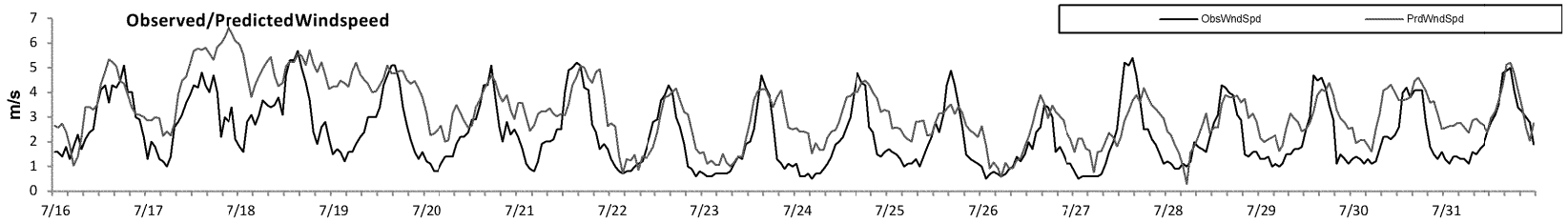
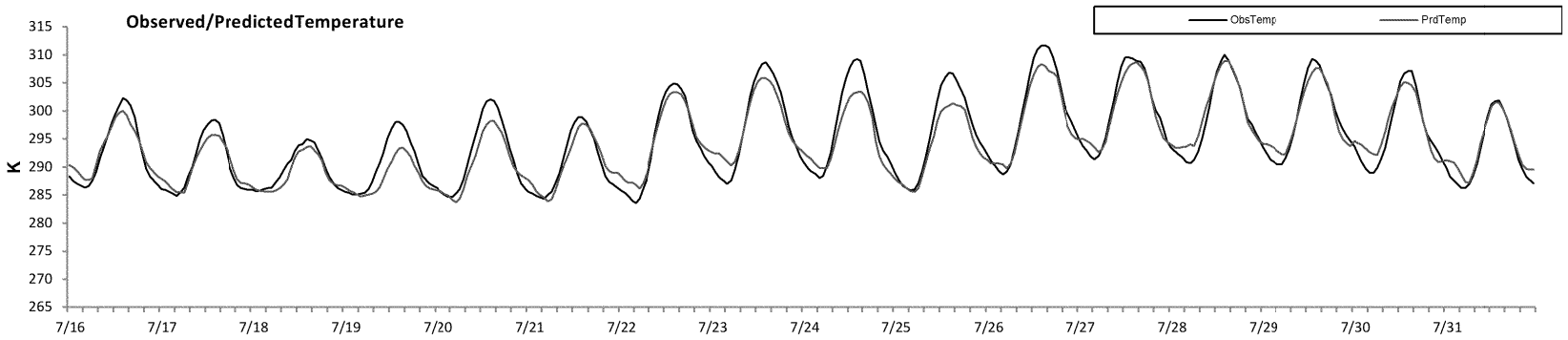
# Model Evaluation – Hourly Time Series at Livermore



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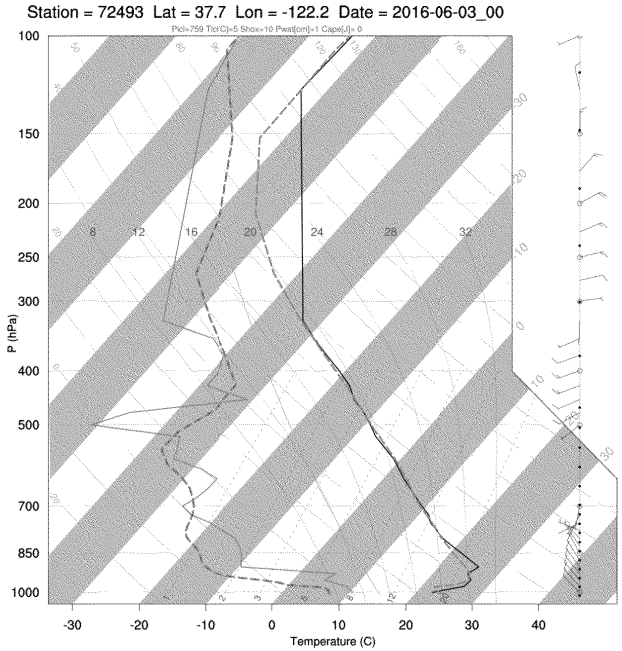
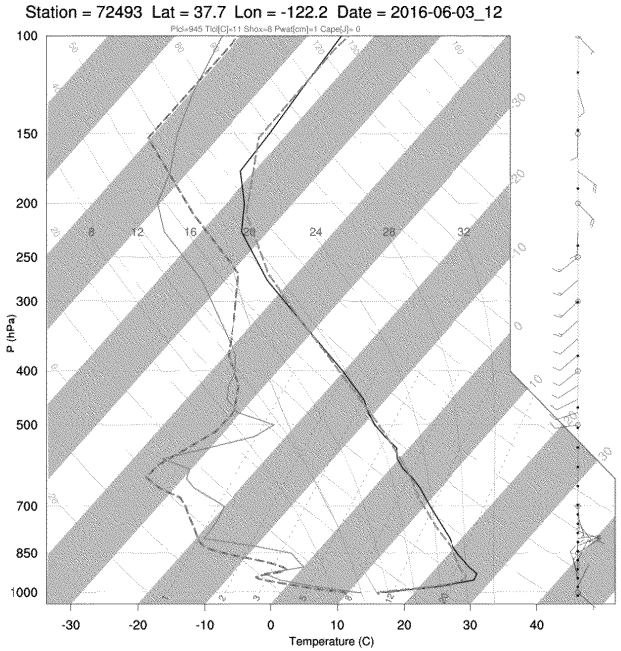
# Model Evaluation -- Oakland Sounding, June 3, 2016

Solid – Observation; Dash -- Simulation



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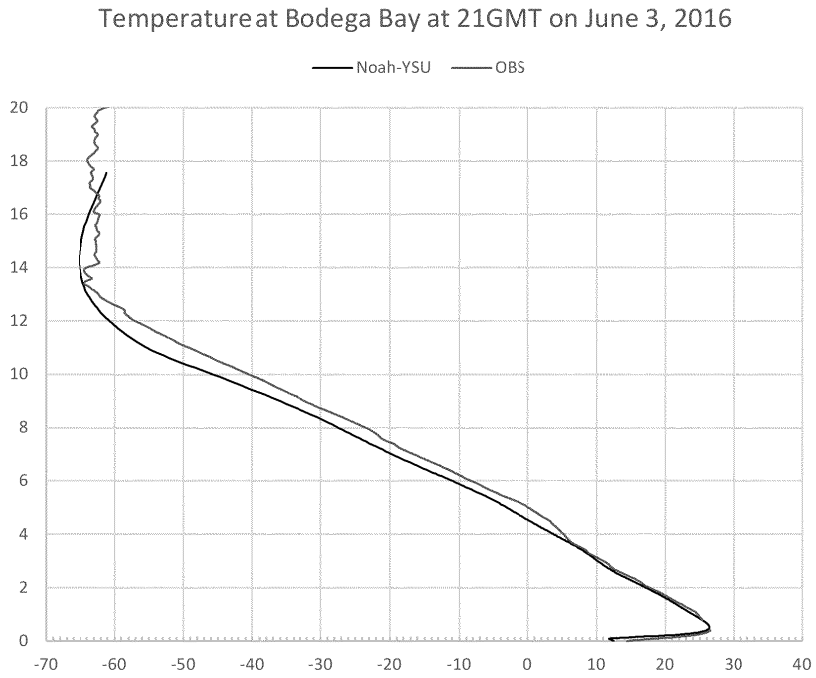
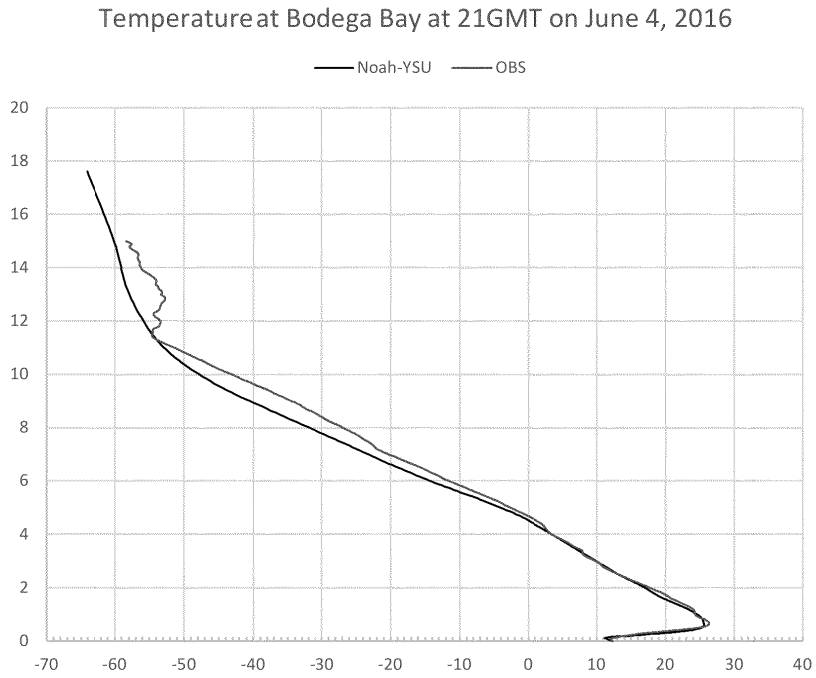
# Model Evaluation – Bodega Bay Ozonesonde, June 3 -4, 2016



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# Future Work

- Sensitivity test on Land Surface Model (LSM) and PBL scheme: Pleim-Xiu & ACM2
- Sensitivity test on Land Use Categories: USGS24, MODIS21, or NLCD40
- Obtain feedback from CMAQ performance for different WRF meteorological inputs, adjust and finalize the WRF configurations
- Conduct additional model evaluation and analysis

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# Ozone Simulations

CMAQ Base-case Specifications

- Domain:  Same as the CCOS domain
  - Horizontal resolution: 4 km
  - Vertical resolution: 15 layers, lowest layer thickness - 32 m
- CMAQ version: 5.1
- Chemical Mechanisms: SAPRC07 AE6
- Initial and Lateral Boundary Conditions: MOZART
- WRF runs: Noah LSM
- Simulation Period: May 15 - Oct 15, 2016

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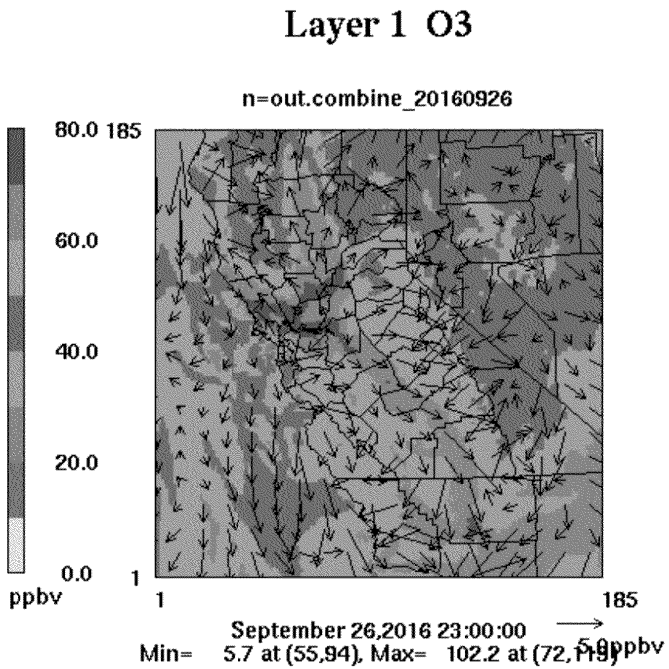
# CMAQ Domain and Example of Simulated O3
# 23 UTC September 26, 2016



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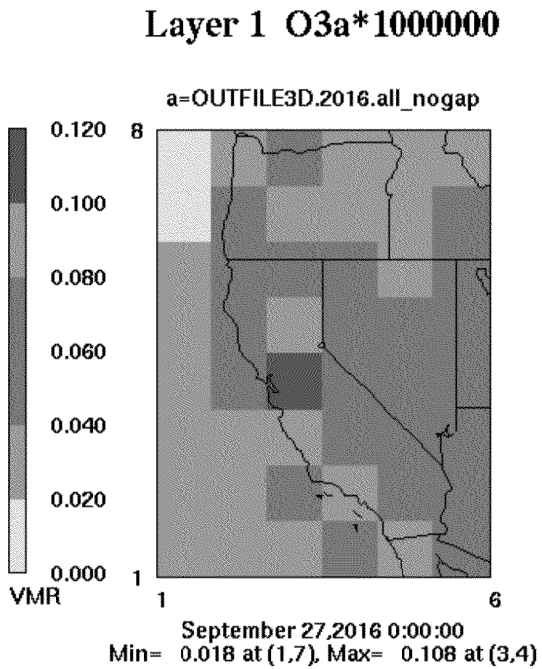
# Mozart O3
# 00 UTC September 27, 2016



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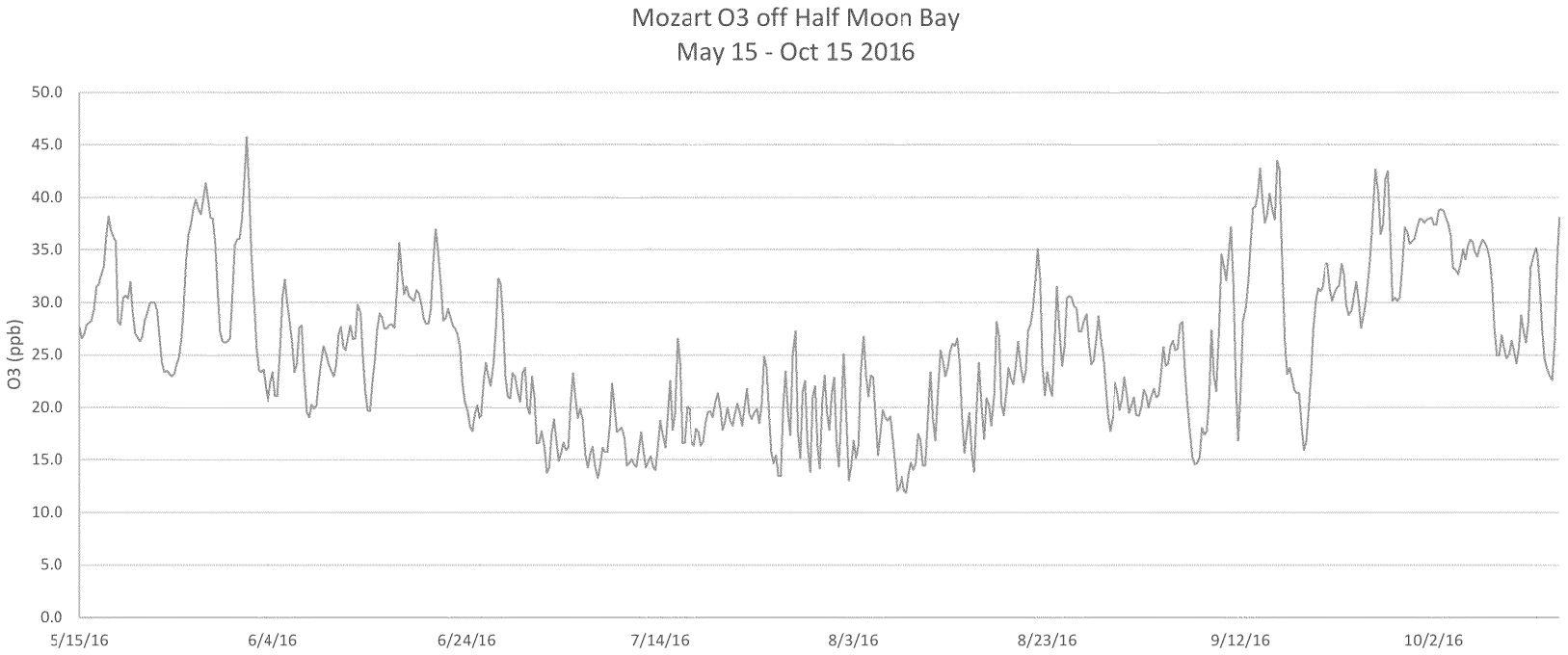
# Mozart O3 off Half Moon Bay
# May 15 – Oct 15 2016



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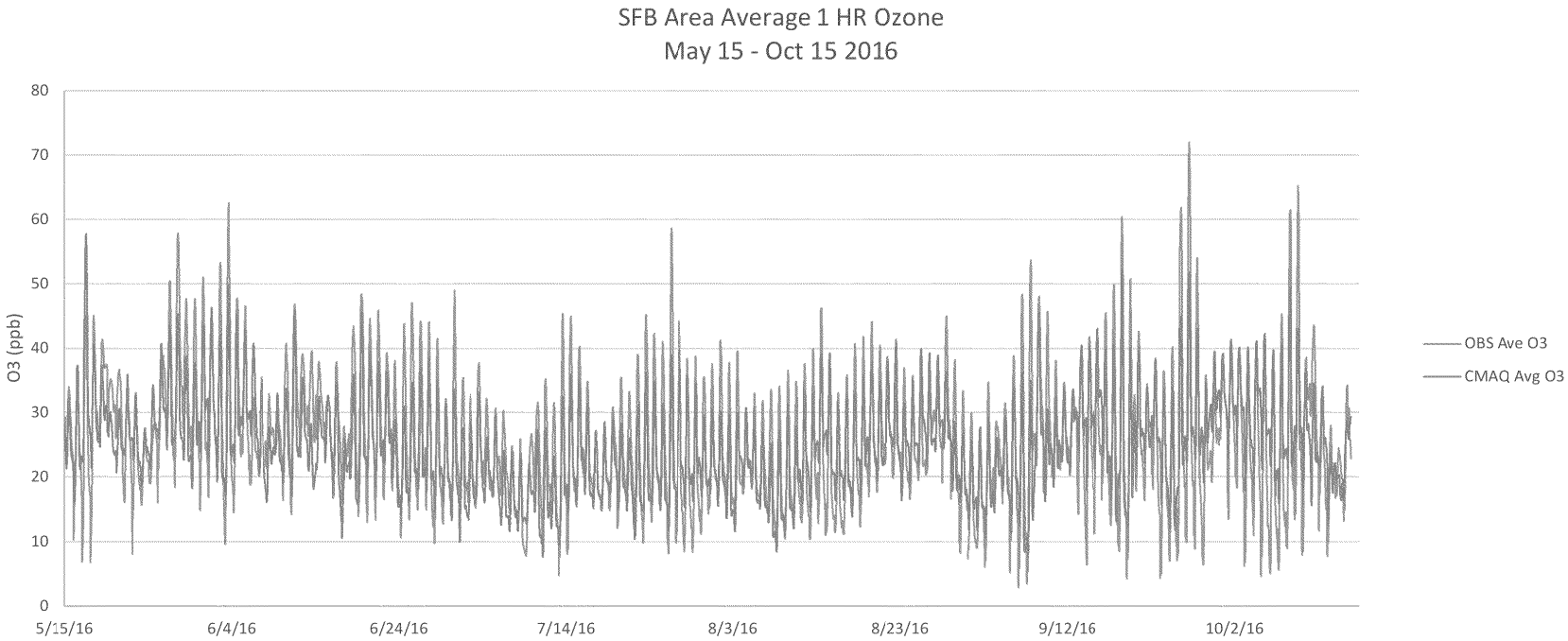
# Simulated and Observed 1-Hour O3
# SFB Area Average



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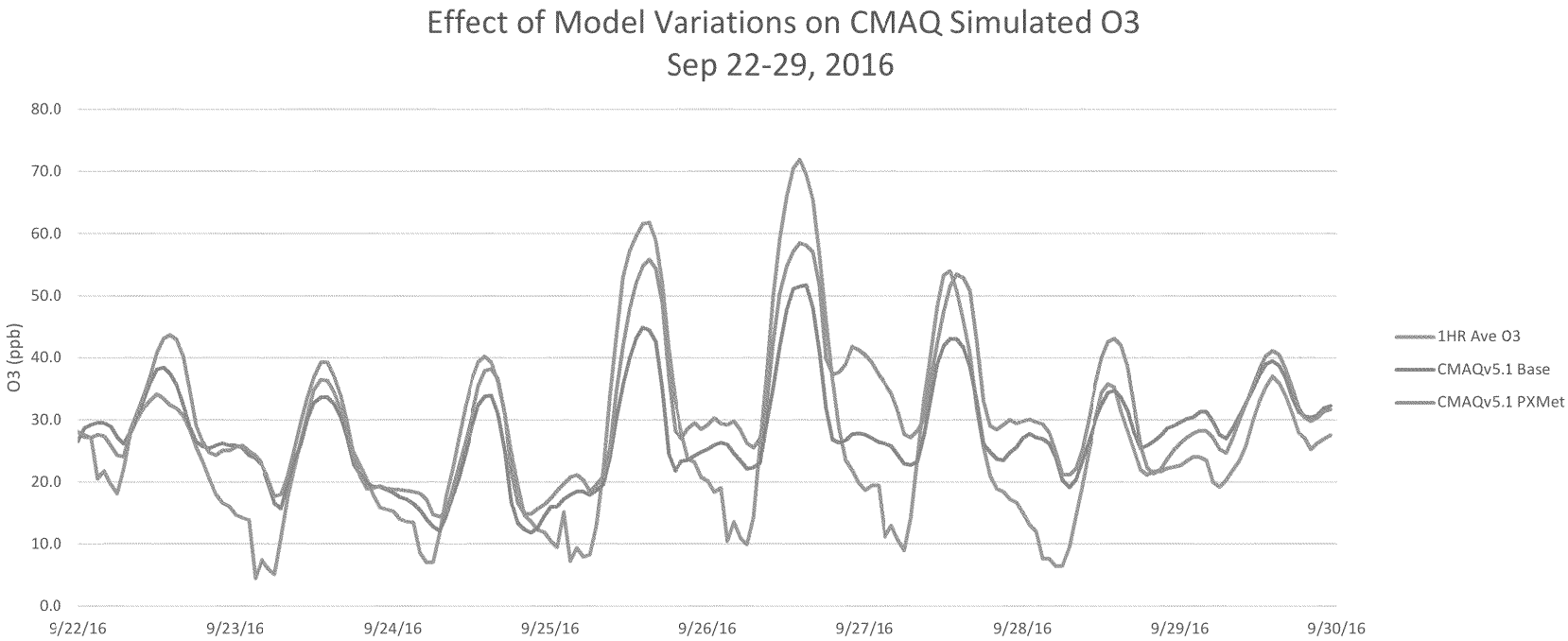
# Effect of WRF LSM on Simulated O3
# Noah (base) vs Pleim-Xiu (PX) LSM



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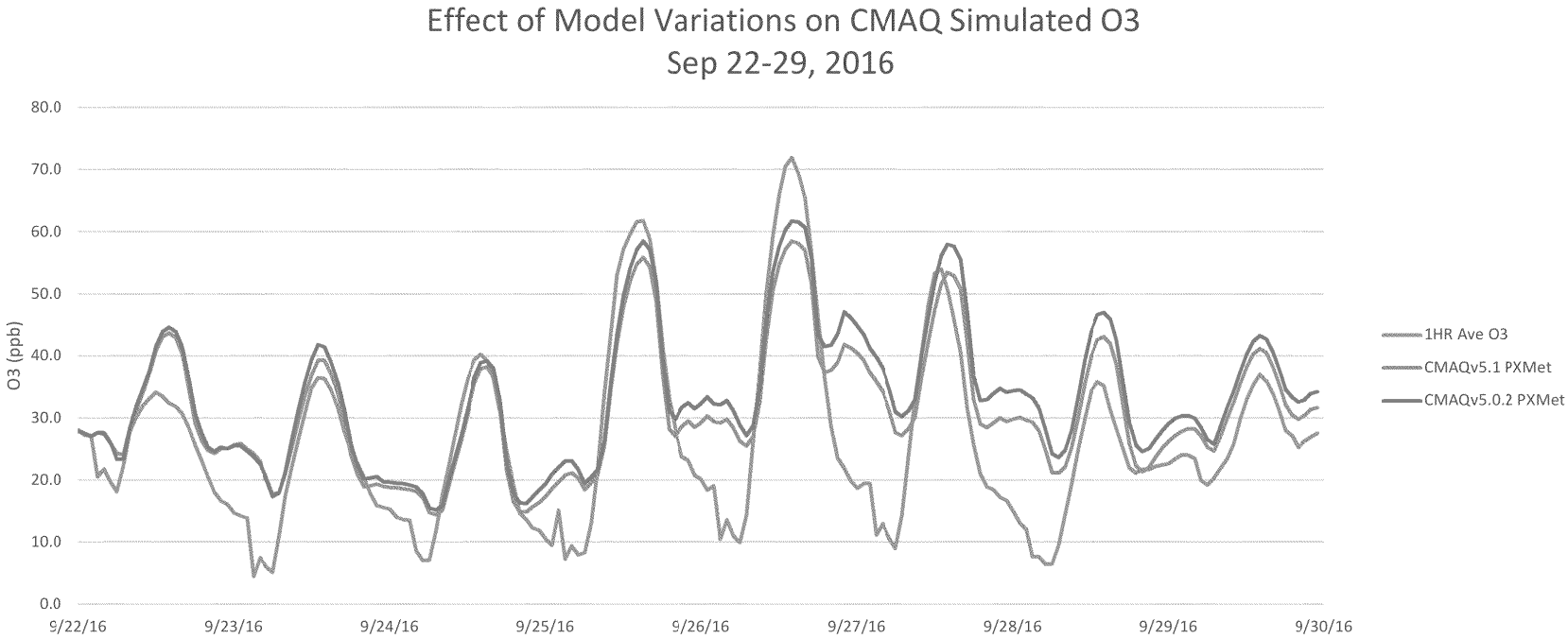
# Effect of CMAQ Versions on Simulated O3
# CMAQv5.1 vs CMAQv5.0.2



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# Effect of Lateral Boundary Condition on Simulated O3

- Half Moon Bay and Mozart O3 sounding comparison
- Effect of Half Moon Bay O3 sounding on simulated O3
- Effect of 10 ppb lateral boundary error on simulated O3
- Effect of 10 ppb lateral boundary error in selected layers on simulated surface O3

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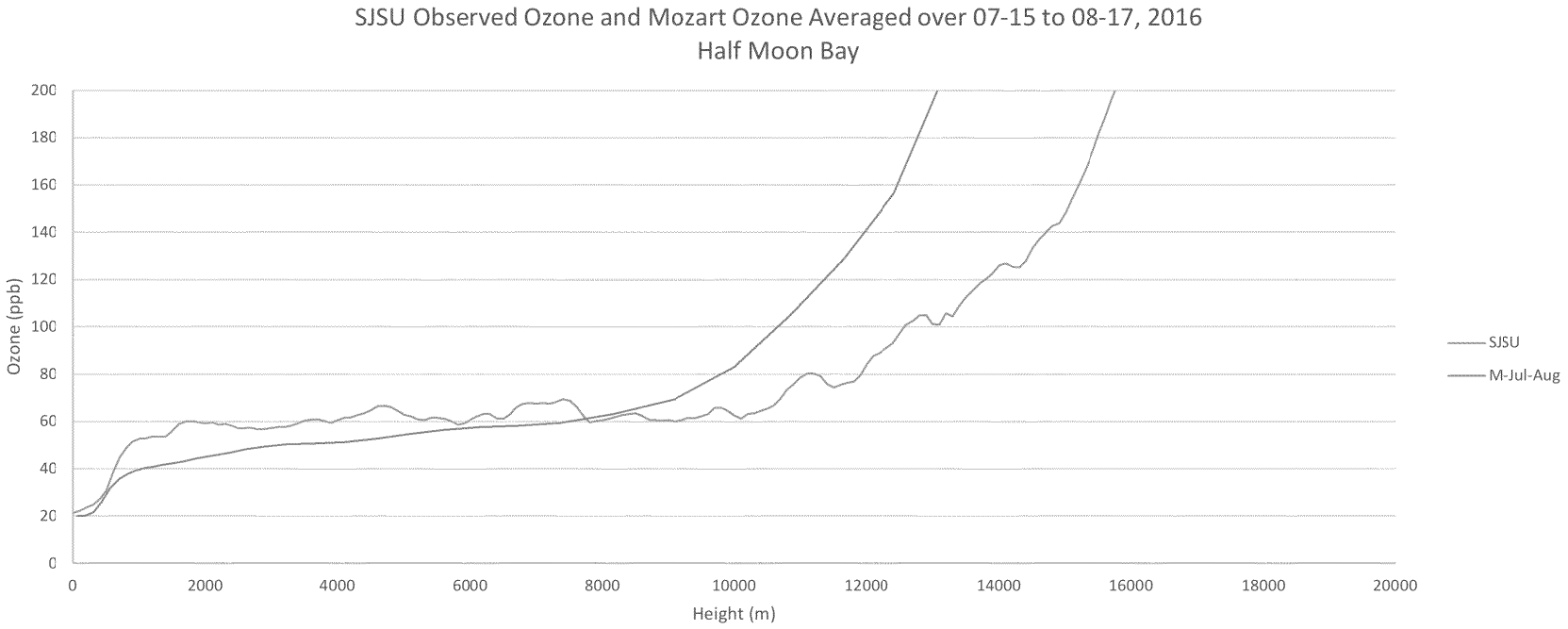
# Half Moon Bay O3
# Mozart Simulation vs Observation



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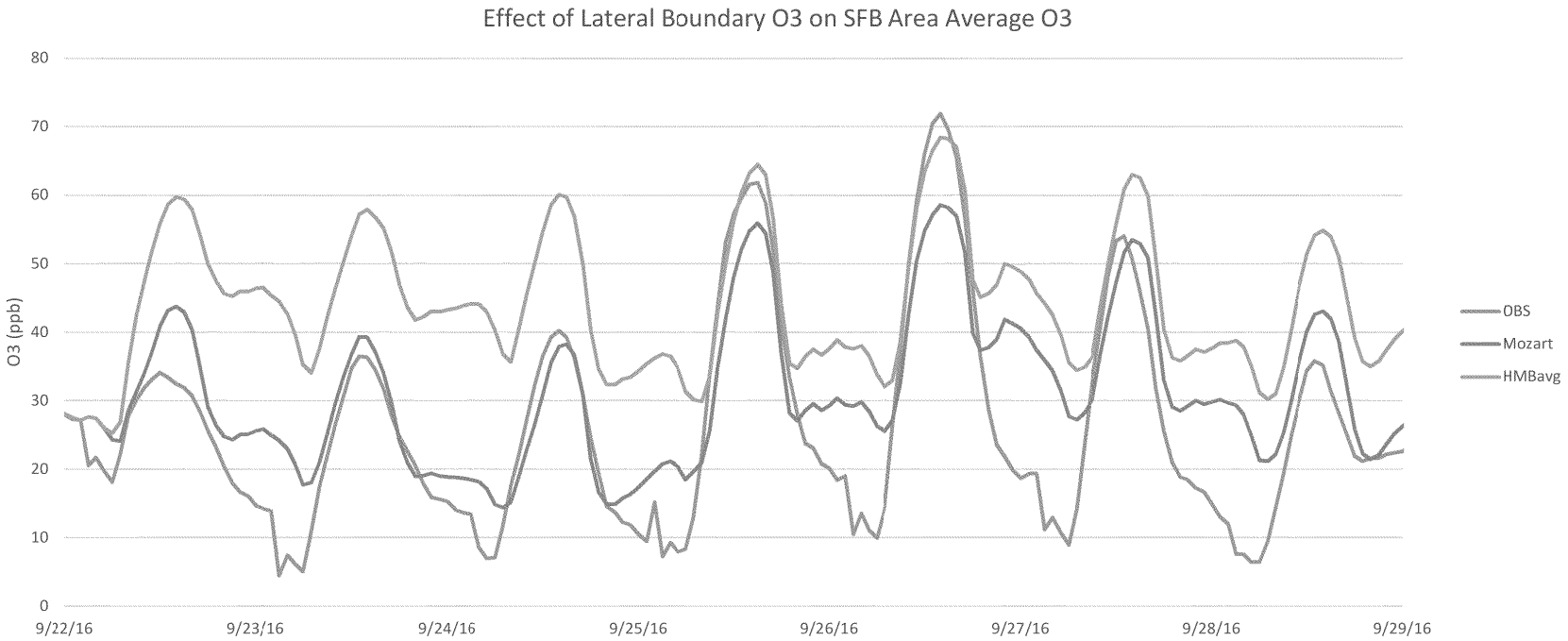
# Effect of Lateral Boundary O3 on SFB Area Average O3



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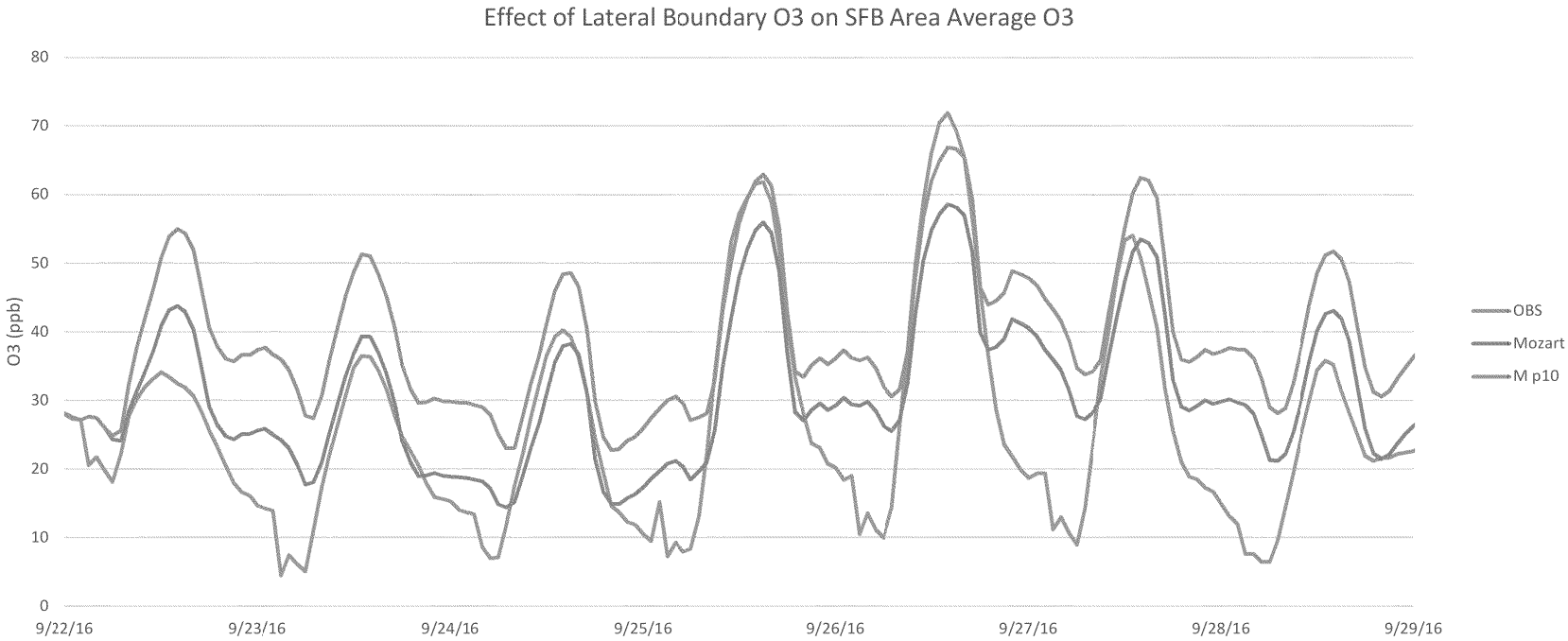
# Effect of 10 ppb Lateral Boundary O3 error on SFB Area Average O3



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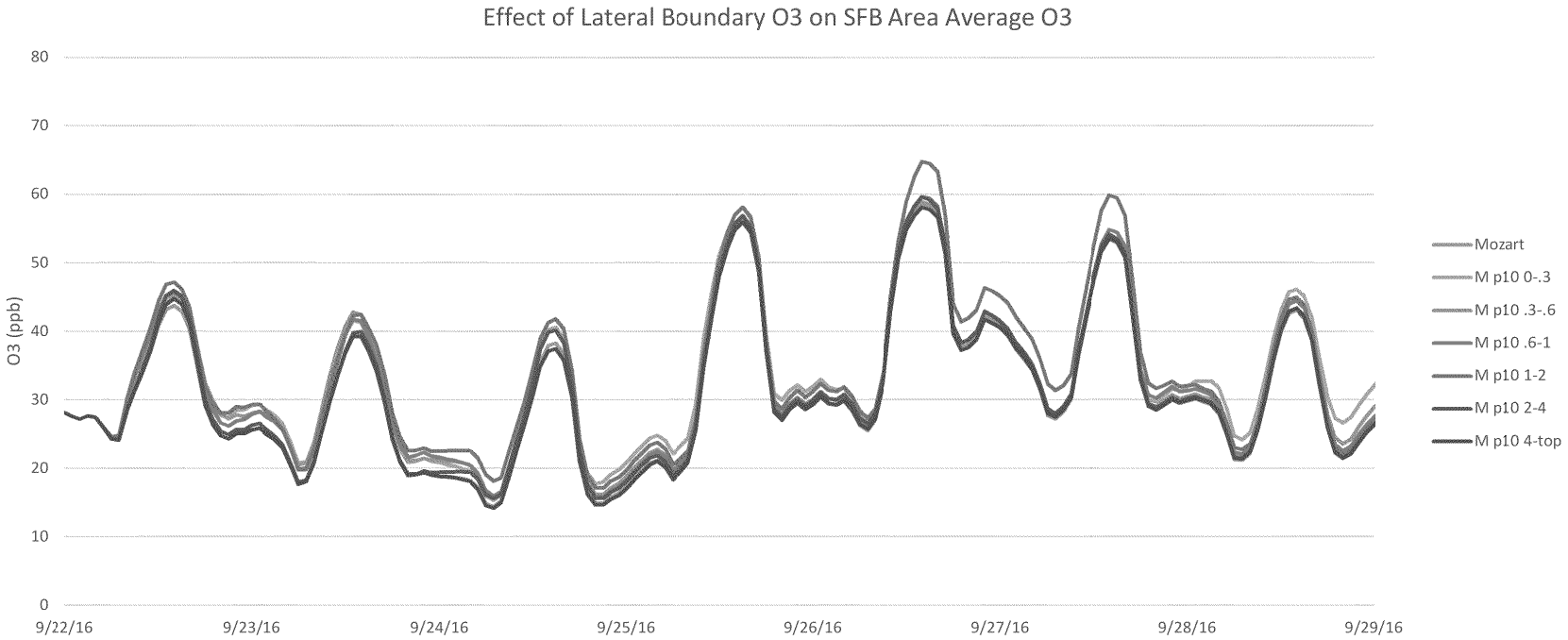
# Effect of 10 ppb Lateral Boundary O3 error in Selected Layers on SFB Area Average O3



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# Conclusions

- CMAQ base case simulation using WRF Noah LSM meteorology underestimated O3 in the SFB Area
- CMAQ simulation using WRF Pleim-Xiu LSM meteorology produced better results
- Mozart BCs resulted in O3 underestimates of as much as 15 ppb below 8 km
- Lateral boundary O3 error had large effect on simulated O3 in the SFB Area
- Lateral boundary O3 error in the 1-2 km layer had the largest effect on simulated O3 in the SFB Area for September 22-29, 2016

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# Improving West Coast Ozone Boundary Conditions for Regional Air Quality Models

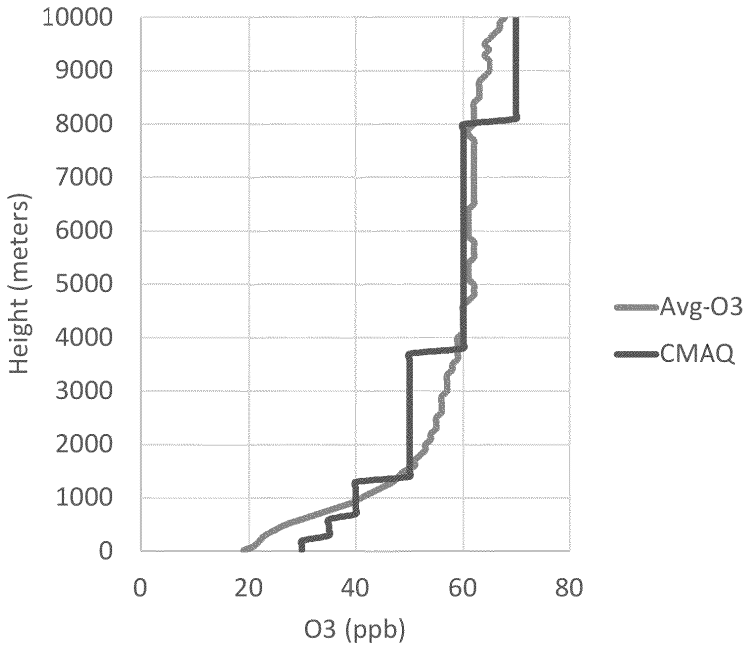
Saffet Tanrikulu, Ph.D.
Research and Modeling Manager
BAAQMD

CABOTS Meeting, April 19, 2017

ED_001361_00003691

# Specifying Ozone Background and Boundary Conditions

- Green line shows ozone boundary values provided with CMAQ distribution
- BAAQMD used it from time to time
- Orange line shows average ozone measured via weekly ozonesondes at Trinidad Head, CA from 1999 to 2014
- BAAQMD has been using orange curve since 2012, and updated it with 2013 and 2014 data



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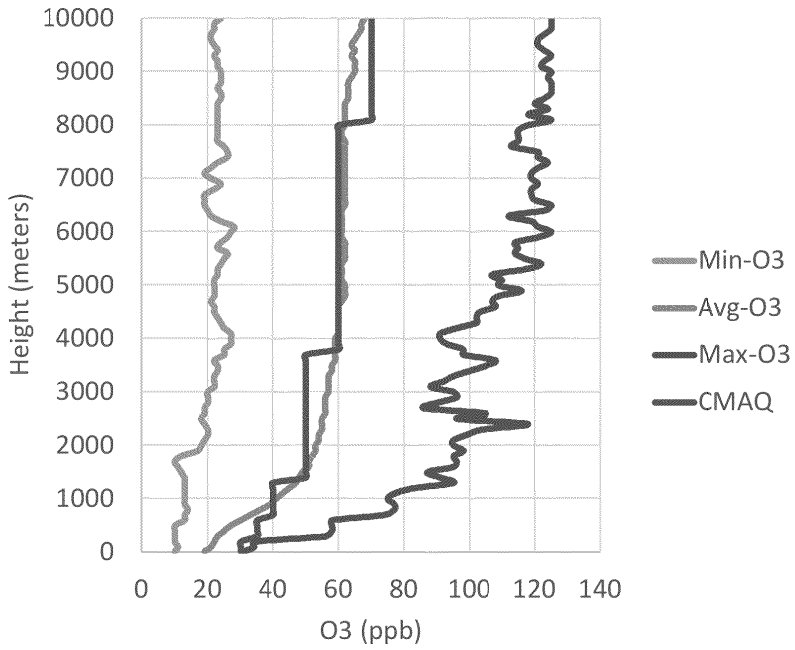
# Trinidad Head Measurements

- Wide variation in ozonesonde measurements
- Day-specific data is needed for successful simulations
- Available hemispheric model outputs, such as outputs of MOZART or GEOS-Chem, are appealing, available every 1-6 hours



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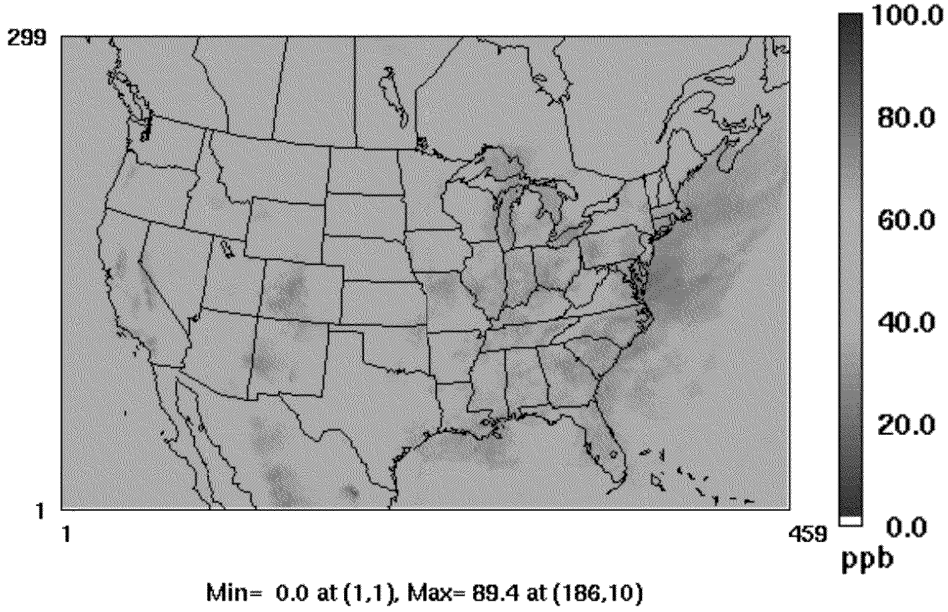
# Background Ozone Estimated with Hemispheric Models

8hr-O3-nonattainment map

- Hemispheric models coupled with regional models overestimate background ozone in the western US
- Incorrectly specified BCs cause two problems for modeling local air quality
  - Model performance
  - Model response to changes in emissions (under-representation and ozone disbenefit)
- These two important problems will be addressed by local air agencies and their collaborators




GEOS-Chem/CAMx estimated Background Ozone, avg. top 10 days
After CRC-project-99. CMAQ shows a similar pattern.

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# Goals of Proposed Project

- Develop a tool to estimate bias in hemispheric models coupled with regional models
- Inputs may include hemispheric model output (ozone and precursors), local ozone measurements, meteorology (wind, temperature and humidity), etc.
- The tool will work with routinely available data and with any hemispheric model output
- The tool will be tested and evaluated against data collected during the 2016 California Baseline Ozone Transport Study (CABOTS)
  - CABOTS data include measurements via aircraft, ozonesonde and ozone lidar
- BAAQMD is further collaborating with NASA's Health and Air Quality Applied Science Team to utilize satellite data to improve ozone estimates by hemispheric models (a large scale improvement)
- The two studies will complement each other
- BAAQMD will quantify improvements through local modeling and document the results

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# Status of the Contract

- The total cost of the project is $60k (does not include satellite project)
  - BAAQMD $30k
  - CRC $15k
  - ARB $15k
- BAAQMD and CRC funds are available; ARB's fund will be available in July 2017
- Workstatement will be developed and reviewed by all three participants in May and June
- Work will start in July or August and is expected to be completed by April 2018

# NASA AJAX

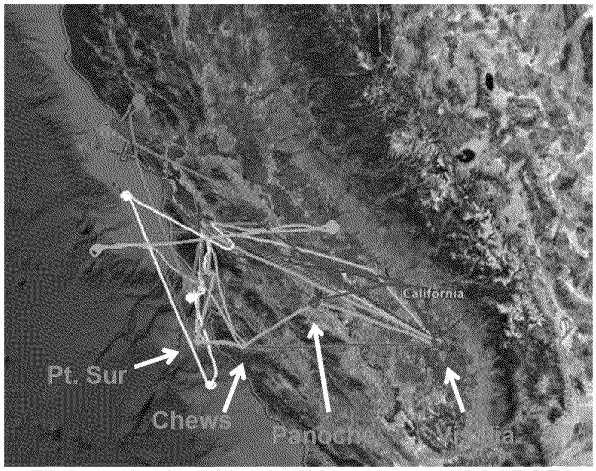
## CABOTS Analysis and Research Plan

19 April 2017, prepared by LT Iraci

### 1) Summary of Data Collected by AJAX

Between May 12 and August 12, 2016, the NASA AJAX team collected data on eleven science flights (Flights 188-198) based at Moffett Field (KNUQ) at the southern end of the San Francisco Bay. The payload contained ozone, carbon dioxide, methane, and formaldehyde in situ sensors, as well as a Meteorological Measurement System which provided measurements of temperature, pressure, and 3-D winds.

- four with W-E set of profiles
- four with N-S profile comparisons
- three with fire sampling
- one with vertical profile in Nevada




Flight paths flown by AJAX in support of CABOTS

### 2) Status of Data Processing

- Quick-look (preliminary) data has been generated, and plots have been uploaded to the NOAA data server (CABOTS_AJAXSummary18April2017.pptx)
- **Final ozone data can probably be produced with 8 more hours' effort**
- Additional Quality Assurance screening is necessary for $CO_2$, $CH_4$, HCHO.
- Additional processing needed for 3-D winds

### 3) Data Analysis Plans

- Initial comparisons to sonde & TOPAZ profiles were presented in AGU 2016 poster by M. McNamara
- Summer intern 2017 will look at meteorological data and model output

In combination with model analysis and other data, AJAX observations can likely contribute to addressing several of the questions articulated by the NOAA team:

1. What is the impact of stratosphere-to-troposphere transport of ozone on air quality in the San Joaquin Valley (SJV)?
3. Where do the elevated ozone layers in the SJV originate and how do they evolve?
5. What is the impact of fires on ozone in the SJV (Soberanes Fire, controlled burns)?
6. What is the influence of intra-state transport of ozone on air quality in the SJV?
7. How does the boundary layer (BL) in the SJV evolve and to what degree does entrainment of lower free tropospheric air affect SJV surface ozone levels?
8. How well do air quality models represent ozone transport on synoptic, regional, and local scales?
9. Comparison of the various ozone instruments deployed during CABOTS.

We look forward to playing a supporting role, but without funding we will not have staff available to participate in thorough data analysis and publication efforts.

## 4) POTENTIAL FUTURE WORK

AJAX would be very interested to participate in future SFBA and SJV campaigns, as well as the proposed CABOOM campaign in southern California. We have preliminary data relevant to the export of LA air to the Mojave, as well as tentative plans to continue a southern California measurement campaign this summer.

**NOAA CABOTS Analysis and Research Plan (18 April 2017)**

1) Status of CABOTS data collected by NOAA

*TOPAZ*

NOAA deployed its truck-based, scanning ozone lidar to the Visalia Municipal Airport during CABOTS. During the two intensive study periods (May 29 - June 18) and (July 18 - August 7), TOPAZ was operated for 212 and 223 hours, respectively. Between 8 and 16 hours of TOPAZ data were collected every day. TOPAZ measured ozone and aerosol backscatter profiles from 20 m up to 5 – 8 km AGL about every 8 minutes.
The TOPAZ data are available at https://www.esrl.noaa.gov/csd/groups/csd3/measurements/cabots/. Final QC of the TOPAZ data is expected by the end of April 2017. Changes from the current data are expected to be minimal.

*In situ ozone and meteorology*

In addition, NOAA also measured surface ozone with a Model 205 2B ozone sensor as well as air temperature, wind speed/direction, and atmospheric pressure. These data were collected continuously from May 29 – August 7. Overview plots of the data are available at the NOAA CABOTS web site. These data will be available for download by the end of April 2017.

*Micro-Doppler wind lidar*

NOAA also deployed its micro-Doppler wind lidar towards the end of the second intensive study period from July 29 – August 7. This instrument measured profiles of vertical wind speed, atmospheric turbulence, and relative aerosol backscatter. These observations have been used to derive estimates of boundary layer height. These data will be made available on the NOAA CABOTS web site by the end of April 2017.

2) CABOTS data analysis

Below is a by no means complete list of research questions that analysis and interpretation of the CABOTS data set can address:

1. What is the impact of stratosphere-to-troposphere transport of ozone on air quality in the San Joaquin Valley (SJV)?
2. How does long-range transport of pollution and biomass burning plumes from Asia affect ozone levels in the SJV?
3. Where do the elevated ozone layers in the SJV originate and how do they evolve?

4. Which mechanisms are responsible for the high ozone levels in Sequoia NP?
5. What is the impact of fires on ozone in the SJV (Soberanes Fire, controlled burns)?
6. What is the influence of intra-state transport of ozone on air quality in the SJV?
7. How does the boundary layer (BL) in the SJV evolve and to what degree does entrainment of lower free tropospheric air affect SJV surface ozone levels?
8. How well do air quality models represent ozone transport on synoptic, regional, and local scales?
9. Comparison of the various ozone instruments deployed during CABOTS (not a science question, but an important exercise).

NOAA is planning to address certain aspects of these topics. Tentative titles for collaborative publications:

- Stratospheric influence on surface ozone in the San Joaquin Valley during CABOTS
- Origin and evolution of elevated ozone layers and impact on Sequoia NP
- Comparison between lidar and aircraft ozone measurements during CABOTS

3) Potential future research efforts

Despite consistent progress in emissions reductions and a decreasing number of ozone exceedance days, the South Coast Air Basin is still the most polluted area in the US. The most recent large-scale research study on air quality in the South Coast Air Basin was the CALNEX campaign in 2010. Since then, changes in emission characteristics, climate change, the recent severe drought, and the changing intensity and frequency of wildland fires are likely to have altered the atmospheric chemistry and dynamics in the Los Angeles Basin and, in turn, affected the local production of ozone. In addition, the South Coast Air Basin, just like other areas of California, is prone to being influenced by long-range transport of pollution from Asia and by stratosphere-to-troposphere transport (STT). Also, ozone and other pollutants are often exported from the Los Angeles Basin to the adjacent high-desert areas or other states farther downwind, contributing to increased ozone levels there.

The research groups that form the Tropospheric Ozone Lidar Network (TOLNet) plan to conduct an air quality study in the Los Angeles area (tentatively called CAlifornia BOundary layer Ozone Measurements or CABOOM!) some time in the 2019 – 2020 time frame. TOLNet would deploy all of its six ozone lidars (5 mobile and 1 fixed system at JPL Table Mountain) in and near the Los Angeles Basin. Objectives of the CABOOM! study would include:

1. Quantify the export of ozone from the Los Angeles Basin and its impact on regions downwind.

2. Characterize the mechanisms through which ozone is exported from the Los Angeles Basin, e.g. mountain gap flows, orographic venting across the San Gabriel and San Bernardino Mountains (mountain chimney effect).
3. Study the effect of long-range transport of ozone from Asia and STT on surface air quality in the South Coast Air Basin.
4. Role of the land-sea breeze circulation on pollutant levels in Los Angeles.
5. Effect on ozone levels when fire plumes mix with urban pollution in the Los Angeles Basin.

While the deployment of six ozone lidars in southern California would provide an unprecedented look at the 3-dimensional distribution of ozone in that region, additional observations would be needed to comprehensively address the above-mentioned and other, related objectives. Research groups at NOAA/CSD have expressed some interest in returning to the Los Angeles area to conduct an air quality study about a decade after CALNex. Local research groups, e.g. at UCLA, may also have interest to join.

DRAFT 08/30/06
Federal/State Technical Work Collaboration Group
Conference Call Summary
August 25, 2016,

1) Roll call:
EPA OAQPS, OAP, OTAQ, WESTAR-WRAP, MARAMA, OTC, SESARM, LADCO, CenSARA, Maryland, New Hampshire, Georgia, Iowa, New York, Texas

2) Status of **Near Term** Actions - all
   a. Oil and Gas AEO projection year – Jeff Vukovich
   Jeff (OAQPS) said in addition to the July call of the Collaboration Group, he briefed the National Oil and Gas Steering Committee and the National Oil and Gas Committee. He confirmed the only feedback pertaining to use of the AEO 2016 Reference Case w/o CPP has been from MARAMA. Julie (MARAMA) said she recently learned that other than Maryland, Rhode Island, and Massachusetts, MARAMA member states want to use 2015 instead. WESTAR/WRAP remains neutral; LADCO will verify with Ohio and let EPA if there is an issue; CenSARA and SESARM are okay with using 2016. MARAMA will work with EPA on what to do for their region for the initial 2015 ozone transport national modeling platform.

   The National Oil and Gas Committee will be tasked with researching whether economic models such as the AEO one are the best vehicle to do projections for oil and gas.

   b. ERTAC update – Mark Janssen
   Mark (LADCO) said the ERTAC/EPA group held an initial call on July 25th and has a second one scheduled for later today. They intend to compare ERTAC and IPM for all states for 2023. Serpil (OAR) added the group has set every 4th Thursday at 2:00 pm eastern for their calls. If you want to join, you may email her. Tom (WESTAR) added he and Mark are coordinating to do an ERTAC model overview for WESTAR's member states.

   Julie (MARAMA) requested confirmation that the ERTAC 2023 run is being used for EPA's initial 2015 ozone transport modeling. Discussion ensued whether ERTAC included CSAPR and/or CPP (neither). Without something for CSAPR, Chet replied EPA couldn't use it. Timing complicates issues because ERTAC (or anyone else) can't receive the final CSAPR data until the rule is finalized and thus can't include in its work, but EPA can't use the ERTAC work until it includes the CSAPR work (and other disconnects are figured out).

   Theresa inquired if the state-by-state comparison work the ERTAC/EPA group is doing will help identify the models' disconnects and gaps. Serpil

replied the group identified an initial 150 units across the country to compare, once the final CSAPR rule is out. They will discuss whether doing a 2023 comparison without CSAPR could help jumpstart the process to figure out "how" a ERTAC/IPM comparison can be done, given the different bases and purposes of the models. Then they could be ready to decide on the "what" to compare once the final 2008 ozone CSAPR rule comes out.

c. EPA use of MARAMA 2023 growth and control packet – Jeff Vukovich
Jeff (OAQPS) said EPA is currently reviewing the information received from MARAMA. For the remaining states, he'll send a spreadsheet to Theresa for distribution that highlights EPA's anticipated growth plans for 19 sectors for 2023 and 2028.

Julie (MARAMA) inquired about the MOVES version to be used. Alison replied they have made an initial 2023 run using the latest version and are now working on how best to prepare specific emission factors to project activity data. Julie asked if the Virginia work will be incorporated – she and Alison will hold an offline conversation on the topic.

For nonroad, Alison said they did a NMIM run for 2023 as well. Mark (LADCO) said they have stationary and area source projections to 2030 and asked how EPA would need the data. Alison replied EPA expects their work will look similar to the 2025 projection work completed for the 2015 NAAQS review and would be a good place to start.

d. Status of EPA modeling activities re: Modeling for 2015 ozone NAAQS transport and modeling for regional haze – Norm Possiel and Brian Timin
Norm (OAQPS) confirmed EPA is still starting with the updated 2011 NEI for the platform, with 2023 projections completed and a NODA or informal memo to be released for public review in the late fall. Work on 2028 projections is on a later track, hopefully out by the end of December. Mark (LADCO) suggested EPA get the 2023 EI in model-ready format to the states as soon as possible, even if in draft form. The pros of doing that is MJOs and states receive the data early; the cons are that all groups could get caught up in a revisions loop, trying to use the latest emissions data and having to remodel.

Jim (GA) asked if EPA is planning to model 2011 with the newer version of CAMX? Norm replied that they would be using the version Environ talked about at the St. Louis workshop and plans to release to the public in the near future. Jim suggested EPA could provide the MJOs and states their 2011 modeling package before 2023 and 2028 modeling are done to allow work to replicate the base modeling to start. Norm replied a staged process could possibly work. Everyone agreed it was best to send materials to one state or MJO who would then ensure all others received it rather than EPA sending separately. The MJOs will discuss off line and let EPA know who the contact

will be.

Theresa (CenSARA) asked Brian (OAQPS) about the source apportion modeling EPA plans to do for regional haze and if decisions regarding which sectors have been made yet. Brian responded they are looking at the same sectors in the spreadsheet Jeff V. referred to earlier in the call as a starting point and reminded everyone this will be national level, not state-by-state work. Because they may need to start prior to the next call on October 13th, he'll prepare a description to send MJOs for initial feedback.

e. Other?
No one had any other topics.

3) Discussion of **Next Six/Twelve Months** activities – all
   a. Non-EGU control measures work- planned or underway
      1. EPA – Larry Sorrels (Air Economics Group)
      Robin Langdon (OAQPS) explained they are drafting a spreadsheet focusing on non-EGU point sources and NOx control information, starting with the 2014 NEIV1. The spreadsheet will include tabs with a summary of the 2014 NEI; detailed information at the unit level; and NEI control codes. Examples of requested information are percent of control efficiency and updated control information. Theresa asked the states if this would be something they thought could be provided without being a resource intensive exercise. Kathy (TX) said it depended whether the information was readily available. Jim (GA) said he knew a lot of information is missing or incorrect and would be resource intensive. Julie (MARAMA) agreed. Mark (LADCO) suggested EPA prioritize the list to help states initially focus. Robin said they'd see if they could do that. Chet added the information they are looking for is information that states are required to submit to the EIS and suggested doing this exercise now will save time later (i.e., when the 2015 ozone transport work comes out). The group agreed EPA would send the draft to the Technical Collaborative Group for feedback before sending to the states (rather than use MJOs as intermediaries). The state contacts will most likely be the NEI contacts. Alison will see if the list can be shared with the MJOs who can then help facilitate state responses.

      2. Other work – focus for October conference call - potential presentations include Maryland OTC rules modeling, OTC boiler report, NOMAD ICI boiler group, and aftermarket catalyst analysis.

   b. Overview of ERTAC/EPA group July call – Serpil Kayin and Mark Janssen
   See above.

   c. Status of MOVES FACA group – Sarah Roberts

Sarah said the group will hold its first meeting on September 14th. The group member organizations include:

University of California, Riverside
EPA OTAQ
Georgia Department of Natural Resources/NACAA
Colorado Department of Public Health and Environment/NACAA
Texas Commission on Environmental Quality/AAPCA
Atlanta Regional Commission / AMPO
Chicago Metropolitan Agency for Planning/AMPO
Virginia Department of Transportation/AASHTO
California Air Resources Board (CARB)
Ozone Transport Commission (OTC)
Lake Michigan Air Directors Consortium (LADCO)
Honda
Alliance of Automobile Manufacturers
Toyota
American Petroleum Institute (API)
Manufacturers of Emission Controls Association (MECA)
Engine Manufacturers Association (EMA)
Federal Highway Administration (FHWA)
National Renewable Energy Laboratory (NREL)
Environmental Defense Fund (EDF)
International Council on Clean Transportation (ICCT)
North Carolina State University
University of Vermont

d. Other?
There were no other topics.

4) Review remaining Action Plan activities (see attachment)
Deferred.

5) Next call – tentative - Thursday, Oct. 13th, 11:00 am – 12:30 pm eastern

**Action Plan – Updates in red (8/30/16)**

Federal/State Technical Air Quality Work Collaboration Group June 20/21 Meeting Follow Up
Group Members: EPA OAQPS, OAP, OTAQ, MJOs/RPOs, interested states and tribes

*Purpose and Objective*

The Federal/State Technical Air Quality Work Collaboration Group provides a forum for cooperatively discussing technical work and activities by states, MJOs/RPOs, and EPA related to air quality modeling for ozone, PM2.5, and Regional Haze. This includes the use of modeling tools (e.g. air quality models, emissions models, meteorological models, and their pre-and post-processors) and sharing, as freely as possible, model input and output data sets among the participants. Federal and state regulatory requirements are the primary drivers, resulting in a periodic need to prioritize activities; both near-term and long-term. Working as partners will help achieve the overall objectives of (1) efficient use of resources, (2) transparency regarding technical data, analyses, tools, and techniques, and (3) the development of technically credible products.

**NEAR TERM ACTIONS**

1) Submit final "tweaks" to EPA for updated 2011 NEI modeling platform that will be released fall 2016 for state consideration in developing 2015 Ozone Transport SIPs
    a. ERTAC working on 2023 projections (mid-August target); use CAMD IPM estimates for WESTAR/WRAP states
        i. Who's operating in 2023 and what fuel are they using – ERTAC to provide data to CAMD by mid-August. EPA can't use ERTAC work without CSAPR projections; ERTAC can't include CSAPR until the rule is final later this year. Group will discuss whether could do a 2023 comparison without CSAPR to jumpstart the project of how to do the comparison.
    b. EPA and Nat'l O&G Committee –
        i. decision regarding updating 2011 NEI with 2014 O&G tool - agreed time and resources better spent on other tasks.
        ii. decision regarding using EIA's 2015 AEO to replace 2014 AEO – discussed during fed/state collaborative group and National O&G Committee calls on July 14th. 2016 AEO also being considered. Feedback deadline to EPA August 12th/Aug. 18th for alternative state or county SCC factors. 2016 Reference Case w/o CPP will most likely be used for all but MARAMA region, which prefers 2015.
    c. Other potential source category updates – MARAMA is working on northeast 2023 SMOKE ready growth and control packets (does not include onroad and nonroad) that may be useful for EPA's work. Jeff V. to send Theresa spreadsheet for distribution that highlights EPA's anticipated 2023 and 2028 growth plan for non-MARAMA regions.

2) Review controls in 2014 NEIV1 for non-EGUs to determine accuracy and completeness; exchange non-EGU control information with EPA for base year and projections. Maryland has modeled OTC rules to see effect in State and in the East (will be presentation for Oct. call). OAQPS will send spreadsheet focusing on NOx controls for non-EGU point sources to states for review and updates. OTC presentation on ICI boiler report scheduled for Oct. call.

3) Theresa P. – draft list of potential source categories that need improvements for 2017 NEI for Fed/State Collaboration Group to prioritize and determine resource needs and availabilities (see



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Attachment 1)

a. Following internal discussions, MJOs and EPA update Fed/State Collaboration Group to discuss conflicts between EI/modeling/timing.

**NEXT SIX MONTHS**

1) EPA finalizes 2008 Ozone Transport FIP with TSD based on previous NODA and proposed rule comments.

2) Call (or webinar) for interested parties on improvements to CMAQ (and CAMx) following ORD's work on CMAQ and Ramboll/Environ work on CAMx. Norm P to schedule for late Oct/early Nov timeframe.

3) Start staff-level technical group to discuss model evaluations/performance – interested orgs so far (GA, NE, OTC, CO, UT, MO, TX, KS, EPA R8 – also probably NV, CO, OR). First step to hold brainstorm session at CMAS in Oct.?

4) EPA releases projected 2023 modeled contribution information for 2015 Ozone Transport SIP work (based on 2011 modeling platform with near term action "tweaks"). Norm P. is the lead. Suggestion that EPA share 2011 modeling package to MJOs/states to begin replicating EPA's work before EPA 2023 and 2028 modeling are done. MJOs to discuss which agency will be point for distribution and get back to EPA.

5) EPA releases national level emissions sector source apportionment modeling for 2028 based on the 2011 platform for use by states in RH SIP development. Request made to include mobile sources. Suggestion to also do 2011 for comparison purposes. Brian T. is lead. Brian to send information to Theresa for distribution to MJOs for initial feedback.

6) EPA releases NATA modeling using 2014 NEIV1 for review.

7) Collaborative Group discusses updated modeling platform base year – 2015 or 2016 or?? for EPA to use for final 2015 Ozone Transport FIP (sometime after 2018) and 2021 regional haze SIPs??

8) Marc H – schedule call with interested states to better understand issues and timing with entering and using control measure information in the NEI, including the qa/qc process and determine if and what "fixes" are needed. Theresa working with Marc H and others to confirm purpose. Timing for the conversation will be after release of 2014 NEIV1 and before V2.

9) ERTAC and CAMD report on progress of four action items. Mark J./Serpil K. taking names if interested in participating. Initial conference call held Monday, July 25th. Calls will be 4th Thursday, 2:00 pm eastern (next one Aug. 25th). Tom (WESTAR) and Mark (LADCO) are coordinating to do an ERTAC model overview for western states.
    a. Educate OAP about the SIP process; develop a user's guide
    b. Communicate with EPA regional offices about IPM/ERTAC options for states in SIP work; review existing SOPs for needed revisions
    c. Discuss how to model CSAPR and other control scenarios in the future
    d. Initiate process to build better emissions budgets – target completion??



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**NEXT 12 MONTHS**

1. Develop database of source definitions by state/local agency to link to NEI, for point (permitted/registered/tracked) vs. non-point (county aggregated estimates only) sources.
2. Call with OAQPS/ORD and interested states/MJOs to hear about work on global modeling studies. Determine interest in forming group to establish coordination/sharing process. Call to be scheduled by Norm P for early spring 2017.
3. National O&G Committee – use MJO oil and gas project (est. completion fall 2016) to help determine priority areas and resource needs from EPA. Task 1 is underway as of August 2016 (evaluation of 2014 NEI data to characterize and prioritize potential data gaps). National O&G Committee is tasked with researching whether economic models (ex: AEO) are the best vehicles to do oil and gas projections.
4. How to stay tuned into OTAQ FACA process for MOVES Nonroad – MJO MOVES Workgroup? General comment/feedback email exists: moves@epa.gov. The FACA group will help its first meeting on Sep. 14th.
5. Review and report current control effectiveness and expected turnover estimates for non-road and on-road mobile sources by 2023 and 2028 for "fleets" in each state by SCC and link to MOVES. *(Answers questions for state planning about how much and which mobile sources can be further controlled and provides data for states to compare to further EGU/non-EGU reduction options. Also will shed light on ambiguity of upstream/midstream O&G engines – which are non-road, point, or non-point sources?)* per July 14th call, 2023 MOVES is available for states/MJOs wanting to use. LADCO running MOVES for 2017, 2018, and 2028.
6. Existing mobile sources - Summary of June 20/21 meeting: OTAQ has no plans for criteria pollutant rules, though next MOVES version will include the GHG Phase II rule (finalized 8/16/16 for HDVs). After Tier III rulemaking, existing vehicles, not new vehicles probably need to be the category to focus on – aftermarket catalysts, onroad and nonroad idling, SmartWay, etc. OTC presentation on aftermarket catalyst analysis scheduled for Oct. call.



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ATTACHMENT 1 (07/07/16)

**POTENTIAL IMPROVEMENTS FOR NEI AND FUTURE MODELING PLATFORM**

**EMISSIONS INVENTORY WORK:**

1) Updating Canada and Mexico emissions – EPA group exists to work on – whether and how to provide input into their work?
2) Rail – group exists that may have improvements for 2014 NEIV2 in late 2016. Mark J. is lead
3) Stack Heights for Offshore Marine – whether/how to use MARAMA data
4) Back up generators run on peak days (starting in 2016, RICE NESHAP will provide test data, not actual use data). Start with MD's temporalization work for small EGUs? Joseph J. is lead
5) Balancing EGU loads high priority in the West
6) Vehicle profiles for ports and oil and gas fields for use in MOVES
7) CRC scoping project to look at rewriting MOVES to run faster (maybe for 2017 NEI?)
8) Uncontrollable sources – ex: fire and biogenics

**MODELING:**

1) Identify monitoring receptors that had bad modeling performance for 2008 Ozone transport work and analyze why
2) Form global modeling sharing group
3) Determine how can utilize modeling profiles for SO2 Round 3 sources (due to EPA 1/1/17) in technical work

**NON-EGU CONTROL MEASURE OPTIONS:**

1) Heavy-duty vehicle idling (onroad and nonroad) – OTC Best Practices document
2) Aftermarket Catalyst – OTC model rule and stakeholder work
3) Point/non-point/area source engines – electrification to zero NOx
4) AIM model rule update
5) Consumer product model rule update
6) ICI Boilers – changing landscape in fuel use and operations
7) Evolution of RACT since 1994



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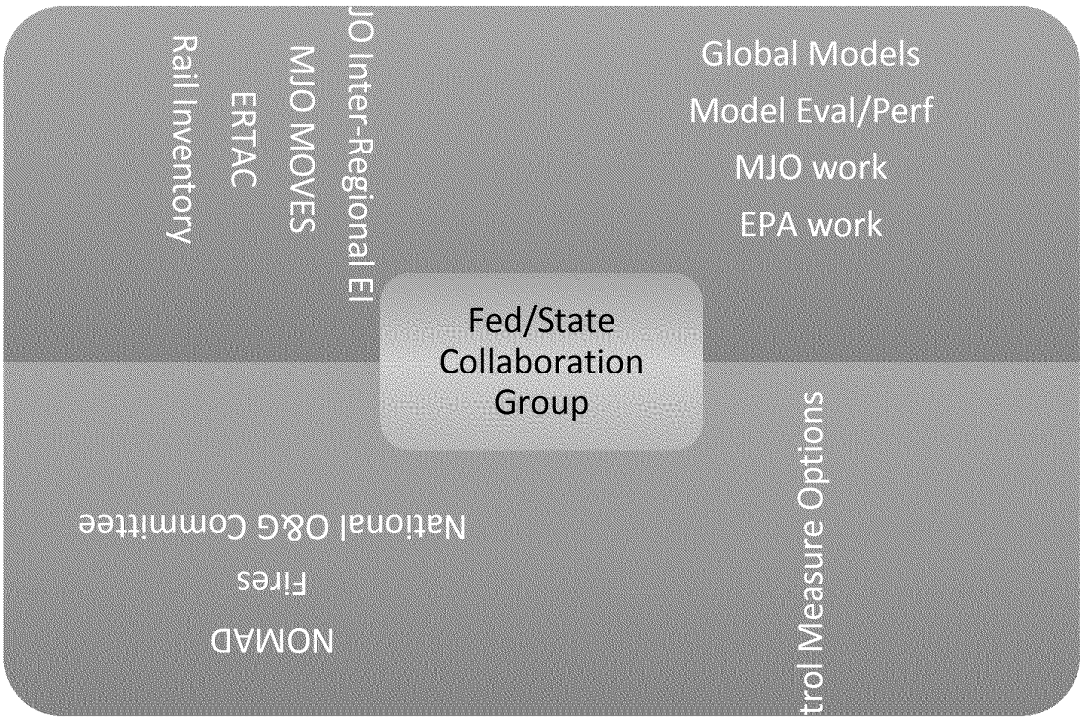
PROCESS (07/07/16):




Resources:

Data files and summaries and Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform - https://www.epa.gov/air-emissions-modeling/2011-version-62-platform



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**Sept. 8, 2016**

**Next Steps Regarding Background Ozone Analysis and Additional Efforts for the Western U.S.**

Background

WESTAR prepared detailed comments in a May 12, 2016 Background Ozone letter to the EPA Docket in regard to EPA's December 30, 2015 *Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone - White Paper for Discussion.*

A working group of representatives from western states, EPA, and WESTAR staff held a call on July 18, 2016 to discuss analysis needs for Background ozone in the West. Call participants:

Gordon Pierce – Colorado APCD
Patrick Barickman – Utah DAQ
Phil Allen – Oregon AQD
Frank Forsgren – Nevada AQB
Pat Dolwick – EPA OAQPS
Gail Tonnesen – EPA Region 8
Bob Lebens – WESTAR
Tom Moore – WESTAR-WRAP

The working group discussed and recommended development of a work plan task to advance the needed analyses as listed in the WESTAR letter, and to approach the WRAP Technical Steering Committee with the idea of including the task in the WRAP Workplan. The WRAP TSC reviewed the following aspects of the task on their August 11, 2016 call:

- Questions posed in WESTAR comment letter

- What is the process to get answers we need and want:
  - Monitoring data: current network, future changes, special studies
  - Future modeling plans for EPA and WRAP
  - A plan for enhanced model evaluation and model intercomparison
  - Develop a collaborative workplan for the next 1-2 years

- Milestones/meeting opportunities to report and discuss progress

The WRAP TSC agreed to include this task in the 2017 WRAP Workplan. The task will be further discussed and defined at the WRAP Technical Planning meeting on October 12-13, 2016.

Analysis Needs

Elements to be addressed in the WRAP Workplan task, brought forward from EPA and WESTAR documents, include:

- Involvement of NOAA, NASA, academic, and other groups with expertise in addition to collaboration of western air agencies, EPA, and federal land managers

- Consideration of background ozone effects in area designations for the October 2015 Ozone air quality standard by Fall 2017

- Coordination with the federal Air Quality Research Subcommittee (AQRS) of the Committee on Environment, Natural Resources, and Sustainability (CENRS), under the National Science and Technology Council (NSTC)

- Include concrete, deliverable/results-focused in scope of work task

    - Comparative evaluation of global air quality models and impacts on regional modeling

    - Components of U.S. Background ozone

    - Tools and methods to define U.S. Background ozone

    - Benchmarks for "best estimates"

    - Evaluation plots and analysis methods

- Opportunities and schedule for tracking/assessing progress on the deliverables and results at meetings and in publications

- Other elements to be included as needed

**To:** lwb@adem.alabama.gov[lwb@adem.alabama.gov];
dkc@adem.alabama.gov[dkc@adem.alabama.gov];
lhicks@adem.alabama.gov[lhicks@adem.alabama.gov];
adh@adem.alabama.gov[adh@adem.alabama.gov];
ahw@adem.alabama.gov[ahw@adem.alabama.gov];
scott.cardno@huntsvilleal.gov[scott.cardno@huntsvilleal.gov];
jason.howanitz@jcdh.org[jason.howanitz@jcdh.org];
corey.m.masuca@jcdh.org[corey.m.masuca@jcdh.org];
lfernandez@broward.org[lfernandez@broward.org];
preston.mclane@dep.state.fl.us[preston.mclane@dep.state.fl.us];
campbell@epchc.org[campbell@epchc.org]; mcwilliams@coj.net[mcwilliams@coj.net]; Bernardo
Bieler[bieleb@miamidade.gov]; roberma@miamidade.gov[roberma@miamidade.gov];
renee.parker@ocfl.net[renee.parker@ocfl.net]; Jorge Patino[Jorge.Patino@flhealth.gov];
asatyal@pinellascounty.org[asatyal@pinellascounty.org];
janet.aldredge@dnr.ga.gov[janet.aldredge@dnr.ga.gov];
deborah.basnight@dnr.ga.gov[deborah.basnight@dnr.ga.gov];
ashley.besaw@dnr.ga.gov[ashley.besaw@dnr.ga.gov];
james.boylan@dnr.ga.gov[james.boylan@dnr.ga.gov];
ken.buckley@dnr.ga.gov[ken.buckley@dnr.ga.gov]; pam.earl@dnr.ga.gov[pam.earl@dnr.ga.gov];
karen.hays@dnr.ga.gov[karen.hays@dnr.ga.gov]; dika.kuoh@dnr.ga.gov[dika.kuoh@dnr.ga.gov];
elisabeth.munsey@dnr.ga.gov[elisabeth.munsey@dnr.ga.gov];
deanna.oser@dnr.ga.gov[deanna.oser@dnr.ga.gov]; Sid Stephens[Sid.Stephens@dnr.ga.gov];
sakina.strozier@dnr.ga.gov[sakina.strozier@dnr.ga.gov]; di.tian@dnr.ga.gov[di.tian@dnr.ga.gov];
alex.yang@dnr.ga.gov[alex.yang@dnr.ga.gov];
farhana.yasmin@dnr.ga.gov[farhana.yasmin@dnr.ga.gov]; sean.alteri@ky.gov[sean.alteri@ky.gov];
Melissa Duff[melissa.duff@ky.gov]; lesliem.poff@ky.gov[lesliem.poff@ky.gov];
michelle.king@louisvilleky.gov[michelle.king@louisvilleky.gov]; boges@metro4-
sesarm.org[boges@metro4-sesarm.org]; carson@metro4-sesarm.org[carson@metro4-sesarm.org];
clafontaine@mdeq.ms.gov[clafontaine@mdeq.ms.gov];
michael.abraczinskas@ncdenr.gov[michael.abraczinskas@ncdenr.gov]; Michael
Pjetraj[michael.pjetraj@ncdenr.gov]; Ashley Featherstone[ashley.featherstone@buncombecounty.org];
barnetwm@forsyth.cc[barnetwm@forsyth.cc];
megan.green@mecklenburgcountync.gov[megan.green@mecklenburgcountync.gov];
Jason.rayfield@mecklenburgcountync.gov[Jason.rayfield@mecklenburgcountync.gov];
leslie.rhodes@mecklenburgcountync.gov[leslie.rhodes@mecklenburgcountync.gov];
brownrj@dhec.sc.gov[brownrj@dhec.sc.gov]; flynntj@dhec.sc.gov[flynntj@dhec.sc.gov];
mccaslsd@dhec.sc.gov[mccaslsd@dhec.sc.gov]; porterhj@dhec.sc.gov[porterhj@dhec.sc.gov];
thompsrb@dhec.sc.gov[thompsrb@dhec.sc.gov]; bcolby@chattanooga.gov[bcolby@chattanooga.gov];
jholloway@chattanooga.gov[jholloway@chattanooga.gov];
james.johnston@tn.gov[james.johnston@tn.gov]; michelle.b.walker@tn.gov[michelle.b.walker@tn.gov];
laliddington@aqm.co.knox.tn.us[laliddington@aqm.co.knox.tn.us];
brivera@aqm.co.knox.tn.us[brivera@aqm.co.knox.tn.us];
john.finke@nashville.gov[john.finke@nashville.gov];
bob.rogers@shelbycountytn.gov[bob.rogers@shelbycountytn.gov];
charles.turner@deq.virginia.gov[charles.turner@deq.virginia.gov]; Wood, Anna[Wood.Anna@epa.gov];
Gibson, Benjamin[gibson.benjamin@epa.gov]; Johnson, Yvonne W[Johnson.Yvonnew@epa.gov]; Palma,
Elizabeth[Palma.Elizabeth@epa.gov]; Wayland, Richard[Wayland.Richard@epa.gov]; Banister,
Beverly[Banister.Beverly@epa.gov]; Benjamin, Lynorae[benjamin.lynorae@epa.gov]; Ceron,
Heather[Ceron.Heather@epa.gov]; Cooper, Artra[Cooper.Artra@epa.gov]; Davis,
Scott[Davis.ScottR@epa.gov]; Davis, Amber[Davis.Amber@epa.gov]; Dressler,
Jason[Dressler.Jason@epa.gov]; Dubose, Dick[DuBose.Dick@epa.gov]; Freeman,
Caroline[Freeman.Caroline@epa.gov]; Gillam, Rick[Gillam.Rick@epa.gov]; Graf,
Gwendolyn[Graf.Gwendolyn@epa.gov]; Isom, Angela[Isom.Angela@epa.gov]; Johnson,
Kristine[Johnson.Kristine@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell,
Ken[Mitchell.Ken@epa.gov]; Page, Lee[Page.Lee@epa.gov]; Perry, Stuart[Perry.Stuart@epa.gov]; Rao,
Seema[Rao.Seema@epa.gov]; Rinck, Todd[Rinck.Todd@epa.gov]; Russo, Todd[Russo.Todd@epa.gov];

Smith, Miya[Smith.Miya@epa.gov]; Spagg, Beverly[Spagg.Beverly@epa.gov]; Worley, Gregg[Worley.Gregg@epa.gov]; Ackerman, Laura[Ackerman.Laura@epa.gov]; Deatrick, John[Deatrick.John@epa.gov]; Mundrick, Doug[Mundrick.Doug@epa.gov]; Gettle, Jeaneanne[Gettle.Jeaneanne@epa.gov]; jim_renfro@nps.gov[jim_renfro@nps.gov]
**From:** John Hornback
**Sent:** Thur 6/1/2017 7:27:37 PM
**Subject:** Correction to attendance list - Gwendolyn Graf
Air Dir Mtg Spring 2017 Attendee List 170601.xlsx
Air Dir Mtg Spring 2017 Agenda Final.docx

Apologies to Ms. Graf. I've edited her e-mail address to fix a typo.

**John E. Hornback**

Executive Director

Metro 4/SESARM

205 Corporate Center Dr Ste D

Stockbridge GA 30281-7383

**404-361-4000** (office)

**770-605-3059** (cell)

**From:** John Hornback [mailto:hornback@metro4-sesarm.org]
**Sent:** Thursday, June 01, 2017 3:21 PM
**To:** lwb@adem.alabama.gov; dkc@adem.alabama.gov; lhicks@adem.alabama.gov; adh@adem.alabama.gov; ahw@adem.alabama.gov; scott.cardno@huntsvilleal.gov; jason.howanitz@jcdh.org; corey.m.masuca@jcdh.org; lfernandez@broward.org; preston.mclane@dep.state.fl.us; campbell@epchc.org; mcwilliams@coj.net; bieleb@miamidade.gov; roberma@miamidade.gov; renee.parker@ocfl.net; jorge.patino@flhealth.gov; asatyal@pinellascounty.org; janet.aldredge@dnr.ga.gov; deborah.basnight@dnr.ga.gov; ashley.besaw@dnr.ga.gov; james.boylan@dnr.ga.gov; ken.buckley@dnr.ga.gov; pam.earl@dnr.ga.gov; karen.hays@dnr.ga.gov; dika.kuoh@dnr.ga.gov; elisabeth.munsey@dnr.ga.gov; deanna.oser@dnr.ga.gov; sid.stephens@dnr.ga.gov; sakina.strozier@dnr.ga.gov; di.tian@dnr.ga.gov; alex.yang@dnr.ga.gov; farhana.yasmin@dnr.ga.gov; sean.alteri@ky.gov; melissa.duff@ky.gov; lesliem.poff@ky.gov; michelle.king@louisvilleky.gov; boges@metro4-sesarm.org; carson@metro4-sesarm.org; hornback@metro4-sesarm.org; clafontaine@mdeq.ms.gov; michael.abraczinskas@ncdenr.gov; michael.pjetraj@ncdenr.gov; ashley.featherstone@buncombecounty.org; barnetwm@forsyth.cc; megan.green@mecklenburgcountync.gov; jason.rayfield@mecklenburgcountync.gov; leslie.rhodes@mecklenburgcountync.gov; brownrj@dhec.sc.gov; flynntj@dhec.sc.gov; mccaslsd@dhec.sc.gov; porterhj@dhec.sc.gov; thompsrb@dhec.sc.gov; bcolby@chattanooga.gov;

jholloway@chattanooga.gov; james.johnston@tn.gov; michelle.b.walker@tn.gov; laliddington@aqm.co.knox.tn.us; brivera@aqm.co.knox.tn.us; john.finke@nashville.gov; bob.rogers@shelbycountytn.gov; charles.turner@deq.virginia.gov; wood.anna@epa.gov; gibson.benjamin@epa.gov; johnson.yvonnew@epa.gov; palma.elizabeth@epa.gov; wayland.richard@epa.gov; banister.beverly@epa.gov; benjamin.lynorae@epa.gov; ceron.heather@epa.gov; cooper.artra@epa.gov; davis.scottr@epa.gov; davis.amber@epa.gov; dressler.jason@epa.gov; dubose.dick@epa.gov; freeman.caroline@epa.gov; gillam.rick@epa.gov; graf.gwendollyn@epa.gov; isom.angela@epa.gov; johnson.kristine@epa.gov; kemker.carol@epa.gov; mitchell.ken@epa.gov; page.lee@epa.gov; perry.stuart@epa.gov; rao.seema@epa.gov; rinck.todd@epa.gov; russo.todd@epa.gov; smith.miya@epa.gov; spagg.beverly@epa.gov; worley.gregg@epa.gov; ackerman.laura@epa.gov; deatrick.john@epa.gov; mundrick.doug@epa.gov; gettle.jeaneanne@epa.gov; jim_renfro@nps.gov
**Subject:** Proposed final attendance list and agenda for next week's meeting

Attached please find copies of the proposed final attendance list and agenda for next week's meeting. Responses are not necessary if no corrections are required but please review if you have time and let me know of any omissions and/or needed additions/edits. We will distribute copies of the agenda to everyone upon arrival. We will not distribute hard copies of the attendance list at the meeting.

Please note:

- Parking.

The Embassy Suites only has valet parking. The normal cost is $37 but we are discounted down to $29.60. The parking process involves getting a receipt from the parking attendant and taking it to the front desk for check-in. Tell the attendant you are with the "Air Directors" Meeting" and verify that the discounted group rate of $29.40 is being applied. If they do not confirm it, let us know so we can work it out.

Other parking options include the parking decks at the nearby Hilton Garden Inn, the College Football Hall of Fame, and the CNN Deck as well as several smaller surface lots. We do not have prices for these parking options.

- We are starting the general session on Tuesday afternoon 15 minutes earlier than originally publicized – at 1:00 p.m. EDT.

- We will provide information about the Wednesday cookout at Carol's house on Tuesday or Wednesday.

- We may finish a bit earlier on Thursday morning but right now are showing the meeting ending time as 11:45 a.m.

Please let us know if you need more information at this time. Thanks. John.

**John E. Hornback**

Executive Director

Metro 4/SESARM

205 Corporate Center Dr Ste D

Stockbridge GA 30281-7383

**404-361-4000** (office)

**770-605-3059** (cell)

**To:** Mark Melvin[mmelvin@jonesctr.org]; Boylan, James[James.Boylan@dnr.ga.gov]
**Cc:** Davis, Scott[Davis.ScottR@epa.gov]; Jennifer Fawcett[jennifer_fawcett@ncsu.edu]; Gillam, Rick[Gillam.Rick@epa.gov]
**From:** Tian, Di
**Sent:** Fri 4/7/2017 6:09:46 PM
**Subject:** RE: Speaker slot at Smoke Summit III
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SmokeSummitIII_GAEPD_Tian_20170407.pdf

Hi Mark and Jennifer,

Attached is my presentation on fire emission inventory. My presentation also includes a few slides on research gaps that may be better included during the section from 10:30 am to 12:00 pm on Tuesday. However, they are also very closely related to national fire emission inventory. Just want to let you know ahead of time for your planning. I also plan to print out my presentation to show during the poster section. This may help in-depth discussion on this topic.

Thanks and see you all soon!

Di

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Di Tian, Ph.D.

Manager, Data & Modeling Unit

Georgia Department of Natural Resources

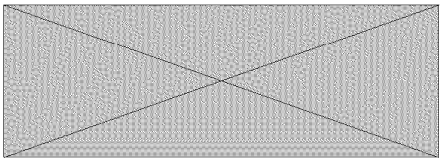
Environmental Protection Division - Air Protection Branch

4244 International Parkway, Suite 120

Atlanta, GA 30354

Office: 404-362-4851 Fax: 404-363-7100

E-mail: di.tian@dnr.state.ga.us



**From:** Mark Melvin [mailto:mmelvin@jonesctr.org]
**Sent:** Friday, April 07, 2017 11:59 AM
**To:** Boylan, James
**Cc:** Davis, Scott; Tian, Di; Jennifer Fawcett; Gillam, Rick
**Subject:** Re: Speaker slot at Smoke Summit III

Thanks Jim

On Fri, Apr 7, 2017 at 11:47 AM, Boylan, James <James.Boylan@dnr.ga.gov> wrote:

Mark and Jennifer,

Attached is a pdf version of my presentation. I will bring a ppt version on a flash drive (too big to e-mail). See you on Monday!!

Jim

---

James W. Boylan, Ph.D.

Manager, Planning & Support Program

Georgia Department of Natural Resources

Environmental Protection Division - Air Protection Branch

4244 International Parkway, Suite 120

Atlanta, GA 30354

Office: 404-363-7014 Fax: 404-363-7100

E-mail: James.Boylan@dnr.ga.gov

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**From:** Davis, Scott [mailto:Davis.ScottR@epa.gov]
**Sent:** Tuesday, March 28, 2017 4:04 PM
**To:** Boylan, James; Tian, Di
**Cc:** Mark Melvin; Jennifer Fawcett; Gillam, Rick
**Subject:** Speaker slot at Smoke Summit III

Jim and Di,

We are looking forward to hearing your presentation at Smoke Summit III in less than two weeks. Details for your sessions are listed below. Please send an electronic copy of your presentation to Mark Melvin and Jennifer Fawcett by Wednesday, APRIL 5 (both copied here) and bring a copy via flash drive as a backup. Thank you for sharing your knowledge and insight with this year's Smoke Summit and please contact me if you have any questions.

DAY 1 – Monday, APRIL 10

**2:15-3:15 2016/Recent Wildfires in the Southeast** **[60 min]**

*Session objective: Identify lessons learned and best practices from recent wildfires in the Southeast related to air and fire agencies coordination and communication*

*Jim Prevette – Southern Group of State Foresters*

*Gary Wood – Southern Group of State Foresters*

*Jim Boylan – Georgia Air Protection Branch* ***[10 min]***

*Pete Lahm – US Forest Service [WebEx link]*

***Q&A + Discussion [10 min]***

DAY 2 – Tuesday, APRIL 11

**9:00-10:00 Concurrent Session 1 – Technical [60 min]**

Fire Tracking and Emissions Inventories: *Moderator - Rick Gillam, US EPA, Region 4*

*Session objective: Emission inventory characterization for wildfire and prescribed fire*

-SmartFire2/BlueSky Smoke Modeling Framework for Developing National Emissions Inventories

*Kirk Baker - US EPA, Office of Research & Development*

*Di Tian – Georgia Air Protection Branch* ***[10 min]***

*Randy Strait – North Carolina Division of Air Quality*

-JFSP Fire Tracking and Emissions Research Project (work by Georgia Tech and North Carolina State University)

*Alan Long – Southern Fire Exchange*

*Dr. Talat Odman – Georgia Institute of Technology [WebEx link]*

***Q&A + Discussion [10 min]***

R. Scott Davis

Chief, Air Planning and Implementation Branch

U.S. Environmental Protection Agency, Region 4

Sam Nunn Atlanta Federal Center, 61 Forsyth Street, SW

Atlanta, GA 30303-8960

Telephone (404) 562-9127

Email: davis.scottr@epa.gov

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Mark A. Melvin

Joseph W. Jones Ecological Research Center @ Ichauway
3988 Jones Center Drive
Newton, GA 39870
229-734-4706 x263
mark.melvin@jonesctr.org

**To:** Albritton, Tim - NRCS, Auburn, AL[Tim.Albritton@al.usda.gov]; kelley.anderson.3.ctr@us.af.mil[kelley.anderson.3.ctr@us.af.mil]; Ken Arney[karney@fs.fed.us]; Robert Bardon[rebardon@ncsu.edu]; Bruce Beard[bruce.beard@ag.tamu.edu]; ryan_boyles@ncsu.edu[ryan_boyles@ncsu.edu]; david_byrd@fws.gov[david_byrd@fws.gov]; Holly Campbell[hcampbell@sref.info]; Cammack, Shan[Shan.Cammack@dnr.ga.gov]; Walter Cartwright[walter.cartwright@forestry.alabama.gov]; Vince Carver[vince_carver@fws.gov]; Bill Cary[BCARY@brookspierce.com]; Tom Darden[darden950584@bellsouth.net]; Corey Davis[Ex. 6 - Personal Privacy]; Dueitt, Michael[michael_dueitt@fws.gov]; Jennifer Evans[jlevans3@ncsu.edu]; Furman, James H -FS[jameshfurman@fs.fed.us]; Harrelson, John[john.harrelson@ncwildlife.org]; Dennis Hazel[hazeld@ncsu.edu]; Stephanie Hertz[Stephanie.Hertz@ag.tamu.edu]; mike_housh[mike_housh@fws.gov]; Darryl Jones[djones@forestry.state.sc.us]; Jones, Kyle R -FS[krjones@fs.fed.us]; Jones, Mark D[mark.jones@ncwildlife.org]; Pete Kubiak[Ex. 6 - Personal Privacy] Roel Lopez[roel@tamu.edu]; Tad W. McCall[tmccall@ag.tamu.edu]; Moreno, Luis A CIV USARMY IMCOM AEC (US)[luis.a.moreno34.civ@mail.mil]; O'Brien, Joseph J -FS[jjobrien@fs.fed.us]; Orndorff, Ryan B CIV (US)[ryan.b.orndorff.civ@mail.mil]; james.m.parker116.civ@mail.mil[james.m.parker116.civ@mail.mil]; Pierluissi, Sergio[sergio_pierluissi@fws.gov]; Jim Prevette[jprevette@southernforests.org]; Raval, Shardul -FS[sraval@fs.fed.us]; Rimer, Linda[Rimer.Linda@epa.gov]; Addie L. Thornton[Addie.Thornton@ag.tamu.edu]; Ulrey, Anne J CIV USARMY USAG (US)[anne.j.ulrey.civ@mail.mil]; Wallace, Phillip[phillip.wallace@ncagr.gov]; michael_d_ward@nps.gov[michael_d_ward@nps.gov]; Ward, Thomas - NRCS, Greensboro, NC[Thomas.Ward@gnb.usda.gov]; Ware, Clay[clay_ware@fws.gov]; John Williams[jrwill19@ncsu.edu]; Gary Wood[gwood@southernforests.org]; Gregg Elliott[Ex. 6 - Personal Privacy] Amity Bass[abass@wlf.la.gov]; woodst@nwf.org[woodst@nwf.org]; Ben Larson[LarsonB@nwf.org]; luann.craighton@cflcp.org[luann.craighton@cflcp.org]; Chris Minor (cminor@TNC.ORG)[cminor@tnc.org]; Vernon Compton[vernon@longleafalliance.org]; Randy Tate[randy@longleafalliance.org]; Godwin,David Robert[drg2814@ufl.edu]; Lane Green[Ex. 6 - Personal Privacy] Kobziar,Leda Nikola[lkobziar@ufl.edu]; Kuebler, Caroline[CKuebler@forestfoundation.org]; Mark Melvin[mark.melvin@jonesctr.org]; Robert Abernethy[Robert@longleafalliance.org]; Long,Alan J[ajl2@ufl.edu]; gseamon@ttrs.org[gseamon@ttrs.org]; David Frederick[Ex. 6 - Personal Privacy]; G. Michael Zupko IV[mike@zup-co-inc.com]; Ryan Bollinger[ryan_b@longleafalliance.org]; Mike Black[Ex. 6 - Personal Privacy]; Boyce, Lawra[boycelc@dhec.sc.gov]; Gillam, Rick[Gillam.Rick@epa.gov]; James Joy[jamesajoyiii@gmail.com]; jenniferf.miller@ky.gov[jenniferf.miller@ky.gov]; nick.witcraft@ncdenr.gov[nick.witcraft@ncdenr.gov]
**Cc:** Pete Lahm fed.us[plahm@fs.fed.us]
**From:** Jennifer Evans Fawcett
**Sent:** Sat 10/29/2016 1:28:22 AM
**Subject:** Next SERPPAS Prescribed Fire Work Group Meeting On Nov 9 at 2pm EST
EPA Regulatory Actions Related to Prescribed Fire Smoke and Air Quality.docx
Driptorch Digest Vol_8_Oct_Nov_2016.pdf

All,
The 8th edition of the Driptorch Digest is now available: https://research.cnr.ncsu.edu/blogs/southeast-fire-update/files/2016/10/Driptorch-Digest-Vol_8_Oct_Nov_2016.pdf

Based on the Doodle poll, the best time for our next meeting is **November 9 at 2pm EST**. Please let me know if you have any items to be added to the Agenda no later than 11/4.

Call-in information will remain the same:

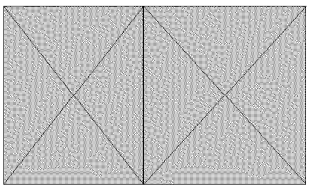
Phone: Ex. 6 - Personal Privacy
Access Code: Ex. 6 - Personal Privacy

Also, just a reminder to please register for the Southeast Regional Prescribed Fire Council Meeting on Nov 4 in Savannah, GA **by Monday, Oct 31** if you plan to attend. Learn more and register here: Southeast Regional Prescribed Fire Council Meeting.

Finally, please see the attached "EPA Regulatory Actions Related to Prescribed Fire Smoke and Air Quality," developed by Rick Gillam and Pete Lahm, which will also be shared at the regional Council meeting.

Regards,
Jenn

Jennifer Evans Fawcett
SERPPAS Prescribed Fire Work Group Coordinator
Extension Associate, North Carolina State University
919-515-8288 (o)
jlevans3@ncsu.edu



Good Fires Protect Your Forest

Check out the Rx Fire Smoke Management App!

On Mon, Oct 17, 2016 at 8:22 PM, Jennifer Evans Fawcett <jlevans3@ncsu.edu> wrote:

> All,
>
> Thank you for those of you who joined last week's SERPPAS Prescribed Fire Work Group Call. I have attached the meeting minutes for those who were unable to join. We hope that those you affected by the hurricane are now fully recovered.
>
> Please fill out this Doodle poll **by October 25** to choose a date for our next call: **Ex. 6 - Personal Privacy**
>
> Some highlights from last week's call included:
>
> - Welcome, Addie Thornton, new SERPPAS Coordinator. Addie will join our calls to stay informed of our work and to communicate with the SERPPAS steering team. I will continue to coordinate the SERPPAS Prescribed Fire Work Group.
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Prescribed Fire Council Meeting. **Registration is free, but is due by October 28.** Contact Jenn or Mark Melvin with questions.

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- Several updates and overviews on ozone, PM, regional haze rule, and Exceptional Events Rule (EER) were provided by Rick Gillam of EPA. These were also provided in context to prescribed burning. The Final EER was signed and came out on September 16. It was recently published in the Federal Register on Oct 3, 2016: https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance. Contact Rick with questions or comments at gillam.rick@epa.gov.
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The next Driptorch Digest newsletter will be sent in the near future. Please read the newsletter to learn more about things going on around the region in regards to prescribed fire, new research, upcoming events, etc. Please send anything that you would like me to include.

Regards,
Jenn

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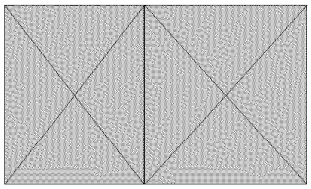

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**To:** Albritton, Tim - NRCS, Auburn, AL[Tim.Albritton@al.usda.gov]; kelley.anderson.3.ctr@us.af.mil[kelley.anderson.3.ctr@us.af.mil]; Ken Arney[karney@fs.fed.us]; Robert Bardon[rebardon@ncsu.edu]; Bruce Beard[bruce.beard@ag.tamu.edu]; ryan_boyles@ncsu.edu[ryan_boyles@ncsu.edu]; david_byrd@fws.gov[david_byrd@fws.gov]; Holly Campbell[hcampbell@sref.info]; Cammack, Shan[Shan.Cammack@dnr.ga.gov]; Walter Cartwright[walter.cartwright@forestry.alabama.gov]; Vince Carver[vince_carver@fws.gov]; Bill Cary[BCARY@brookspierce.com]; Tom Darden[Ex. 6 - Personal Privacy]; Corey Davis[Ex. 6 - Personal Privacy]; Dueitt, Michael[michael_dueitt@fws.gov]; Jennifer Evans[jlevans3@ncsu.edu]; Furman, James H -FS[jameshfurman@fs.fed.us]; Harrelson, John[john.harrelson@ncwildlife.org]; Dennis Hazel[hazeld@ncsu.edu]; Stephanie Hertz[Stephanie.Hertz@ag.tamu.edu]; mike_housh[mike_housh@fws.gov]; Darryl Jones[djones@forestry.state.sc.us]; Jones, Kyle R -FS[krjones@fs.fed.us]; Jones, Mark D[mark.jones@ncwildlife.org]; Pete Kubiak[Ex. 6 - Personal Privacy]; Roel Lopez[roel@tamu.edu]; Tad W. McCall[tmccall@ag.tamu.edu]; Moreno, Luis A CIV USARMY IMCOM AEC (US)[luis.a.moreno34.civ@mail.mil]; O'Brien, Joseph J -FS[jjobrien@fs.fed.us]; Orndorff, Ryan B CIV (US)[ryan.b.orndorff.civ@mail.mil]; james.m.parker116.civ@mail.mil[james.m.parker116.civ@mail.mil]; Pierluissi, Sergio[sergio_pierluissi@fws.gov]; Jim Prevette[jprevette@southernforests.org]; Raval, Shardul -FS[sraval@fs.fed.us]; Rimer, Linda[Rimer.Linda@epa.gov]; Addie L. Thornton[Addie.Thornton@ag.tamu.edu]; Ulrey, Anne J CIV USARMY USAG (US)[anne.j.ulrey.civ@mail.mil]; Wallace, Phillip[phillip.wallace@ncagr.gov]; michael_d_ward@nps.gov[michael_d_ward@nps.gov]; Ward, Thomas - NRCS, Greensboro, NC[Thomas.Ward@gnb.usda.gov]; Ware, Clay[clay_ware@fws.gov]; John Williams[jrwill19@ncsu.edu]; Gary Wood[gwood@southernforests.org]; Gregg Elliott[Ex. 6 - Personal Privacy]; Amity Bass[abass@wlf.la.gov]; woodst@nwf.org[woodst@nwf.org]; Ben Larson[LarsonB@nwf.org]; luann.craighton@cflcp.org[luann.craighton@cflcp.org]; Chris Minor (cminor@TNC.ORG)[cminor@tnc.org]; Vernon Compton[vernon@longleafalliance.org]; Randy Tate[randy@longleafalliance.org]; Godwin,David Robert[drg2814@ufl.edu]; Lane Green[Ex. 6 - Personal Privacy]; Kobziar,Leda Nikola[lkobziar@ufl.edu]; Kuebler, Caroline[CKuebler@forestfoundation.org]; Mark Melvin[mark.melvin@jonesctr.org]; Robert Abernethy[Robert@longleafalliance.org]; Long,Alan J[ajl2@ufl.edu]; gseamon@ttrs.org[gseamon@ttrs.org]; David Frederick[Ex. 6 - Personal Privacy]; G. Michael Zupko IV[mike@zup-co-inc.com]; Ryan Bollinger[ryan_b@longleafalliance.org]; Mike Black[seqfw@aol.com]; Boyce, Lawra[boycelc@dhec.sc.gov]; Gillam, Rick[Gillam.Rick@epa.gov]; James Joy[Ex. 6 - Personal Privacy]; jenniferf.miller@ky.gov[jenniferf.miller@ky.gov]; nick.witcraft@ncdenr.gov[nick.witcraft@ncdenr.gov]
**From:** Jennifer Evans Fawcett
**Sent:** Tue 10/18/2016 3:22:54 AM
**Subject:** Oct 12 SERPPAS Prescribed Fire Work Group Meeting Notes
Meeting Notes 10_12_16.docx

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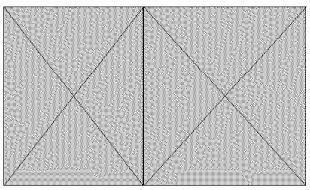

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**To:** ahobbs@placer.ca.gov[ahobbs@placer.ca.gov]; airquality@nezperce.org[airquality@nezperce.org]; asaschin@sonoma-county.org[asaschin@sonoma-county.org]; Benjamin_Jacobs@nps.gov[Benjamin_Jacobs@nps.gov]; blocksom@KSU.EDU[blocksom@KSU.EDU]; bmoss@co.calaveras.ca.us[bmoss@co.calaveras.ca.us]; boycelc@dhec.sc.gov[boycelc@dhec.sc.gov]; brad_washa@blm.gov[brad_washa@blm.gov]; brennej@doacs.state.fl.us[brennej@doacs.state.fl.us]; bret_l@ldaf.state.la.us[bret_l@ldaf.state.la.us]; bwasha@blm.gov[bwasha@blm.gov]; cgoodell@blm.gov[cgoodell@blm.gov]; Christine.Paulson@dnr.iowa.gov[Christine.Paulson@dnr.iowa.gov]; coleen.campbell@state.co.us[coleen.campbell@state.co.us]; craig_goodell@blm.gov[craig_goodell@blm.gov]; cryan@countyofcolusa.org[cryan@countyofcolusa.org]; dan.jackson@forestry.alabama.gov[dan.jackson@forestry.alabama.gov]; daniel.martinez@valleyair.org[daniel.martinez@valleyair.org]; DARWeb@gw.dec.state.ny.us[DARWeb@gw.dec.state.ny.us]; david.celino@state.ma.us[david.celino@state.ma.us]; dchan@gfc.state.ga.us[dchan@gfc.state.ga.us]; dconway@mariposacounty.org[dconway@mariposacounty.org]; ddaily@dnr.in.gov[ddaily@dnr.in.gov]; dharris@ncuaqmd.org[dharris@ncuaqmd.org]; Didier.Davignon@ec.gc.ca[Didier.Davignon@ec.gc.ca]; djones@forestry.state.sc.us[djones@forestry.state.sc.us]; dmims@arb.ca.gov[dmims@arb.ca.gov]; dpsmith@ldaf.state.la.us[dpsmith@ldaf.state.la.us]; dwashing@blm.gov[dwashing@blm.gov]; ebeck@co.siskiyou.ca.us[ebeck@co.siskiyou.ca.us]; Law, Erin -FS[elaw@fs.fed.us]; eolson@co.siskiyou.ca.us[eolson@co.siskiyou.ca.us]; fcook@blm.gov[fcook@blm.gov]; fred.turck@dof.virginia.gov[fred.turck@dof.virginia.gov]; Gail.Kantak@dnr.iowa.gov[Gail.Kantak@dnr.iowa.gov]; garcemont@co.slo.ca.us[garcemont@co.slo.ca.us]; gary.curcio@gmail.com[gary.curcio@gmail.com]; Gatewood.Doreen@azdeq.gov[Gatewood.Doreen@azdeq.gov]; ggg@sbcapcd.org[ggg@sbcapcd.org]; Gillam, Rick[Gillam.Rick@epa.gov]; heidi.hales@state.vt.us[heidi.hales@state.vt.us]; James.Brenner@FreshFromFlorida.com[James.Brenner@FreshFromFlorida.com]; Jared_Hammatt@BLM.gov[Jared_Hammatt@BLM.gov]; jbecknell@gbuapcd.org[jbecknell@gbuapcd.org]; jcitron@fraqmd.org[jcitron@fraqmd.org]; Hall, Joshua D -FS[jdhall@fs.fed.us]; jeff_eyamie@hc-sc.gc.ca[jeff_eyamie@hc-sc.gc.ca]; jeffcosmoke@hotmail.com[jeffcosmoke@hotmail.com]; jesusramirez@co.imperial.ca.us[jesusramirez@co.imperial.ca.us]; jhammatt@blm.gov[jhammatt@blm.gov]; jimmie.cooksey@sdcounty.ca.gov[jimmie.cooksey@sdcounty.ca.gov]; Peterson, Janice L -FS[jlpeterson@fs.fed.us]; jmalinski@redlakenation.org[jmalinski@redlakenation.org]; john.e.maile@us.army.mil[john.e.maile@us.army.mil]; john.kirksey@tn.gov[john.kirksey@tn.gov]; johnsond18@michigan.gov[johnsond18@michigan.gov]; kevin_beck@fws.gov[kevin_beck@fws.gov]; kim_vanhemelryck@fws.gov[kim_vanhemelryck@fws.gov]; Kordzi, Joe[Kordzi.Joe@epa.gov]; ksumner@co.siskiyou.ca.us[ksumner@co.siskiyou.ca.us]; lbye@blm.gov[lbye@blm.gov]; Lisa_Bye@BLM.GOV[Lisa_Bye@BLM.GOV]; mary anderson[Mary.Anderson@deq.idaho.gov]; McGown, Michael[McGown.Michael@epa.gov]; mckenzier@michigan.gov[mckenzier@michigan.gov]; mmelvin@jonesctr.org[mmelvin@jonesctr.org]; Trebon, Meg M -FS[mtrebon@fs.fed.us]; natalene.cummings@fcpotawatomi-nsn.gov[natalene.cummings@fcpotawatomi-nsn.gov]; nberry@aqmd.gov[nberry@aqmd.gov]; Neal_Mulconrey@nps.gov[Neal_Mulconrey@nps.gov]; ngifford@albanypinebush.org[ngifford@albanypinebush.org]; Lancaster, Nathan J -FS[njlancaster@fs.fed.us]; nyonker@odf.state.or.us[nyonker@odf.state.or.us]; **Ex. 6 - Personal Privacy** paul_charland@fws.gov[paul_charland@fws.gov]; Bostwick, Pamela S -FS[pbostwick@fs.fed.us]; **Ex. 6 - Personal Privacy** PetriniJ@sbcapcd.org[PetriniJ@sbcapcd.org]; Connell, Richard L -FS[rconnell@fs.fed.us]; rgray@tfs.tamu.edu[rgray@tfs.tamu.edu]; rick.boddicker@state.sd.us[rick.boddicker@state.sd.us]; Marchion, Russ J -FS[rjmarchion@fs.fed.us]; rs8@azdeq.gov[rs8@azdeq.gov]; Sherron, Ronald A -FS[rsherron@fs.fed.us]; Russ_langford@fws.gov[Russ_langford@fws.gov]; scott.reed@arkansas.gov[scott.reed@arkansas.gov]; sdearsty@blm.gov[sdearsty@blm.gov]; sgallup@colostate.edu[sgallup@colostate.edu]; Hoyt, Stu -FS[shoyt@fs.fed.us]; O'Neill, Susan M -FS[smoneill@fs.fed.us]; Robson, Shane -FS[srobson@fs.fed.us]; Stephanie.E.Hammonds@wv.gov[Stephanie.E.Hammonds@wv.gov]; **Ex. 6 - Personal Privacy** ; Suzuki, Debra[Suzuki.Debra@epa.gov];

tbreininge@state.pa.us[tbreininge@state.pa.us]; tbrians@tehcoapcd.net[tbrians@tehcoapcd.net]; TBriggs@albanypinebush.org[TBriggs@albanypinebush.org]; thomas.guertin@des.nh.gov[thomas.guertin@des.nh.gov]; tim.howell@ncagr.gov[tim.howell@ncagr.gov]; timothy.marsh@ct.gov[timothy.marsh@ct.gov]; Brown, Terri L -FS[tlbrown02@fs.fed.us]; Todd_Richardson@blm.gov[Todd_Richardson@blm.gov]; trichardson@blm.gov[trichardson@blm.gov]; twalea@spokanetribe.com[twalea@spokanetribe.com]; Wickman, Trent R -FS[twickman@fs.fed.us]; uparker@bcaqmd.org[uparker@bcaqmd.org]; veldacavazos@co.imperial.ca.us[veldacavazos@co.imperial.ca.us]; Begay, Willie N - FS[wbegay@fs.fed.us]; yoda@sopris.net[yoda@sopris.net]; kparker@GFC.STATE.GA.US[kparker@GFC.STATE.GA.US]; Clezie, Steve -FS[sclezie@fs.fed.us]; YONKER Nick J * ODF[Nick.J.YONKER@oregon.gov]; Davignon, Didier (EC)[didier.davignon@canada.ca]; Eyamie, Jeff (HC/SC)[jeff.eyamie@canada.ca]; Judith Harlow[jharlow@fraqmd.org]; McGown, Michael[McGown.Michael@epa.gov]; Mims, Dartanion@ARB[Dar.Mims@arb.ca.gov]; Broughton, Michael - FS[michaelbroughton@fs.fed.us]
**From:** Gillam, Rick
**Sent:** Mon 9/19/2016 3:13:24 PM
**Subject:** Final EPA Exceptional Events Rule

Hello NWCG Smoke Managers Subcommittee,

On Friday evening (9/16/16), the EPA Administrator Gina McCarthy signed the 2016 revisions to the Exceptional Events Rule. At the same time, Steve Page, the OAQPS Director, signed the final *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*. The rule revisions, final guidance, response to comments document and a fact sheet are now available on the EPA's web site at http://www2.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events.

Please know the following:

- The EPA will host an informational public webinar on Wednesday to provide an overview of the final Exceptional Events Rule revisions and the final wildfire/ozone implementation guidance. Details are as follows:

  - **Date:** Wednesday, September 21, 2016
  - **Time:** 2:00 – 3:30 pm EDT
  - **Webinar URL:** https://epawebconferencing.acms.com/e-events

- The effective date of the rule will be the date that it is published in the *Federal*

*Register*. We expect this date to be before October 1, 2016.

•□□□□□□□□ The final rule extends by 60 days from the effective date of the action, the deadline for states to submit 2013 – 2015 exceptional events demonstrations as part of their initial designations recommendations for the 2015 ozone NAAQS. These demonstrations were originally due by October 1, 2016.

Regards,

Rick Gillam

U.S. EPA Region 4

Atlanta, Georgia

404/562-9049

ED_001361_00011926

# EXCEPTIONAL EVENTS IMPLEMENTATION WORKSHOP
# OVERVIEW OF EXCEPTIONAL EVENTS RULE REVISIONS

Ruben R. Casso, Engineer
Geographic Strategies Group
Air Quality Policy Division, OAQPS - U.S. EPA
Exceptional Events Workshop
November 2016

ED_001361_00011926



# Overview of Exceptional Events Rule Revisions

- Project scope
- Rule background
- Technical criteria: the finer points
- Demonstration development, submittal and review
- Mitigation

ED_001361_00011926



# Overview of Exceptional Events Rule Revisions
# Project Scope

- The 2016 rule revisions and final wildfire/ozone guidance were needed first steps, but efficient and coordinated implementation is critical.
- What is next?
- Additional Implementation Guidance
  - Revisions to *Interim Exceptional Events Guidance Documents*
  - Stratospheric Ozone Intrusion Guidance
  - Alternate Paths for Data Exclusion Guidance
  - Prescribed Fire Guidance
- Continued development of exceptional events tools
  - Templates
  - Website updates
  - AQS modifications to reflect rule revisions
  - Standardized metrics and tracking
  - Targeted efforts with FLMs – communications and tools
- Other?

*For illustration and discussion purposes only*

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# Overview of Exceptional Events Rule Revisions
# Rule Background

- New rule effective 9/30/16; published in Federal Register 10/3/16 (81 FR 68216)
- Applies to the treatment of data showing exceedances or violations of any NAAQS for purposes of the specific types of regulatory determinations by the Administrator:
- Affects Designations/Redesignations; Classifications; Attainment demonstrations (including clean data determinations); Attainment date extensions; Findings of SIP inadequacy leading to a SIP call
- Applies to all state air agencies, to (delegated) local air agencies, to tribal air agencies that operate air quality monitors that produce regulatory data and to federal land managers/federal agencies if agreed to by the state
- Other actions on a case-by-case basis

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: the finer points

* The event affected air quality in such a way that there exists a **clear causal relationship** between the specific event and the monitored exceedance or violation (as supported by a comparison of the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times)

* The event was a human activity that is unlikely to recur at a particular location or was a natural event.

* The event was not reasonably controllable or preventable

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Clear Causal Relationship

*The event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation*

- May wish to consider addressing this element first
- Clear causal relationship element consists of the following:
  - Analyses to show that the event occurred
  - Analyses to show that emissions of the pollutant of interest were transported to the monitor(s) recording the exceedance
- Weight of evidence analysis

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# Clear Causal Overview of Exceptional Events Rule Revisions
# Technical Criteria: Clear Causal Relationship

*The event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation*

- Analyses that the event occurred
  - Comparison to historical concentrations [50.14(c)(3)(iv)(C)]
    - May be sufficient to demonstrate that the event occurred
    - No cut-off or percentile that must be met or proven for historical concentrations.
    - Recommend using 5 years of data
    - Example analyses provided in preamble to final rule (see Table 2)
  - Other analyses as needed [50.14(c)(3)(iv)(B)

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Clear Causal Relationship

*The event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation*

- Evidence of Transport to the Monitor
  - Speciation data at the monitor
  - Back/Forward Trajectories
  - Satellite imagery
  - Spatial extent maps comparing event days and non-event days

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Clear Causal Relationship

*The event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation*

- Clear causal relationship considerations for natural events
  - Shows that the event was caused by non-anthropogenic sources
    - If anthropogenic contributors → need showing of reasonable controls showing
  - Criterion referenced in the not reasonably controllable or preventable section for natural events
  - Rule language as natural events:
    - Wildfires on wildland, stratospheric ozone intrusions
    - Volcanos (no specific regulatory language)

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Human Activity / Natural Event

*The event was caused by human activity that is unlikely to recur at a particular location or was a natural event.*

- Was the event natural or a human activity that is unlikely to recur?
  - Recognized natural events (81 FR 68232)
    - Wildfires, stratospheric ozone intrusions, volcanic and seismic activity, natural disasters, certain high wind dust events
    - Natural events can recur
  - Emissions do not have to be entirely without a human component. If anthropogenic sources contribute to the event and are reasonably controlled, then an air agency can make the case that these emissions play no direct causal role. 40 CFR 50.1(k). Thus, they can satisfy the definition of "natural events."

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Human Activity / Natural Event

*The event was caused by human activity that is unlikely to recur at a particular location or was a natural event.*

- Is this human activity unlikely to recur?
- Particular Location:
  - Can vary depending on the specifics of the area
  - Air agencies and regions should proactively discuss what a "particular location" means
- Event recurrence
  - Three events in 3 years benchmark: Has there been a similar event type generating emissions of the same pollutant (regardless of whether it was an exceptional event) within 3 years before the date of the event?
    - A single discrete event is one occurrence even if it extends over more than one day
    - An event that does not fit this recurrence benchmark may be approvable on a case-by-case basis.

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Not Reasonably Controllable or Preventable

*The event was not reasonably controllable and the event was not reasonably preventable*

- "Controllable" and "Preventable" are separate tests
- Not reasonably controllable?
  - Reasonable measures to control the impact of the event on air quality were applied at the time of the event
- Not reasonably preventable?
  - Reasonable measures to prevent the event were applied at the time of the event
- Case specific approach evaluated in light of information available as of the date of the event.

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Not Reasonably Controllable or Preventable

*The event was not reasonably controllable and the event was not reasonably preventable*

- Circumstances that do not require detailed analysis
  - (1) The emissions generating activity is beyond the jurisdictional boundaries of the state submitting the demonstration [50.14(b)(8)(vii)]
  - (2) the emissions generating activity is a natural event and all anthropogenic contributors are reasonably controlled
    - Wildfires on wildland [50.14(b)(5)(iv)]
    - Large-scale, high-energy high wind dust events [50.14(b)(5)(vi)]
    - Stratospheric ozone intrusions [50.14(b)(6)]
  - (3) Deference to measures in a nonattainment or maintenance SIP/FIP/TIP approved within 5 years of the date of the event [50.14(b)(8)(v)]
    - Does not apply if the air agency is under obligation to revise SIP
- If the event-type exclusion applies to the event emissions, then the not reasonably controllable or preventable section of the demonstration should include a statement explaining this point and cite to the rule presumption.

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Not Reasonably Controllable or Preventable

*The event was not reasonably controllable and the event was not reasonably preventable*

- Approach for event emissions without presumptions
  - (1) Identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance or violation, including the contribution from local sources
  - (2) identify the relevant SIP, FIP or TIP or other enforceable control measures in place for these sources and the implementation status of these controls
  - (3) provide evidence of effective implementation and enforcement of reasonable controls, if applicable

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# Overview of Exceptional Events Rule Revisions Technical Criteria: High Wind Elements

- Provisions for high wind thresholds
  - EPA will accept 25 mph sustained winds threshold for listed Western States, provided…
  - Alternative area-specific high wind thresholds
- Provisions and criteria for large-scale and high energy high wind dust events
  - Generally consider demonstration sufficient documenting nature and extent of the event for the not reasonably controllable criterion provided State provides evidence showing:
    - Event is associated with dust storm and is the focus of a ''Dust Storm Warning'' by the NWS* and include NWS* observations of dust storms and blowing dust
    - Event has sustained wind speeds $\geq$ 40 mph, and has reduced visibility $\leq$ 0.5 miles
  - In addition, the event should generally be associated with measured exceedances occurring at multiple monitoring sites over a large geographic area, unless… **

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Fire-Related Rule Revisions

- Fire-related rule language and preamble text
  - Define fire-related terms in regulatory language
    - *Wildland* means an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.
    - *Prescribed Fire* is any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific land or resource management objectives.
    - *Wildfire* is any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event.
  - Clarify that all wildfires on wildland are natural events
  - Clarify that prescribed fire on wildland is a human-caused event eligible for treatment as an exceptional event

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Fire-Related Rule Revisions

- Provisions for prescribed fires
  - Language in preamble recognizes the need for and benefits of prescribed fire
  - Applying rule criteria to prescribed fires
    - Clear causal relationship – analyses similar to those for wildfires (see guidance)
    - Human activity unlikely to recur – recurrence is either the natural fire return interval OR the fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem (as documented in a land/resource management plan)
    - Not reasonably preventable – incorporates concept of "foregone benefits" and uses same approach as unlikely to recur
    - Not reasonably controllable – fire conducted under a certified and implemented Smoke Management Program (SMP, see preamble) or using basic smoke management practices (BSMP, see rule text)

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Fire-Related Rule Revisions

- Provisions for prescribed fires (cont'd)
  - Remove existing rule language requiring a state to re-consider adopting a SMP after each exceptional event
  - Require land managers, burn managers and air agencies to collaborate regarding the process by which the agencies will work together to include general expectations for selection and application of appropriate BSMP (2-year phase in period)
- Land/resource management plans and exceptional events
  - Can be relied upon to address recurrence and not reasonably preventable
  - Requirements apply equally to federal, public and private landowners

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# Overview of Exceptional Events Rule Revisions
# Technical Criteria: Fire-Related Rule Revisions

- Prescribed fire recurrence
  - Different for prescribed fire on wildland and other event types
  - Different for "unlikely to recur" and trigger for mitigation plan development
- Fire roles and responsibilities
  - Burn manager/agency can provide fire-specific information (e.g., emissions, acres burned, meteorology, modeling, communication and outreach, etc.)
  - Air agency and/or FLM can assess regulatory significance and the usefulness of getting EPA approval for data exclusion
  - Air agency and/or FLM can prepare the technical demonstration, which involves several data gathering and analysis tasks (EPA strongly encourages air agency and land manager collaboration and leveraging of resources and expertise)
  - Air agency is responsible for initial notification to EPA (can be delegated to FLM), deciding (with EPA input) whether to submit a demonstration, and submitting the prepared demonstration and/or endorsing the FLM's submission

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# Overview of Exceptional Events Rule Revisions Demonstration Development

- Initial event description and flagging associated data submitted to the AQS database
- **Initial notification** by the State to the EPA of a potential exceptional event a required (but waivable) preliminary step before submitting a demonstration
- The State and the appropriate EPA Regional office shall engage in regular communications to identify those data that have been potentially influenced by an exceptional event, to determine whether the identified data may affect a regulatory determination and to discuss whether the State should develop and submit an exceptional events demonstration
- For data that may affect an anticipated regulatory determination or where circumstances otherwise compel the Administrator to prioritize the resulting demonstration, the Administrator shall respond to a State's Initial Notification of Potential Exceptional Event with a due date for demonstration submittal that considers the nature of the event and the anticipated timing of the associated regulatory decision

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# Overview of Exceptional Events Rule Revisions Demonstration Submittal

- Established 2015 Ozone NAAQS demonstration submission deadlines:
  - November 29, 2016 (for 2013 - 2015 data)
  - May 31, 2017 (2016 data) for ozone designations promulgated in Oct. 2017 (CAA 2-yr schedule)
  - May 31, 2018 (for 2017 data) only if designations are completed under a 3-year schedule

- Demonstration components
  - Conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from event(s) led to exceedance or violation at affected monitor(s);
  - Sections for each of the 3 technical criteria
    - clear causal relationship supported by comparison to historical concentrations
    - human activity unlikely to recur/natural event
    - not reasonably controllable or preventable
  - Public Input
    - Documentation that (30 day) public comment process was conducted
    - Comments received
    - **Address comments disputing or contradicting factual evidence in demonstration***

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# Overview of Exceptional Events Rule Revisions Demonstration Review

- Technical review based on weight of evidence
  - Review applicant responses to comments disputing or contradicting demonstration evidence
  - Possible reviews for timeliness, administrative completeness and technical adequacy.
- Flagging
  - Ensure that the applicable demonstration submittal deadlines are met (if for initial designations)
  - Ensure that the AQS flagged data and request for exclusion in the demonstration agree
  - Where a State demonstrates to the Administrator's satisfaction that such data satisfy the requirements in paragraph (c)(3)(iv)(B) of this section regarding the clear causal relationship criterion and otherwise satisfy the requirements of this section, the Administrator shall agree to exclude all data within the affected calendar day(s). **(PM data only)**
- Request event flagging could trigger mitigation requirements

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# Overview of Exceptional Events Rule Revisions Demonstration Review

- General timelines for EPA action and review
  - 60 days - formal response to the Initial Notification
  - 120 days of receipt - initial review of an exceptional events demonstration with regulatory significance
  - 12 months of receipt of a complete demonstration - a decision regarding event concurrence/nonconcurrence
  - 60 days of receipt of a demonstration that the EPA determined during the Initial Notification process to not to have regulatory significance – issue "deferral letter"

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# Overview of Exceptional Events Rule Revisions
## Mitigation

- Mitigation Plan Requirements
  - Preamble identifies areas with recurring events (generally three events in a 3-year time period, which for final rule purposes was 1/1/13 – 12/31/15)
  - Requires development of mitigation plan (elements specified)
    - Prepared and after notice and opportunity for public comment
    - Submitted for EPA's review and verification of the plan components
    - Administrator shall notify the State upon completion of the review.
  - Identified areas have 2 years from the rule effective date (September 30, 2016 or subsequent notification from the Regional office) to submit a mitigation plan
    - After 2-year period, the EPA will not concur with demonstrations for events that are the focus of the mitigation plan.

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# Overview of Exceptional Events Rule Revisions
# Mitigation Plan Components

- Required elements
  - Public notification to and education programs
  - Steps to identify, study and implement mitigating measures
  - Measures to abate or minimize contributing controllable sources of identified pollutants.
  - Methods to minimize public exposure to high concentrations of identified pollutants.
  - **Processes to collect and maintain data pertinent to the event**
  - **Mechanisms to consult with other air quality managers** in the affected area regarding the appropriate responses to abate and minimize impacts.
  - **Provisions for periodic review and evaluation of the mitigation plan** and its implementation and effectiveness by the State and all interested stakeholders
- Relationship to other (existing) plans/documents
  - Natural Events Action Plans
  - High Wind Action Plan
  - Smoke Management Program
  - Subpart H Contingency Plan

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# Overview of Exceptional Events Rule Revisions
# Initial Mitigation Plan and Periodic Reviews

- With the submission of the ***initial*** mitigation plan, State must
  - Document that a draft version of the mitigation plan was available for public comment for a minimum of 30 days
  - Submit the public comments it received along with its mitigation plan to the EPA Regional office
  - In its submission, for each public comment received, explain the changes made to the mitigation plan or explain why the State did not make any changes to the mitigation plan
- The State shall specify in its mitigation plan the periodic review and evaluation process that it intends to follow for reviews following the initial review

For discussion purposes only

# Questions and Comments

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June 6-8, 2017 Region 4 Grants/Planning Meeting
Embassy Suites Centennial Olympic Park
Atlanta, Georgia

| Tuesday, June 6, 2017 – SESARM Board – Small Group Meeting – Salon 4 | | |
|---|---|---|
| **8:15 a.m.** | **SESARM Board of Directors Meeting** | *Rhonda Thompson (SC), Chair* |
| **9:00 a.m.** | **Small Group Meeting**<br>• TSA Lean Project and data quality<br>• New administration expectations<br>• Program funding<br>• Ozone designation process<br>• Input to CAAAC process | *Local representatives*<br>*State agencies*<br>*EPA OAQPS – Anna Wood*<br>*EPA Region 4 APTMD staff*<br>*EPA Region 4 SESD staff* |
| **10:15 a.m.** | **Break** | |
| **10:30 a.m.** | **Small Group Meeting (continues)** | |
| **11:30 a.m.** | **Lunch** | |

| Tuesday, June 6, 2017 General Session – Legacy A, B, C | | |
|---|---|---|
| **12:00 noon** | **Registration begins** | |
| **1:00 p.m.** | **Welcome**<br>• Introductions and logistics<br>• EPA welcome<br>• Metro 4 welcome<br>• SESARM welcome | ***Facilitator – John Hornback (Metro 4/SESARM)***<br>*Beverly Banister (EPA Reg 4 APTMD)*<br>*Jerry Campbell (Hillsborough Co FL)*<br>*Rhonda Thompson (SC)* |
| **1:30 p.m.** | **Standards and Implementation - National**<br>• NAAQS development updates<br>• Implementation discussions<br>• Regional haze expectations and schedule<br>• Transport issues and analyses<br>• Other topics<br>• Local/State feedback/Q&A | ***Facilitator – Lynne Liddington (Knox Co TN)***<br>*Anna Wood (EPA OAQPS)* |
| **2:30 p.m.** | **Break** | |
| **3:00 p.m.** | **Standards and Implementation – Regional**<br>• NAAQS updates<br>• $SO_2$ designations update<br>• 4-Year SIP plans update<br>• Other topics<br>• Local/State feedback/Q&A | ***Facilitator – Preston McLane (FL)***<br>*Scott Davis (EPA Reg 4 APTMD)*<br>*Lynorae Benjamin (EPA Reg 4 APTMD)* |
| **4:00 p.m.** | **Ports Initiative**<br>• Update from EPA<br>• Local/State feedback/Q&A | ***Facilitator – John Hornback***<br>*Amber Davis (EPA Reg 4 APTMD)* |
| **4:15 p.m.** | **General session adjourns for the day** | |
| **4:15 – 5:00 p.m.**<br>Salon 4 | **Metro 4 Board of Directors and Membership Meeting** | ***Jerry Campbell (Hillsborough Co FL), President*** |



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| Wednesday, June 7, 2017 General Session – Legacy A, B, C<br>(Call-in options will exist throughout today for member agency staff who cannot be present.)<br>1-800-704-9804 plus pass code 5728 5514 # | | |
|---|---|---|
| **8:30 a.m.** | **EPA Region 4 APTMD Director Welcome and Report**<br>• Region 4 updates & staff changes<br>• National priorities and implications for agencies<br>• Budget updates for 2017 and 2018<br>• Local/State feedback/Q&A | ***Facilitator – Sean Alteri (KY)***<br>*Beverly Banister (EPA Reg 4 APTMD)* |
| **9:00 a.m.** | **Modeling Support and Updates**<br>• Summary of $SO_2$ Data Requirements Rule modeling<br>• Appendix W implementation<br>• Other modeling issues<br>• Local/State feedback/Q&A | ***Facilitator – Jimmy Johnston (TN)***<br>*Chet Wayland (EPA OAQPS) (by phone)*<br>*Rick Gillam (EPA Reg 4 APTMD)*<br>*Larry Brown (AL)* |
| **9:30 a.m.** | **Monitoring Update**<br>• 2017 annual network plan submittal<br>• Monitoring Workshop follow-up<br>• Monitoring equipment replacement<br>• PAMS update<br>• Local/State feedback/Q&A | ***Facilitator – Rhonda Thompson***<br>*Gregg Worley (EPA Reg 4 APTMD)*<br>*Todd Rinck (EPA Reg 4 APTMD)*<br>*Jeaneanne Gettle (EPA Reg 4 SESD)*<br>*Laura Ackerman (EPA Reg 4 SESD)*<br>*Chet Wayland (EPA OAQPS) (by phone)* |
| **10:15 a.m.** | **Break** | |
| **10:45 a.m.** | **TSAs and Monitoring Data Quality**<br>• Report on status of TSA Lean Initiative<br>• Feedback from participants<br>• Update on process improvements<br>• Next steps<br>• Local/State feedback/Q&A | ***Facilitator – Karen Hays (GA)***<br>*Jeaneanne Gettle (EPA Reg 4 SESD)*<br>*Laura Ackerman (EPA Reg 4 SESD)*<br>*DeAnna Oser (GA)*<br>*Minor Barnett (Forsyth Co NC)*<br>*Chet Wayland (EPA OAQPS) (by phone)* |
| **11:15 a.m.** | **CAA Stationary Source Regulatory Update**<br>• Section 111/129<br>• Section 112 MACT<br>• Local/State feedback/Q&A | ***Facilitator – Larry Brown (AL)***<br>*Jason Dressler (EPA Reg 4 APTMD)*<br>*Lee Page (EPA Reg 4 APTMD)* |
| **11:45 a.m.** | **Lunch** | |
| **1:30 p.m.** | **Great Smoky Mountains Water Quality Impairment and Air Emissions Linkages**<br>• Observations on atmospheric deposition and stream acidification<br>• Modeling and long-term prognosis<br>• Collaboration with states<br>• State/Local feedback/Q&A | ***Facilitator – Todd Rinck (invited)***<br>*Jim Renfro (National Park Service)*<br>*Mike Abraczinskas (NC)*<br>*Jimmy Johnston (TN)* |
| **2:30 p.m.** | **Break** | |



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| | | |
|---|---|---|
| **3:00 p.m.** | **Grants and Funding**<br>• Holdback certifications<br>• Status/process – final awards for FY 2017<br>• Grant allocation formula update<br>• FY 2018 funding – what to do?<br>• MJO funding – Metro 4 and SESARM<br>• Local/State feedback/Q&A | ***Facilitator – Corey Masuca (Jefferson Co AL)***<br>*Carol Kemker (EPA Reg 4 APTMD)*<br>*Stuart Perry (EPA Reg 4 APTMD)* |
| **3:45 p.m.** | **Exceptional Events**<br>• When exceptional event demonstrations are needed<br>• Expectations for demonstrations<br>• Local/State feedback/Q&A | ***Facilitator – Karen Hays (GA)***<br>*Beth Palma (EPA OAQPS) (by phone)*<br>*Ben Gibson ( EPA OAQPS) (by phone)*<br>*Gregg Worley (EPA Reg 4 APTMD)*<br>*Todd Rinck (EPA Reg 4 APTMD)* |
| **4:30 p.m.** | **General session adjourns for the day** | |
| **6:30 p.m.** | **Evening reception and cookout** | ***Hosted by Carol Kemker and family*** |

| Thursday, June 8, 2017 General Session – Legacy A, B, C | | |
|---|---|---|
| **8:30 a.m.** | **2016 Southeastern Wildfire Experiences**<br>• Air quality impacts<br>• Community impacts<br>• Communications<br>• Lessons learned | ***Facilitator – Mike Abraczinskas***<br>*Jim Boylan (GA)*<br>*Local/State agencies roundtable* |
| **9:00 a.m.** | **Smoke Summit III Report**<br>• Recap of recent workshop<br>• Next steps<br>• Local/State feedback/Q&A | ***Facilitator – John Hornback***<br>*Scott Davis (EPA Reg 4 APTMD)*<br>*Rick Gillam (EPA Reg 4 APTMD)* |
| **9:30 a.m.** | **Permitting Update**<br>• Permit program updates<br>• Report from recent Permit Workshop<br>• Local/State feedback/Q&A | ***Facilitator – John Hornback***<br>*Heather Ceron (EPA Reg 4 APTMD)* |
| **10:00 a.m.** | **Break** | |
| **10:15 a.m.** | **State/Local Agency Sharing**<br>• Organizational and staffing updates<br>• Initiatives and successes<br>• Issues Local/State agencies | ***Facilitator – John Hornback***<br>*Local/State agencies roundtable* |
| **11:30 a.m.** | **Closing Remarks**<br>• 2017 training schedule status<br>• 2018 training needs and planning update<br>• Future program manager workshops<br>• Future director meeting planning<br>• Member agency special project needs | *John Hornback*<br>*Doug Carson (Metro 4/SESARM)* |
| **11:45 p.m.** | **Meeting concludes** | |



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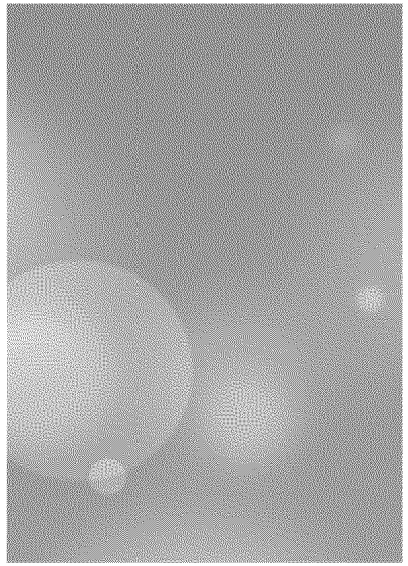
GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

# Fire Tracking and Emission Inventory Development in Georgia

- Close collaboration between Georgia Forestry Commission and Georgia EPD



**Di Tian**
**Manager, Data and Modeling Unit**
**Planning and Support Program**
**Air Protection Branch**

Smoke Summit III
Joseph W. Jones Ecological Center
Ichauway, GA
April 10, 2017

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# WILDLAND FIRES AND EMISSION INVENTORIES

## Georgia wildland fires

- Prescribed fires burned more than 1 million acres of forest land a year in Georgia;
- Less wildfires with large inter-annual variation;

## Total emissions, timing, location, speciation, plume rise (flaming/smoldering split)

$$E = A \times F_a \times E_f$$

A: burned area (acres),

$F_a$: fuel consumption (tons/acre)

$E_f$: emission factor (lbs/ton)

## Georgia Fire emissions inventory

- VISTAS 2002, GA 2005, SEMAP 2007, GA 2008, GA 2011 and GA 2014
- Going forward, will develop fire inventory for every year.

## Southeastern Fire emissions inventory

- Collaborative efforts among ten states (AL, FL, GA, KY, MS, NC, SC, TN, VA, WV) and federal agencies (USFS, FWS and NPS)
- Southeastern Modeling, Analysis, and Planning (SEMAP)
- Visibility Improvement State and Tribal Association of the Southeast (VISTAS)
- Developed fuel consumption and Emission factor values specific for the southeast

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# GEORGIA FIRE RECORDS

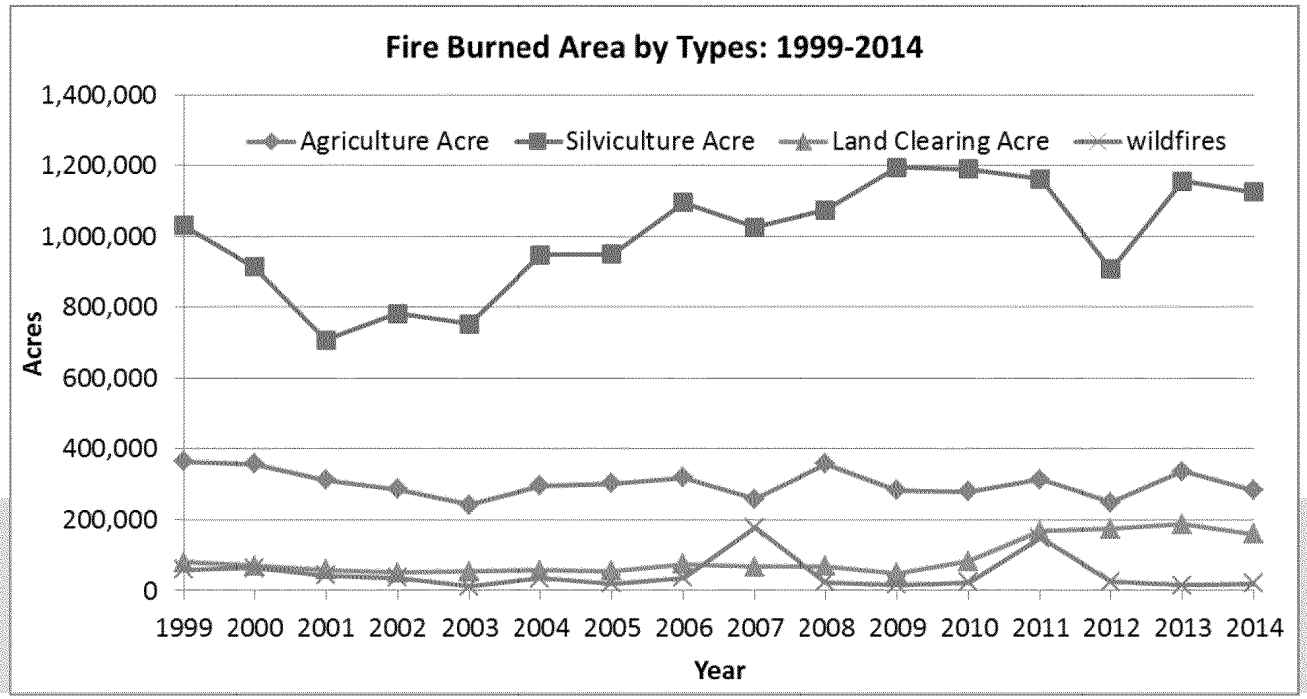
## Georgia Forestry Commission (GFC)

- Electronic permit tracking for prescribed fires, agriculture burning and land clearing, including information such as permit area, date, location (only good for fires larger than 100 acres)
- Wildfires were tracked in Excel spreadsheet, including information such as area, date, time, location and fuel type.

## Military bases: Fort Benning, Fort Stewart, Fort Gordon

## USFS and FWS

## Large wildfires: daily burned area



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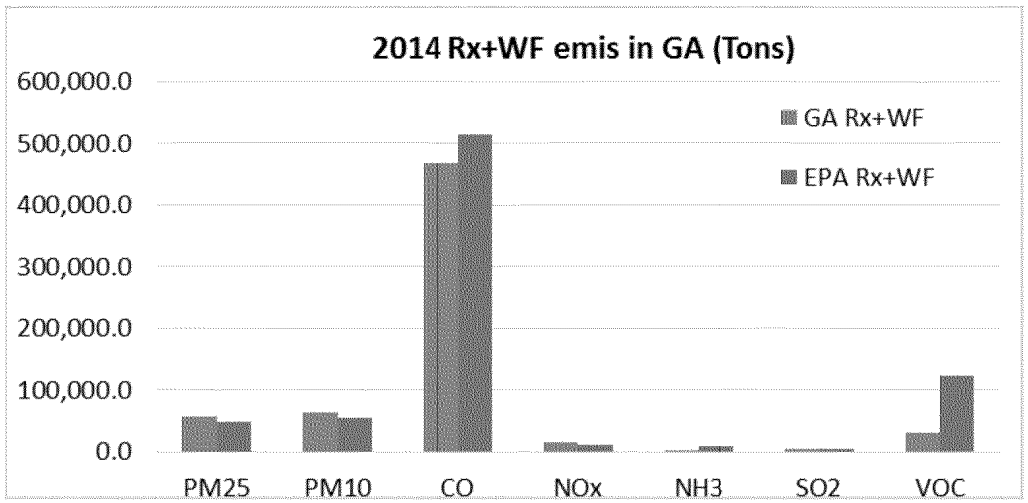
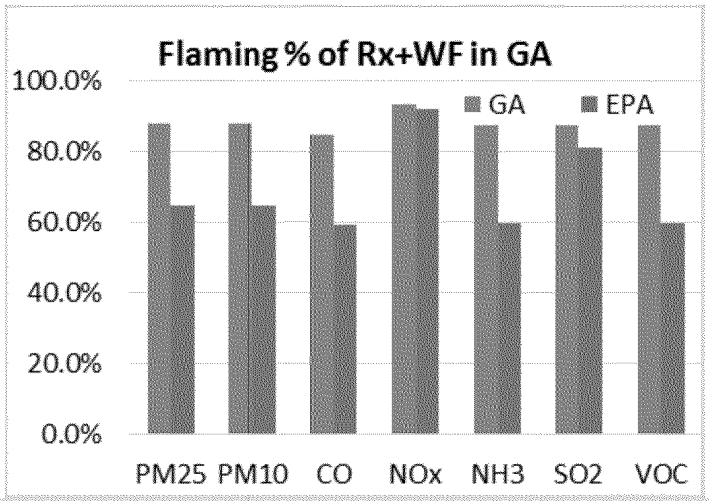
# EPA NATIONAL WILDLAND FIRE INVENTORY

## Based on SMARTFIRE2/Bluesky

- EPA did not use satellite records for Georgia in 2014 National Wildland FireInventory
- Uncertainties in fuel consumption and emission factors (high VOC EFs, wrong fuel type assignment, impact of fuel conditions, etc)
- Need to improve emission splits for flaming/smoldering phases which have different plume rise and thus air quality impacts
  - Flaming/smoldering/residual smoldering
  - Flaming and smoldering occur simultaneously; EF measurement



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# SATELLITE FIRE DETECTION

## Emory and GA EPD study

- X. Hu, C. Yu, D. Tian, M. Ruminski, K. Robertson, L. Waller, Y. Liu., 2016, Comparison of the Hazard Mapping System (HMS) fire product to ground-based fire records in Georgia, USA., JGR-Atmosphere, 121, 2901–2910

## Satellite fire detection data used in SMARTFIRE are mainly Hazard Mapping System (HMS ) for the southeast

- HMS detects fires using data from multiple satellite sensors in order to maximize its fire detection rate

## HMS detection rate

- Compare HMS data with 2011 Georgia local fire records
- The detection rate increases dramatically from 3% to 80% with an increase in fire size from less than 0.02 $km^2$ (5 acres) to larger than 2 $km^2$ (500 acres)
- Detection of approximately 12% of all recorded fires which represent approximately 57% of the total area burned

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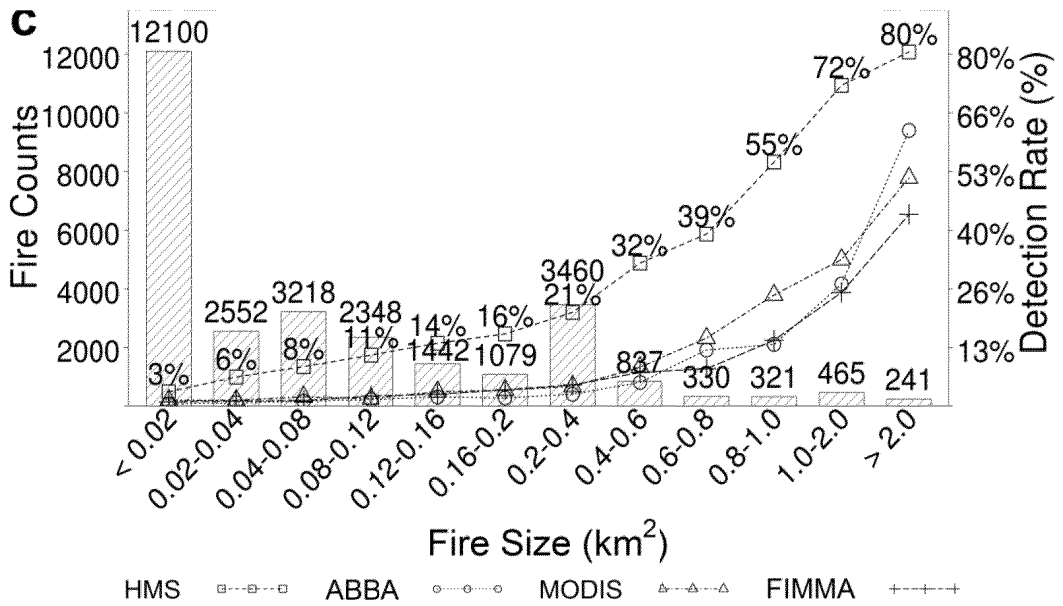
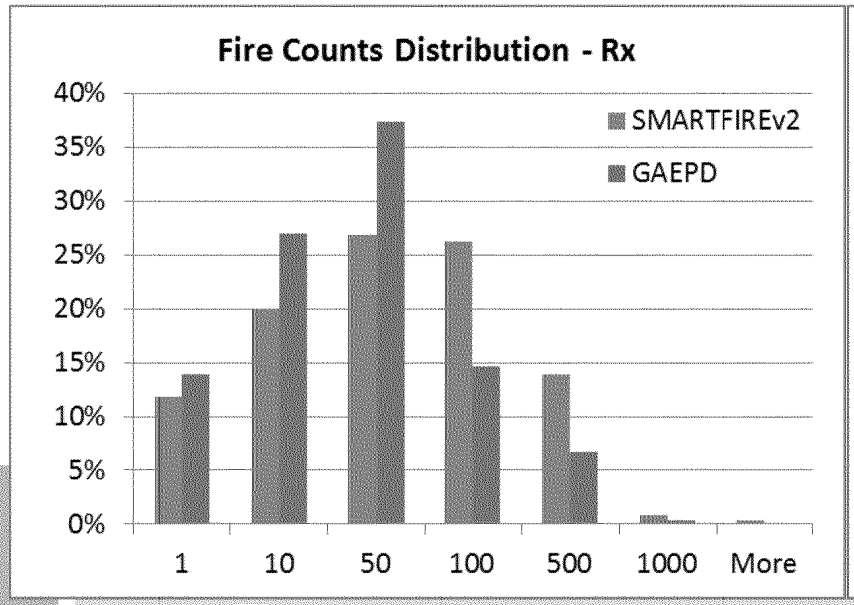
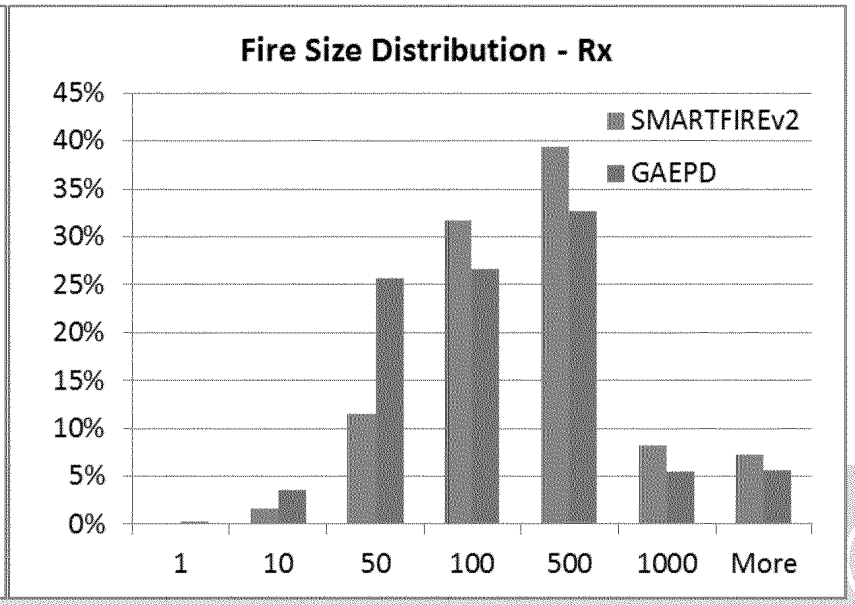
# DETECTION RATE AND GEORGIA FIRE SIZE DISTRIBUTION

- HMS detection rate for Georgia 2011 fire activities
- HMS detection rate increases with fire size
- Georgia has a lot of small fires (0.02 $km^2$ ~5 acres)
- Small fires can have large air quality impacts.



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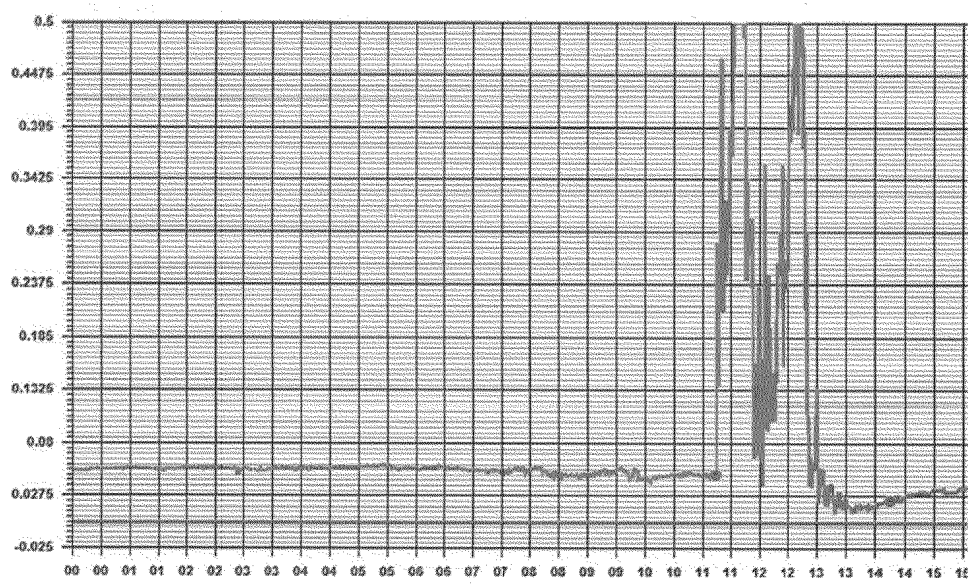
# OZONE – FORT MOUNTAIN




- Prescribed fire (2 acres) on <u>April 24, 2015</u>
  - 8-hour daily maximum ozone concentration was 104 ppb
    - The next highest 8-hour ozone concentration at this site in 2015 was 67 ppb
  - Elevated 1-minute ozone concentrations (over 500 ppb) from 11:00 am to 1:00 pm
- Q/D = 0.174tpd/km << 100 tpd/km
  - Emis_NOx: 0.0114 tons, Emis_VOC: 0.0151tons, D = 0.15 km
  - Q/D > 100 tpd/km recommended by EPA to screen fire events with large air quality impacts in the "Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations"

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# POTENTIAL GEORGIA FIRE PERMIT TRACKING SYSTEM

GFC applied for the 2017 National Environmental Information Exchange Network Grant together with Georgia EPD to develop a new web-based Prescribed Burn Permit Tracking System

Collect detailed/accurate prescribed burn information that was not available before

- Burned area, timing, location (latitude and longitude), fuel type and conditions, post-burn information such as actual burned area and burned percentage of shrub for each prescribed burn permit issued by the Georgia Forestry Commission.
- Improve quality of wildland fire emission inventory and understanding of their air quality impacts without significantly increasing prescribed burn permit issuance time
- Enable data sharing among GFC, forest managers/land owners, GA EPD, EPA, U.S. Forest Service, communities of interest and the public
- Enhance services to the regulated community (i.e. forest managers/land owners)
- Enable better decisions through timely, accessible and useful information to minimize adverse air quality and health impacts from prescribed fires.

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# FUEL TYPES AND TYPICAL FUEL CONSUMPTION TABLES

## Fuel types

- The inferred fuel type based on fire location and fuel maps is often wrong
- Collect fuel type information in the new Prescribed Burn Permit Tracking System
- Log slash burning or not?

## Develop Georgia typical fuel consumption tables

- 5~10 major fuel types will be identified for each county/district using FCCS fuel map and local knowledge by local forest managers
- GA EPD will calculate fuel consumption by fuel types and conditions using FCCS/CONSUME
- GFC local forest managers in district offices will review the calculated fuel consumption values and adjust the values according to their precious local knowledge on fuels
- Include impacts from fuel conditions (e.g. years since last burn, fuel moisture levels, burned percentage of shrub, etc)

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# AREAS NEED TO BE IMPROVED

Don't use satellite fire detection for emission inventory development used in local air quality management practices

Conduct more field measurements to understand typical fuel consumption under different fuel conditions in the southeast

Improve VOC EFs or fuel consumption estimates by combustion phases

- VOC emissions in the 2014 EPA National Wildland Fire Inventory are 5 times of GA EPD estimates based on fuel consumption and emission factors used in SEMAP
- VOC EFs or fuel consumption estimates during smoldering phase in NWFI may be too high
- Compare SEMAP EFs with Urbanski 2014

  VOC: 52 lbs/ton, 32 lbs/ton (without unidentified species), 13-15 lbs/ton (GAEPD/SEMAP).
- Tesh Rao, EPA research team

Need to improve emission splits for flaming/smoldering phases

- Flaming and smoldering: simultaneously occur, often mixed together
- Residual smoldering: after strong fire flames
- Lumped emission factors in Urbanski 2014 for both flaming and smoldering phases
- Different plume rise and thus air quality impacts

VOC speciation

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# CONTACT INFORMATION

Di Tian, Ph.D.
Georgia Dept. of Natural Resources
4244 International Parkway, Suite 120
Atlanta, GA 30354

di.tian@dnr.state.ga.us
404-362-4851

**Southeast Regional Partnership for Planning and Sustainability (SERPPAS)**
**Prescribed Fire Work Group Meeting**

**Date:** October 12, 2016
**Time:** 2PM Eastern
**Attendees:** Mike Black, Ryan Bollinger, Holly Campbell, LuAnn Craighton, Tom Darden, Jennifer Evans Fawcett, Rick Gillam, Stephanie Hertz, Mark Melvin, Jim Prevette, Linda Rimer, Addie Thornton, Nick Witcraft,

**Agenda**

- *Introductions* – Welcome Addie Thornton (new SERPPAS Coordinator)

- *SERPPAS Steering Meeting Update*
  a. A SERPPAS Steering Meeting was held on September 29, 2017 and a discussion was led around the fire work group
  b. Positive conversation around fire work group
  c. Good discussion and interest around RCPP proposal
     a. We had submitted a pre-proposal for NRCS RCPP earlier this year for funding towards support of several prescribed fire efforts. This would include both financial and technical assistance for prescribed burning, with priority given to locations as defined as priority areas by REPI, American Forest Foundation, FORCES, and several potential Prescribed Burn Associations.
     b. We were not able to move forward with a full proposal this year, but the proposed project partners are interested in submitting another proposal next year.
     c. No firm commitments, but SERPPAS Steering Team encouraged us pursuing a proposal in the next round.
     d. South Carolina may be interested
     e. Need to still find match, narrow down locations, project lead, etc.
     f. Funds can go directly to agencies if needed, and does not have to go through landowners.
     g. Discussions will continue for a proposal in 2017. Please contact Jenn if interested in joining in the proposal. This can include funding for Technical and Financial Assistance.

- *Cohesive Strategy Updates*
  a. Innovations Workshop
     a. Past workshop in Bend, OR being used as a model for a similar Southern CS Innovations workshop
     b. Goal is to make the CS more acceptable and usable, use expansion of FAC Network up through Appalachians; introduce stakeholders to CS
     c. Dates: January 18-19, 2017
     d. Location: Southern Blue Ridge in Appalachians of NC
     e. More details TBA soon. Invite only.
  b. National Science Workshop
     a. A science related workshop for CS is being planned for April 25-27, 2017 in Reno, NV.
     b. More details to come as it is in the planning stage.
     c. A call for presentations will be out soon and Gary encourages the SE to submit, especially where science has benefited prescribed fire implementation on landscapes.
  c. Models for Action/Success Stories
     a. Many entities are conducting successful fire efforts across the region. Success stories collected so far can be seen here: http://www.southernwildfire.net/models-for-action
     b. Send this form with suggestions along with high resolution photos to Holly Campbell at hcampbell@sref.info. Holly can help to write your story, if needed.
  d. Gap analysis
     a. Work continues and results should be completed in the coming months. Results will show which

areas of the Cohesive Strategy and the SERPPAS Prescribed Fire Strategy have the greatest areas of need and the most efforts occurring.

- *Southeast Regional Prescribed Fire Council Meeting*
  a. A regional meeting of Prescribed Fire Councils allows the opportunity for the PFCs to build partnerships and share information.
  b. This year, a regional meeting will be held on Nov 4 in conjunction with the 11th Biennial Longleaf Conference. In the morning 10-11:30 part of the conference, and then from 12:30-5pm will be the meeting itself. A social to follow.
  c. This will be an open invite to anyone who is a member of any fire council, and you don't need to register for the LLA conference to attend this meeting.
  **d.** Learn more and register here: Southeast Regional Prescribed Fire Council Meeting. **Registration due by October 28.**

- *Air Quality and Smoke Management*
  *a.* Ozone Updates
    a. 2015 standard on Oct 1, 2017 recommendations from state were due to EPA on areas that are not currently meeting new ozone standards (70ppm)
    *b.* All states in SE provided recommendations
    c. Only a few areas were not meeting new standards, including Atlanta, GA area (13 counties around main metro area; this has shrunk from 18 counties) and Northern KY
    *d.* Only 2 areas based on existing data not meeting standards
    e. A few areas in S FL where may be issues with ambient monitoring data being collected, and so may be identified as unclassifiable, but are working on these issues
    f. Recommendations were based on 3 years of data (2013-2015). 2016 data is not yet available, but preliminary data shows Louisville, KY area may not be meeting standards
    g. These revisions are good for prescribed burning in that there are not a lot of new areas in un-attainment
  *b.* PM Updates
    *a.* AQ is improving and not getting worse
  *c.* Regional Haze Rule
    a. Proposed revision to rule was sent out in the summer, comment period is now closed. EPA HQ is now looking at comments and working on final rule. Final rule to be complete by end of December.
    *b.* Companion guidance document is also being finalized, and may be complete in January/February.
    *c.* Goal of rule is to get back to original haze condition before human interaction.
  *d.* Exceptional Events Rule
    a. Final rule signed and came out on September 16. Was published in Federal Register on Oct 3, 2016: https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance
    b. Clarifications were made about what specific actions could be done, EPA only approving EE demonstrations from states if they affect a regulatory condition. For example, fires that caused high values but were EE and beyond their control, then they could go from non-attainment to attainment. If they exceed a value but don't affect a regulatory decision, then no action will be taken.
    *c.* Clarified 1990 rule to match EE.
    d. An EER can be defined when it is a clear causal related to event and exceedance, and event was not controllable to preventable, and a natural event or a human activity unlikely to happen on a recurring basis.
    e. For fire, main changes are some new definitions for terms prescribed fire, wildfire, and wildland fire. Pursuant to recommendations from land managers, EPA have adopted definitions from NWCG to be consistent.
    f. For wildfires, clarification was made that all wildfires (even if from arson) that occur on wildland

are considered to be natural events (bypass need for demonstration).

g. Prescribed fire is a human caused event, and eligible for EE. Language added on relying on land or resource management plans about frequency. If a management plan includes recurring frequency and is an approved plan, then as long as being done according to plan, then is not reasonably preventable. If deviates from plan, then would need to demonstrate that the frequency is needed. This is new from the last rule.

h. Smoke management- fire must be according to state smoke management program or follows basic smoke management practices (defined in rule with criteria based on NWCG). Items in rule are general, but requires collaboration between burners and air quality in the state.

*i.* Only states can make recommendations to EPA, but federal agencies can work with states.

j. Request for EPA to develop a guidance for prescribed fire and would be put for public comment in next 6 months.

- *SERPPAS Prescribed Fire Work Group Updates*
  a. Training materials & Field days
     1. It has been documented in surveys that lack of knowledge and experience are a primary reason for landowners not burning.
     2. We aim to develop prescribed fire training materials based on the needs of private landowners in the Southeast. If you have a need for specific materials, please let me know.
     3. NRCS has funded three field days to be held for landowners in conjunction with longleaf implementation teams in AL, LA and GA.
  b. TREX
     1. Building capacity in the south continues to be difficult. In order to help build capacity, the USFS has provided funding for three people from the south to attend a WTREX in October. In addition to myself, there will be people from TNC, GA DNR, and Wildland Restoration International.
     2. We have also received funding to support a Prescribed Fire Training Exchange (TREX) in the Southeast. If you would like to host a TREX, please let me know.

e. Driptorch Digest Newsletter
   a. If you would like to have a section dedicated to your organization/agency on a regular basis, or if you have something to be added to the upcoming newsletter, please contact me at jlevans3@ncsu.edu.
   b. See the most recent edition here: https://research.cnr.ncsu.edu/blogs/southeast-fire-update/driptorch-digest/.

- *Other*

a. **2017 JFSP Research Funding Opportunity Solicitation is Now Open**
   - Open: September 15, 2016; Closes: November 17, 2016 (Thursday at 5 PM Mountain Standard Time)
     a. The primary funding opportunity notice (FA-FON0017-0001) includes the following 6 Task statements:

1. Landscape fuel treatment strategies and wildfire management
2. Effects of changing wildfire management strategies
3. Post-fire recovery
4. Fire effects on herbaceous and shrub species
5. Validating mesoscale, atmospheric boundary prediction models and tools
6. Factors that affect the co-management of wildland fire risk

- *Shortleaf Pine Initiative*
  a. Mike Black attended the LA PFC annual meeting; it was well attended with about 90 participants

- *Resources, upcoming events, meetings & conferences*
  a. Upcoming webinars can be seen here: http://www.southernfireexchange.org/Web_Event/Webinars.html
  b. See the most recent *Driptorch Digest* newsletter for more upcoming events
  c. Follow us on Twitter @SE_RxFire, Facebook at Southeast Rx Fire, or blog at Southeast Prescribed Fire Update

- *Conclusion/Next Meeting*
  a. The next meeting will be in November.
  b. Please fill out this Doodle poll **by October 25** to choose a date for our next call:
     Ex. 6 - Personal Privacy

# APPENDIX G

# AIR QUALITY:
# EMISSIONS FOR THE CUMULATIVE AND VISIBILITY IMPACTS

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# G AIR QUALITY: EMISSIONS FOR THE CUMULATIVE AND VISIBILITY IMPACTS

## G.1 INTRODUCTION

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) is required under the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1334(a)(8)) to comply with the National Ambient Air Quality Standards (NAAQS) to the extent that Outer Continental Shelf (OCS) offshore oil and gas exploration, development, and production sources do not significantly affect the air quality of any state. The Gulf of Mexico OCS Region's OCS area of possible influence includes the States of Texas, Louisiana, Mississippi, Alabama, and Florida. BOEM's Gulf of Mexico OCS Region manages the responsible development of oil, gas, and mineral resources for the 430 million acres in the Western, Central, and Eastern Planning Areas on the OCS comprising the Gulf Of Mexico OCS Region, including the areas under moratoria (shown in **Figure G-1**). The Clean Air Act Amendments (CAAA) of 1990 designate air quality authorities in the Gulf Of Mexico OCS Region, giving BOEM air quality jurisdiction westward of 87°30'W. longitude and the U.S. Environmental Protection Agency (USEPA) air quality jurisdiction eastward of 87°30'W. longitude. In 2006, oil and gas leasing operations within 125 miles (201 kilometers [km]) of the Florida coastline were banned until 2022 under the Gulf of Mexico Energy Security Act (GOMESA). The GOMESA moratoria area is depicted on **Figure G-1**.

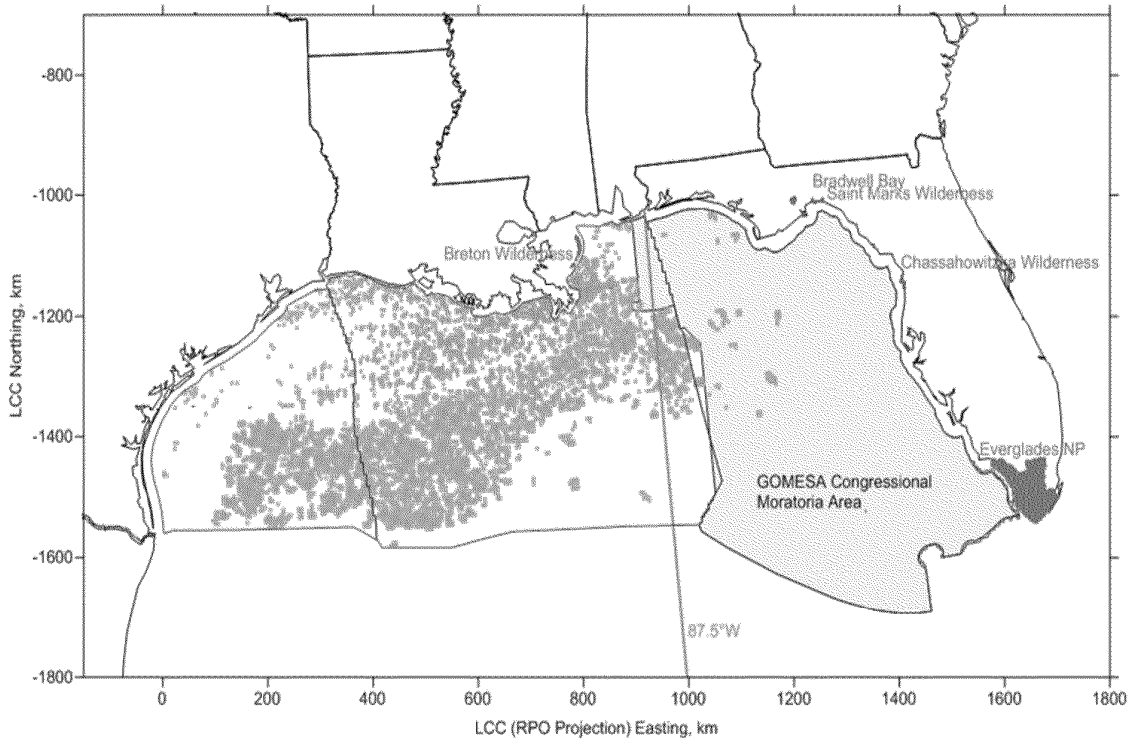


*Figure G-1. Location of the "Air Quality Modeling in the Gulf of Mexico Region" Study, with Class I Areas (purple) and Platform Locations (gray dots).*

The USEPA has set NAAQS for six regulated air quality pollutants: ozone; particulate matter with an aerodynamic diameter of 2.5 micrometers and smaller ($PM_{2.5}$); particulate matter with an aerodynamic diameter of 10 micrometers and smaller ($PM_{10}$); sulfur dioxide ($SO_2$); nitrogen dioxide ($NO_2$); carbon monoxide (CO); and lead (Pb). After promulgation of a NAAQS, the USEPA designates areas that fail to achieve the NAAQS as nonattainment areas (NAAs) and States are required to submit State Implementation Plans (SIPs) to the USEPA that contain emission control plans and a demonstration that the NAA will achieve the NAAQS by the required date. After an area comes into attainment of the NAAQS, the area can be redesignated as a maintenance area and must continue to demonstrate compliance with the NAAQS.

In 1997, the USEPA promulgated the first 8-hour ozone NAAQS with a threshold of 0.08 parts per million (ppm) (84 parts per billion [ppb]). On March 12, 2008, the USEPA promulgated a more stringent 0.075 ppm (75 ppb) 8-hour ozone NAAQS. **Figure G-2** presents the current ozone nonattainment areas in the southeastern U.S. On October 1, 2015, the USEPA strengthened the 8-hour NAAQS for ozone to 0.07 ppm (70 ppb). Under this more stringent ozone NAAQS, there may be more areas in the southeastern U.S. that will be in nonattainment. The USEPA plans to make attainment and nonattainment designations for the revised standards by late 2017, with the designations based on 2014-2016 air quality data.

On December 14, 2012, the USEPA revised the $PM_{2.5}$ primary NAAQS by lowering the annual $PM_{2.5}$ NAAQS threshold from 15.0 micrograms per cubic meter ($\mu g/m^3$) to 12.0 $\mu g/m^3$. The USEPA retained the 24-hour $PM_{2.5}$ primary NAAQS at 35 $\mu g/m^3$. The 24-hour coarse PM NAAQS ($PM_{10}$) was also retained at 150 $\mu g/m^3$.

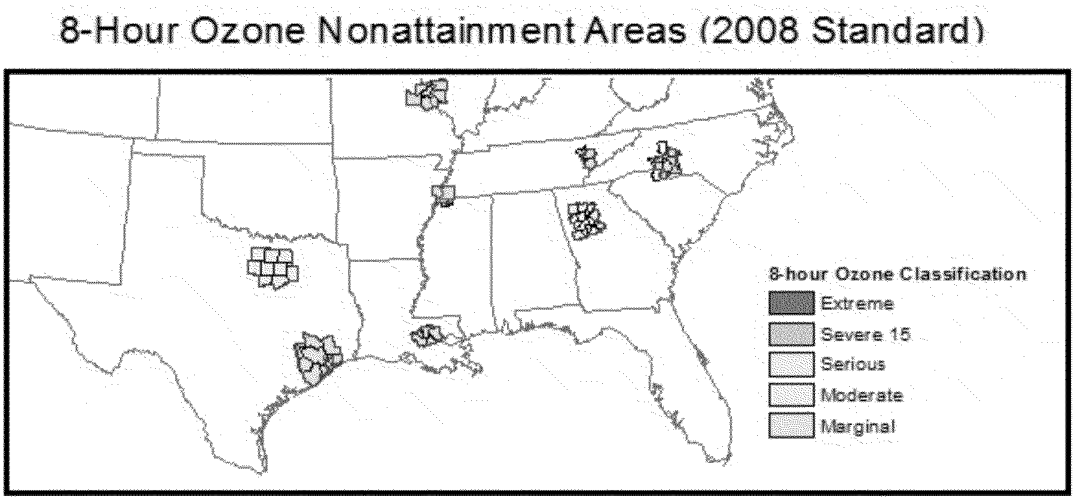


*Figure G-2. Ozone Nonattainment Areas in the Southeastern U.S. (USEPA, 2016a).*

In February 2010, the USEPA issued a new 1-hour $NO_2$ NAAQS with a threshold of 100 ppb ($98^{th}$ percentile daily maximum average over 3 years) and a new 1-hour $SO_2$ NAAQS was promulgated in June 2010 with a threshold of 75 ppb ($99^{th}$ percentile averaged over 3 years). The USEPA has not yet designated the nonattainment areas for the 1-hour $NO_2$ and 1 hour $SO_2$ NAAQS.

A new lead NAAQS was issued in 2008; NAAs for lead are associated with specific industrial sources. The NAAQS for carbon monoxide has remained essentially unchanged since it was originally promulgated in 1971. As of September 27, 2010, all NAAs for carbon monoxide have been redesignated as maintenance areas. **Table G-1** summarizes the nonattainment and maintenance areas in the southeastern U.S.

Table G-1. Nonattainment and Maintenance Areas in the Southeastern U.S.

| State | Area | 8-hr $O_3$ (1997) | 8-hr $O_3$ (2008) | $SO_2$ (2010) | Lead (2008) |
|---|---|---|---|---|---|
| Alabama | Troy, AL | | | | NAA[a] |
| Florida | Tampa, FL | | | | NAA |
| | Hillsborough County, FL | | | NAA | |
| | Nassau County, FL | | | NAA | |
| Louisiana | Baton Rouge, LA | M[b] | NAA | | |
| | St. Bernard Parish, LA | | | NAA | |
| Texas | Beaumont-Port Arthur, TX | M | | | |
| | Houston-Galveston-Brazoria, TX | NAA | NAA | | |
| | Frisco, TX | | | | NAA |

[a] NAA = nonattainment area

[b] M = maintenance area

Blank cells indicate the area is in attainment of the NAAQS.

The CAAA designated 156 Class I areas consisting of National Parks and Wilderness Areas that are offered special protection for air quality and air quality-related values (AQRVs). The Class I areas, compared to Class II areas, have lower Prevention of Significant Deterioration (PSD) air quality increments that new sources may not exceed and are protected against excessive increases in several AQRVs including visibility impairment, acid (sulfur and nitrogen) deposition, and nitrogen eutrophication. The Regional Haze Rule (RHR) has a goal of natural visibility conditions by 2064 at Class I areas, and States must submit RHR SIPs that demonstrate progress towards that goal. **Figure G-1** displays the locations of the mandatory Class I areas (in purple) in the Gulf Of Mexico OCS Region. In addition to Class I areas, Federal Land Management (FLM) agencies have designated certain other areas as sensitive Class II areas for tracking PSD increment consumption and AQRV impacts.

On August 26, 2014, BOEM contracted with Eastern Research Group, Inc. (ERG) and team members Ramboll Environ US Corporation (Ramboll Environ) and Alpine Geophysics, LLC to complete a comprehensive air quality modeling study in the Gulf Of Mexico OCS Region. Under BOEM Contract Number M14PC00007, air quality photochemical grid modeling (PGM) will be conducted in the Gulf Of Mexico OCS Region to assess the impacts to nearby States of OCS oil and gas exploration, development, and production as required under OCSLA. This assessment is used by BOEM in the cumulative and visibility impacts analyses of the National Environmental Policy Act (NEPA) environmental impact statement (EIS), which is the *Gulf of Mexico OCSOil and Gas Lease Sales: 2017-2022; Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and*

*261—Final Multisale Environmental Impact Statement* (2017-2022 GOM Multisale EIS). These analyses address both current and proposed NAAQS.

Air quality modeling requires several input datasets, including meteorology, emissions inventories, and ambient pollutant concentrations. **Figure G-3** presents an overview of how these project datasets fit together for the "Air Quality Modeling in the Gulf of Mexico Region" study.

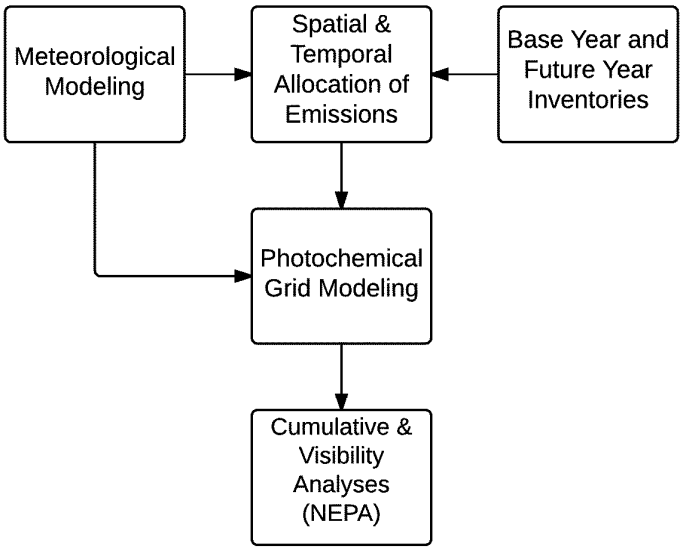


*Figure G-3. Overview of the "Air Quality Modeling in the Gulf of Mexico Region" Study Tasks.*

## G.2 Development of Emission Inventories

A key step in performing the "Air Quality Modeling in the Gulf of Mexico Region" study in support of the subsequent cumulative and visibility impacts analyses is development of comprehensive air emission inventories that accurately depict the base case emissions within the study area, and emissions associated with the 2017-2022 GOM Multisale EIS scenario (the future year).

The scope of the air pollutant emissions inventory development effort for the "Air Quality Modeling in the Gulf of Mexico Region" study includes selection of: pollutants, base case year, geographical domain, sources, spatial resolution, temporal resolution, speciation, and development of the base case and future year emission estimates. These elements are described below.

### G.2.1 Pollutants

Pollutants for the "Air Quality Modeling in the Gulf of Mexico Region" study consist of criteria air pollutants as defined by CAA Title I: CO; lead; $NO_x$ (stated as equivalent mass of nitrogen

dioxide [$NO_2$]); $PM_{2.5}$; $PM_{10}$; and $SO_2$, as well as volatile organic compounds (VOCs, which are precursors to ozone formation) and ammonia ($NH_3$, a precursor to PM formation).

### G.2.2 Base Case Year

In determining the base case year for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory, 2011 was initially selected based on data availability. Calendar year 2011 emissions data are readily available for most sources from the USEPA National Emissions Inventory (NEI) (USEPA, 2015a), and BOEM's *Year 2011 Gulfwide Emissions Inventory Study* (Wilson et al., 2014), hereby called the "2011 Gulfwide Inventory." However, 2011 was an unusually hot and dry year in the Gulf Of Mexico OCS Region, particularly in Texas, which experienced record heat and dry conditions during the summer of 2011 and had a very high incidence of wildfires. Therefore, 2012 was selected as the base case year as more representative of "typical" conditions in the Gulf Of Mexico OCS Region.

### G.2.3 Geographical Domain

The domain of the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory is the area depicted in **Figure G-4**, particularly the 4-kilometer (km) domain encompassing the Gulf of Mexico OCS. This area, which includes parts of Alabama, Georgia, Louisiana, Mississippi, and Texas; all of Florida; as well as the Western, Central, and Eastern Planning Areas in the Gulf of Mexico and part of the Atlantic Ocean, are the main focus of the emissions inventory efforts. Emissions data were also required for the 36- and 12-km expanded domains depicted in **Figure G-4**, which include parts of Mexico and Canada. The outermost domain with 36-km resolution includes the entire continental U.S. and parts of Canada and Mexico, and captures synoptic-scale (storm system-scale) structures in the atmosphere. The inner 12-km regional grid covers the southeastern U.S. and is used to ensure that large-scale meteorological patterns across the region are adequately represented and to provide boundary conditions to the 4-km domain.

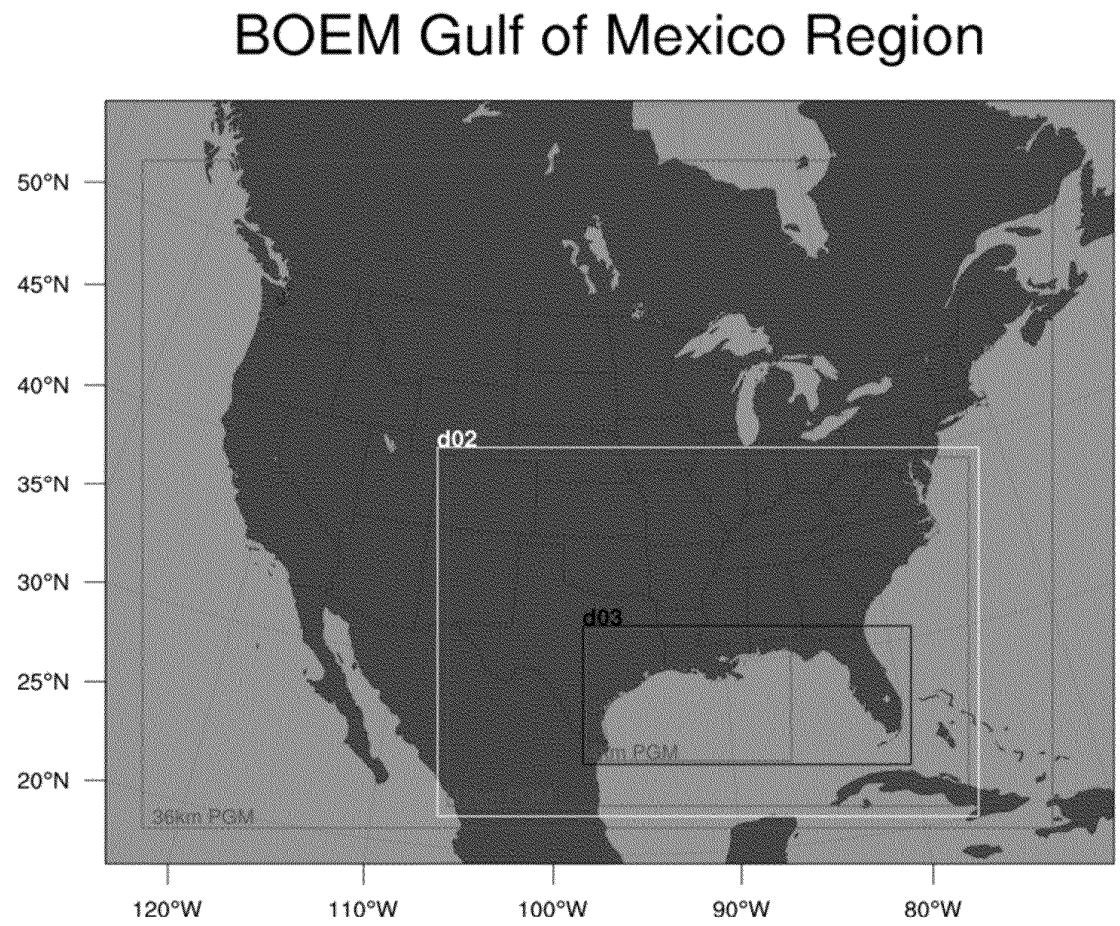


*Figure G-4. WRF 36-km CONUS (d01), 12-km SE Regional (d02), and 4-km Gulf of Mexico Region (d03) Domains Along With the PGM Grids.*

## G.2.4 Inventory Sources

Emissions from anthropogenic (i.e., human caused) sources, including stationary point and nonpoint area sources located both onshore and offshore, onroad motor vehicles, nonroad equipment, locomotives, marine vessels and other offshore sources, and airports, were compiled for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory. **Table G-2** lists the source groups and categories included in the emissions inventory, along with the pollutants applicable to each source, and the spatial and temporal resolution. Note that emissions from non-anthropogenic sources (i.e., biogenic and geogenic sources) are also included as part of the "Air Quality Modeling in the Gulf of Mexico Region" study cumulative and visibility analyses.

Table G-2. Gulf of Mexico Air Quality Modeling Study Source Categories.

| Group and Source Category | | CO | $NO_x$ | $SO_2$ | VOC | Pb | $PM_{2.5}$ | $PM_{10}$ | $NH_3$ | Spatial Resolution[a] |
|---|---|---|---|---|---|---|---|---|---|---|
| NEI Onshore Sources | Point Sources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nonpoint Area Sources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | A |
| | Onroad Mobile Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | A |
| | Commercial Marine Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P, A[b] |
| | Locomotives | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P, A[c] |
| | Aircraft and Airports | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| | Other Nonroad Mobile Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | A |
| Offshore Oil & Gas Sources | Platforms in State Waters | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | P |
| | Platforms in Central and Western GOM OCS Planning Areas | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| | Drilling Rigs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Pipe-Laying Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Support Helicopters | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | LB |
| | Support Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Survey Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| Non-oil and Gas Offshore Vessels and Activities | Commercial Fishing Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Commercial Marine Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Louisiana Offshore Oil Port | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| | Military Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Recreational Vessels | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | LB |
| | Vessel Lightering | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| Biogenic and Geogenic Sources | Subsurface Oil Seeps | | | | ✓ | | | | | LB |
| | Mud Volcanoes | | | | ✓ | | | | | LB |
| | Onshore Vegetation | | ✓ | | ✓ | | | | | A |
| | Wildfires and Prescribed Burning | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | P |
| | Windblown Dust | | | | | | ✓ | ✓ | | A |
| | Lightning | | ✓ | | | | | | | A |
| | Sea Salt Emissions | | | | | | ✓ | ✓ | | A |
| Sources in Mexico and Canada | Point Sources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | P |
| | Nonpoint Area Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | A |
| | Mobile Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | A |

[a] A = Area source (modeling grid cell, spatial surrogate); P = Point source (UTM coordinates, stack parameters); LB = Offshore lease block (modeling grid cell, spatial surrogate)

[b] Larger ports and shipping will be represented as shape files; smaller ports as point sources.

[c] Rail yards will be represented as point sources; railway segments as area sources.

### G.2.5 Spatial Resolution

The spatial resolution of the emissions inventory is source-specific. For example, sources such as power plants are identified based on their geographic coordinates (i.e., latitude and

longitude), while other sources such as nonroad mobile sources (e.g., construction equipment) are spatially distributed using surrogates within the county in which they are reported and that are typically related to the activity distribution of the category (e.g., construction sites).

The resolution of the geographical area covered by the emissions inventory is based on the grid cell size needed for photochemical modeling. Furthermore, the photochemical model grid resolution is dependent on the grid resolution of the WRF meteorological model output used.

### G.2.6 Temporal Resolution

Emissions for all sources were estimated on an annual basis (i.e., emissions generated during 2012). For electric generating units (EGUs), emissions were allocated on a sub-annual basis to reflect variations in activity using data from the USEPA.

Emissions were allocated on an hourly, daily, and seasonal basis using default temporal allocation factors provided with the Sparse Matrix Operator Kernel Emissions (SMOKE) emissions model for some sources; other temporal allocations were source-specific, and profiles were developed and applied within the SMOKE model.

### G.2.7 Speciation

When applying the PGM modeling, PM emissions were allocated to individual PM species as part of the SMOKE emissions processing using PM speciation factors obtained from the USEPA's SPECIATE database (USEPA 2014a) for each source category (as defined by the Source Classification Code). This resulted in the PM mass being broken into the mass associated with elemental carbon (EC), organic carbon (OC), and other elements, and particle-bound VOCs, such as polycyclic aromatic hydrocarbons (PAHs). The model predictions of EC will undergo further analysis and will be discussed in the "Air Quality Modeling in the Gulf of Mexico Region" study final report.

SMOKE was also used to convert VOC emissions into the photochemical mechanism-specific (e.g., CB05 or CB6r2h) model species used in air quality models.

## G.3 Base Case Emission Estimates

This section presents an overview of the methodologies used to compile the base case 2012 emission estimates for all source categories in the emissions inventory.

### G.3.1 Point Sources

Calendar year 2011 emissions data are available for onshore point sources from the USEPA NEI (USEPA, 2015a). In a separate modeling effort, the USEPA prepared a criteria pollutant calendar 2012 year emissions inventory for some sectors, including onshore point sources (USEPA, 2015b). The ERG obtained the USEPA 2012 point sources emissions inventory, conducted quality assurance/quality control (QA/QC) on the data, and supplemented and revised the criteria pollutant estimates, as needed. The USEPA prepared the 2012 point source emissions inventory as follows:

1. 2012 data compiled by the USEPA from annual criteria pollutant reporting of Type A (large) sources that are submitted by responsible State and local air agencies;
2. 2012 EGU emissions from the USEPA Clean Air Markets Division (CAMD) hourly emissions data;
3. 2011 NEI data for other, smaller point sources that are not identified above; and
4. 2011 airport and aircraft emission estimates developed by the USEPA updated to 2012 as needed.

Although the emissions data are likely complete for most point sources, ERG confirmed that offshore platforms within State boundaries are included in the NEI. Data from the USEPA's 2012 Toxics Release Inventory (TRI) for lead and ammonia were also used to supplement the inventory as needed (USEPA, 2015c).

### G.3.2 Nonpoint Area Sources

The starting point for the 2012 nonpoint area source inventory was the data submitted by State and local agencies for the 2011 NEI. In addition, for completeness, the USEPA develops emission estimates for a number of nonpoint source categories (up to 165) for inclusion in the NEI if agencies do not provide estimates. The USEPA did not develop 2012 emission estimates for nonpoint area sources. The ERG prioritized key top-emitting source categories of $NO_x$, PM, $SO_2$, and VOCs in AL, FL, GA, LA, MS, and TX, and developed 2012 emission estimates using the USEPA nonpoint area source category tools (USEPA, 2014b). These categories are as follows: consumer products, architectural surface coatings, industrial maintenance coatings, open burning: municipal solid waste (MSW), residential and institutional/commercial/industrial (ICI) heating, upstream oil and gas, open burning, land clearing debris, paved and unpaved roads, and gasoline distribution Stage I. The ERG also conducted point source reconciliation for ICI heating, oil and gas, and gasoline distribution Stage I to verify that there are no gasoline distribution Stage II records in USEPA's nonpoint file (now reported with onroad mobile sources).

### G.3.3 Mobile Sources

The onroad mobile source category includes exhaust and evaporative emissions from onroad motor vehicles (e.g., automobiles, light-duty trucks, heavy-duty trucks) and exhaust and evaporative emissions from nonroad mobile sources. The ERG team ran the MOVES2014 model for onroad sources (USEPA, 2014c), and the USEPA ran the NONROAD model for nonroad sources to develop 2012 emission estimates for these categories. Locomotive emissions in the 2011 NEI were not adjusted to represent 2012 activities because it was confirmed that the 2011 and 2012 fuel usage data from the Surface Transportation Board's R-1 Class 1 railroad annual reporting data (Surface Transportation Board, 2015) show only a slight (2%) reduction in 2012 levels from 2011 levels.

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### G.3.4 Offshore Helicopters

The Gulf of Mexico has more helicopter traffic than any other region of the U.S., primarily associated with offshore oil and gas support. Offshore support helicopter emission estimates were obtained from the 2011 Gulfwide inventory (Wilson et al., 2014). The estimates were supplemented with 2011 NEI helicopter data for onshore airports. The two datasets map out the full route between offshore platforms equipped with helipads and the closest onshore support facility; the NEI addresses emissions only at each airport and only for operations up to 3,000 feet of elevation (i.e., local mixing height). The two datasets were evaluated to ensure that the helicopter traffic data between the two are comparable and that there is no double counting of emissions.

### G.3.5 Offshore Oil and Gas Production Sources—Western and Central/Eastern Planning Areas in the Gulf of Mexico

The starting point for offshore oil and gas production platforms in the Western and Central/Eastern Planning Areas (WPA and CPA//EPA) was the 2011 Gulfwide inventory. The ERG team supplemented the 2011 Gulfwide inventory with $NH_3$ and Pb emission estimates for all applicable emission sources using USEPA emission factors. The ERG team conducted research to determine if the 2011 emissions values for platform sources should be adjusted to be more representative of 2012 emissions values. Offshore oil and gas production values for 2011 and 2012 were obtained from the BOEM Part A Oil and Gas Operations Reports (OGOR) (USDOI, BOEM, 2015). The OGOR data are presented at the lease level. Production of both oil and gas (including deepwater production) decreased from 2011 to 2012; thus, the 2011 emission estimates were modeled without adjustment in order to be conservative. **Table G-3** presents the base case emission estimates for offshore oil and gas production sources in the WPA and CPA//EPA. **Figures G-5, G-6, and G-7** show the $NO_x$, VOC, and $PM_{2.5}$ emissions from platform sources. Platform sources include the following emission source types: amine units, boilers/heater/burners, diesel and gasoline engines, drilling equipment, combustion flares, fugitives, glycol dehydrators, losses from flashing, mud degassing, natural gas engines, natural gas turbines, pneumatic pumps, pressure/level controllers, storage tanks, and cold vents.

Table G-3. Base Case Offshore Oil and Gas Production Source Emissions Estimates for the GOM Western and Central/Eastern Planning Areas.

| | $NO_X$ (TPY) | $SO_2$ (TPY) | $PM_{10}$ (TPY) | $PM_{2.5}$ (TPY) | VOC (TPY) | CO (TPY) | Pb (TPY) | $NH_3$ (TPY) |
|---|---|---|---|---|---|---|---|---|
| Platform Sources | 84,128 | 3,197 | 838 | 835 | 54,724 | 70,339 | <1 | 40 |
| Non-platform Sources | 232,765 | 22,977 | 8,632 | 8,225 | 7,937 | 41,880 | 701 | 70,139 |
| Total | **316,893** | **26,174** | **9,470** | **9,060** | **62,661** | **112,219** | **701** | **70,179** |

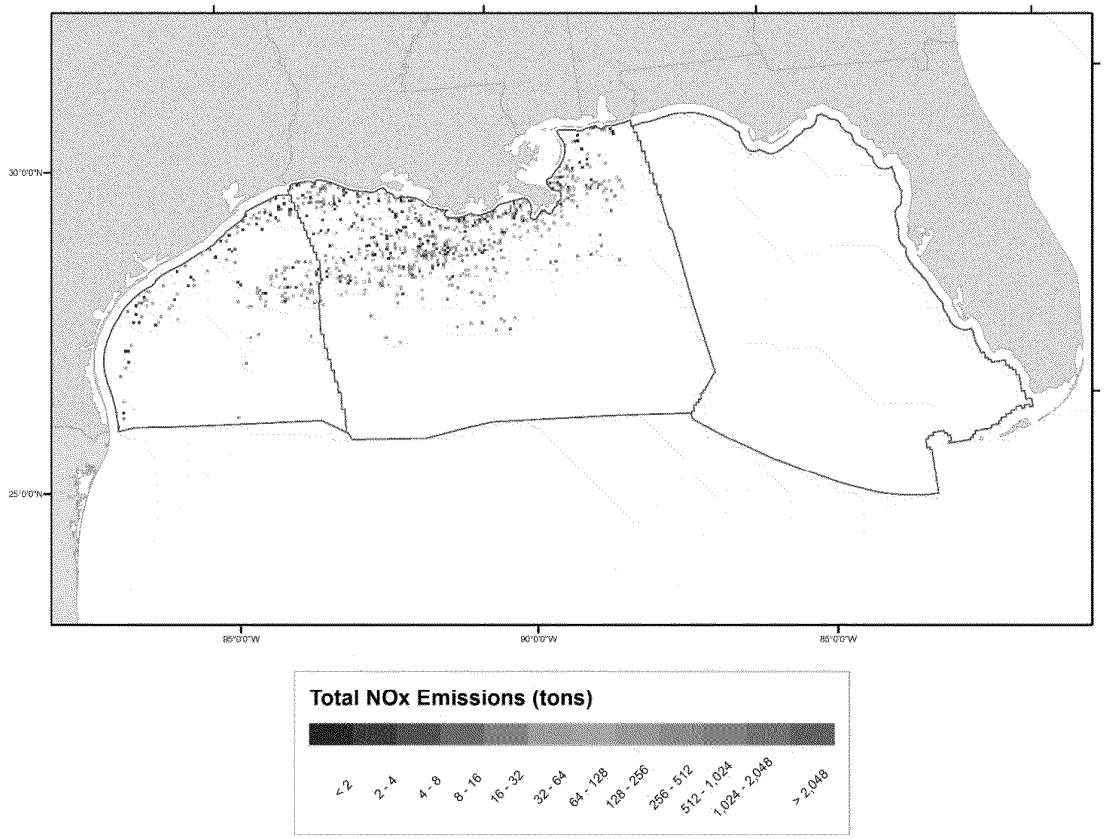


*Figure G-5. 2012 Platform $NO_x$ Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

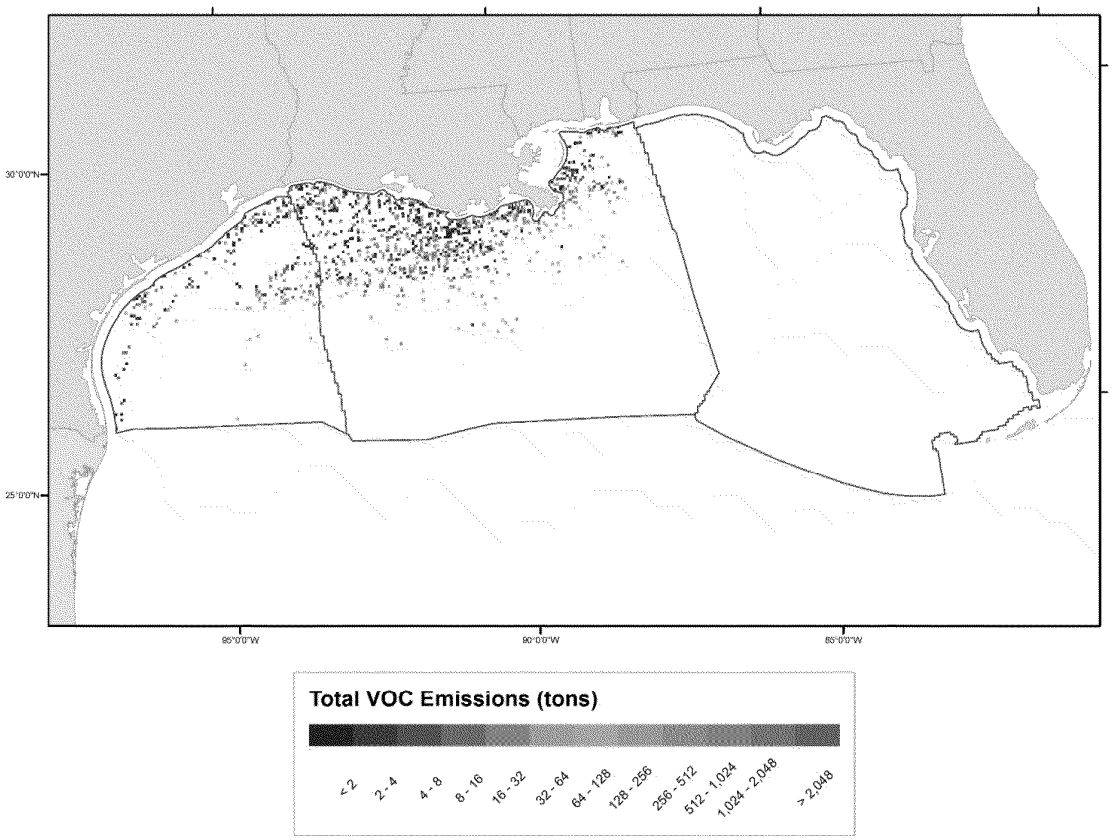


*Figure G-6. 2012 Platform VOC Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

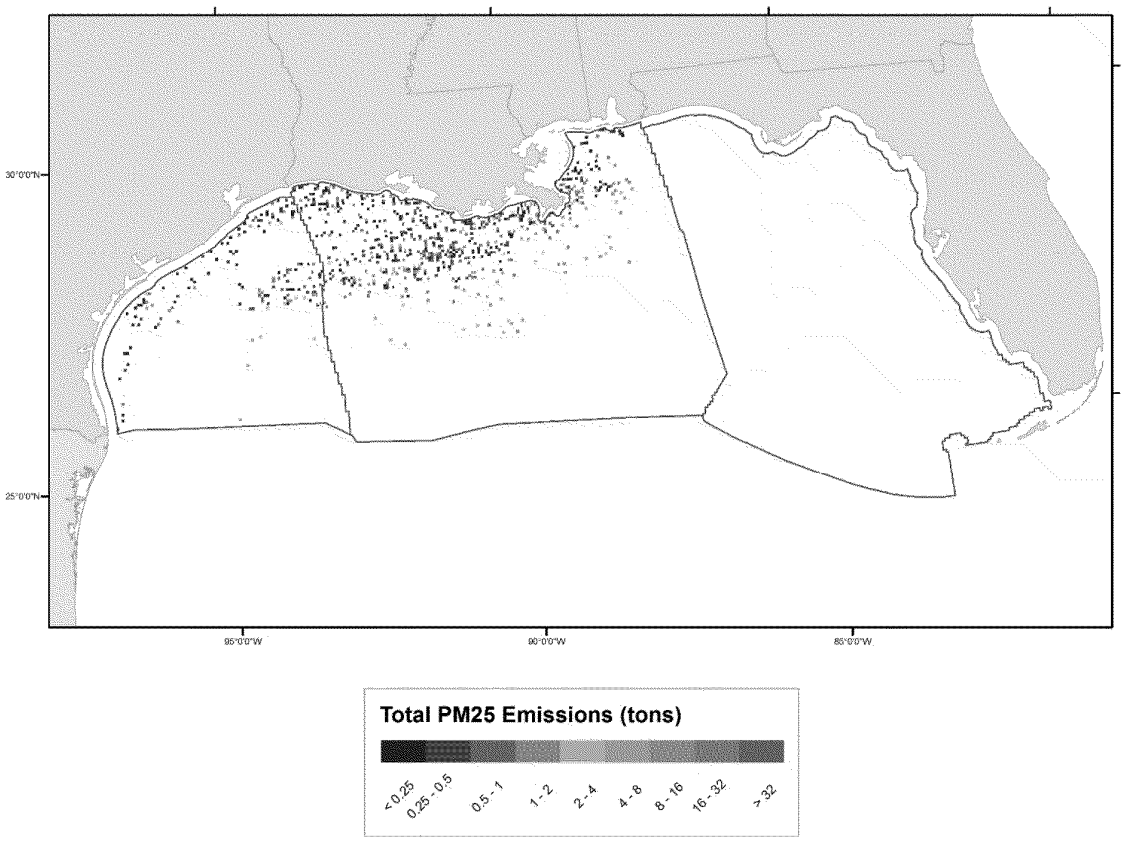


*Figure G-7. 2012 Platform $PM_{2.5}$ Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

## G.3.6 Offshore Vessels

Offshore vessels can be grouped into vessels that support the construction, operation, and decommissioning of oil and gas platforms; and vessels involved in other commercial, recreational, and military operations. All marine vessels included in this study operate using diesel engines. These include very large propulsion engines as well as smaller auxiliary diesel engines that provide power for electricity generation, winches, pumps, and other onboard equipment. Smaller engines tend to use distillate grade diesel fuel, while large engines are able to combust heavier residual blends.

40 CFR § 1043.109(b) created the North American Emission Control Area (ECA), which includes the Gulf of Mexico (USEPA, 2010). This regulation limits marine fuel sulfur content to 1% after August 1, 2012, for any vessel with a gross tonnage greater than 400. Vessels below this threshold tend to use distillate fuels, which are already at or below the 1% limit.

### G.3.6.1 Oil and Gas Production Support Vessels

The offshore oil and gas production sector requires a wide variety of vessels to support the

exploration, development, and extraction of oil and gas, including the following:

- seismic survey vessels;
- drilling vessels;
- pipe-laying vessels;
- crewboats; and
- supply vessels.

For the 2011 Gulfwide inventory, Automatic Identification System (AIS) data from PortVision were used to map spatial aspects of vessel movements (PortVision, 2012). The AIS is an automated tracking system that allows exchanges of location and contact data with other nearby ships, offshore platforms, satellites, and AIS base stations, enhancing navigation and reducing at-sea collisions.

On October 22, 2003, the U.S. harmonized the AIS mandates of the Safety of Life at Sea Convention with the Maritime Transportation Security Act of 2002 (MTSA), which requires the following vessels, including offshore support vessels, to participate in the AIS program:

(1) passenger vessels of 150 gross tonnage or more;

(2) tankers, regardless of tonnage; and

(3) vessels other than passenger vessels or tankers of 300 gross tonnage or more.

Vessels that do not meet these thresholds, such as crew boats and smaller support vessels, can still participate in AIS on a voluntary basis. The Offshore Marine Service Association (OMSA) is encouraging its membership to equip their vessels with AIS transponders, allowing for more efficient and safer ship movements in the highly congested central and western areas of the Gulf of Mexico.

The ERG team used the spatially distributed support vessel emission estimates from BOEM's 2011 Gulfwide inventory. While the USEPA 2011 NEI also includes marine vessel emission estimates for the Gulf of Mexico, the emission estimates were derived from national vessel activity data. During QA/QC of the 2011 BOEM Gulfwide estimates, ERG found and corrected an error in the vessel power rating for a number of smaller vessels.

As discussed above for offshore oil and gas production platforms, the 2011 emission estimates for these vessels were not adjusted to reflect 2012 production levels. $SO_x$ and PM (associated with sulfates) were not adjusted to account for the introduction of low sulfur ECA compliant fuel in the last 5 months of 2012 because it was determined that most support vessels are Category 1 or 2, which already use ECA compliant fuels. Emission estimates for $NH_3$ and Pb were also developed for vessels. **Table G-3** presents the base case emission estimates for drilling rigs, pipe-laying operations, support helicopters, support vessels, and survey vessels. **Figures G-8, G-9, and G-10** show the $NO_x$, VOC, and $PM_{2.5}$ emissions from non-platform sources.

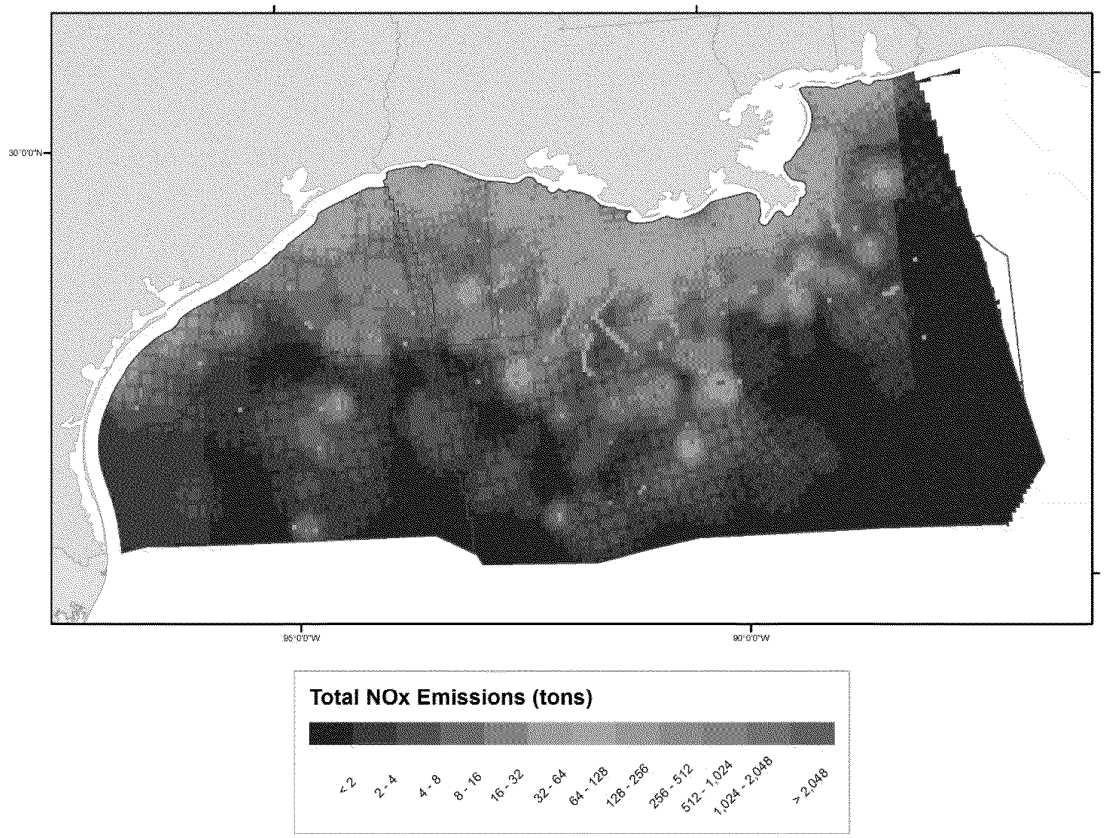


*Figure G-8. 2012 Non-platform $NO_x$ Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

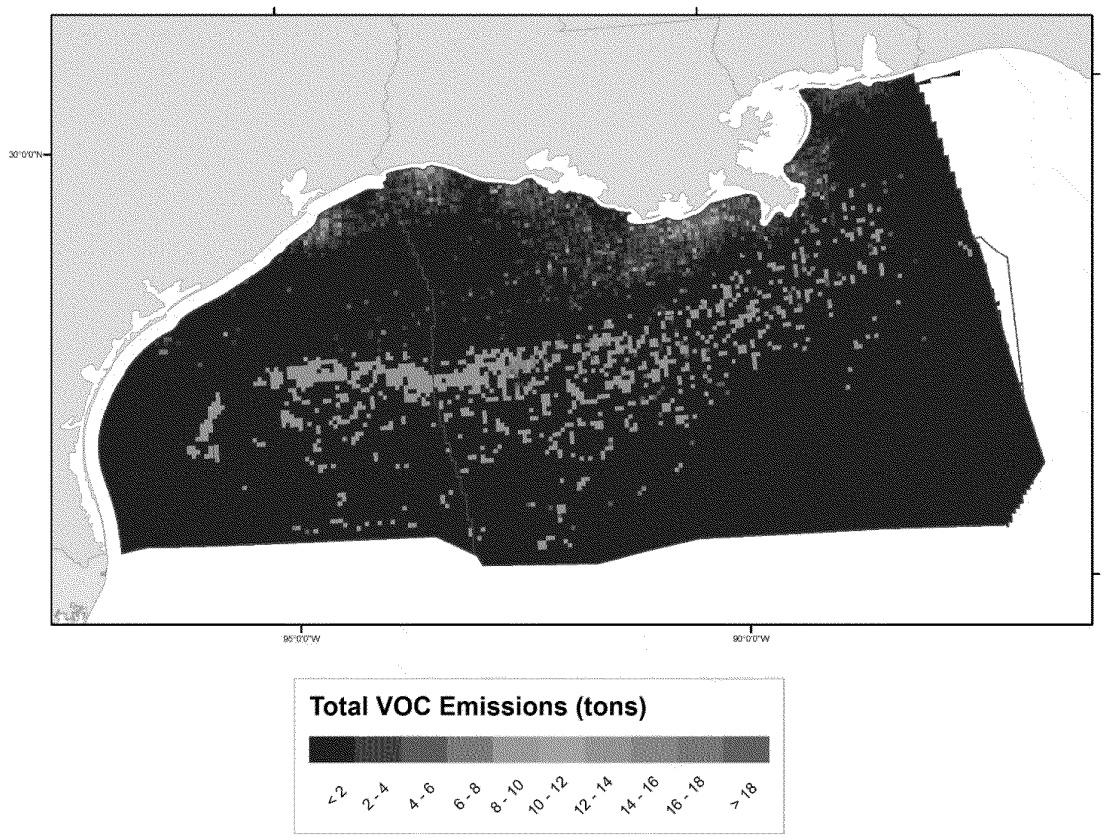


*Figure G-9. 2012 Non-platform VOC Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

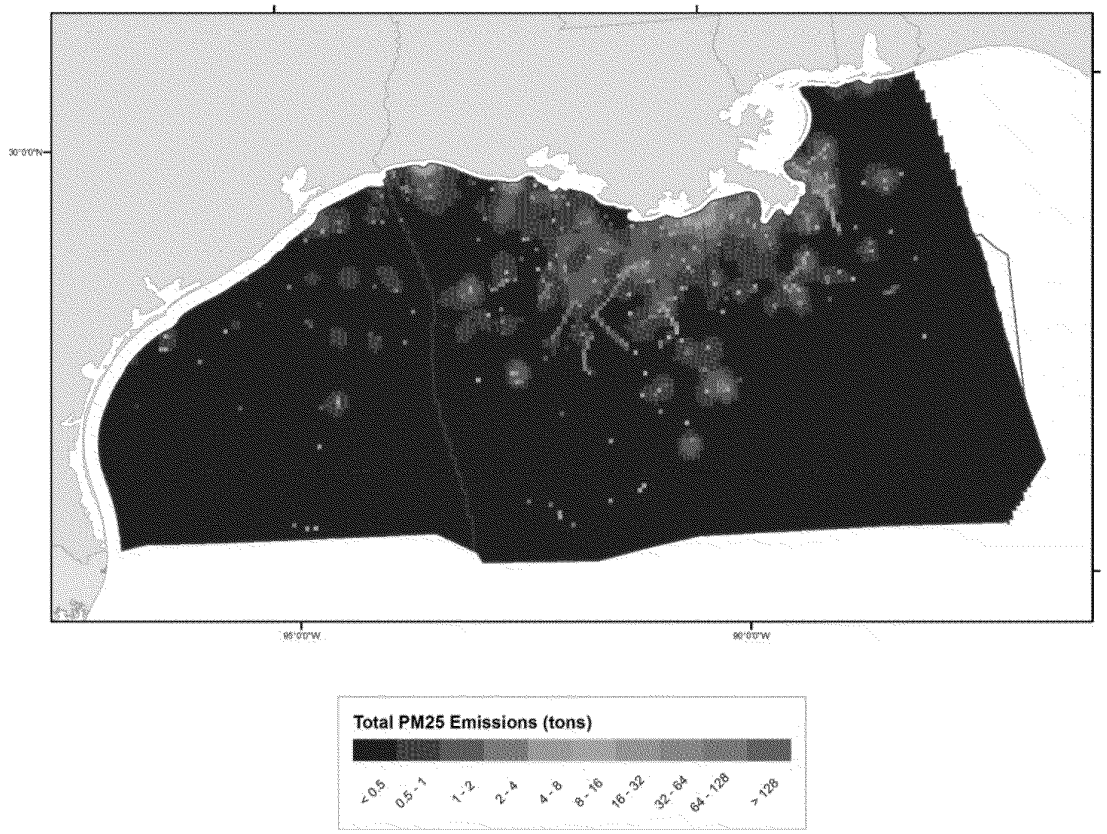


*Figure G-10. 2012 Non-platform $PM_{2.5}$ Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

The ERG team obtained drilling vessel data from BSEE to confirm that there was no drilling activity in the eastern Gulf Of Mexico OCS Region in 2012, and reviewed the permits granted by the USEPA for offshore platforms in the eastern Gulf Of Mexico OCS Region to confirm there were no active production platform activities in 2012.

### G.3.6.2 Non-oil and Gas Production Offshore Vessels

Vessels not directly associated with the offshore oil and gas activities include the following:

- commercial marine vessels;
- Louisiana Offshore Oil Port-associated vessels;
- commercial and recreational fishing vessels;
- ferries;
- research vessels;
- harbor craft; and

- military vessels.

Commercial marine vessels (CMVs) include large ships involved in international trade that visit coastal ports and operate in deep waters, as well as smaller general cargo ships and tugs that move barges along waterways and rivers. For the Federal waters of the central and western of the Gulf of Mexico, the ERG team used the commercial marine vessel data from the 2011 Gulfwide inventory. For completeness, for all other areas of the Gulf of Mexico, Atlantic Ocean, and State waters, the USEPA's NEI data were used (which were developed from national vessel activity data as noted above). These inventories cover different geographical areas than the BOEM inventory, as well as different vessel types. BOEM's data include large deepwater vessels as does the USEPA data beyond the Federal/State boundary, but they also include vessels such as ferries, dredging vessels, tugs, towboats, and harbor craft that tend to operate only in State waters.

The Louisiana Offshore Oil Port (LOOP) is a pumping platform for tankers to discharge imported crude oil to the mainland without having to maneuver through port traffic. Similarly, there are four offshore lightering zones in the Gulf of Mexico (i.e., Southtex, Gulfmex No. 2, Offshore Pascagoula No. 2, and South Sabine Point) where smaller shuttle tankers can move product from very large crude carriers, bringing the oil to port while the large tankers remain off the coast. Tankers that visit the LOOP or the lightering zones along with the shuttle tankers were identified in the 2011 Gulfwide inventory. The inventory also accounts for evaporative emissions from unloading and loading activities, and emissions from the operation of generators and pumps at the LOOP; adjustments were made to the 2011 LOOP emission estimates to reflect the 18% decline in crude imports in 2012.

Emissions from the operation of commercial and recreational fishing vessels are also included in the 2011 Gulfwide inventory for Federal waters. These were supplemented with the USEPA's 2011 NEI data for these fishing vessels for operations in the eastern Gulf, Atlantic Ocean, and State waters. For military vessels, the ERG team used the 2011 Gulfwide inventory Navy and Coast Guard vessel emission estimates and the NEI's Coast Guard emission estimates for State waters, as well as Federal waters in the eastern part of the Gulf of Mexico and the Atlantic Coast. The ERG team conducted research to determine that activity levels from 2011 to 2012 were similar for the other non-oil and gas vessels (e.g., tankers, container ships, bulk, and general cargo). Based on the most recent International Maritime Organization data (IMO, 2015), fuel combustion is projected to remain constant from 2010 to 2015. Thus, no adjustments were needed to approximate activities in 2012.

The $SO_2$ and PM (associated with sulfates) emission estimates were adjusted for Category 3 vessels to account for the introduction of low sulfur ECA-compliant fuel in the last 5 months of 2012.

### G.3.7 Biogenic and Geogenic Sources

For completeness, it is important to include non-anthropogenic emission sources in the inventory. The ERG team also estimated emissions for the sources listed below.

- Onshore vegetation (biogenic): MEGAN (version 2.1) biogenic emission model
- Wildfires, prescribed burns, and agricultural burning: USEPA's SMARTFIRE emissions inventory for the U.S.
- Windblown dust: Windblown dust (WBD) modeling using the WRF meteorological dataset
- Lightning: WRF data (preprocessor)
- Subsurface oil seeps: 2011 Gulfwide inventory
- Mud volcanoes: 2011 Gulfwide inventory
- Sea salt emissions: WRF data (preprocessor)

The ERG team used fire emission estimates from the National Center for Atmospheric Research (NCAR) Fire INventory (FINN) for Mexico and Canada.

### G.3.8 Sources In Mexico

The ERG team developed the 2012 emission inventories for the portions of Mexico within the 36-km modeling inventory domain using the municipality-level emission files from the 2008 Mexico National Emissions Inventory (MNEI) (SEMARNAT, 2014) combined with projection factors for point, nonpoint area, and nonroad mobile sources. Mexico onroad motor vehicle emissions were generated using a version of the USEPA vehicle emissions model MOVES, updated to reflect conditions in Mexico. MOVES2014 was the most recent version of the model available at the time of the analysis and reflects USEPA's latest estimate of vehicle emissions and default U.S. activity data (USEPA, 2014c). The ERG also conducted research on the offshore oil production activities off the coast of Mexico. Based on a report published by the Congressional Research Service, it was determined that there was no offshore production within the 36-km modeling domain in 2012 (Seelke et al., 2015).

### G.3.9 Sources In Canada

Emissions from the USEPA's most recent modeling platform (2010) were used for sources in Canada.

## G.4 Future Year Modeling Scenario Emission Estimates

Emission estimates were also needed as inputs for additional modeling scenarios that will predict future impacts from implementation of the 2017-2022 GOM Multisale EIS. For modeling the future year impacts, the ERG team forecast emissions estimates based on information provided by BOEM, combined with USEPA projected emission estimates and other data for onshore sources and marine vessels and other sources outside of the GOM region. The ERG team confirmed that offshore drilling in the EPA under USEPA air quality jurisdiction is included in BOEM's *Proposed*

*Final Outer Continental Shelf Oil & Gas Leasing Program: 2017-2022* (Five-Year Program) spreadsheets. The ERG also reviewed the USEPA's offshore oil and gas production permits to confirm that no production platforms were permitted to be constructed prior to or during 2017. Projected emission estimates were developed for anticipated offshore drilling off the coast of Mexico.

### G.4.1 Western, Central, and Eastern Planning Areas OCS Offshore Oil and Gas Production Sources

The ERG team developed annual emission estimates for all categories and pollutants for each year of activity for OCS offshore oil and gas production sources associated with the Five-Year Program using BOEM's spreadsheet-based data analyses tools. BOEM provided information on the predicted levels of activity, sources, and locations (by planning area and water depth) to depict offshore oil and gas activities in the future scenario. The emissions estimates are based on a mid-price oil case scenario and cover the WPA, CPA, and EPA, which are under BOEM's jurisdiction.

After completion of the OCS offshore oil and gas production source emission estimates, the resulting cumulative emissions for each pollutant were assessed to determine which emission estimates should be selected for PGM modeling to support the cumulative and visibility impacts analyses.

Based on information provided by BOEM, it was assumed that emissions for the following sources occur during the total period of proposed activity based on the 2017-2022 GOM Multisale EIS scenario (2017-2056)[1]:

- exploration and delineation well drilling activities (1,671 wells drilled);
- development and production well drilling activities (1,135 wells drilled);
- platform installation activities (535 platforms installed);
- FPSO installation (1 FPSO installed);
- FPSO operation (1 FPSO operating);
- FPSO removal (1 FPSO removed);
- pipeline installation excluding State waters (7,251 km of pipeline installed);
- platform oil and gas production (535 platforms in operation);
- platform removal (535 platforms removed);
- support helicopters (642,000 round trips); and
- support vessels (1,062,000 operations).

The BOEM data analyses tools provide information on each of these anticipated activities by

[1] Excluding the Gulf of Mexico Energy Security Act (GOMESA) moratorium area.

year, as well as water depth. The anticipated water depths by planning area were used to spatially allocate the emissions.

The ERG used this information to develop emission estimates for each source category based on emission estimation methods used in past Gulfwide emissions inventory studies and other data compiled for BOEM in order to determine which estimates should be selected for photochemical modeling to support the cumulative and visibility impacts analyses.

The following sections discuss the emission estimation methods that the ERG team used to estimate emissions for the BOEM oil and gas production sources in the future scenario.

#### G.4.1.1 Oil and Natural Gas Offshore Production Platforms

In order to develop reasonably foreseeable emission estimates for projected oil and natural gas production platforms, the emission factors presented in **Table G-4** were developed based on the 2011 Gulfwide inventory (Wilson et al., 2014). Because deepwater operations may significantly differ from conventional operations in shallower waters, are technologically more sophisticated, and produce at much higher rates, two sets of emission factors were developed and assigned to each projected platform based on water depth. Depths below 200 meters (656 feet) were assigned the shallow-water emission factors, and depths above were assigned deepwater emission factors.

Emission estimates for platform sources were developed based on platform installation and carried forward until the projected platform removal dates (provided by planning area and water depth).

Table G-4. Future Year Production Platform Emission Factors.

| Pollutant | Shallow Water Emission Factors (<200 m) (tons/platform/yr) | Deepwater Emission Factors (>200 m) (tons/platform/yr) |
|---|---|---|
| CO | 56 | 192 |
| $NO_x$ | 46 | 582 |
| $PM_{10}$-PRI | 0.5 | 5.17 |
| $PM_{2.5}$-PRI | 0.50 | 5.15 |
| $SO_2$ | 0.51 | 44 |
| VOC | 22 | 96 |
| Pb | 2.38E-05 | 3.79E-03 |
| $NH_3$ | 0.0349 | 0.49 |

Source: Developed from the *Year 2011 Gulfwide Emissions Inventory* (Wilson et al., 2014).

#### G.4.1.2 Offshore Support Helicopters

The ERG team obtained helicopter emission factors from the Switzerland Federal Office of Civil Aviation (FOCA) Guidance on Determination of Helicopter Emissions (FOCA, 2009). However, the landing and takeoff (LTO) cycle used by FOCA was determined to be too short for typical trips taken in the Gulf of Mexico. The time-in-mode values were therefore adjusted based on the

International Civil Aviation Organization (ICAO) test cycles, which are considered to be appropriate for offshore operations in the Gulf of Mexico. Because the future fleet mix is unknown, ERG weighted the emission factors using fleet profile data from the Helicopter Safety Advisory Conference (HSAC, 2015). The VOC emission factors were developed by converting the hydrocarbon (HC) emission factors using data from the USEPA's Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (USEPA, 1992). The aggregated general aviation conversion factor of 1.0631 for turbine engines was used because the GOM support helicopter fleet is primarily equipped with turbine engines. The $PM_{2.5}$ emission factors were speciated from $PM_{10}$ factors using USEPA aircraft speciation data, and the $SO_2$ emission factors were developed based on a typical jet fuel sulfur concentration of 0.05% (UNEP, 2012).

#### G.4.1.3 Oil and Gas Production Offshore Support Vessels

Four components are needed to estimate future offshore vessel emissions:

- vessel characteristics (engine power and speed);
- engine operating load (percent of maximum engine power);
- hours of operation (typically determined by the distance the vessel travels divided by the vessel speed); and
- appropriate emission factors (grams per kW-hr).

Because there is uncertainty about the location of future activities, it was assumed that a typical vessel trip is 200 nautical miles, which is the round-trip distance from shore to the mid-point of Federal waters.

In projecting future year activity, it is not always possible to identify specific vessels that will be used. Therefore, the use of larger vessels that represent the upper bound of each vessel type was assumed, such that actual future year emissions should be similar to or lower than emission estimates developed using this fleet profile. These vessels were identified based on data compiled from the Information Handling Service (IHS) Register of Ships (IHS, 2015). Vessels from the global fleet were used because these larger ships move internationally based on local demand. It should also be noted that these larger vessels tend to be involved in deepwater activities because they are designed for extended open-water operations. As trends to develop deeper water locations in the Gulf of Mexico continue into the future, it is likely that these larger or similar vessels will support future year activities.

The selected vessels and their characteristics are presented in **Table G-5**. In order to correctly match the vessel to the appropriate emission factors, the vessel engine category is required. The USEPA vessel category was determined by calculating the cylinder volume based on the stroke length and diameter of the cylinder. The USEPA categories are defined by the following cylinder volumes:

- Category 1: Cylinder displacement less than 5 liters;
- Category 2: Cylinder displacement from 5 to 30 liters; and
- Category 3: Cylinder displacement greater than 30 liters.

If a vessel's cylinder volume was unknown, it was assumed that the vessel was powered by a Category 3 propulsion engine. It should also be noted that all of the selected vessels are foreign flagged, but it is assumed that they refuel using U.S.-regulated marine fuels as they shift equipment and supplies from nearby U.S. ports.

Table G-5. Summary of Vessel Characteristics.

| Vessel Type | Total Main Power (kW) | Vessel Name | Propulsion Engine Category | Speed (knots) |
|---|---|---|---|---|
| Drillship | 48,666 | Rowan Renaissance | 3 | 12 |
| Jackup | 12,485 | Bob Palmer | 2 | |
| (auxiliary) | Not self-propelled | | | |
| Platform Rig | 8,100 | Nabors Mods 087 | 2 | |
| (auxiliary) | Not self-propelled | | | |
| Semisubmersible | 22,371 | ENSCO 7500 | 2 | 3.5 |
| Submersible | 3,691 | Hercules 78 | 2 | |
| (auxiliary) | Not self-propelled | | | |
| FPSO | 14,110[1] | Terra Nova FPSO | 2 | 12.0 |
| FSO | 51,519 | Africa | 3 | 16.5 |
| Stimulation Vessel | 15,840 | Norshore Atlantic | 2 | 14 |
| Oil Tanker | 13,369 | SPT Explorer | 3 | 15 |
| Anchor Handling Vessel | 27,000 | KL Sandefjord | 3 | 17 |
| Crew Boat | 11,520 | R. J. Coco Mccall | 3 | 23 |
| Supply Vessel | 18,000 | Aleksey Chirikov | 3 | 15 |
| Tug Boat | 19,990 | Yury Topchev | 3 | 15 |
| Pipe-Laying Vessel | 67,200 | Castorone | 3 | 14 |

[1] Only distillate oil main engine kW included (430 kW & 2 x 6840 kW). Topside emissions are included in the deepwater production platform estimates.

A vessel's engine power varies relative to the type of operation that is implemented. While cruising in open waters, the propulsion engine load is typically 84% of maximum load; during maneuvering, it can be 60% or lower; and when stationary,. it can be 10% or lower. **Table G-6** presents the aggregated load factors that will be used in this Study for propulsion and auxiliary engines.

Table G-6. Load Factors to be Used in the Future Year Projections.

| Vessel Type | Load Factor |
|---|---|

| | |
|---|---|
| Propulsion Cruising | 0.8-0.85 |
| Propulsion Idle | 0.1 |
| Propulsion Crew/Supply Boat | 0.45 |
| Propulsion Drill Ship and Semi-Submersible | 0.83 |
| Propulsion Pipe-Laying Vessel | 0.16 |
| Propulsion Tug | 0.68 |
| Auxiliary Emergency Generator | 0.75 |
| Drilling Equipment | 1 |

The future year emission factors were developed in terms of grams of pollutant emitted per load-adjusted engine kW-hours based on the emission factors used in the USEPA's 2014 NEI (**Table G-7**). The factors presented below are applicable for foreign-flagged vessels that are not required to comply with USEPA exhaust standards but that must comply with international Emission Control Area (ECA) standards. These future year factors account for the reduction in fuel sulfur level associated with the ECA. Because Category 2 foreign-flagged offshore support vessels will be refueling at U.S. ports, it was anticipated that these vessels will use low sulfur compliant U.S. fuels. Also, the $NO_x$ emission factors were adjusted to account for the 2016 ECA Tier III standard that requires high efficiency, after-treatment technology, and is applicable for U.S. and foreign-flagged vessels. The Category 3 PM emission factors were not adjusted to account for reductions in PM as sulfate compounds because the USEPA's adjustment equation provided a PM factor lower than the PM emission factor for Category 2 powered vessels.

Table G-7. Marine Vessel Emission Factors (g/kW-hr).

| Engine Category | $NO_x$ | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ | VOC | CO | HC | $NH_3$ | Pb |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3.4 | 0.006 | 0.320 | 0.310 | 0.141 | 2.48 | 0.13 | 0.005 | 0.00003 |
| 3 | 3.4 | 0.362 | 0.450 | 0.437 | 0.632 | 1.40 | 0.60 | 0.003 | 0.00003 |

Source: USEPA, 2016b.

#### G.4.1.4 Future Year Emission Estimates and Selection of Future Modeling Year

The emission estimates developed for the future BOEM oil and gas production sources were reviewed to determine the most suitable future year emissions to model. The PGM modeling for the cumulative and visibility impacts analysis was conducted based on the emissions anticipated to have the greatest impact on the air quality of any state. This was determined based on the estimated annual emission trends. The future highest $NO_x$ emission year for all activities in all planning areas coincided with the highest PM, CO, $NH_3$, and Pb emissions. These emissions are driven by support vessel activity for the most part. The future highest VOC emission year for all activities in all planning areas coincided with the highest $SO_2$ emissions and is driven by production platform emissions. **Table G-8** presents the resulting emission estimates, and **Figure G-11** presents a graphical depiction of the annual emission estimates for all pollutants. **Figures G-12, G-13, and G-14** present graphical depictions of the annual emission estimates for $NO_x$, VOC, and $PM_{2.5}$ by source category.

It was concluded that BOEM would model the activity data and resulting emission estimates for year 2033 for non-platform sources, and year 2036 activity data and resulting emission estimates

for platform sources.

Table G-8. Emission Estimates for the Western, Central, and Eastern Planning Areas, All Depths, By Year and Pollutant.

| Year | $NO_x$ (TPY) | $SO_2$ (TPY) | $PM_{10}$ (TPY) | $PM_{2.5}$ (TPY) | VOC (TPY) | CO (TPY) | Pb (TPY) | $NH_3$ (TPY) |
|---|---|---|---|---|---|---|---|---|
| 2017 | 3,693 | 40 | 360 | 349 | 200 | 2,591 | 0.03 | 10 |
| 2018 | 19,328 | 118 | 1,813 | 1,759 | 1,213 | 14,058 | 0.17 | 80 |
| 2019 | 34,958 | 158 | 3,199 | 3,104 | 2,150 | 25,462 | 0.30 | 98 |
| 2020 | 46,119 | 268 | 4,124 | 4,001 | 3,042 | 33,293 | 0.39 | 111 |
| 2021 | 50,126 | 379 | 4,368 | 4,238 | 3,807 | 35,937 | 0.42 | 125 |
| 2022 | 54,328 | 446 | 4,605 | 4,469 | 4,535 | 38,906 | 0.45 | 139 |
| 2023 | 57,639 | 527 | 4,888 | 4,743 | 5,311 | 41,426 | 0.48 | 154 |
| 2024 | 59,979 | 484 | 5,030 | 4,881 | 5,872 | 43,637 | 0.49 | 170 |
| 2025 | 64,527 | 523 | 5,413 | 5,252 | 6,543 | 47,198 | 0.53 | 189 |
| 2026 | 70,601 | 598 | 5,870 | 5,696 | 7,510 | 51,762 | 0.57 | 209 |
| 2027 | 76,146 | 704 | 6,305 | 6,118 | 8,419 | 55,747 | 0.61 | 228 |
| 2028 | 79,863 | 742 | 6,609 | 6,414 | 9,125 | 58,701 | 0.64 | 244 |
| 2029 | 85,277 | 803 | 7,012 | 6,805 | 10,034 | 62,750 | 0.68 | 262 |
| 2030 | 90,332 | 876 | 7,381 | 7,163 | 11,010 | 66,523 | 0.72 | 280 |
| 2031 | 97,123 | 984 | 7,860 | 7,628 | 12,185 | 71,365 | 0.77 | 298 |
| 2032 | 100,564 | 1,022 | 8,057 | 7,820 | 13,228 | 74,107 | 0.79 | 315 |
| 2033 | **108,447** | 1,199 | **8,590** | **8,338** | 14,709 | **79,486** | **0.85** | **334** |
| 2034 | 101,673 | 1,193 | 7,919 | 7,687 | 14,939 | 74,742 | 0.79 | 329 |
| 2035 | 102,443 | 1,253 | 7,923 | 7,691 | 15,484 | 75,167 | 0.79 | 327 |
| 2036 | 103,354 | **1,395** | 7,865 | 7,635 | **15,940** | 75,096 | 0.79 | 318 |
| 2037 | 96,715 | 1,343 | 7,274 | 7,062 | 15,254 | 70,088 | 0.74 | 298 |
| 2038 | 92,539 | 1,327 | 6,935 | 6,732 | 14,560 | 66,732 | 0.71 | 283 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2039 | 84,787 | 1,280 | 6,269 | 6,087 | 13,443 | 60,725 | 0.65 | 247 |
| 2040 | 79,475 | 1,235 | 5,841 | 5,672 | 12,317 | 56,455 | 0.61 | 226 |
| 2041 | 77,705 | 1,294 | 5,652 | 5,488 | 11,544 | 54,267 | 0.60 | 209 |
| 2042 | 71,710 | 1,292 | 5,110 | 4,962 | 10,485 | 49,266 | 0.55 | 187 |

Table G-9. Emission Estimates for the Western, Central, and Eastern Planning Areas, Emissions Estimations for Western, Central, and Eastern Planning Areas, All Depths, By Year and Pollutant (continued).

| Year | $NO_x$ (TPY) | $SO_2$ (TPY) | $PM_{10}$ (TPY) | $PM_{2.5}$ (TPY) | VOC (TPY) | CO (TPY) | Pb (TPY) | $NH_3$ (TPY) |
|---|---|---|---|---|---|---|---|---|
| 2043 | 51,254 | 1,094 | 3,390 | 3,293 | 8,643 | 34,736 | 0.38 | 157 |
| 2044 | 46,692 | 1,077 | 3,018 | 2,932 | 7,842 | 31,076 | 0.35 | 143 |
| 2045 | 42,933 | 1,009 | 2,752 | 2,673 | 7,115 | 28,358 | 0.32 | 128 |
| 2046 | 39,227 | 974 | 2,433 | 2,364 | 6,492 | 25,503 | 0.29 | 117 |
| 2047 | 37,540 | 965 | 2,313 | 2,247 | 6,006 | 24,050 | 0.28 | 108 |
| 2048 | 34,738 | 954 | 2,083 | 2,024 | 5,495 | 21,808 | 0.26 | 98 |
| 2049 | 32,995 | 904 | 1,995 | 1,939 | 5,020 | 20,615 | 0.25 | 90 |
| 2050 | 28,873 | 849 | 1,688 | 1,640 | 4,403 | 17,665 | 0.22 | 82 |
| 2051 | 26,286 | 796 | 1,524 | 1,481 | 3,872 | 15,834 | 0.20 | 73 |
| 2052 | 24,303 | 747 | 1,406 | 1,367 | 3,475 | 14,510 | 0.18 | 67 |
| 2053 | 15,585 | 598 | 757 | 737 | 2,610 | 8,716 | 0.11 | 23 |
| 2054 | 13,131 | 592 | 542 | 527 | 2,333 | 6,838 | 0.09 | 17 |
| 2055 | 12,062 | 502 | 548 | 533 | 2,010 | 6,479 | 0.09 | 16 |
| 2056 | 10,119 | 453 | 434 | 422 | 1,615 | 5,185 | 0.07 | 12 |
| 2057 | 9,083 | 450 | 340 | 331 | 1,528 | 4,407 | 0.06 | 9 |
| 2058 | 8,519 | 405 | 344 | 335 | 1,321 | 4,185 | 0.06 | 8 |
| 2059 | 7,182 | 316 | 321 | 313 | 1,031 | 3,653 | 0.05 | 7 |
| 2060 | 6,052 | 314 | 215 | 209 | 984 | 2,829 | 0.04 | 5 |
| 2061 | 5,765 | 270 | 237 | 231 | 877 | 2,852 | 0.04 | 5 |
| 2062 | 5,075 | 268 | 180 | 176 | 760 | 2,305 | 0.04 | 4 |
| 2063 | 4,614 | 224 | 186 | 181 | 646 | 2,201 | 0.03 | 3 |
| 2064 | 3,524 | 136 | 183 | 178 | 433 | 1,872 | 0.03 | 2 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2065 | 1,906 | 46 | 130 | 126 | 175 | 1,157 | 0.02 | 1 |
| 2066 | 1,392 | 46 | 81 | 79 | 153 | 782 | 0.01 | 1 |

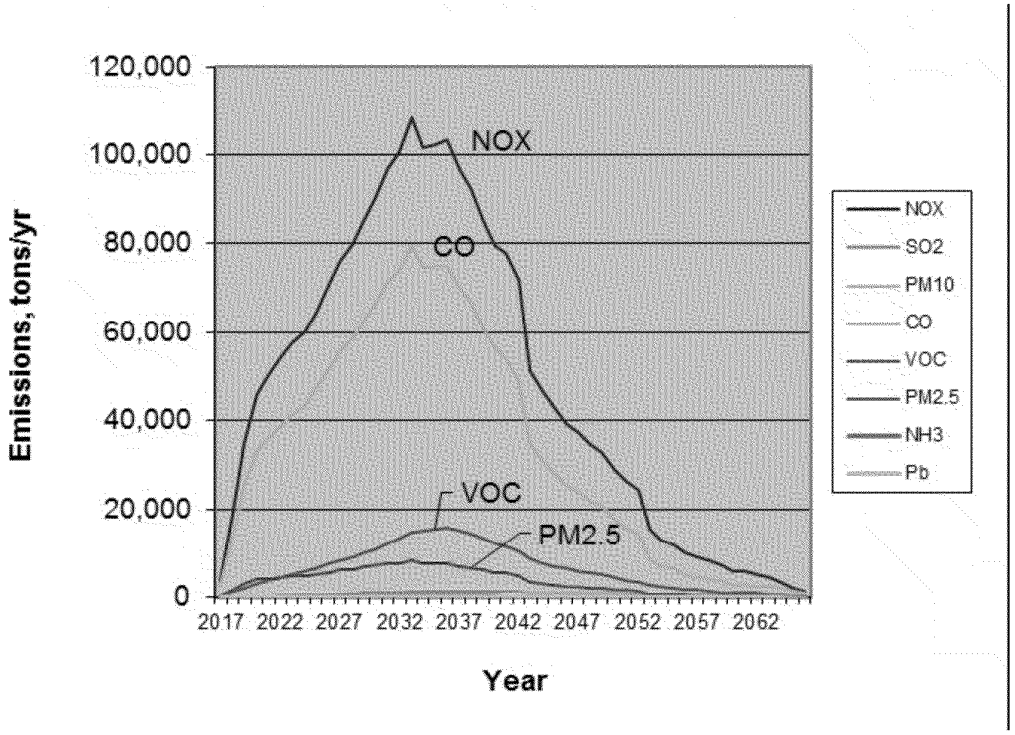


*Figure G-11. Emission Estimates for all Planning Areas and Future Activities.*

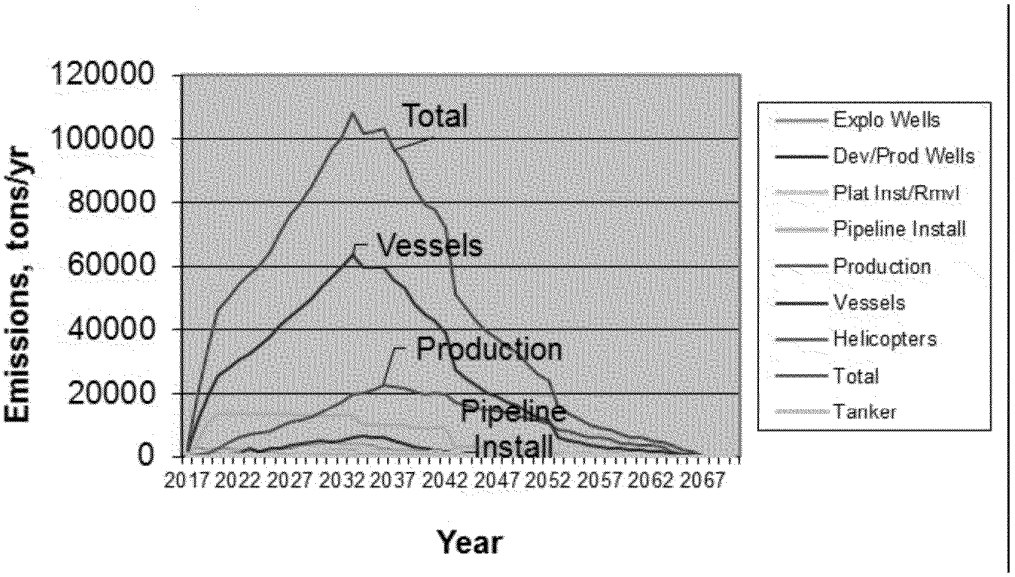


*Figure G-12. Combined Annual $NO_x$ Emissions.*

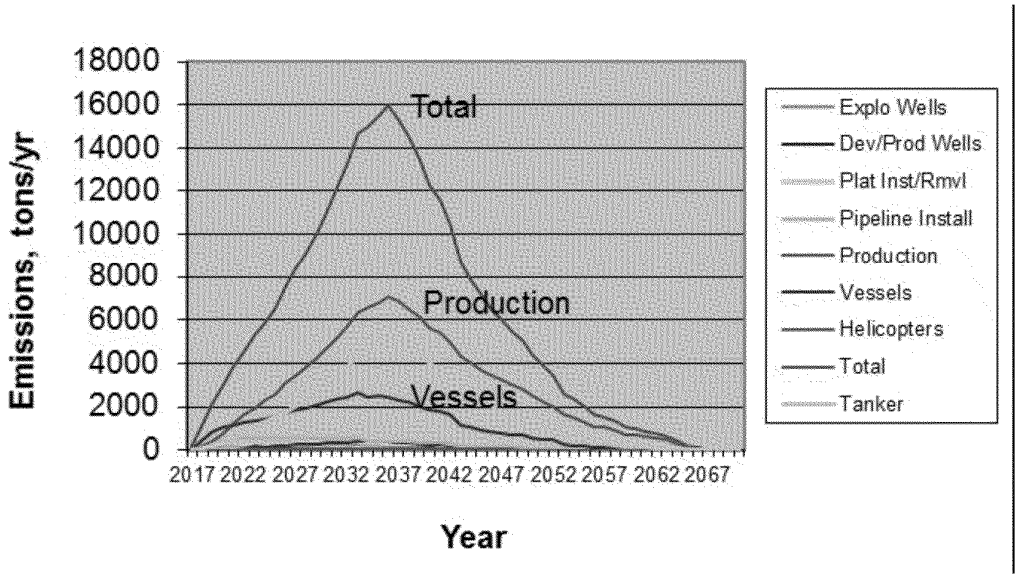


*Figure G-13. Combined Annual VOC Emissions.*

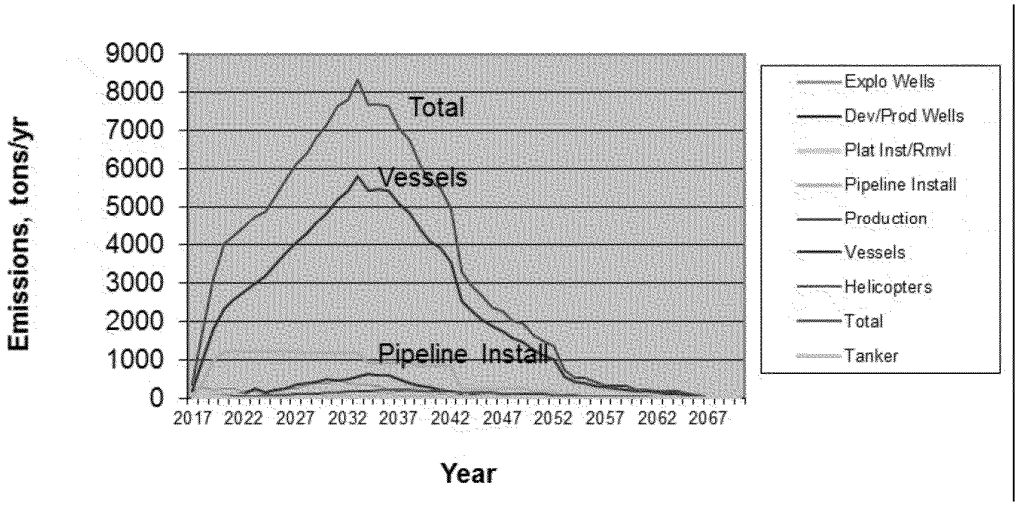


*Figure G-14. Combined Annual $PM_{2.5}$ Emissions.*

### G.4.1.5 Spatial Allocation

The estimated emissions were allocated by planning area (WPA vs. CPA/EPA) and water depth (i.e., 0-60 m, 60-200 m, 200-800 m, 800-1,600 m, 1,600-2,400 m, and >2,400 m). **Figure G-15** depicts the planning area boundaries and water depth contours. [Note that the GOMESA Congressional Moratoria Area is not indicated in **Figure G-15**.] Emissions were not allocated to the GOMESA. The emission estimates were allocated spatially based on the anticipated future year activities provided by BOEM. Because helicopters, support vessels, and tankers transit multiple water depths, their emissions were allocated across multiple water depth contours based on assumed installed platform locations.

For some sources, emissions were assigned to unleased blocks in each area (i.e., WPA and CPA/EPA) relative to the water depth where the activity is anticipated to occur. These categories include the following:

- exploratory drilling vessels;
- development/production drilling vessels; and
- production platforms.

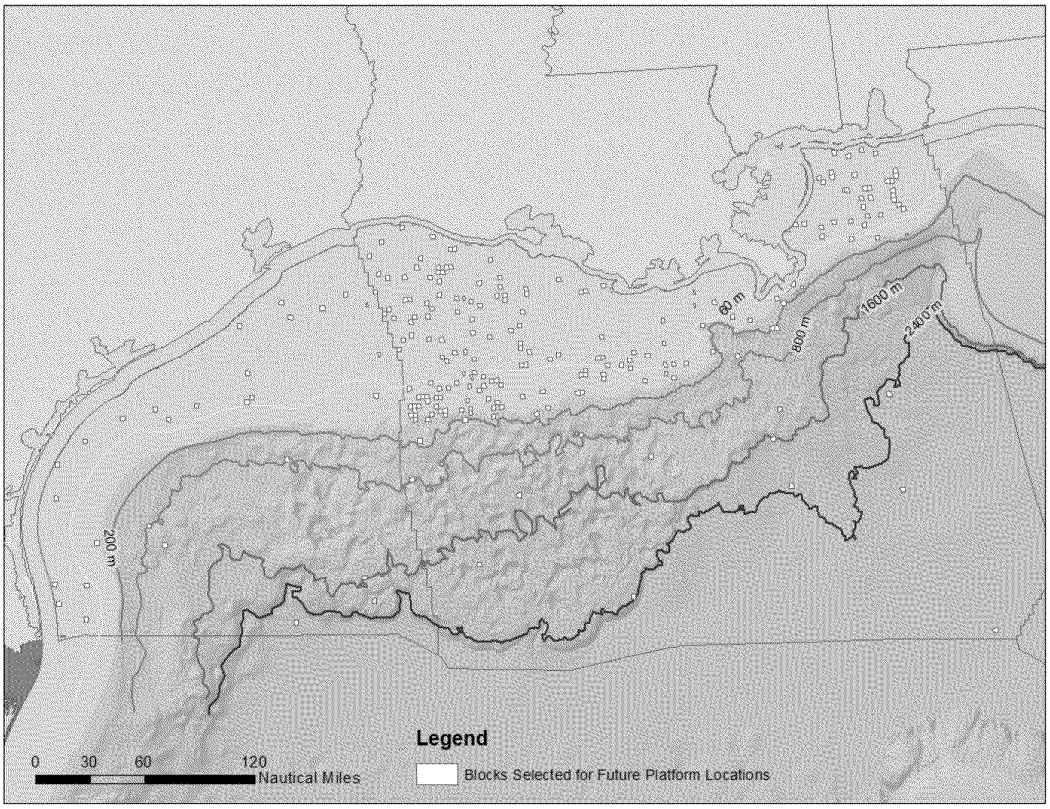


*Figure G-15. BOEM OCS Planning Areas and Water Depths.*

Production platforms were located as point sources with randomly selected locations. Using GIS, each lease block in the Gulf of Mexico was assigned to a water depth bin. Blocks with an active lease and that have contained a platform were then removed. Blocks that have had a platform suggest that they were leased at some point in time, and therefore are less desirable for future exploration. Once the inactive blocks with no history of production were identified, random blocks were selected throughout each water depth for each future platform as depicted in **Figure G-15**. Each platform was placed in a separate block at the centroid. Pipe-laying vessel activities were assigned to leased and unleased blocks as their operations were not limited to just the unleased blocks.

Emissions associated with BOEM's existing OCS oil and gas production sources were held constant at 2012 levels.

### G.4.2 Onshore Sources and Marine Vessels

In support of the proposed ozone NAAQS revisions, the USEPA released the 2011 air quality modeling platform (2011v6.1), with projections to 2018 and 2025, for point, nonpoint area, and mobile sources in the United States (USEPA, 2014d). In addition, the USEPA released the 2011 air quality modeling platform (2011v6.2), with projections to 2017, to support ozone transport modeling for the 2008 NAAQS as well as the 2015 ozone NAAQS (USEPA, 2015d). In early October, 2015, the USEPA also released the 2011v6.2 calendar year 2025 projected inventory (USEPA, 2015d). The ERG team used the 2011v6.2 platform for calendar year 2017, primarily because the platform is based on the most recent version of the NEI (2011v.2). Calendar year 2017 data were selected rather than 2025 data because there is less uncertainty associated with the 2017 estimated emissions because most of the controls factored in by the USEPA are already "on the books" and not speculative. The Technical Support Document, Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform (USEPA 2015d), provides details on the development of the 2011v6.2 future year modeling platforms.

### G.4.3 Other Sources

For sources in Mexico, the USEPA air quality modeling platform 2011v6.2 includes projected 2018 emissions for onshore sources. The USEPA held emissions constant for sources in Canada.

For completeness, projected emissions estimates were also developed for platforms off the coast of Mexico; the ERG team researched the impacts of the restructuring of the energy sector in Mexico, which is predicted to include deepwater drilling within the modeling domain. Emissions were estimated based on projected deepwater production (PEMEX, 2012) and using production-based emission factors developed from the 2011 Gulfwide Inventory (Wilson et al., 2014).

For the LOOP and vessel lightering, emissions were held at 2012 levels because of uncertainties in future crude oil imports, which involve the very large crude carriers that visit the LOOP and lightering zones. The ERG team also investigated the need to include a liquefied natural gas (LNG) port to be located in Federal waters and originally expected to be operational in 2019. On September 18, 2015, however, the Maritime Administration (MARAD) and the U.S. Coast Guard stopped the permit application process, as Delphin LNG, LLC is amending the application. This potential source was not included in the future scenario given this uncertainty.

## G.5 Source Apportionment

Source apportionment, as applied in PGM modeling, provides a means of assessing the contributions of specified sources or source groups to predicted ozone and PM concentrations under the air quality conditions being simulated. Source contributions can be calculated for ozone and for PM using ozone or PM source apportionment routines included in the CAMx PGM modeling. In this

Study, the primary receptor locations of interest for examining source contributions lie both along the shoreline and the State seaward boundary, although the PGM source apportionment output is for the entire modeling domain. Source apportionment analyses with the PGM will be applied to the future year scenario in order to analyze the pre- and postlease OCS oil and gas impacts to short-term and annual NAAQS. This will afford BOEM the opportunity to discern which source groups have the largest impacts and potentially need to be examined for control strategies. BOEM selected the following source groups for source apportionment:

- fires (U.S., Canada, and Mexico);
- biogenic and other natural sources (e.g., lighting $NO_x$ and sea salt);
- additional BOEM OCS oil and gas production platforms associated with the Five-Year Program;
- additional BOEM oil and gas production support vessels and helicopters associated with the Five-Year Program;
- BOEM OCS oil and gas production platforms, support vessels, and helicopters under No Action (base case) alternative;
- all other marine vessel activity in the Gulf of Mexico;
- other anthropogenic U.S. sources;
- Mexican and Canadian anthropogenic sources; and
- initial and boundary conditions (IC and BC).

These source groups aggregate similar sources based on jurisdiction (i.e., sources under BOEM control versus other Federal agencies) and sources beyond control (e.g., natural emission sources and foreign sources). This is helpful in showing whether BOEM's sources are significantly contributing to any modeled air quality issues onshore and at the State seaward boundary, or if a source category regulated by another Federal agency is the more likely the problem source.

Having the additional OCS oil and gas production platforms, support vessels, and helicopters associated with the 2017-2022 GOM Multisale EIS scenario as separate source groups allows BOEM to quantify the impact of these sources on the onshore air quality and at the State seaward boundary.

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# APPENDIX G

# AIR QUALITY:
# EMISSIONS FOR THE CUMULATIVE AND VISIBILITY IMPACTS

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# G AIR QUALITY: EMISSIONS FOR THE CUMULATIVE AND VISIBILITY IMPACTS

## G.1 INTRODUCTION

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) is required under the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1334(a)(8)) to comply with the National Ambient Air Quality Standards (NAAQS) to the extent that Outer Continental Shelf (OCS) offshore oil and gas exploration, development, and production sources do not significantly affect the air quality of any state. The Gulf of Mexico OCS Region's OCS area of possible influence includes the States of Texas, Louisiana, Mississippi, Alabama, and Florida. BOEM's Gulf of Mexico OCS Region manages the responsible development of oil, gas, and mineral resources for the 430 million acres in the Western, Central, and Eastern Planning Areas on the OCS comprising the Gulf Of Mexico OCS Region, including the areas under moratoria (shown in **Figure G-1**). The Clean Air Act Amendments (CAAA) of 1990 designate air quality authorities in the Gulf Of Mexico OCS Region, giving BOEM air quality jurisdiction westward of 87°30'W. longitude and the U.S. Environmental Protection Agency (USEPA) air quality jurisdiction eastward of 87°30'W. longitude. In 2006, oil and gas leasing operations within 125 miles (201 kilometers [km]) of the Florida coastline were banned until 2022 under the Gulf of Mexico Energy Security Act (GOMESA). The GOMESA moratoria area is depicted on **Figure G-1**.

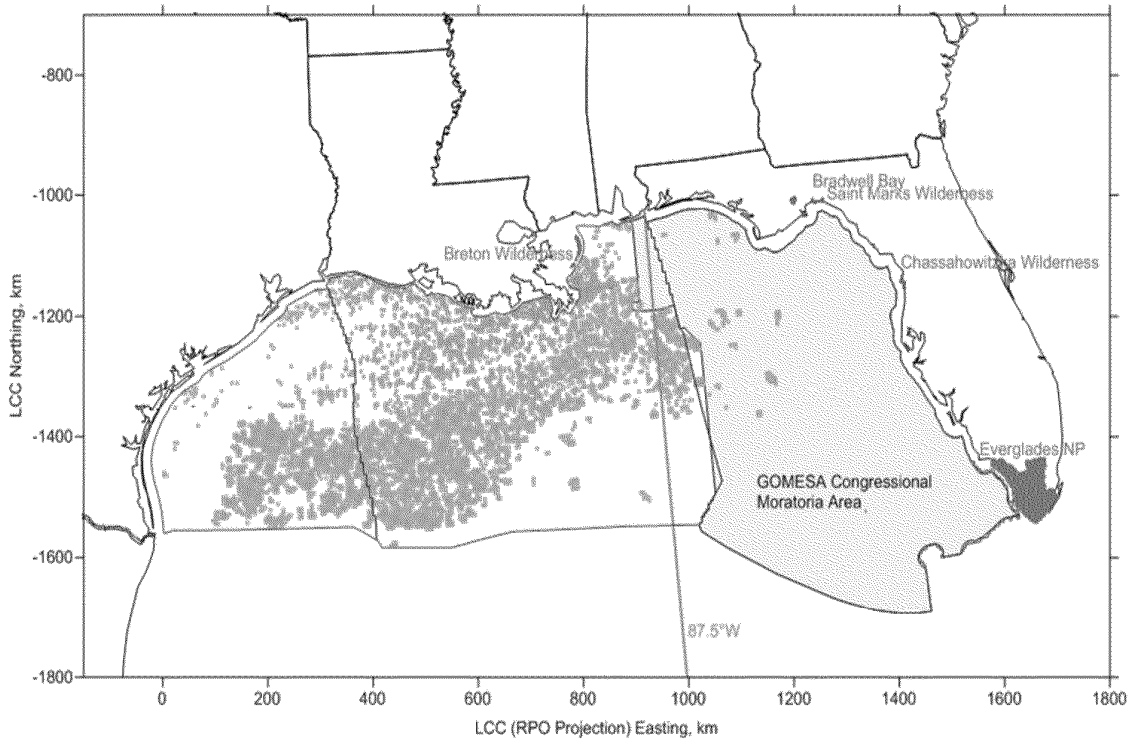


*Figure G-1. Location of the "Air Quality Modeling in the Gulf of Mexico Region" Study, with Class I Areas (purple) and Platform Locations (gray dots).*

The USEPA has set NAAQS for six regulated air quality pollutants: ozone; particulate matter with an aerodynamic diameter of 2.5 micrometers and smaller ($PM_{2.5}$); particulate matter with an aerodynamic diameter of 10 micrometers and smaller ($PM_{10}$); sulfur dioxide ($SO_2$); nitrogen dioxide ($NO_2$); carbon monoxide (CO); and lead (Pb). After promulgation of a NAAQS, the USEPA designates areas that fail to achieve the NAAQS as nonattainment areas (NAAs) and States are required to submit State Implementation Plans (SIPs) to the USEPA that contain emission control plans and a demonstration that the NAA will achieve the NAAQS by the required date. After an area comes into attainment of the NAAQS, the area can be redesignated as a maintenance area and must continue to demonstrate compliance with the NAAQS.

In 1997, the USEPA promulgated the first 8-hour ozone NAAQS with a threshold of 0.08 parts per million (ppm) (84 parts per billion [ppb]). On March 12, 2008, the USEPA promulgated a more stringent 0.075 ppm (75 ppb) 8-hour ozone NAAQS. **Figure G-2** presents the current ozone nonattainment areas in the southeastern U.S. On October 1, 2015, the USEPA strengthened the 8-hour NAAQS for ozone to 0.07 ppm (70 ppb). Under this more stringent ozone NAAQS, there may be more areas in the southeastern U.S. that will be in nonattainment. The USEPA plans to make attainment and nonattainment designations for the revised standards by late 2017, with the designations based on 2014-2016 air quality data.

On December 14, 2012, the USEPA revised the $PM_{2.5}$ primary NAAQS by lowering the annual $PM_{2.5}$ NAAQS threshold from 15.0 micrograms per cubic meter ($\mu g/m^3$) to 12.0 $\mu g/m^3$. The USEPA retained the 24-hour $PM_{2.5}$ primary NAAQS at 35 $\mu g/m^3$. The 24-hour coarse PM NAAQS ($PM_{10}$) was also retained at 150 $\mu g/m^3$.

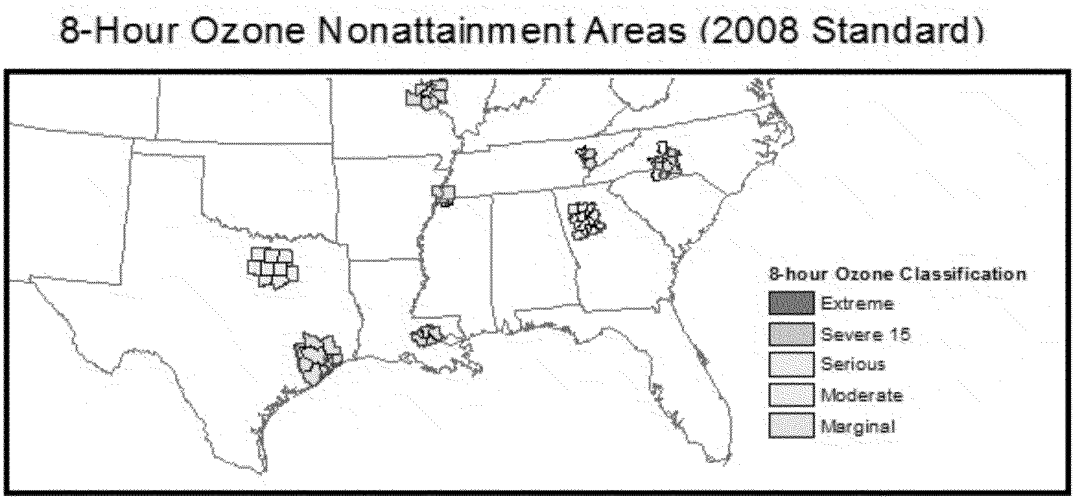


*Figure G-2. Ozone Nonattainment Areas in the Southeastern U.S. (USEPA, 2016a).*

In February 2010, the USEPA issued a new 1-hour $NO_2$ NAAQS with a threshold of 100 ppb ($98^{th}$ percentile daily maximum average over 3 years) and a new 1-hour $SO_2$ NAAQS was promulgated in June 2010 with a threshold of 75 ppb ($99^{th}$ percentile averaged over 3 years). The USEPA has not yet designated the nonattainment areas for the 1-hour $NO_2$ and 1 hour $SO_2$ NAAQS.

A new lead NAAQS was issued in 2008; NAAs for lead are associated with specific industrial sources. The NAAQS for carbon monoxide has remained essentially unchanged since it was originally promulgated in 1971. As of September 27, 2010, all NAAs for carbon monoxide have been redesignated as maintenance areas. **Table G-1** summarizes the nonattainment and maintenance areas in the southeastern U.S.

Table G-1. Nonattainment and Maintenance Areas in the Southeastern U.S.

| State | Area | 8-hr $O_3$ (1997) | 8-hr $O_3$ (2008) | $SO_2$ (2010) | Lead (2008) |
|---|---|---|---|---|---|
| Alabama | Troy, AL | | | | NAA[a] |
| Florida | Tampa, FL | | | | NAA |
| | Hillsborough County, FL | | | NAA | |
| | Nassau County, FL | | | NAA | |
| Louisiana | Baton Rouge, LA | M[b] | NAA | | |
| | St. Bernard Parish, LA | | | NAA | |
| Texas | Beaumont-Port Arthur, TX | M | | | |
| | Houston-Galveston-Brazoria, TX | NAA | NAA | | |
| | Frisco, TX | | | | NAA |

[a] NAA = nonattainment area

[b] M = maintenance area

Blank cells indicate the area is in attainment of the NAAQS.

The CAAA designated 156 Class I areas consisting of National Parks and Wilderness Areas that are offered special protection for air quality and air quality-related values (AQRVs). The Class I areas, compared to Class II areas, have lower Prevention of Significant Deterioration (PSD) air quality increments that new sources may not exceed and are protected against excessive increases in several AQRVs including visibility impairment, acid (sulfur and nitrogen) deposition, and nitrogen eutrophication. The Regional Haze Rule (RHR) has a goal of natural visibility conditions by 2064 at Class I areas, and States must submit RHR SIPs that demonstrate progress towards that goal. **Figure G-1** displays the locations of the mandatory Class I areas (in purple) in the Gulf Of Mexico OCS Region. In addition to Class I areas, Federal Land Management (FLM) agencies have designated certain other areas as sensitive Class II areas for tracking PSD increment consumption and AQRV impacts.

On August 26, 2014, BOEM contracted with Eastern Research Group, Inc. (ERG) and team members Ramboll Environ US Corporation (Ramboll Environ) and Alpine Geophysics, LLC to complete a comprehensive air quality modeling study in the Gulf Of Mexico OCS Region. Under BOEM Contract Number M14PC00007, air quality photochemical grid modeling (PGM) will be conducted in the Gulf Of Mexico OCS Region to assess the impacts to nearby States of OCS oil and gas exploration, development, and production as required under OCSLA. This assessment is used by BOEM in the cumulative and visibility impacts analyses of the National Environmental Policy Act (NEPA) environmental impact statement (EIS), which is the *Gulf of Mexico OCSOil and Gas Lease Sales: 2017-2022; Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and*

*261—Final Multisale Environmental Impact Statement* (2017-2022 GOM Multisale EIS). These analyses address both current and proposed NAAQS.

Air quality modeling requires several input datasets, including meteorology, emissions inventories, and ambient pollutant concentrations. **Figure G-3** presents an overview of how these project datasets fit together for the "Air Quality Modeling in the Gulf of Mexico Region" study.

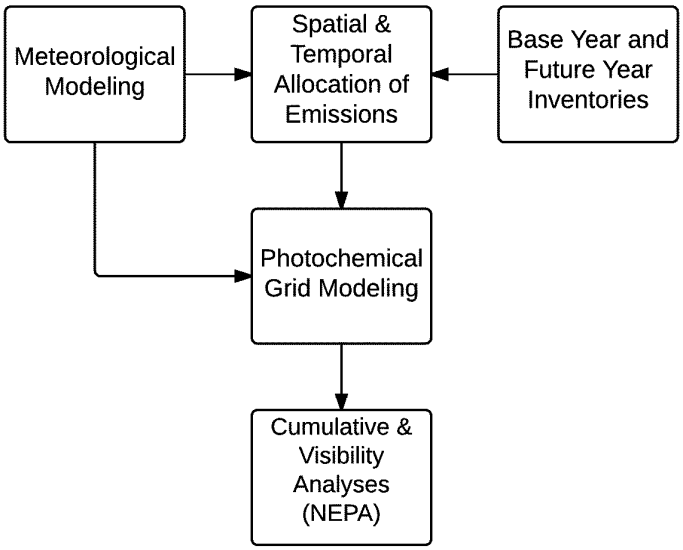


*Figure G-3. Overview of the "Air Quality Modeling in the Gulf of Mexico Region" Study Tasks.*

## G.2 Development of Emission Inventories

A key step in performing the "Air Quality Modeling in the Gulf of Mexico Region" study in support of the subsequent cumulative and visibility impacts analyses is development of comprehensive air emission inventories that accurately depict the base case emissions within the study area, and emissions associated with the 2017-2022 GOM Multisale EIS scenario (the future year).

The scope of the air pollutant emissions inventory development effort for the "Air Quality Modeling in the Gulf of Mexico Region" study includes selection of pollutants, base case year, geographical domain, sources, spatial resolution, temporal resolution, speciation, and development of the base case and future year emission estimates. These elements are described below.

### G.2.1 Pollutants

Pollutants for the "Air Quality Modeling in the Gulf of Mexico Region" study consist of criteria air pollutants as defined by CAA Title I: CO; lead; $NO_x$ (stated as equivalent mass of nitrogen

dioxide [$NO_2$]); $PM_{2.5}$; $PM_{10}$; and $SO_2$, as well as volatile organic compounds (VOCs, which are precursors to ozone formation) and ammonia ($NH_3$, a precursor to PM formation).

### G.2.2 Base Case Year

In determining the base case year for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory, 2011 was initially selected based on data availability. Calendar year 2011 emissions data are readily available for most sources from the USEPA National Emissions Inventory (NEI) (USEPA, 2015a), and BOEM's *Year 2011 Gulfwide Emissions Inventory Study* (Wilson et al., 2014), hereby called the "2011 Gulfwide Inventory." However, 2011 was an unusually hot and dry year in the Gulf Of Mexico OCS Region, particularly in Texas, which experienced record heat and dry conditions during the summer of 2011 and had a very high incidence of wildfires. Therefore, 2012 was selected as the base case year as more representative of "typical" conditions in the Gulf Of Mexico OCS Region.

### G.2.3 Geographical Domain

The domain of the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory is the area depicted in **Figure G-4**, particularly the 4-kilometer (km) domain encompassing the Gulf of Mexico OCS. This area, which includes parts of Alabama, Georgia, Louisiana, Mississippi, and Texas; all of Florida; as well as the Western, Central, and Eastern Planning Areas in the Gulf of Mexico and part of the Atlantic Ocean, are the main focus of the emissions inventory efforts. Emissions data were also required for the 36- and 12-km expanded domains depicted in **Figure G-4**, which include parts of Mexico and Canada. The outermost domain with 36-km resolution includes the entire continental U.S. and parts of Canada and Mexico, and captures synoptic-scale (storm system-scale) structures in the atmosphere. The inner 12-km regional grid covers the southeastern U.S. and is used to ensure that large-scale meteorological patterns across the region are adequately represented and to provide boundary conditions to the 4-km domain.

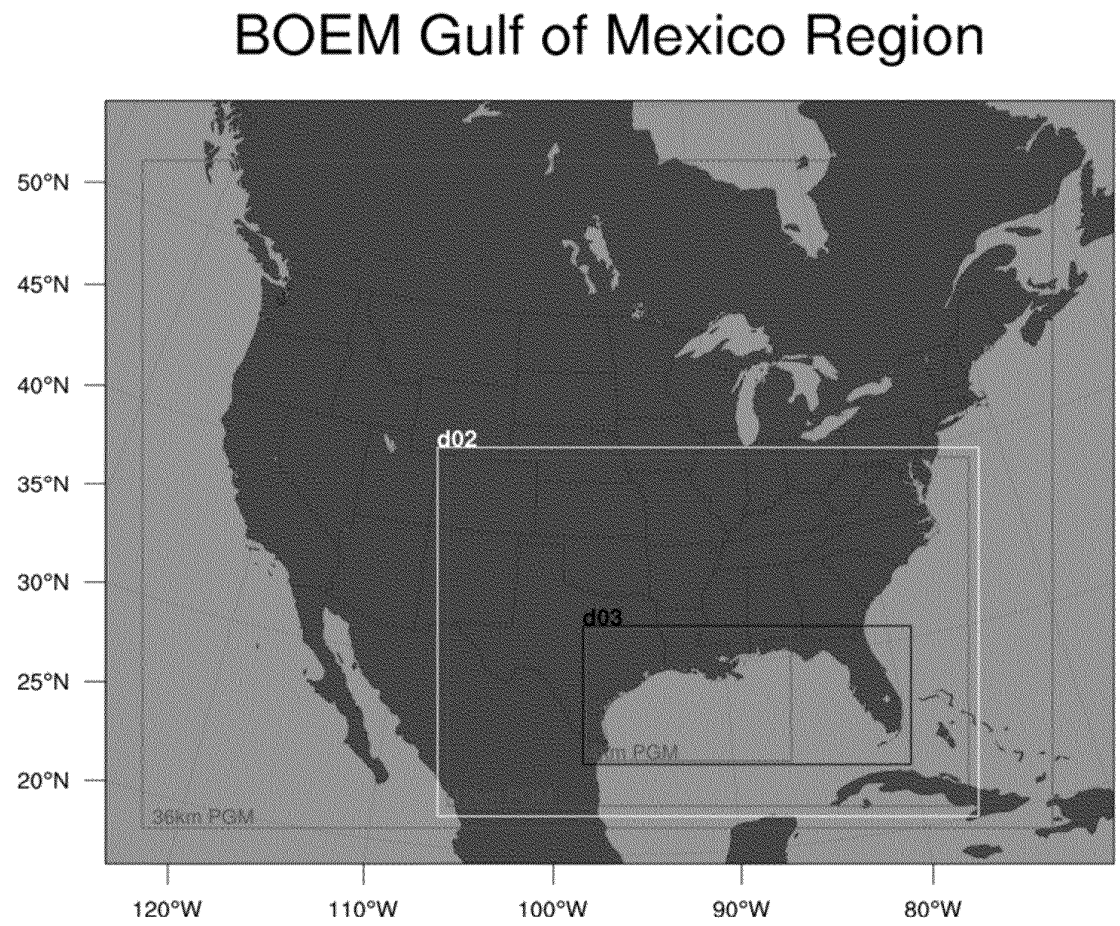


*Figure G-4. WRF 36-km CONUS (d01), 12-km SE Regional (d02), and 4-km Gulf of Mexico Region (d03) Domains Along With the PGM Grids.*

## G.2.4 Inventory Sources

Emissions from anthropogenic (i.e., human caused) sources, including stationary point and nonpoint area sources located both onshore and offshore, onroad motor vehicles, nonroad equipment, locomotives, marine vessels and other offshore sources, and airports, were compiled for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory. **Table G-2** lists the source groups and categories included in the emissions inventory, along with the pollutants applicable to each source, and the spatial and temporal resolution. Note that emissions from non-anthropogenic sources (i.e., biogenic and geogenic sources) are also included as part of the "Air Quality Modeling in the Gulf of Mexico Region" study cumulative and visibility analyses.

Table G-2. Gulf of Mexico Air Quality Modeling Study Source Categories.

| Group and Source Category | | CO | $NO_x$ | $SO_2$ | VOC | Pb | $PM_{2.5}$ | $PM_{10}$ | $NH_3$ | Spatial Resolution[a] |
|---|---|---|---|---|---|---|---|---|---|---|
| NEI Onshore Sources | Point Sources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nonpoint Area Sources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | A |
| | Onroad Mobile Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | A |
| | Commercial Marine Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P, A[b] |
| | Locomotives | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P, A[c] |
| | Aircraft and Airports | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| | Other Nonroad Mobile Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | A |
| Offshore Oil & Gas Sources | Platforms in State Waters | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | P |
| | Platforms in Central and Western GOM OCS Planning Areas | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| | Drilling Rigs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Pipe-Laying Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Support Helicopters | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | LB |
| | Support Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Survey Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| Non-oil and Gas Offshore Vessels and Activities | Commercial Fishing Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Commercial Marine Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Louisiana Offshore Oil Port | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| | Military Vessels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LB |
| | Recreational Vessels | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | LB |
| | Vessel Lightering | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | P |
| Biogenic and Geogenic Sources | Subsurface Oil Seeps | | | | ✓ | | | | | LB |
| | Mud Volcanoes | | | | ✓ | | | | | LB |
| | Onshore Vegetation | | ✓ | | ✓ | | | | | A |
| | Wildfires and Prescribed Burning | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | P |
| | Windblown Dust | | | | | | ✓ | ✓ | | A |
| | Lightning | | ✓ | | | | | | | A |
| | Sea Salt Emissions | | | | | | ✓ | ✓ | | A |
| Sources in Mexico and Canada | Point Sources | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | P |
| | Nonpoint Area Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | A |
| | Mobile Sources | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | A |

[a] A = Area source (modeling grid cell, spatial surrogate); P = Point source (UTM coordinates, stack parameters); LB = Offshore lease block (modeling grid cell, spatial surrogate)

[b] Larger ports and shipping will be represented as shape files; smaller ports as point sources.

[c] Rail yards will be represented as point sources; railway segments as area sources.

## G.2.5 Spatial Resolution

The spatial resolution of the emissions inventory is source-specific. For example, sources such as power plants are identified based on their geographic coordinates (i.e., latitude and

longitude), while other sources such as nonroad mobile sources (e.g., construction equipment) are spatially distributed using surrogates within the county in which they are reported and that are typically related to the activity distribution of the category (e.g., construction sites).

The resolution of the geographical area covered by the emissions inventory is based on the grid cell size needed for photochemical modeling. Furthermore, the photochemical model grid resolution is dependent on the grid resolution of the WRF meteorological model output used.

### G.2.6 Temporal Resolution

Emissions for all sources were estimated on an annual basis (i.e., emissions generated during 2012). For electric generating units (EGUs), emissions were allocated on a sub-annual basis to reflect variations in activity using data from the USEPA.

Emissions were allocated on an hourly, daily, and seasonal basis using default temporal allocation factors provided with the Sparse Matrix Operator Kernel Emissions (SMOKE) emissions model for some sources; other temporal allocations were source-specific, and profiles were developed and applied within the SMOKE model.

### G.2.7 Speciation

When applying the PGM modeling, PM emissions were allocated to individual PM species as part of the SMOKE emissions processing using PM speciation factors obtained from the USEPA's SPECIATE database (USEPA 2014a) for each source category (as defined by the Source Classification Code). This resulted in the PM mass being broken into the mass associated with elemental carbon (EC), organic carbon (OC), and other elements, and particle-bound VOCs, such as polycyclic aromatic hydrocarbons (PAHs). The model predictions of EC will undergo further analysis and will be discussed in the "Air Quality Modeling in the Gulf of Mexico Region" study final report.

SMOKE was also used to convert VOC emissions into the photochemical mechanism-specific (e.g., CB05 or CB6r2h) model species used in air quality models.

## G.3 Base Case Emission Estimates

This section presents an overview of the methodologies used to compile the base case 2012 emission estimates for all source categories in the emissions inventory.

### G.3.1 Point Sources

Calendar year 2011 emissions data are available for onshore point sources from the USEPA NEI (USEPA, 2015a). In a separate modeling effort, the USEPA prepared a criteria pollutant calendar 2012 year emissions inventory for some sectors, including onshore point sources (USEPA, 2015b). The ERG obtained the USEPA 2012 point sources emissions inventory, conducted quality assurance/quality control (QA/QC) on the data, and supplemented and revised the criteria pollutant estimates, as needed. The USEPA prepared the 2012 point source emissions inventory as follows:

1. 2012 data compiled by the USEPA from annual criteria pollutant reporting of Type A (large) sources that are submitted by responsible State and local air agencies;
2. 2012 EGU emissions from the USEPA Clean Air Markets Division (CAMD) hourly emissions data;
3. 2011 NEI data for other, smaller point sources that are not identified above; and
4. 2011 airport and aircraft emission estimates developed by the USEPA updated to 2012 as needed.

Although the emissions data are likely complete for most point sources, ERG confirmed that offshore platforms within State boundaries are included in the NEI. Data from the USEPA's 2012 Toxics Release Inventory (TRI) for lead and ammonia were also used to supplement the inventory as needed (USEPA, 2015c).

### G.3.2 Nonpoint Area Sources

The starting point for the 2012 nonpoint area source inventory was the data submitted by State and local agencies for the 2011 NEI. In addition, for completeness, the USEPA develops emission estimates for a number of nonpoint source categories (up to 165) for inclusion in the NEI if agencies do not provide estimates. The USEPA did not develop 2012 emission estimates for nonpoint area sources. The ERG prioritized key top-emitting source categories of $NO_x$, PM, $SO_2$, and VOCs in AL, FL, GA, LA, MS, and TX, and developed 2012 emission estimates using the USEPA nonpoint area source category tools (USEPA, 2014b). These categories are as follows: consumer products, architectural surface coatings, industrial maintenance coatings, open burning: municipal solid waste (MSW), residential and institutional/commercial/industrial (ICI) heating, upstream oil and gas, open burning, land clearing debris, paved and unpaved roads, and gasoline distribution Stage I. The ERG also conducted point source reconciliation for ICI heating, oil and gas, and gasoline distribution Stage I to verify that there are no gasoline distribution Stage II records in USEPA's nonpoint file (now reported with onroad mobile sources).

### G.3.3 Mobile Sources

The onroad mobile source category includes exhaust and evaporative emissions from onroad motor vehicles (e.g., automobiles, light-duty trucks, heavy-duty trucks) and exhaust and evaporative emissions from nonroad mobile sources. The ERG team ran the MOVES2014 model for onroad sources (USEPA, 2014c), and the USEPA ran the NONROAD model for nonroad sources to develop 2012 emission estimates for these categories. Locomotive emissions in the 2011 NEI were not adjusted to represent 2012 activities because it was confirmed that the 2011 and 2012 fuel usage data from the Surface Transportation Board's R-1 Class 1 railroad annual reporting data (Surface Transportation Board, 2015) show only a slight (2%) reduction in 2012 levels from 2011 levels.

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### G.3.4 Offshore Helicopters

The Gulf of Mexico has more helicopter traffic than any other region of the U.S., primarily associated with offshore oil and gas support. Offshore support helicopter emission estimates were obtained from the 2011 Gulfwide inventory (Wilson et al., 2014). The estimates were supplemented with 2011 NEI helicopter data for onshore airports. The two datasets map out the full route between offshore platforms equipped with helipads and the closest onshore support facility; the NEI addresses emissions only at each airport and only for operations up to 3,000 feet of elevation (i.e., local mixing height). The two datasets were evaluated to ensure that the helicopter traffic data between the two are comparable and that there is no double counting of emissions.

### G.3.5 Offshore Oil and Gas Production Sources—Western and Central/Eastern Planning Areas in the Gulf of Mexico

The starting point for offshore oil and gas production platforms in the Western and Central/Eastern Planning Areas (WPA and CPA//EPA) was the 2011 Gulfwide inventory. The ERG team supplemented the 2011 Gulfwide inventory with $NH_3$ and Pb emission estimates for all applicable emission sources using USEPA emission factors. The ERG team conducted research to determine if the 2011 emissions values for platform sources should be adjusted to be more representative of 2012 emissions values. Offshore oil and gas production values for 2011 and 2012 were obtained from the BOEM Part A Oil and Gas Operations Reports (OGOR) (USDOI, BOEM, 2015). The OGOR data are presented at the lease level. Production of both oil and gas (including deepwater production) decreased from 2011 to 2012; thus, the 2011 emission estimates were modeled without adjustment in order to be conservative. **Table G-3** presents the base case emission estimates for offshore oil and gas production sources in the WPA and CPA//EPA. **Figures G-5, G-6, and G-7** show the $NO_x$, VOC, and $PM_{2.5}$ emissions from platform sources. Platform sources include the following emission source types: amine units, boilers/heater/burners, diesel and gasoline engines, drilling equipment, combustion flares, fugitives, glycol dehydrators, losses from flashing, mud degassing, natural gas engines, natural gas turbines, pneumatic pumps, pressure/level controllers, storage tanks, and cold vents.

Table G-3. Base Case Offshore Oil and Gas Production Source Emissions Estimates for the GOM Western and Central/Eastern Planning Areas.

| | $NO_X$ (TPY) | $SO_2$ (TPY) | $PM_{10}$ (TPY) | $PM_{2.5}$ (TPY) | VOC (TPY) | CO (TPY) | Pb (TPY) | $NH_3$ (TPY) |
|---|---|---|---|---|---|---|---|---|
| Platform Sources | 84,128 | 3,197 | 838 | 835 | 54,724 | 70,339 | <1 | 40 |
| Non-platform Sources | 232,765 | 22,977 | 8,632 | 8,225 | 7,937 | 41,880 | 701 | 70,139 |
| Total | **316,893** | **26,174** | **9,470** | **9,060** | **62,661** | **112,219** | **701** | **70,179** |

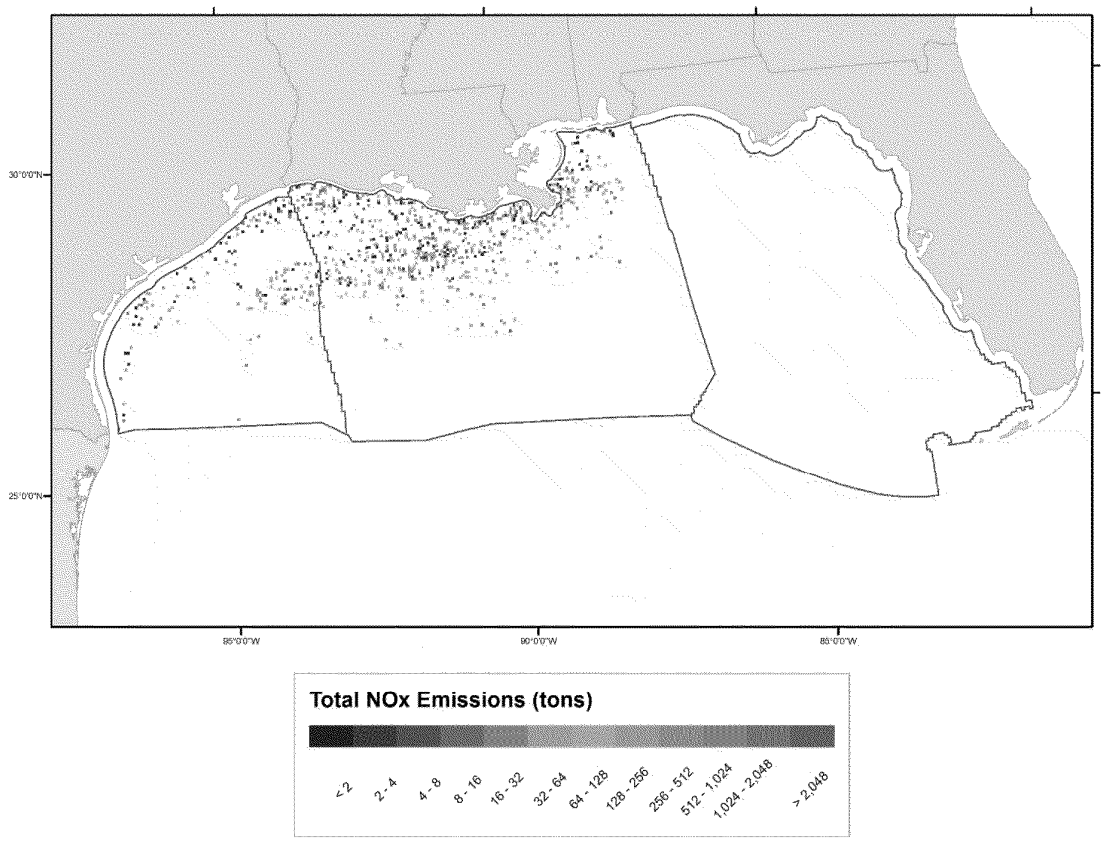


*Figure G-5. 2012 Platform $NO_x$ Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

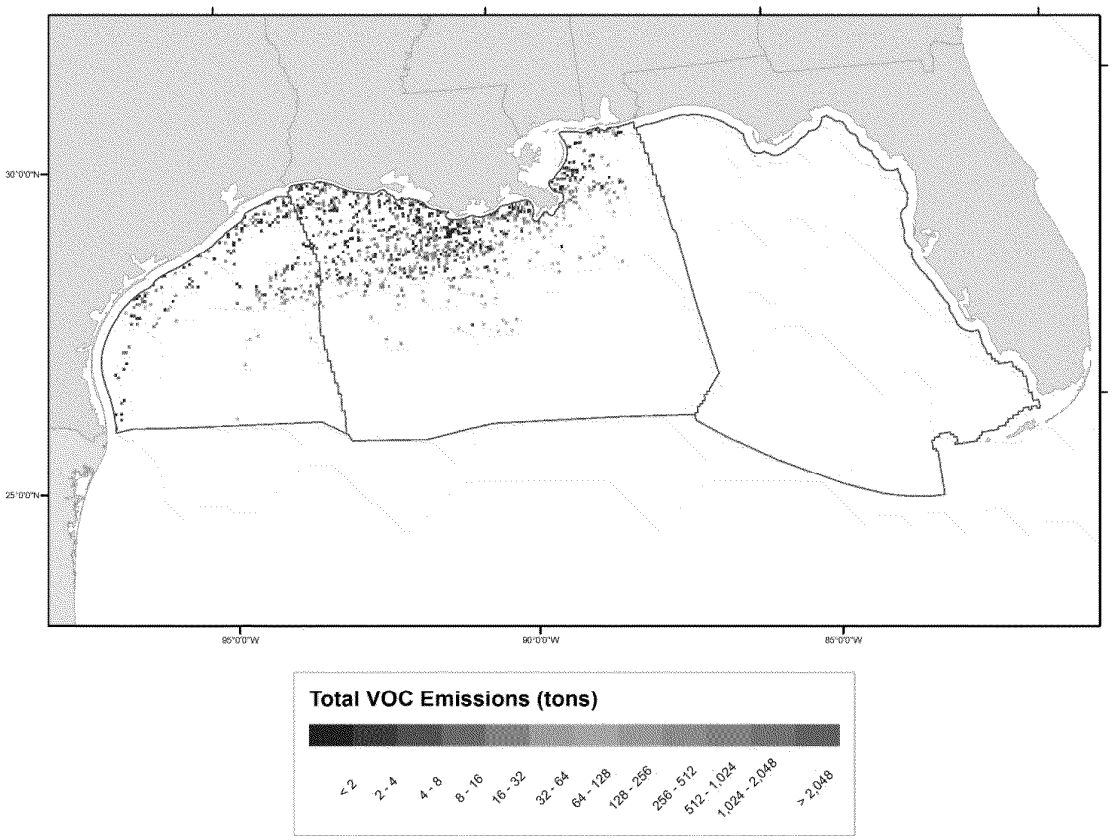


*Figure G-6. 2012 Platform VOC Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

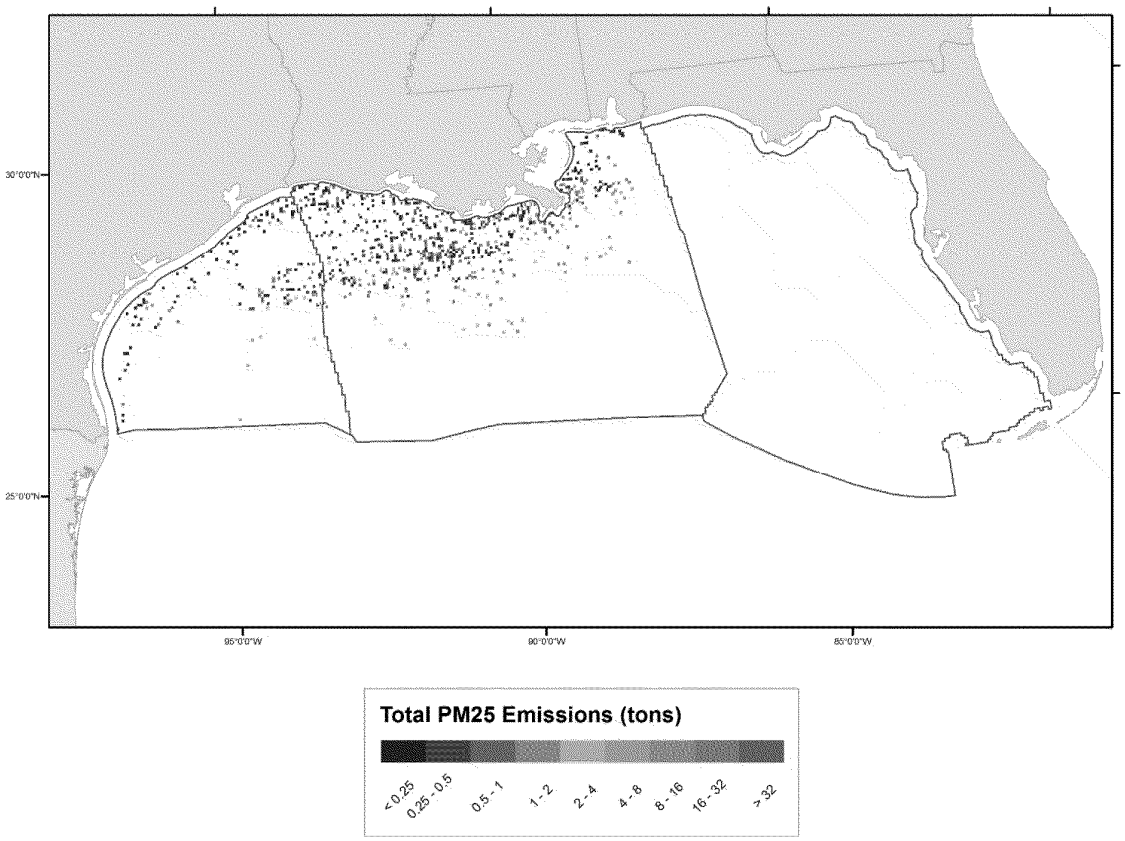


*Figure G-7. 2012 Platform $PM_{2.5}$ Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

## G.3.6 Offshore Vessels

Offshore vessels can be grouped into vessels that support the construction, operation, and decommissioning of oil and gas platforms; and vessels involved in other commercial, recreational, and military operations. All marine vessels included in this study operate using diesel engines. These include very large propulsion engines as well as smaller auxiliary diesel engines that provide power for electricity generation, winches, pumps, and other onboard equipment. Smaller engines tend to use distillate grade diesel fuel, while large engines are able to combust heavier residual blends.

40 CFR § 1043.109(b) created the North American Emission Control Area (ECA), which includes the Gulf of Mexico (USEPA, 2010). This regulation limits marine fuel sulfur content to 1% after August 1, 2012, for any vessel with a gross tonnage greater than 400. Vessels below this threshold tend to use distillate fuels, which are already at or below the 1% limit.

### G.3.6.1 Oil and Gas Production Support Vessels

The offshore oil and gas production sector requires a wide variety of vessels to support the

exploration, development, and extraction of oil and gas, including the following:

- seismic survey vessels;
- drilling vessels;
- pipe-laying vessels;
- crewboats; and
- supply vessels.

For the 2011 Gulfwide inventory, Automatic Identification System (AIS) data from PortVision were used to map spatial aspects of vessel movements (PortVision, 2012). The AIS is an automated tracking system that allows exchanges of location and contact data with other nearby ships, offshore platforms, satellites, and AIS base stations, enhancing navigation and reducing at-sea collisions.

On October 22, 2003, the U.S. harmonized the AIS mandates of the Safety of Life at Sea Convention with the Maritime Transportation Security Act of 2002 (MTSA), which requires the following vessels, including offshore support vessels, to participate in the AIS program:

(1) passenger vessels of 150 gross tonnage or more;

(2) tankers, regardless of tonnage; and

(3) vessels other than passenger vessels or tankers of 300 gross tonnage or more.

Vessels that do not meet these thresholds, such as crew boats and smaller support vessels, can still participate in AIS on a voluntary basis. The Offshore Marine Service Association (OMSA) is encouraging its membership to equip their vessels with AIS transponders, allowing for more efficient and safer ship movements in the highly congested central and western areas of the Gulf of Mexico.

The ERG team used the spatially distributed support vessel emission estimates from BOEM's 2011 Gulfwide inventory. While the USEPA 2011 NEI also includes marine vessel emission estimates for the Gulf of Mexico, the emission estimates were derived from national vessel activity data. During QA/QC of the 2011 BOEM Gulfwide estimates, ERG found and corrected an error in the vessel power rating for a number of smaller vessels.

As discussed above for offshore oil and gas production platforms, the 2011 emission estimates for these vessels were not adjusted to reflect 2012 production levels. $SO_x$ and PM (associated with sulfates) were not adjusted to account for the introduction of low sulfur ECA compliant fuel in the last 5 months of 2012 because it was determined that most support vessels are Category 1 or 2, which already use ECA compliant fuels. Emission estimates for $NH_3$ and Pb were also developed for vessels. **Table G-3** presents the base case emission estimates for drilling rigs, pipe-laying operations, support helicopters, support vessels, and survey vessels. **Figures G-8, G-9,**

**and G-10** show the $NO_x$, VOC, and $PM_{2.5}$ emissions from non-platform sources.

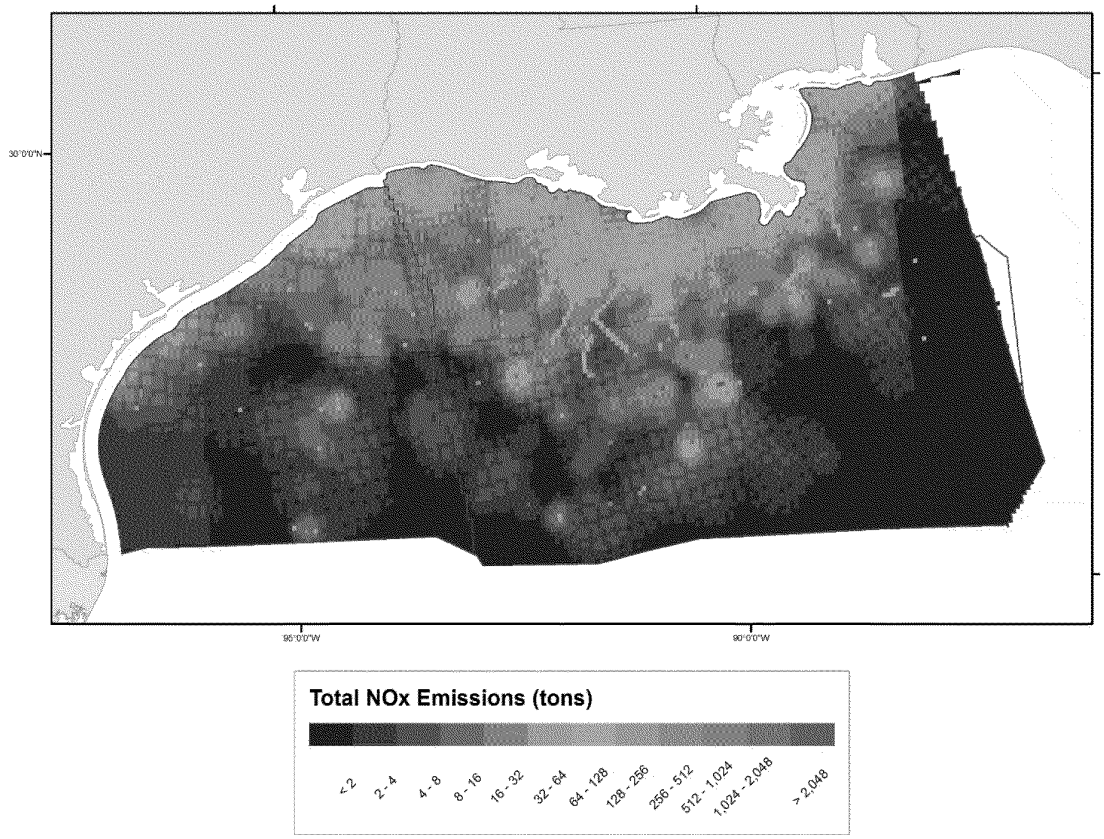


*Figure G-8. 2012 Non-platform $NO_x$ Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

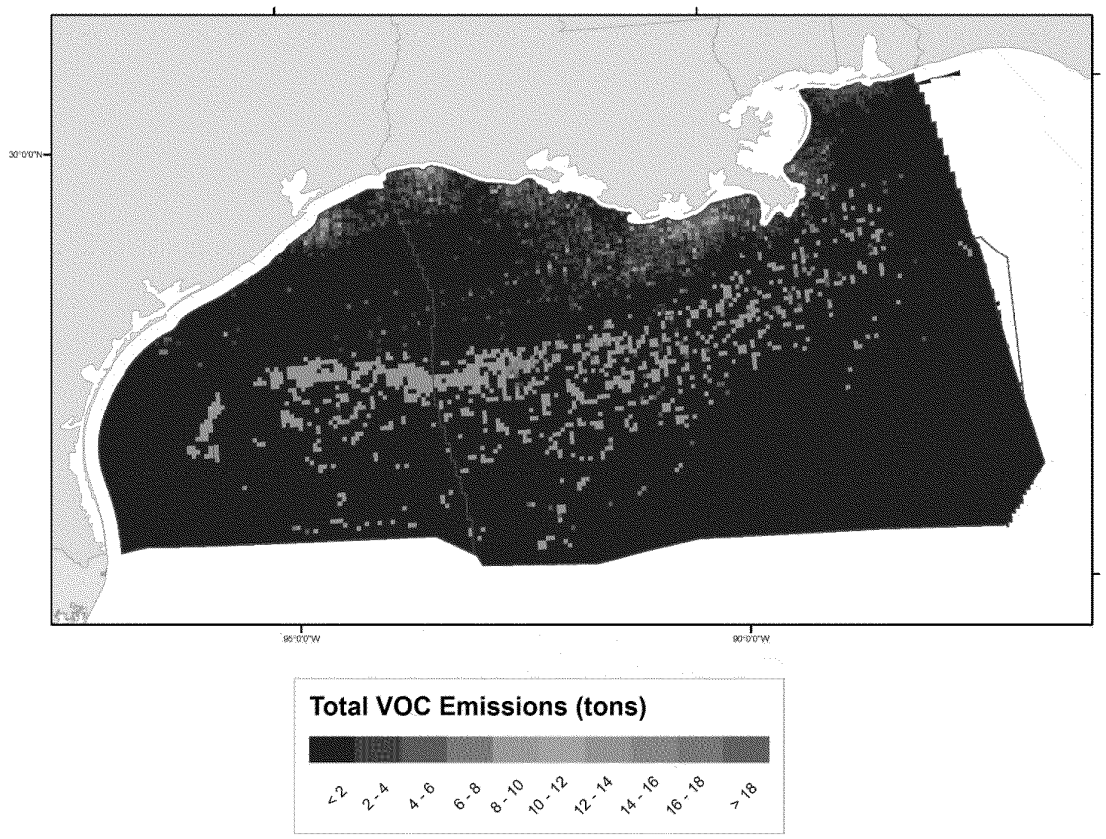


*Figure G-9. 2012 Non-platform VOC Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

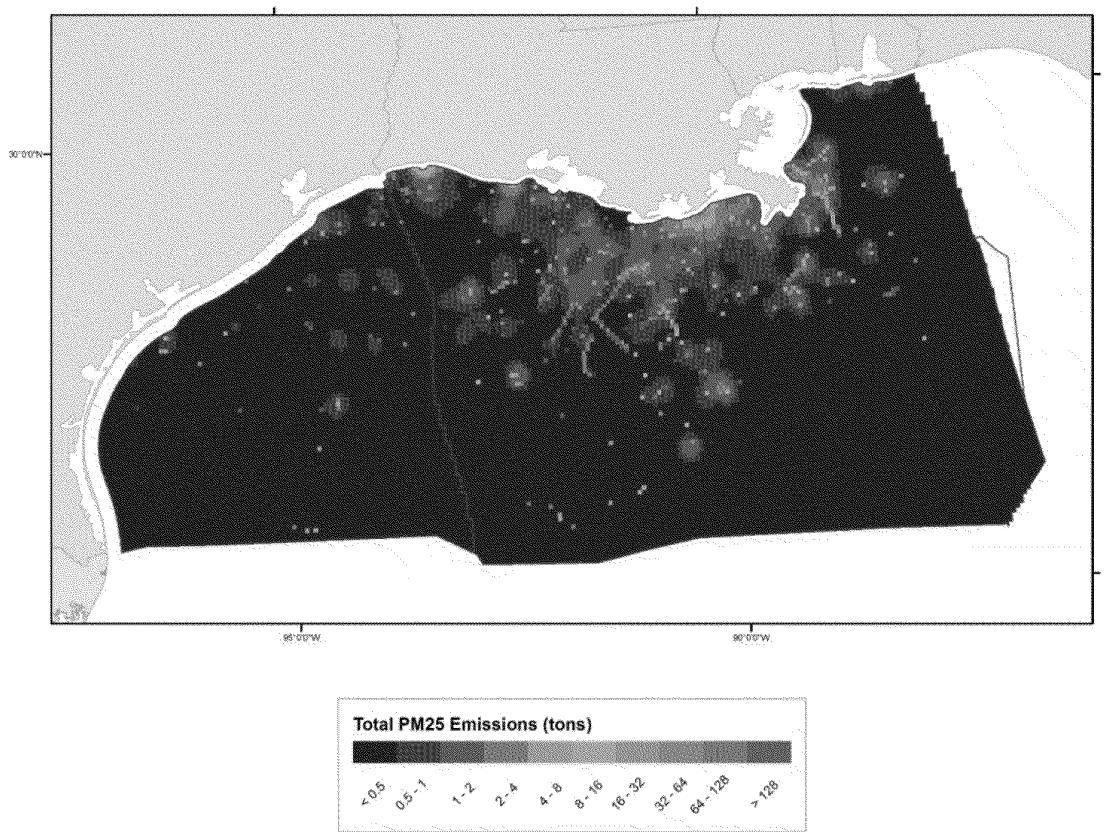


*Figure G-10. 2012 Non-platform $PM_{2.5}$ Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

The ERG team obtained drilling vessel data from BSEE to confirm that there was no drilling activity in the eastern Gulf of Mexico OCS Region in 2012, and reviewed the permits granted by the USEPA for offshore platforms in the eastern Gulf of Mexico OCS Region to confirm there were no active production platform activities in 2012.

### G.3.6.2 Non-oil and Gas Production Offshore Vessels

Vessels not directly associated with the offshore oil and gas activities include the following:

- commercial marine vessels;
- Louisiana Offshore Oil Port-associated vessels;
- commercial and recreational fishing vessels;
- ferries;
- research vessels;
- harbor craft; and

- military vessels.

Commercial marine vessels (CMVs) include large ships involved in international trade that visit coastal ports and operate in deep waters, as well as smaller general cargo ships and tugs that move barges along waterways and rivers. For the Federal waters of the central and western of the Gulf of Mexico, the ERG team used the commercial marine vessel data from the 2011 Gulfwide inventory. For completeness, for all other areas of the Gulf of Mexico, Atlantic Ocean, and State waters, the USEPA's NEI data were used (which were developed from national vessel activity data as noted above). These inventories cover different geographical areas than the BOEM inventory, as well as different vessel types. BOEM's data include large deepwater vessels as does the USEPA data beyond the Federal/State boundary, but they also include vessels such as ferries, dredging vessels, tugs, towboats, and harbor craft that tend to operate only in State waters.

The Louisiana Offshore Oil Port (LOOP) is a pumping platform for tankers to discharge imported crude oil to the mainland without having to maneuver through port traffic. Similarly, there are four offshore lightering zones in the Gulf of Mexico (i.e., Southtex, Gulfmex No. 2, Offshore Pascagoula No. 2, and South Sabine Point) where smaller shuttle tankers can move product from very large crude carriers, bringing the oil to port while the large tankers remain off the coast. Tankers that visit the LOOP or the lightering zones along with the shuttle tankers were identified in the 2011 Gulfwide inventory. The inventory also accounts for evaporative emissions from unloading and loading activities, and emissions from the operation of generators and pumps at the LOOP; adjustments were made to the 2011 LOOP emission estimates to reflect the 18% decline in crude imports in 2012.

Emissions from the operation of commercial and recreational fishing vessels are also included in the 2011 Gulfwide inventory for Federal waters. These were supplemented with the USEPA's 2011 NEI data for these fishing vessels for operations in the Eastern Planning Area in the Gulf of Mexico, Atlantic Ocean, and State waters. For military vessels, the ERG team used the 2011 Gulfwide inventory Navy and Coast Guard vessel emission estimates and the NEI's Coast Guard emission estimates for State waters, as well as Federal waters in the eastern part of the Gulf of Mexico and the Atlantic Coast. The ERG team conducted research to determine that activity levels from 2011 to 2012 were similar for the other non-oil and gas vessels (e.g., tankers, container ships, bulk, and general cargo). Based on the most recent International Maritime Organization data (IMO, 2015), fuel combustion is projected to remain constant from 2010 to 2015. Thus, no adjustments were needed to approximate activities in 2012.

The $SO_2$ and PM (associated with sulfates) emission estimates were adjusted for Category 3 vessels to account for the introduction of low sulfur ECA-compliant fuel in the last 5 months of 2012.

### G.3.7 Biogenic and Geogenic Sources

For completeness, it is important to include non-anthropogenic emission sources in the inventory. The ERG team also estimated emissions for the sources listed below.

- Onshore vegetation (biogenic): MEGAN (version 2.1) biogenic emission model
- Wildfires, prescribed burns, and agricultural burning: USEPA's SMARTFIRE emissions inventory for the U.S.
- Windblown dust: Windblown dust (WBD) modeling using the WRF meteorological dataset
- Lightning: WRF data (preprocessor)
- Subsurface oil seeps: 2011 Gulfwide inventory
- Mud volcanoes: 2011 Gulfwide inventory
- Sea salt emissions: WRF data (preprocessor)

The ERG team used fire emission estimates from the National Center for Atmospheric Research (NCAR) Fire INventory (FINN) for Mexico and Canada.

### G.3.8 Sources In Mexico

The ERG team developed the 2012 emission inventories for the portions of Mexico within the 36-km modeling inventory domain using the municipality-level emission files from the 2008 Mexico National Emissions Inventory (MNEI) (SEMARNAT, 2014) combined with projection factors for point, nonpoint area, and nonroad mobile sources. Mexico onroad motor vehicle emissions were generated using a version of the USEPA vehicle emissions model MOVES, updated to reflect conditions in Mexico. MOVES2014 was the most recent version of the model available at the time of the analysis and reflects USEPA's latest estimate of vehicle emissions and default U.S. activity data (USEPA, 2014c). The ERG also conducted research on the offshore oil production activities off the coast of Mexico. Based on a report published by the Congressional Research Service, it was determined that there was no offshore production within the 36-km modeling domain in 2012 (Seelke et al., 2015).

### G.3.9 Sources In Canada

Emissions from the USEPA's most recent modeling platform (2010) were used for sources in Canada.

## G.4 Future Year Modeling Scenario Emission Estimates

Emission estimates were also needed as inputs for additional modeling scenarios that will predict future impacts from implementation of the 2017-2022 GOM Multisale EIS. For modeling the future year impacts, the ERG team forecast emissions estimates based on information provided by BOEM, combined with USEPA projected emission estimates and other data for onshore sources and marine vessels and other sources outside of the GOM region. The ERG team confirmed that offshore drilling in the EPA under USEPA air quality jurisdiction is included in BOEM's *Proposed*

*Final Outer Continental Shelf Oil & Gas Leasing Program: 2017-2022* (Five-Year Program) spreadsheets. The ERG also reviewed the USEPA's offshore oil and gas production permits to confirm that no production platforms were permitted to be constructed prior to or during 2017. Projected emission estimates were developed for anticipated offshore drilling off the coast of Mexico.

### G.4.1 Western, Central, and Eastern Planning Areas OCS Offshore Oil and Gas Production Sources

The ERG team developed annual emission estimates for all categories and pollutants for each year of activity for OCS offshore oil and gas production sources associated with the Five-Year Program using BOEM's spreadsheet-based data analyses tools. BOEM provided information on the predicted levels of activity, sources, and locations (by planning area and water depth) to depict offshore oil and gas activities in the future scenario. The emissions estimates are based on a mid-price oil case scenario and cover the WPA, CPA, and EPA, which are under BOEM's jurisdiction.

After completion of the OCS offshore oil and gas production source emission estimates, the resulting cumulative emissions for each pollutant were assessed to determine which emission estimates should be selected for PGM modeling to support the cumulative and visibility impacts analyses.

Based on information provided by BOEM, it was assumed that emissions for the following sources occur during the total period of proposed activity based on the 2017-2022 GOM Multisale EIS scenario (2017-2056)[1]:

- exploration and delineation well drilling activities (1,671 wells drilled);
- development and production well drilling activities (1,135 wells drilled);
- platform installation activities (535 platforms installed);
- FPSO installation (1 FPSO installed);
- FPSO operation (1 FPSO operating);
- FPSO removal (1 FPSO removed);
- pipeline installation excluding State waters (7,251 km of pipeline installed);
- platform oil and gas production (535 platforms in operation);
- platform removal (535 platforms removed);
- support helicopters (642,000 round trips); and
- support vessels (1,062,000 operations).

The BOEM data analyses tools provide information on each of these anticipated activities by

[1] Excluding the Gulf of Mexico Energy Security Act (GOMESA) moratorium area.

year, as well as water depth. The anticipated water depths by planning area were used to spatially allocate the emissions.

The ERG used this information to develop emission estimates for each source category based on emission estimation methods used in past Gulfwide emissions inventory studies and other data compiled for BOEM in order to determine which estimates should be selected for photochemical modeling to support the cumulative and visibility impacts analyses.

The following sections discuss the emission estimation methods that the ERG team used to estimate emissions for the BOEM oil and gas production sources in the future scenario.

#### G.4.1.1 Oil and Natural Gas Offshore Production Platforms

In order to develop reasonably foreseeable emission estimates for projected oil and natural gas production platforms, the emission factors presented in **Table G-4** were developed based on the 2011 Gulfwide inventory (Wilson et al., 2014). Because deepwater operations may significantly differ from conventional operations in shallower waters, are technologically more sophisticated, and produce at much higher rates, two sets of emission factors were developed and assigned to each projected platform based on water depth. Depths below 200 meters (656 feet) were assigned the shallow-water emission factors, and depths above were assigned deepwater emission factors.

Emission estimates for platform sources were developed based on platform installation and carried forward until the projected platform removal dates (provided by planning area and water depth).

Table G-4. Future Year Production Platform Emission Factors.

| Pollutant | Shallow Water Emission Factors (<200 m) (tons/platform/yr) | Deepwater Emission Factors (>200 m) (tons/platform/yr) |
|---|---|---|
| CO | 56 | 192 |
| $NO_x$ | 46 | 582 |
| $PM_{10}$-PRI | 0.5 | 5.17 |
| $PM_{2.5}$-PRI | 0.50 | 5.15 |
| $SO_2$ | 0.51 | 44 |
| VOC | 22 | 96 |
| Pb | 2.38E-05 | 3.79E-03 |
| $NH_3$ | 0.0349 | 0.49 |

Source: Developed from the *Year 2011 Gulfwide Emissions Inventory* (Wilson et al., 2014).

#### G.4.1.2 Offshore Support Helicopters

The ERG team obtained helicopter emission factors from the Switzerland Federal Office of Civil Aviation (FOCA) Guidance on Determination of Helicopter Emissions (FOCA, 2009). However, the landing and takeoff (LTO) cycle used by FOCA was determined to be too short for typical trips taken in the Gulf of Mexico. The time-in-mode values were therefore adjusted based on the

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International Civil Aviation Organization (ICAO) test cycles, which are considered to be appropriate for offshore operations in the Gulf of Mexico. Because the future fleet mix is unknown, ERG weighted the emission factors using fleet profile data from the Helicopter Safety Advisory Conference (HSAC, 2015). The VOC emission factors were developed by converting the hydrocarbon (HC) emission factors using data from the USEPA's Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (USEPA, 1992). The aggregated general aviation conversion factor of 1.0631 for turbine engines was used because the GOM support helicopter fleet is primarily equipped with turbine engines. The $PM_{2.5}$ emission factors were speciated from $PM_{10}$ factors using USEPA aircraft speciation data, and the $SO_2$ emission factors were developed based on a typical jet fuel sulfur concentration of 0.05% (UNEP, 2012).

#### G.4.1.3 Oil and Gas Production Offshore Support Vessels

Four components are needed to estimate future offshore vessel emissions:

- vessel characteristics (engine power and speed);
- engine operating load (percent of maximum engine power);
- hours of operation (typically determined by the distance the vessel travels divided by the vessel speed); and
- appropriate emission factors (grams per kW-hr).

Because there is uncertainty about the location of future activities, it was assumed that a typical vessel trip is 200 nautical miles, which is the round-trip distance from shore to the mid-point of Federal waters.

In projecting future year activity, it is not always possible to identify specific vessels that will be used. Therefore, the use of larger vessels that represent the upper bound of each vessel type was assumed, such that actual future year emissions should be similar to or lower than emission estimates developed using this fleet profile. These vessels were identified based on data compiled from the Information Handling Service (IHS) Register of Ships (IHS, 2015). Vessels from the global fleet were used because these larger ships move internationally based on local demand. It should also be noted that these larger vessels tend to be involved in deepwater activities because they are designed for extended open-water operations. As trends to develop deeper water locations in the Gulf of Mexico continue into the future, it is likely that these larger or similar vessels will support future year activities.

The selected vessels and their characteristics are presented in **Table G-5**. In order to correctly match the vessel to the appropriate emission factors, the vessel engine category is required. The USEPA vessel category was determined by calculating the cylinder volume based on the stroke length and diameter of the cylinder. The USEPA categories are defined by the following cylinder volumes:

- Category 1: Cylinder displacement less than 5 liters;
- Category 2: Cylinder displacement from 5 to 30 liters; and
- Category 3: Cylinder displacement greater than 30 liters.

If a vessel's cylinder volume was unknown, it was assumed that the vessel was powered by a Category 3 propulsion engine. It should also be noted that all of the selected vessels are foreign flagged, but it is assumed that they refuel using U.S.-regulated marine fuels as they shift equipment and supplies from nearby U.S. ports.

Table G-5. Summary of Vessel Characteristics.

| Vessel Type | Total Main Power (kW) | Vessel Name | Propulsion Engine Category | Speed (knots) |
|---|---|---|---|---|
| Drillship | 48,666 | Rowan Renaissance | 3 | 12 |
| Jackup | 12,485 | Bob Palmer | 2 | |
| (auxiliary) | Not self-propelled | | | |
| Platform Rig | 8,100 | Nabors Mods 087 | 2 | |
| (auxiliary) | Not self-propelled | | | |
| Semisubmersible | 22,371 | ENSCO 7500 | 2 | 3.5 |
| Submersible | 3,691 | Hercules 78 | 2 | |
| (auxiliary) | Not self-propelled | | | |
| FPSO | 14,110[1] | Terra Nova FPSO | 2 | 12.0 |
| FSO | 51,519 | Africa | 3 | 16.5 |
| Stimulation Vessel | 15,840 | Norshore Atlantic | 2 | 14 |
| Oil Tanker | 13,369 | SPT Explorer | 3 | 15 |
| Anchor Handling Vessel | 27,000 | KL Sandefjord | 3 | 17 |
| Crew Boat | 11,520 | R. J. Coco Mccall | 3 | 23 |
| Supply Vessel | 18,000 | Aleksey Chirikov | 3 | 15 |
| Tug Boat | 19,990 | Yury Topchev | 3 | 15 |
| Pipe-Laying Vessel | 67,200 | Castorone | 3 | 14 |

[1] Only distillate oil main engine kW included (430 kW & 2 x 6840 kW). Topside emissions are included in the deepwater production platform estimates.

A vessel's engine power varies relative to the type of operation that is implemented. While cruising in open waters, the propulsion engine load is typically 84% of maximum load; during maneuvering, it can be 60% or lower; and when stationary,. it can be 10% or lower. **Table G-6** presents the aggregated load factors that will be used in this Study for propulsion and auxiliary engines.

Table G-6. Load Factors to be Used in the Future Year Projections.

| Vessel Type | Load Factor |
|---|---|

| | |
|---|---|
| Propulsion Cruising | 0.8-0.85 |
| Propulsion Idle | 0.1 |
| Propulsion Crew/Supply Boat | 0.45 |
| Propulsion Drill Ship and Semi-Submersible | 0.83 |
| Propulsion Pipe-Laying Vessel | 0.16 |
| Propulsion Tug | 0.68 |
| Auxiliary Emergency Generator | 0.75 |
| Drilling Equipment | 1 |

The future year emission factors were developed in terms of grams of pollutant emitted per load-adjusted engine kW-hours based on the emission factors used in the USEPA's 2014 NEI (**Table G-7**). The factors presented below are applicable for foreign-flagged vessels that are not required to comply with USEPA exhaust standards but that must comply with international Emission Control Area (ECA) standards. These future year factors account for the reduction in fuel sulfur level associated with the ECA. Because Category 2 foreign-flagged offshore support vessels will be refueling at U.S. ports, it was anticipated that these vessels will use low sulfur compliant U.S. fuels. Also, the $NO_x$ emission factors were adjusted to account for the 2016 ECA Tier III standard that requires high efficiency, after-treatment technology, and is applicable for U.S. and foreign-flagged vessels. The Category 3 PM emission factors were not adjusted to account for reductions in PM as sulfate compounds because the USEPA's adjustment equation provided a PM factor lower than the PM emission factor for Category 2 powered vessels.

Table G-7. Marine Vessel Emission Factors (g/kW-hr).

| Engine Category | $NO_x$ | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ | VOC | CO | HC | $NH_3$ | Pb |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3.4 | 0.006 | 0.320 | 0.310 | 0.141 | 2.48 | 0.13 | 0.005 | 0.00003 |
| 3 | 3.4 | 0.362 | 0.450 | 0.437 | 0.632 | 1.40 | 0.60 | 0.003 | 0.00003 |

Source: USEPA, 2016b.

#### G.4.1.4 Future Year Emission Estimates and Selection of Future Modeling Year

The emission estimates developed for the future BOEM oil and gas production sources were reviewed to determine the most suitable future year emissions to model. The PGM modeling for the cumulative and visibility impacts analysis was conducted based on the emissions anticipated to have the greatest impact on the air quality of any state. This was determined based on the estimated annual emission trends. The future highest $NO_x$ emission year for all activities in all planning areas coincided with the highest PM, CO, $NH_3$, and Pb emissions. These emissions are driven by support vessel activity for the most part. The future highest VOC emission year for all activities in all planning areas coincided with the highest $SO_2$ emissions and is driven by production platform emissions. **Table G-8** presents the resulting emission estimates, and **Figure G-11** presents a graphical depiction of the annual emission estimates for all pollutants. **Figures G-12, G-13, and G-14** present graphical depictions of the annual emission estimates for $NO_x$, VOC, and $PM_{2.5}$ by source category.

It was concluded that BOEM would model the activity data and resulting emission estimates

for year 2033 for non-platform sources, and year 2036 activity data and resulting emission estimates for platform sources.

Table G-8. Emission Estimates for the Western, Central, and Eastern Planning Areas, All Depths, By Year and Pollutant.

| Year | $NO_x$ (TPY) | $SO_2$ (TPY) | $PM_{10}$ (TPY) | $PM_{2.5}$ (TPY) | VOC (TPY) | CO (TPY) | Pb (TPY) | $NH_3$ (TPY) |
|---|---|---|---|---|---|---|---|---|
| 2017 | 3,693 | 40 | 360 | 349 | 200 | 2,591 | 0.03 | 10 |
| 2018 | 19,328 | 118 | 1,813 | 1,759 | 1,213 | 14,058 | 0.17 | 80 |
| 2019 | 34,958 | 158 | 3,199 | 3,104 | 2,150 | 25,462 | 0.30 | 98 |
| 2020 | 46,119 | 268 | 4,124 | 4,001 | 3,042 | 33,293 | 0.39 | 111 |
| 2021 | 50,126 | 379 | 4,368 | 4,238 | 3,807 | 35,937 | 0.42 | 125 |
| 2022 | 54,328 | 446 | 4,605 | 4,469 | 4,535 | 38,906 | 0.45 | 139 |
| 2023 | 57,639 | 527 | 4,888 | 4,743 | 5,311 | 41,426 | 0.48 | 154 |
| 2024 | 59,979 | 484 | 5,030 | 4,881 | 5,872 | 43,637 | 0.49 | 170 |
| 2025 | 64,527 | 523 | 5,413 | 5,252 | 6,543 | 47,198 | 0.53 | 189 |
| 2026 | 70,601 | 598 | 5,870 | 5,696 | 7,510 | 51,762 | 0.57 | 209 |
| 2027 | 76,146 | 704 | 6,305 | 6,118 | 8,419 | 55,747 | 0.61 | 228 |
| 2028 | 79,863 | 742 | 6,609 | 6,414 | 9,125 | 58,701 | 0.64 | 244 |
| 2029 | 85,277 | 803 | 7,012 | 6,805 | 10,034 | 62,750 | 0.68 | 262 |
| 2030 | 90,332 | 876 | 7,381 | 7,163 | 11,010 | 66,523 | 0.72 | 280 |
| 2031 | 97,123 | 984 | 7,860 | 7,628 | 12,185 | 71,365 | 0.77 | 298 |
| 2032 | 100,564 | 1,022 | 8,057 | 7,820 | 13,228 | 74,107 | 0.79 | 315 |
| 2033 | **108,447**[1] | 1,199 | **8,590** | **8,338** | 14,709 | **79,486** | **0.85** | **334** |
| 2034 | 101,673 | 1,193 | 7,919 | 7,687 | 14,939 | 74,742 | 0.79 | 329 |
| 2035 | 102,443 | 1,253 | 7,923 | 7,691 | 15,484 | 75,167 | 0.79 | 327 |
| 2036 | 103,354 | **1,395** | 7,865 | 7,635 | **15,940** | 75,096 | 0.79 | 318 |
| 2037 | 96,715 | 1,343 | 7,274 | 7,062 | 15,254 | 70,088 | 0.74 | 298 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2038 | 92,539 | 1,327 | 6,935 | 6,732 | 14,560 | 66,732 | 0.71 | 283 |
| 2039 | 84,787 | 1,280 | 6,269 | 6,087 | 13,443 | 60,725 | 0.65 | 247 |
| 2040 | 79,475 | 1,235 | 5,841 | 5,672 | 12,317 | 56,455 | 0.61 | 226 |
| 2041 | 77,705 | 1,294 | 5,652 | 5,488 | 11,544 | 54,267 | 0.60 | 209 |
| 2042 | 71,710 | 1,292 | 5,110 | 4,962 | 10,485 | 49,266 | 0.55 | 187 |

Table G-9. Emission Estimates for the Western, Central, and Eastern Planning Areas, Emissions Estimations for Western, Central, and Eastern Planning Areas, All Depths, By Year and Pollutant (continued).

| Year | $NO_x$ (TPY) | $SO_2$ (TPY) | $PM_{10}$ (TPY) | $PM_{2.5}$ (TPY) | VOC (TPY) | CO (TPY) | Pb (TPY) | $NH_3$ (TPY) |
|---|---|---|---|---|---|---|---|---|
| 2043 | 51,254 | 1,094 | 3,390 | 3,293 | 8,643 | 34,736 | 0.38 | 157 |
| 2044 | 46,692 | 1,077 | 3,018 | 2,932 | 7,842 | 31,076 | 0.35 | 143 |
| 2045 | 42,933 | 1,009 | 2,752 | 2,673 | 7,115 | 28,358 | 0.32 | 128 |
| 2046 | 39,227 | 974 | 2,433 | 2,364 | 6,492 | 25,503 | 0.29 | 117 |
| 2047 | 37,540 | 965 | 2,313 | 2,247 | 6,006 | 24,050 | 0.28 | 108 |
| 2048 | 34,738 | 954 | 2,083 | 2,024 | 5,495 | 21,808 | 0.26 | 98 |
| 2049 | 32,995 | 904 | 1,995 | 1,939 | 5,020 | 20,615 | 0.25 | 90 |
| 2050 | 28,873 | 849 | 1,688 | 1,640 | 4,403 | 17,665 | 0.22 | 82 |
| 2051 | 26,286 | 796 | 1,524 | 1,481 | 3,872 | 15,834 | 0.20 | 73 |
| 2052 | 24,303 | 747 | 1,406 | 1,367 | 3,475 | 14,510 | 0.18 | 67 |
| 2053 | 15,585 | 598 | 757 | 737 | 2,610 | 8,716 | 0.11 | 23 |
| 2054 | 13,131 | 592 | 542 | 527 | 2,333 | 6,838 | 0.09 | 17 |
| 2055 | 12,062 | 502 | 548 | 533 | 2,010 | 6,479 | 0.09 | 16 |
| 2056 | 10,119 | 453 | 434 | 422 | 1,615 | 5,185 | 0.07 | 12 |
| 2057 | 9,083 | 450 | 340 | 331 | 1,528 | 4,407 | 0.06 | 9 |
| 2058 | 8,519 | 405 | 344 | 335 | 1,321 | 4,185 | 0.06 | 8 |
| 2059 | 7,182 | 316 | 321 | 313 | 1,031 | 3,653 | 0.05 | 7 |
| 2060 | 6,052 | 314 | 215 | 209 | 984 | 2,829 | 0.04 | 5 |
| 2061 | 5,765 | 270 | 237 | 231 | 877 | 2,852 | 0.04 | 5 |
| 2062 | 5,075 | 268 | 180 | 176 | 760 | 2,305 | 0.04 | 4 |
| 2063 | 4,614 | 224 | 186 | 181 | 646 | 2,201 | 0.03 | 3 |
| 2064 | 3,524 | 136 | 183 | 178 | 433 | 1,872 | 0.03 | 2 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2065 | 1,906 | 46 | 130 | 126 | 175 | 1,157 | 0.02 | 1 |
| 2066 | 1,392 | 46 | 81 | 79 | 153 | 782 | 0.01 | 1 |

[1] Bold numbers are the highest emissions per year per pollutant. These were the amounts modeled.

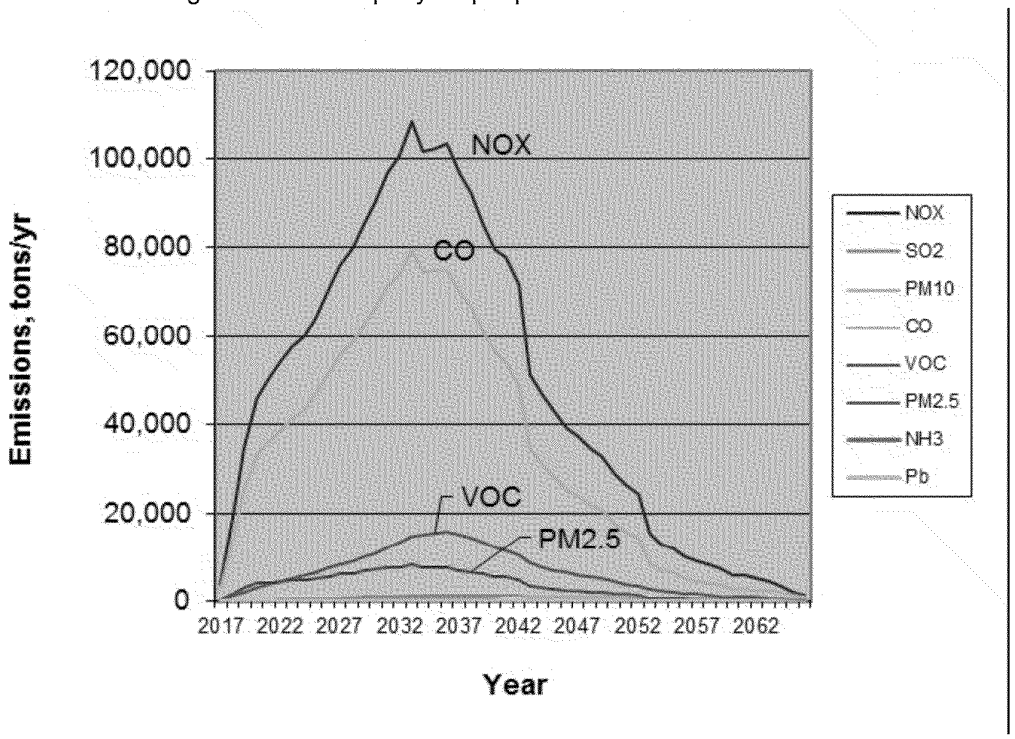


*Figure G-11. Emission Estimates for all Planning Areas and Future Activities.*

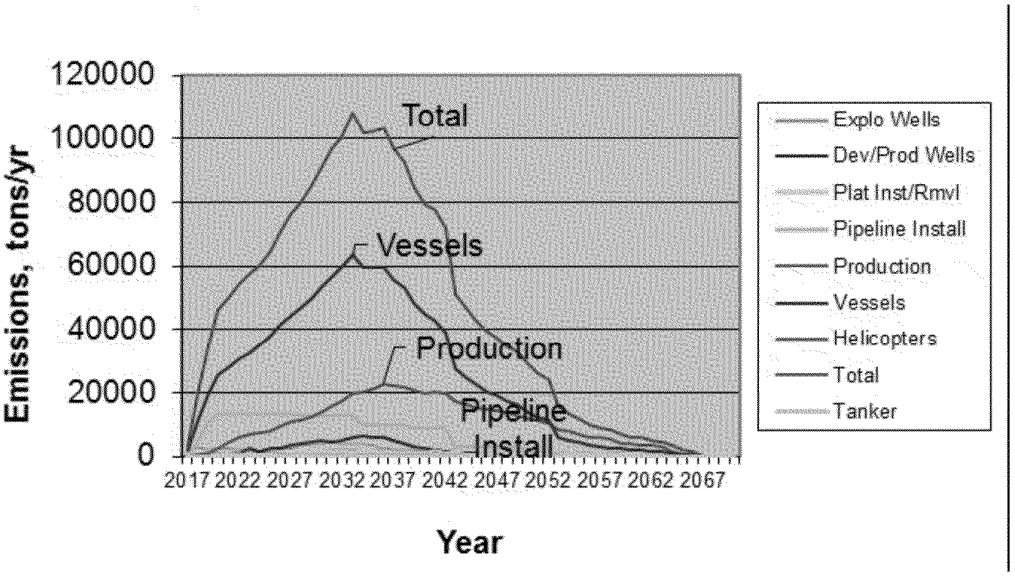


*Figure G-12. Combined Annual $NO_x$ Emissions.*

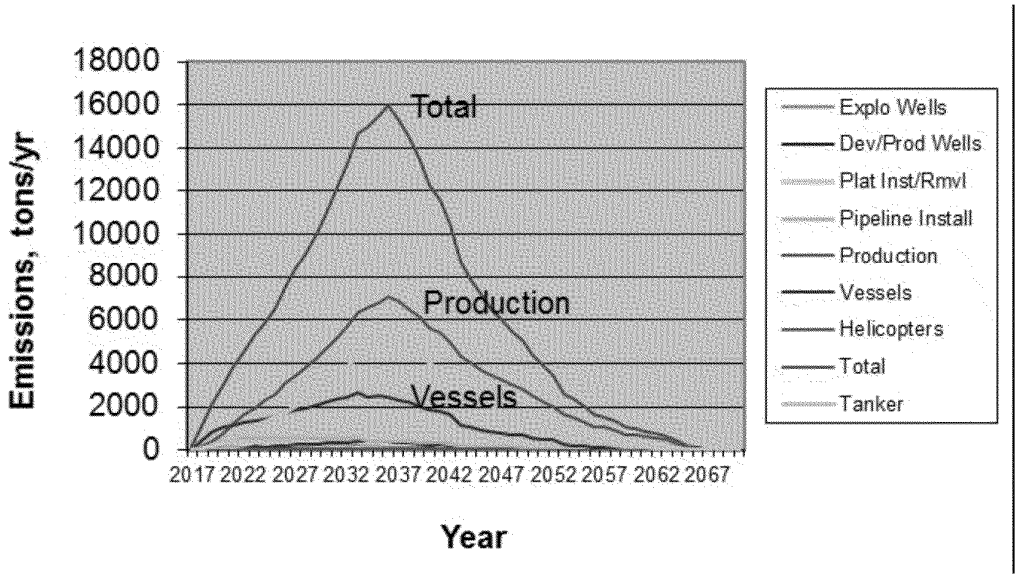


*Figure G-13. Combined Annual VOC Emissions.*

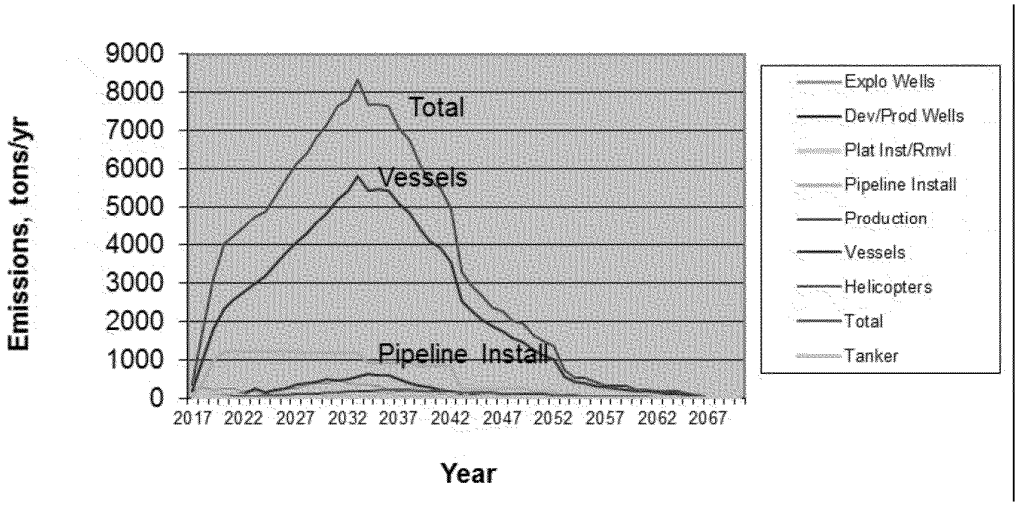


*Figure G-14. Combined Annual $PM_{2.5}$ Emissions.*

### G.4.1.5 Spatial Allocation

The estimated emissions were allocated by planning area (WPA vs. CPA/EPA) and water depth (i.e., 0-60 m, 60-200 m, 200-800 m, 800-1,600 m, 1,600-2,400 m, and >2,400 m). **Figure G-15** depicts the planning area boundaries and water depth contours. (Note that the GOMESA Congressional Moratoria Area is not indicated in **Figure G-15**.) Emissions were not allocated to the GOMESA. The emission estimates were allocated spatially based on the anticipated future year activities provided by BOEM. Because helicopters, support vessels, and tankers transit multiple water depths, their emissions were allocated across multiple water depth contours based on assumed installed platform locations.

For some sources, emissions were assigned to unleased blocks in each area (i.e., WPA and CPA/EPA) relative to the water depth where the activity is anticipated to occur. These categories include the following:

- exploratory drilling vessels;
- development/production drilling vessels; and
- production platforms.

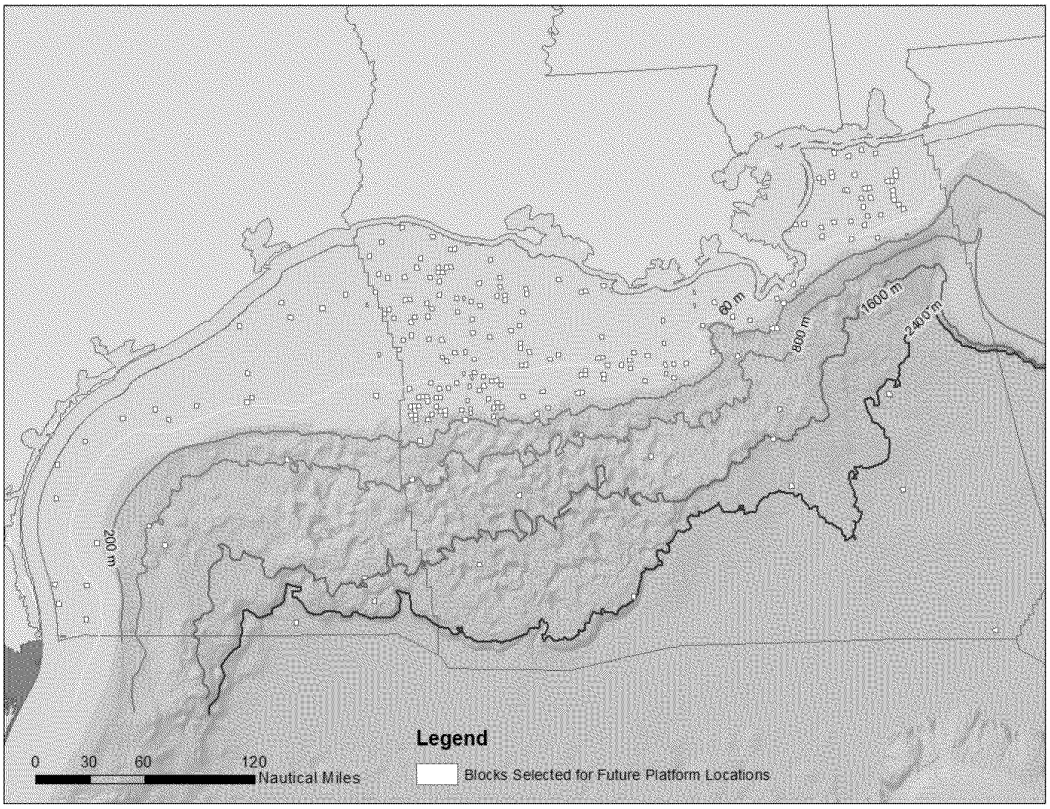


*Figure G-15. BOEM OCS Planning Areas and Water Depths.*

Production platforms were located as point sources with randomly selected locations. Using GIS, each lease block in the Gulf of Mexico was assigned to a water depth bin. Blocks with an active lease and that have contained a platform were then removed. Blocks that have had a platform suggest that they were leased at some point in time, and therefore are less desirable for future exploration. Once the inactive blocks with no history of production were identified, random blocks were selected throughout each water depth for each future platform as depicted in **Figure G-15**. Each platform was placed in a separate block at the centroid. Pipe-laying vessel activities were assigned to leased and unleased blocks as their operations were not limited to just the unleased blocks.

Emissions associated with BOEM's existing OCS oil and gas production sources were held constant at 2012 levels.

### G.4.2 Onshore Sources and Marine Vessels

In support of the proposed ozone NAAQS revisions, the USEPA released the 2011 air quality modeling platform (2011v6.1), with projections to 2018 and 2025, for point, nonpoint area, and mobile sources in the United States (USEPA, 2014d). In addition, the USEPA released the 2011 air quality modeling platform (2011v6.2), with projections to 2017, to support ozone transport modeling for the 2008 NAAQS as well as the 2015 ozone NAAQS (USEPA, 2015d). In early October, 2015, the USEPA also released the 2011v6.2 calendar year 2025 projected inventory (USEPA, 2015d). The ERG team used the 2011v6.2 platform for calendar year 2017, primarily because the platform is based on the most recent version of the NEI (2011v.2). Calendar year 2017 data were selected rather than 2025 data because there is less uncertainty associated with the 2017 estimated emissions because most of the controls factored in by the USEPA are already "on the books" and not speculative. The *Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform* (USEPA 2015d) provides details on the development of the 2011v6.2 future year modeling platforms.

### G.4.3 Other Sources

For sources in Mexico, the USEPA air quality modeling platform 2011v6.2 includes projected 2018 emissions for onshore sources. The USEPA held emissions constant for sources in Canada.

For completeness, projected emissions estimates were also developed for platforms off the coast of Mexico; the ERG team researched the impacts of the restructuring of the energy sector in Mexico, which is predicted to include deepwater drilling within the modeling domain. Emissions were estimated based on projected deepwater production (PEMEX, 2012) and using production-based emission factors developed from the 2011 Gulfwide Inventory (Wilson et al., 2014).

For the LOOP and vessel lightering, emissions were held at 2012 levels because of uncertainties in future crude oil imports, which involve the very large crude carriers that visit the LOOP and lightering zones. The ERG team also investigated the need to include a liquefied natural gas (LNG) port to be located in Federal waters and originally expected to be operational in 2019. On September 18, 2015, however, the Maritime Administration (MARAD) and the U.S. Coast Guard stopped the permit application process, as Delphin LNG, LLC is amending the application. This potential source was not included in the future scenario given this uncertainty.

## G.5 Source Apportionment

Source apportionment, as applied in PGM modeling, provides a means of assessing the contributions of specified sources or source groups to predicted ozone and PM concentrations under the air quality conditions being simulated. Source contributions can be calculated for ozone and for PM using ozone or PM source apportionment routines included in the CAMx PGM modeling. In this

Study, the primary receptor locations of interest for examining source contributions lie both along the shoreline and the State seaward boundary, although the PGM source apportionment output is for the entire modeling domain. Source apportionment analyses with the PGM will be applied to the future year scenario in order to analyze the pre- and postlease OCS oil and gas impacts to short-term and annual NAAQS. This will afford BOEM the opportunity to discern which source groups have the largest impacts and potentially need to be examined for control strategies. BOEM selected the following source groups for source apportionment:

- fires (U.S., Canada, and Mexico);
- biogenic and other natural sources (e.g., lighting $NO_x$ and sea salt);
- additional BOEM OCS oil and gas production platforms associated with the Five-Year Program;
- additional BOEM oil and gas production support vessels and helicopters associated with the Five-Year Program;
- BOEM OCS oil and gas production platforms, support vessels, and helicopters under No Action (base case) alternative;
- all other marine vessel activity in the Gulf of Mexico;
- other anthropogenic U.S. sources;
- Mexican and Canadian anthropogenic sources; and
- initial and boundary conditions (IC and BC).

These source groups aggregate similar sources based on jurisdiction (i.e., sources under BOEM control versus other Federal agencies) and sources beyond control (e.g., natural emission sources and foreign sources). This is helpful in showing whether BOEM's sources are significantly contributing to any modeled air quality issues onshore and at the State seaward boundary, or if a source category regulated by another Federal agency is the more likely the problem source.

Having the additional OCS oil and gas production platforms, support vessels, and helicopters associated with the 2017-2022 GOM Multisale EIS scenario as separate source groups allows BOEM to quantify the impact of these sources on the onshore air quality and at the State seaward boundary.

## G.6 REFERENCES

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**To:** LAWRENCE, LAURA[Lawrence.Laura@epa.gov]
**From:** Jessica L. Wood
**Sent:** Fri 2/10/2017 3:57:53 PM
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I'm sorry for the delayed response. If you would still like to have a call to talk, I have a couple of periods of time available today to talk from 11am-12pm mountain time and from 1pm-2pm mountain time. Let me know if you would still like to have a call and if either of these times work for you.

Thanks,

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 08, 2017 2:30 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Jessica,

No problem—that happens! We definitely understand! Do you have anytime at all today to talk? I'm working until 4pm Pacific Time and have no meetings. (I think Rynda and Jennifer have some conflicts, but I can fill them in if only you and I are able to connect.) 415-972-3407. If not, I'll try you later this week.

Thanks!

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 08, 2017 1:26 PM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am so sorry, I just had a meeting come up for one of my other projects and am going to have to cancel our call this afternoon. Sorry my schedule keeps not working out!

To answer your question though, there isn't an error in the NEI regarding that point source, but ADEQ only looked at state and local permitted major point sources for our analysis (see Chapter 3, page 6 of our recommendation). Please let me know if you have any other questions and we

can reschedule our call for later this week or next week.

Again, sorry for this inconvenience!

Thanks,

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 08, 2017 12:21 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

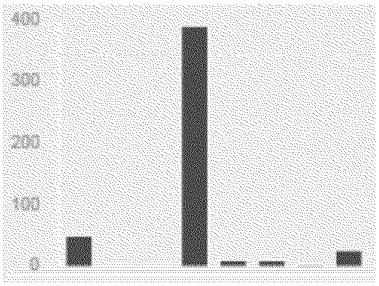
Great, thanks! It should just be a quick call. We were looking through the NEI for the Phoenix area, and there seems to be a discrepancy between the NEI data and what was submitted in the ADEQ recommendation—a large (392tpd NOx) source in the Casa Grande area. It's possible there's an error in the NEI… just trying to get to the bottom of this and hope you can help! Screen shot of the relevant data below is from the ozone mapping tool.

**CASA GRANDE**

EIS ID: 14432311
Facility Source Description: Rail Yard
NAICS Code: 488210 (link takes you to a different site)

Unknown
Unknown, AZ 00000
Latitude: 32.886346
Longitude: -111.772990

*Emissions (in tons):*
CO: 50.72
Lead: 0.00
NH3: 0.15
NOx: 392.94
PM10: 11.12
PM2.5: 10.79
SO2: 3.43
VOC: 27.23




***

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 08, 2017 11:12 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I hope you're feeling better as well! And 2pm pacific time today works for me.

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 08, 2017 12:00 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Jessica,

Sorry for the delay. It was my turn to be out sick. ☹ I hope you're feeling better! Could we call you at about 2pm Pacific Time today?

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Friday, February 03, 2017 8:53 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am out sick today, can we reschedule our call for this afternoon? I am really sorry for the

inconvenience. I am free anytime next Wednesday, Thursday, and Friday after 2pm pacific time.

Thanks,

Jessica Wood

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 5:14 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Just sent a meeting invite for 2pm. We'll give you a call. Thanks!

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 01, 2017 4:09 PM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I can talk any time after 2pm pacific time, let me know what works best for you.

Thanks,

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 4:58 PM
**To:** Heidi Haggerty <Haggerty.Heidi@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Jessica L. Wood <Wood.Jessica@azdeq.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Heidi, congratulations on the new position! I'll miss working with you, but wish you the best!

Jessica, any chance you could chat for a few minutes on Friday afternoon? We're free after 2pm pacific time.

Thanks,
Laura

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Heidi Haggerty [mailto:Haggerty.Heidi@azdeq.gov]
**Sent:** Wednesday, February 01, 2017 1:43 PM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Jessica L. Wood <Wood.Jessica@azdeq.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

Jessica Wood is still the technical lead. I'm also actually moving to Water Quality Division starting Monday, so Jessica's also the main contact moving forward for ozone designations, at least for now. I've cc'd her on this email and her contact information is below:

Jessica Wood

602-771-7576

Wood.Jessica@azdeq.gov

Things are pretty good; hope they are with you, too!

Thanks!

Heidi Haggerty

State Implementation Planner

Planning Unit, Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

602-771-4815

haggerty.heidi@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 2:27 PM
**To:** Heidi Haggerty <Haggerty.Heidi@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Chen, Eugene <Chen.Eugene@epa.gov>
**Subject:** questions about emissions discussion in ADEQ O3 designations recommendation

Hi Heidi,

I hope all's well at ADEQ! We've been working through our technical analysis of the ozone designation recommendations, and had a couple of questions about the emissions data for the Phoenix area (section 3.1.2 in the recommendation). I think I remember you saying the technical lead for the project had changed—would it be best for us to work through you for our questions,

or is there a new technical person assigned to ozone designations?

Thanks,

Laura

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

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**To:** LAWRENCE, LAURA[Lawrence.Laura@epa.gov]
**From:** Jessica L. Wood
**Sent:** Wed 2/8/2017 9:25:54 PM
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am so sorry, I just had a meeting come up for one of my other projects and am going to have to cancel our call this afternoon. Sorry my schedule keeps not working out!

To answer your question though, there isn't an error in the NEI regarding that point source, but ADEQ only looked at state and local permitted major point sources for our analysis (see Chapter 3, page 6 of our recommendation). Please let me know if you have any other questions and we can reschedule our call for later this week or next week.

Again, sorry for this inconvenience!

Thanks,

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]

**Sent:** Wednesday, February 08, 2017 12:21 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

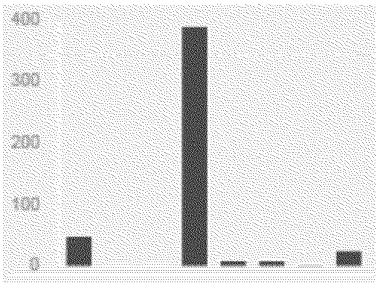
Great, thanks! It should just be a quick call. We were looking through the NEI for the Phoenix area, and there seems to be a discrepancy between the NEI data and what was submitted in the ADEQ recommendation—a large (392tpd NOx) source in the Casa Grande area. It's possible there's an error in the NEI… just trying to get to the bottom of this and hope you can help! Screen shot of the relevant data below is from the ozone mapping tool.

**CASA GRANDE**

EIS ID: 14432311
Facility Source Description: Rail Yard
NAICS Code: 488210 (link takes you to a different site)

Unknown
Unknown, AZ 00000
Latitude: 32.886346
Longitude: -111.772990

*Emissions (in tons):*
CO: 50.72
Lead: 0.00
NH3: 0.15
NOx: 392.94
PM10: 11.12
PM2.5: 10.79
SO2: 3.43
VOC: 27.23




***

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

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**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I hope you're feeling better as well! And 2pm pacific time today works for me.

Jessica L Wood

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**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Jessica,

Sorry for the delay. It was my turn to be out sick. ☹ I hope you're feeling better! Could we call you at about 2pm Pacific Time today?

Laura Lawrence

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75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Friday, February 03, 2017 8:53 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am out sick today, can we reschedule our call for this afternoon? I am really sorry for the

inconvenience. I am free anytime next Wednesday, Thursday, and Friday after 2pm pacific time.

Thanks,

Jessica Wood

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 5:14 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Just sent a meeting invite for 2pm. We'll give you a call. Thanks!

Laura Lawrence

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Hi Laura,

I can talk any time after 2pm pacific time, let me know what works best for you.

Thanks,

Jessica L Wood

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**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Jessica L. Wood <Wood.Jessica@azdeq.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Heidi, congratulations on the new position! I'll miss working with you, but wish you the best!

Jessica, any chance you could chat for a few minutes on Friday afternoon? We're free after 2pm pacific time.

Thanks,
Laura

Laura Lawrence

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**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

Jessica Wood is still the technical lead. I'm also actually moving to Water Quality Division starting Monday, so Jessica's also the main contact moving forward for ozone designations, at least for now. I've cc'd her on this email and her contact information is below:

Jessica Wood

602-771-7576

Wood.Jessica@azdeq.gov

Things are pretty good; hope they are with you, too!

Thanks!

Heidi Haggerty

State Implementation Planner

Planning Unit, Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

602-771-4815

haggerty.heidi@azdeq.gov

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**Subject:** questions about emissions discussion in ADEQ O3 designations recommendation

Hi Heidi,

I hope all's well at ADEQ! We've been working through our technical analysis of the ozone designation recommendations, and had a couple of questions about the emissions data for the Phoenix area (section 3.1.2 in the recommendation). I think I remember you saying the technical lead for the project had changed—would it be best for us to work through you for our questions,

or is there a new technical person assigned to ozone designations?

Thanks,

Laura

Laura Lawrence

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**Cc:** Kay, Rynda[Kay.Rynda@epa.gov]; Williams, Jennifer[Williams.Jennifer@epa.gov]
**From:** Jessica L. Wood
**Sent:** Wed 2/8/2017 7:12:17 PM
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

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Jessica L Wood

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State Implementation Planner

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Laura

Laura Lawrence

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**To:** planning@capcoa.org[planning@capcoa.org]
**From:** Jillian Wong
**Sent:** Wed 2/8/2017 1:26:09 AM
**Subject:** [CAPCOA Planning Managers] Planning Manager's February Call
RE: Ozone comments - one observation
Ozone Imp Rule - Revised Draft Comments from Northern Sierra
CAPCOA comments on proposed O3 NAAQS SIP Req Rule Final.docx
DRAFT 201701 Planning Managers Minutes Revised.docx
FINAL 201702 Planning Managers Agenda.docx

Hi everyone,

Attached are the revised minutes from last month's call, along with the agenda for this Thursday's call. Due to a scheduling conflict, I won't be able to make the call, but you'll be in good hands with David Frisbey.

I'm also attaching an email from Sondra at Feather River and Sam from Northern Sierra with their comments on the ozone implementation rule. Also attached is the comment letter CAPCOA sent on the last ozone implementation rule and Sondra wanted me to point out that the last two comments in that letter would still be relevant.

Thanks,

Jillian.

**To:** OConnor, Karina[OConnor.Karina@epa.gov]; Brenda Harpring[bharprin@ndep.nv.gov]
**Cc:** Frank Forsgren[fforsgre@ndep.nv.gov]; Patricia Bobo[pbobo@ndep.nv.gov]; dwinkelman@ndep.nv.gov[dwinkelman@ndep.nv.gov]; LAWRENCE, LAURA[Lawrence.Laura@epa.gov]
**From:** Danilo Dragoni
**Sent:** Wed 9/14/2016 12:14:51 AM
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

Ok,
so about the designation for the Apex monitoring in Clark County. We (NDEP) have spoken with Clark County about this, and confirmed that their recommendation is indeed consistent with their understanding of the situation. We also understand the EPA concern, but also recognize that Clark County is the expert authority when it comes to the Apex basin. So, we will transmit the recommendation as developed by Clark County.

Please, let me know if you have questions or comments.

thanks

Danilo

---

**From:** Danilo Dragoni
**Sent:** Tuesday, September 13, 2016 10:34 AM
**To:** OConnor, Karina; Brenda Harpring
**Cc:** Frank Forsgren; Patricia Bobo; Daren Winkelman; LAWRENCE, LAURA
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

That's good for me. I am at the WESTAR meeting right now, but I will write you something about the Apex issue this evening. For the rest, Frank and Daren have an extensive understanding on what's going on.
thanks

Danilo

---

**From:** OConnor, Karina [OConnor.Karina@epa.gov]
**Sent:** Tuesday, September 13, 2016 10:23 AM
**To:** Danilo Dragoni; Brenda Harpring
**Cc:** Frank Forsgren; Patricia Bobo; Daren Winkelman; LAWRENCE, LAURA
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

We'll wait till October 6th to have our next monthly call.

Laura and I would like to chat briefly with Frank and Darren on Thursday (I'll be at NDEP) about your timing on the designations, get an update on how you are handling the Apex monitoring in the Clark recommendations and find out where you're going in Washoe with all of the EE events.

Thanks, Karina

Karina OConnor

EPA, Region 9

Air Planning Office (AIR-2)

(775) 434-8176
oconnor.karina@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Tuesday, September 13, 2016 9:12 AM
**To:** Brenda Harpring <bharprin@ndep.nv.gov>; OConnor, Karina <OConnor.Karina@epa.gov>
**Cc:** Frank Forsgren <fforsgre@ndep.nv.gov>; Patricia Bobo <pbobo@ndep.nv.gov>; dwinkelman@ndep.nv.gov
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

Hi,

yes, I'l be back on the 26th... Any chance we could wait until then? If this is getting us too close to the October 1st deadline, I am ok if this is dealt without me, but I would suggest to include Daren Winkelman in the discussion. He has been heavily involved in the EE discussion. Also, if you need any input from me, I can do that until Wednesday (by email). After that, I will be camping in Glacier with the bears. :-)

thanks

Danilo

**From:** Brenda Harpring
**Sent:** Monday, September 12, 2016 4:40 PM
**To:** 'OConnor, Karina'
**Cc:** Frank Forsgren; Patricia Bobo; Danilo Dragoni
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

OK.

Frank worked on the ozone designations, and Danilo is back Sept. 26.

Thanks, Brenda

**From:** OConnor, Karina [mailto:OConnor.Karina@epa.gov]
**Sent:** Monday, September 12, 2016 3:05 PM
**To:** Brenda Harpring
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

Yes – though we may want to discuss a few issues with you regarding the ozone designations before October 6th.

Thanks, Karina

Karina OConnor

EPA, Region 9

Air Planning Office (AIR-2)

(775) 434-8176
oconnor.karina@epa.gov

**From:** Brenda Harpring [mailto:bharprin@ndep.nv.gov]
**Sent:** Monday, September 12, 2016 2:33 PM
**To:** OConnor, Karina <OConnor.Karina@epa.gov>

**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

So NO call this week?

Brenda Harpring

please consider the environment before printing this e-mail

**From:** OConnor, Karina [mailto:OConnor.Karina@epa.gov]
**Sent:** Monday, September 12, 2016 2:32 PM
**To:** Brenda Harpring
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

Ok – it wasn't clear from my notes, but that makes sense!

Thanks, Karina

Karina OConnor

EPA, Region 9

Air Planning Office (AIR-2)

(775) 434-8176
oconnor.karina@epa.gov

**From:** Brenda Harpring [mailto:bharprin@ndep.nv.gov]
**Sent:** Monday, September 12, 2016 2:18 PM
**To:** OConnor, Karina <OConnor.Karina@epa.gov>
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

HI Karina,

I was looking at my notes from the Aug. 4, 2016 call and I had written down that there would **NOT** be a call September 15, and the next call would be October 6. Is that correct? Danilo is also out this week – might have been part of the reasoning.

Brenda

**From:** OConnor, Karina [mailto:OConnor.Karina@epa.gov]
**Sent:** Monday, September 12, 2016 10:34 AM
**To:** Brenda Harpring; Patricia Bobo
**Subject:** Review of draft agenda for Thursday's EPA/NDEP monthly planning call

It looks like both Frank and Danilo are out till Thursday. Could you guys review the attached agenda and get back to me with any comments by tomorrow at noon?

Thanks, Karina

Karina OConnor

EPA, Region 9

Air Planning Office (AIR-2)

(775) 434-8176
oconnor.karina@epa.gov

**To:** OConnor, Karina[OConnor.Karina@epa.gov]; Brenda Harpring[bharprin@ndep.nv.gov]
**Cc:** Frank Forsgren[fforsgre@ndep.nv.gov]; Patricia Bobo[pbobo@ndep.nv.gov]; dwinkelman@ndep.nv.gov[dwinkelman@ndep.nv.gov]; LAWRENCE, LAURA[Lawrence.Laura@epa.gov]
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thanks

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**Cc:** Frank Forsgren; Patricia Bobo; Daren Winkelman; LAWRENCE, LAURA
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

We'll wait till October 6th to have our next monthly call.

Laura and I would like to chat briefly with Frank and Darren on Thursday (I'll be at NDEP) about your timing on the designations, get an update on how you are handling the Apex monitoring in the Clark recommendations and find out where you're going in Washoe with all of the EE events.

Thanks, Karina

Karina OConnor

EPA, Region 9

Air Planning Office (AIR-2)

(775) 434-8176
oconnor.karina@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Tuesday, September 13, 2016 9:12 AM

**To:** Brenda Harpring <bharprin@ndep.nv.gov>; OConnor, Karina <OConnor.Karina@epa.gov>
**Cc:** Frank Forsgren <fforsgre@ndep.nv.gov>; Patricia Bobo <pbobo@ndep.nv.gov>; dwinkelman@ndep.nv.gov
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**To:** 'OConnor, Karina'
**Cc:** Frank Forsgren; Patricia Bobo; Danilo Dragoni
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**From:** OConnor, Karina [mailto:OConnor.Karina@epa.gov]
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**To:** Brenda Harpring
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So NO call this week?

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please consider the environment before printing this e-mail

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**From:** OConnor, Karina
**Sent:** Tue 9/13/2016 5:23:52 PM
**Subject:** RE: Review of draft agenda for Thursday's EPA/NDEP monthly planning call

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**To:** planning@capcoa.org[planning@capcoa.org]
**From:** Jillian Wong
**Sent:** Wed 1/11/2017 3:15:08 AM
**Subject:** [CAPCOA Planning Managers] CAPCOA Planning Managers Monthly Call - Final Agenda
FINAL January 2017 Planning Managers Agenda.docx
Comment letter on Discussion Draft_121616 FINAL.PDF

Attached is the final agenda for our call on Thursday. Scott Mathias from EPA will be joining us at 9:30am to discuss the 2015 ozone NAAQS implementation rule, so we might have to move some items around to accommodate his schedule.

Abby Young would also like to share the Bay Area's comment letter on the Draft 2030 Target Scoping Plan update (attached) with the group.

Thanks,

Jillian Wong, Ph.D.

Planning & Rules Manager

South Coast AQMD

21865 Copley Drive,

Diamond Bar, CA 91765

Direct: 909-396-3176

Fax: 909-396-3640

**To:** Danilo Dragoni[ddragoni@ndep.nv.gov]; sjaunara@ndep.nv.gov[sjaunara@ndep.nv.gov]
**Cc:** Lo, Doris[Lo.Doris@epa.gov]; LAWRENCE, LAURA[Lawrence.Laura@epa.gov]; OConnor, Karina[OConnor.Karina@epa.gov]
**From:** McKaughan, Colleen
**Sent:** Thur 6/22/2017 8:41:22 PM
**Subject:** Response to I-SIP Question

Hi, Danilo and Sig,

I hope you are staying cool in this weird weather!

You had asked whether the delay in the 2015 ozone designations also applied to the 2015 ozone I-SIP. We checked with HQ on your question and just heard back from them. Unfortunately, the I-SIP is still due on October 1, 2018. The I-SIP requirement is triggered when the NAAQS is promulgated and is due three years after promulgation of the standard, so October 2018. We will keep you updated if something changes with respect to this requirement.

The good news is that, if circumstances haven't changed much from your last ozone I-SIP, you can recycle much of the old I-SIP, and just update it as you feel appropriate.

Let me know if you have questions.

Colleen

520-498-0118

**To:** planning@capcoa.org[planning@capcoa.org]
**From:** Jillian Wong
**Sent:** Sun 6/11/2017 5:19:11 PM
**Subject:** [CAPCOA Planning Managers] FW: EPA to Extend Deadline for 2015 Ozone NAAQS Area Designations

Thanks Molly for the info! Please see email below.

Thanks,

Jillian.

**From:** Molly M. Pearson [mailto:PearsonM@sbcapcd.org]
**Sent:** Wednesday, June 7, 2017 12:19 PM
**To:** Jillian Wong <jwong1@aqmd.gov>
**Subject:** EPA to Extend Deadline for 2015 Ozone NAAQS Area Designations

Hi Jillian,

You may want to forward this to Planning Managers group.

https://www.epa.gov/newsreleases/epa-extend-deadline-2015-ozone-naaqs-area-designations

Thanks!

Molly

**Molly Pearson**

Planning & Grants Supervisor

Santa Barbara County APCD

260 N. San Antonio Rd. Ste. A

Santa Barbara, CA 93110

(805) 961-8838

mmp@sbcapcd.org

OurAir.org

twitter.com/OurAirSBC

CAPCOA MEETING NOTICE
The California Air Pollution Control Officers Association

**CAPCOA PLANNING MANAGERS**
**Final Agenda**

**Thursday, January 12, 2017**
**9:00 AM – 11:00 AM**
**Conference Call**
**Number: 1-913-312-9372**
Passcode: 398292#
Call Leader: Jillian Wong

## I. Call to Order, Introductions

ARB (Earl Withycombe), John Kelly, Region 9 EPA & Scott Mathias EPA RTP, North Carolina, OAQPS, Antelope/Mojave (Alan DeSalvio), Bay Area (Josh Pollak), Feather River (Sondra Spaethe), Imperial (Monica Saucier), Placer(Yu-Shuo Chang) , Sacramento (Rachel DuBose, Charles Anderson, Rich Muzzy), San Diego, San Luis Obispo(Andy Mutziger, Gary Arcemont), Santa Barbara (Ben Ellenberger), South Coast (Jillian Wong)

## II. Administrative Items

1. Approval of minutes from December 1, 2016 meeting – Minutes Approved
2. Additions or Changes to the Agenda – Add: Leg update from Larry Robinson
3. Committee leadership – Jillian Wong new Chair, David Frisbee with Monterey Vice Chair, Rubi Rajbanshi with SLO Vice Vice Chair
4. Change in conference call schedule – Options for discussion:
   i. 2nd Thursday, 9-11am or 1-3pm
   ii. 2nd Tuesday, 9-11am or 10am-12pm
   iii. Other options?

It was decided to have the monthly meeting on the 2nd Thursday from 1-3pm

## III. General Discussion Items

1. ARB's Cap and Trade Regulation – On December 21st, ARB posted a Notice of Availability of Modified Text and Availability of Additional Documents with additional changes to Cap and Trade (see https://www.arb.ca.gov/regact/2016/capandtrade16/15daynotice.pdf) Attachment A has the newly revised regulations, with 15-day changes in double-underline and double-strikethrough. Comments are requested by January 20th.

Ben – Santa Barbara has reviewed: much of the changes are administrative changes to how off-sets are handled. Waste to energy project exemptions will be expiring. Electricity importer changes. Clean Power Plant portion has a hold on it is contingent on directions from the Feds. BIGGEST Item for Districts to look at Benchmark for determining freely allocated credits will be dropping after 2020. Those operators will have to purchase credits in the future. Each District should consider how this will affect operators in their jurisdiction. Full consignment for natural gas providers is also discussed.

2. Possible formation of sub-committees to study the following topics:
   I. Increased risk of dementia near roadways – a recent news article (http://www.cnn.com/2017/01/04/health/dementia-risk-living-near-major-road/) reported the results of a study which found that living close to heavy traffic was associated with a higher incidence of dementia, but not with Parkinson's or multiple sclerosis. (http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)32399-6/fulltext). The sub-committee would review the study to see if and how dementia might be analyzed in CEQA documents.



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The person requesting this item was not on the call. Earl W. noted that beyond dementia, research has found a correlation between proximity to roadways and obesity, diabetes and other health issues. He will send Jillian a list of studies to forward to the Planning Managers. Jillian noted that South Coast relies on recommendations from OEHHA.

**Action Item:** If there is interest, in the broader topic by District, we can discuss this further following input from Earl.

Sondra – the committee has been following the development of an ARB guidance document on things to consider with CEQA for development near roadways. Ben identified the title of the guidance document: *Strategies for Reducing Exposure to Near Roadways*. We are not sure if this document was ever finalized. In general, with remaining land availability limited, we anticipate more projects are being built close to roadways.

**Action Item:** Earl did not know where this document stands but will do some research and get back to us.

II. Implementation of 2015 OEHHA HRA Guidelines for CEQA Projects – Given that the 2015 OEHHA HRA Guidelines analyze cancer risks based on discrete age bins, there are questions as to the use of these guidelines in both construction and operation HRAs for CEQA documents when emissions are varying during the years analyzed but also spatially within the project site. The sub-committee would develop recommendations and methodologies for application of the 2015 OEHHA HRA Guidelines in CEQA documents.

Two-month short term projects can now be evaluated as an HHRA based on 6-month exposure, but, we do not want every project to need an EIR. Historically, South Coast has asked for HRA's when a construction project is longer than 9 years.

**Action Item:** Gary (SLO) and Sondra (Feather River) expressed interest in understanding this topic further and Jillian asked members to send her an email if they are interested in forming a working group on this issue.

## IV. ADDED Agenda Item: Leg Update

Larry Robinson: provided a very quick summary of bills and (Action Item). Jillian will send the group the bill matrix that Larry provided. Please check matrix for specifics. Some of the bills he called out during the call were:

- AB1 and SB1 carry overs from last year add $38 for registration and if EV even higher Reg to cover loss of gas tax. Because electric vehicles do not pay gas taxes, proposed registration fee of $100 for electric vehicles is to pay for road infrastructure.
- AB33 – spot bill vehicle fees and rebates for GHG reductions
- SB3 $3B bond for affordable housing
- AB18, SB5 $3 Billion for issues related to water, climate and affordable housing

## V. Subcommittees and Work Groups

CalEEMod Focus Group – Barbara Radlein

Focus Group has been working to provide recommendation for CalEEMod power users to adjust Title 24 in the 2016 model because the 2016 model includes the T24 2013 standards, not the 2016 standards. Barbara has worked with Alan Abs of CAPCOA on a recommendation that Trinity, the current CalEEMod programmers, be contracted to program T24 adjustments into a prompt update to the 2016 version of CalEEMod. CAPCOA Board agreed with the need and OKed the cost and CAPCOA/Trinity are currently entering into contract. Trinity also found to bugs in the reporting side of the model and will include that fix with the update.

The Focus Group members are being bombarded with CalEEMod issues. We are forwarding to Trinity and Trinity is not able to replicate the issues that the users are experiencing. Trinity has suggested adding hard coded error report that gets sent directly to Trinity so they can understand and fix issues. Trinity will also provide tech support at $150/hr at $2,000 max per month and will send CAPCOA monthly report about the software support and issue resolutions they are providing.

Alison Kirk w/ Bay Area: Strategic Growth Council will be soliciting applications for Round 2 of GGRF funding and have come out in support of CalEEMod being the recommended evaluation tool.



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A call member asked about CalEEMod training. Barbara reported that the plan is to create training videos and South Coast, with the help of their AV group, will produce these and will have to purchase video capture software for the production process.

**VI. EPA Update, John Kelly/Scott Mathias (scheduled for 9:30am) – Issued implementation rule and 13 of Feb is close of comments period. There was a hearing on this rule today.**

Earl – Consider emission reductions from measures upwind. Hypothetical Example: If Sacramento cannot demonstrate RACM to attain their standards but if RACM will help a downwind district (Northern Sierra) meet its standards, does Sac have to implement the measures?

EPA: 172c6 is not traditional RACM measures – it is that other measures after RACM has been completed and more measures are needed.

2015 Implementation rule has been in guidance docs in the past, but EPA is adding it into the implementation rule to help the provisions be very clear.

Implementation Rule for the 2015 ozone NAAQS, www.epa.gov/ozone-pollution/implementation-2015-national-ambient-air-quality-standards-naaqs-ozone-state
Extension of comment period, https://www.epa.gov/sites/production/files/2016-12/documents/frn_o3_hearing_ext_of_comment_period_12_13_16.pdf

Upwind districts may be required to adopt control measures to assist downwind districts in attaining standards (Clean Air Act).

Implementing outside (i.e. upwind or areas that will impact an adjacent district) attainment measures are to be important if inside attainment measures do not achieve attainment for the inside district. If this is the case, then it will be important to look at measures that will most effectively benefit downwind air quality and this may or may not need to be evaluated with photochemical modeling.

Southern Sutter County of Feather River is defined as a non-attainment area. When Sac has to look at other measures, then reductions from nearby upwind areas will be important and EPA will consider Southern Sutter County as a nearby county.

Earl Withycombe – ARB modeling domain is the part of California that is north of the Tehachapi Mtns. SCAQMD modeling domain is southern California.

**Action Item:** EPA is looking forward to our comments.

**VII. ARB Update, Earl Withycombe**

Carl Moyer program of Timber for Rural counties to increase C/E limit from $18,030/ton to $18,260/ton.

Cap & Trade Guidelines from ARB to update disadvantaged communities eval and reporting requirements

EMFAC – question from Barbara. EMFAC 2017 work is underway. **Action Item:** Earl will talk with Staff and send Jillian their proposed milestones.

**VIII. District Updates –**

Mojave: Finally have all the attainment modeling and preparing plans for adoption in March. Final SIP call will be finalized in next few weeks with RACM measures. Not asking for bump up in existing non-attainment area – severe is what they are settling on, not going to extreme. Currently Severe 17 and severe 15. Had 3 fire exceedance last year of one hour standard and they have submitted exceptional event request. If the request is not approved, then their approach will need to be revised.

Eastern Kern will be asking for bump up.



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South Coast - AQMP is being considered at Feb Board meeting

Sac (Charles) – submitting 2024 modeling year with bracketing

## IX. Adjourn

**Next Meeting:** conference call, 1pm on 9th of Feb.

For additional information, contact Jillian Wong, Planning & Rules Manager at SCAQMD and Chair, CAPCOA Planning Managers Committee, at (909) 396-3176 or jwong1@aqmd.gov.

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CAPCOA MEETING NOTICE
The California Air Pollution Control Officers Association

**CAPCOA PLANNING MANAGERS**
Final Agenda

**Thursday, February 9, 2017**
**1:00 PM – 3:00 PM**
**Conference Call**
**Number: 1-719-457-6422**
Passcode: 585685#
Call Leader: David Frisbey

I. Call to Order, Introductions

II. Administrative Items
1. Approval of minutes from January 12, 2017 meeting
2. Additions or Changes to the Agenda

III. General Discussion Items
1. Scheduling in-person meetings
    i. May meeting in Sacramento
    ii. October meeting
2. Woodstove Replacement Program update – Josh Lowe
3. Proposed 2015 Ozone Implementation Rule – Sam Longmire & Sondra Spaethe
4. 2030 Scoping Plan – Molly Pearson

IV. Subcommittees and Work Groups
1. Legislative Update, Larry Robinson
2. CalEEMod Working Group, Barbara Radlein
3. Climate Change Focus Group

V. EPA Update, John Kelly

VI. ARB Update, Earl Withycombe

VII. District Updates

VIII. Adjourn

Next Meeting: conference call, March 9, 1pm to 3pm

For additional information, contact Jillian Wong, Planning & Rules Manager at SCAQMD and Chair, CAPCOA Planning Managers Committee, at (909) 396-3176 or jwong1@aqmd.gov.



ED_001361_00014725

Re: Docket ID No. EPA-HQ-OAR-2016-0202

Comments on Proposed Rule – Implementation of the 2015 NAAQS for Ozone: Nonattainment Area Classifications and SIPS

Submitted by: Northern Sierra Air Quality Management District, 200 Litton Dr., Ste. 320, Grass Valley, CA 95945
Contact: Sam Longmire, sam@myairdistrict.com, (530) 274-9360 x106

The following comments are separated by topic, with the relevant section of the preamble or CFR reference indicated, followed by a title for the topic.

III(G). Requirements for RFP: Baseline Year
The proposal to set a standard default base year for RFP but allow areas to choose another year (2015 through the effective designation year) makes sense for several reasons. First, if there is some sort of anomaly in the standard base year (e.g. a non-representative combination of sources or extreme weather or fire events), the flexibility to choose an alternate year would allow areas to perform more realistic progress analyses. Second, monitor malfunctions or relocations could make alternate base year selection a sound possibility. Third, areas should not be discouraged from, or penalized for, taking early actions to minimize emissions, which could happen under a fixed RFP baseline year if reductions are achieved between the years used for designation and that fixed year.

IV(B). Revoking the 2008 Ozone NAAQS
Option 1 (revoking the 2008 NAAQS everywhere at the same time) is preferable to having more than one health-based standard that depends on a person's location, primarily for simplicity of public messaging. Further, if the practice of waiting until an area reaches attainment for an earlier standard before switching to the next standard (Option 2) were to continue, the nation could eventually become a complicated mosaic of different National Ambient Air Quality Standards that do not necessarily reflect our current understanding of the health effects of air pollution.

V(D). International Transport
179B(b) demonstrations recognize international transport, and EPA is seeking comment on including emissions from farther away than Canada and Mexico in 179B demonstrations. It makes sense for an area not to be reclassified or otherwise penalized for ozone that is beyond its control.

Modeling and data from various federal agencies, universities, scientific institutions and the private sector leave little room to doubt that precursor emissions in Asia result in at least some transboundary ozone transport (as the preamble acknowledges in footnote 75), particularly to the west coast of the US. Estimates of ozone transported from Asia range from a few ppb to more than 15 ppb under certain conditions, and actual amounts may vary considerably from day to day. The science is extremely complicated because there are many variables (atmospheric chemistry processes, weather, etc.), some of which are probably not even known.

The proposal's preamble discusses the possibility of areas using 179B demonstrations to avoid reclassification, section 185 fees and section 181(a)(5) extensions, but doesn't provide much specificity on how this might happen. It simply says that 179B demonstrations will be evaluated on a case-by-case basis. However, there are three main problems with this open-ended approach. First, areas with relatively little funding (such as most small, rural nonattainment areas) may lack the resources to either internally put together adequate 179B demonstrations for long range international transport or to contract the work out. Second, it could become burdensome on EPA to wade through a number of different methodologies that areas might come up with for quantifying the long-range transport effects. Third, there is a high likelihood that such demonstrations would be subject to lawsuits. Therefore, there should be established procedures for determining the amount that an area may claim as influencing its data in order to maintain nationwide consistency, minimize EPA's workload and reduce the chances of legal challenges. Perhaps a separate guidance document would be a reasonable way to establish such a procedure. A suggestion is that EPA (probably along with CASAC) could develop a nationwide map of international transport impact ranges based on consideration of available data. For instance, California's San Joaquin Valley might be assigned a range of 3 to 8 ppb, while Washington DC might have a range of 1 to 2 ppb. It would be expected that areas would be allowed to assume the minimum calculated transport impact, but have to provide justification for using the upper end. The evolving global geostationary satellite network (including the TEMPO project that is currently under development) could provide valuable data for assessing the role of long-range ozone transport and quantifying resulting ground-level impacts as our understanding increases year by year.

III(H)(2), IV(E) & §51.1312(c). SIP Revision for RACM and Out-of-Area "Other Control Measures"

Several aspects of the proposal present new challenges for nonattainment areas and states. The proposed §51.1312(c) requires that along with an attainment demonstration, a SIP revision must be submitted that includes both RACM under 172(c)(1) (which is specifically required if it will enable an area to meet RFP or if it will advance the attainment date) and out-of-area measures under 172(c)(6) (which must be evaluated for determining the attainment year and implemented if, combined with RACM, the attainment year can be advanced). In other words, if a combination of RACM and "reasonable" out-of-area measures will advance the attainment year, that becomes the new "expeditious as practicable" or "applicable" attainment date, and both RACM and out-of-area measures must be included in the SIP revision with the attainment demonstration for that new date. This is a substantial change from the approach described in the 2008 Ozone Implementation rule, which simply noted in the preamble that states should consider the effect of reducing out-of-area emissions in establishing a nonattainment area's attainment date. The key differences are that there was formerly no requirement to implement out-of-area measures and that the proposal requires the inclusion of specific out-of-area measures in a nonattainment area's SIP.

Which air agency? The preamble states (p. 81281), "In determining the attainment date that is as expeditious as practicable an air agency should consider impacts on the

nonattainment area of intrastate transport of pollution within its jurisdiction, and potential reasonable measures to reduce emissions from those sources." This phrasing results in ambiguity regarding which air agency's jurisdiction the requirement refers to – the jurisdiction of the statewide air agency or the jurisdiction of a local air agency that contains a nonattainment area. Several states have local air agencies that function under statewide air agencies and have their own jurisdictional boundaries. These "sub-agencies" typically carry out the responsibilities to develop and implement SIPs on behalf of their respective state air agencies. The State of California is entirely subdivided into local air agencies, generally known as air districts. However, it is the State that is ultimately responsible for complying with the CAA and meeting NAAQS. As written, the proposal seems to require the analysis at both the state and local level. That is, if either air agency can find reasonable reductions within its respective jurisdiction to (along with in-area RACM) advance an area's attainment date, they must be included in a SIP revision along with the attainment demonstration for that thus-informed attainment date. However, measures that would help advance the attainment date for one local air agency's nonattainment area might be located in another local air agency's jurisdiction, while both areas are under the statewide air agency's jurisdiction, but the state may not have jurisdiction over the types of sources from which emissions could be reduced. In California, for instance, stationary sources and most areawide sources fall under local air agency jurisdiction, while mobile (including off-road) sources are under the State's jurisdiction, and there are numerous Statewide regulations on areawide sources that local air agencies enforce.

The problems with a local air agency performing the out-of-area analysis and implementing measures are mainly that it doesn't have the ability to adopt and enforce measures in other local air agency jurisdictions, may not be able to work with emissions inventories for other areas, and is not in the position to determine the reasonability of potential measures in other local jurisdictions. The problems with a state agency performing the analysis and implementing measures are mainly that it may have no jurisdiction over some types of emission sources, it may not have a well-developed emissions inventory for areas that have always been in attainment or unclassified, and the state may also be unable to determine the reasonability of potential measures in out-of-area local air agency jurisdictions. Underlying these complications, and related to the issue of jurisdictional responsibility, is the issue of implementing and timing control measures outside of nonattainment areas such that attainment in downwind areas is achieved quickly enough because there is no "hammer" forcing areas outside nonattainment areas (and states, for that matter) to take action – CAA sanctions do not apply outside a nonattainment area. These problems (jurisdiction over out-of-area measures, emissions inventory shortcomings and determining reasonability of out-of-area measures) should be addressed and clarified in the final rule preamble (or possibly in a separate guidance document), and the air agency responsible for their quantification, implementation and inclusion in the SIP should be clearly specified.

As a related issue, there is a lack of clarity in the level of detail that is necessary in order for the out-of-area "other control measures" analysis to be considered adequate. Given that areas that are unclassified or in attainment for the ozone NAAQS typically don't have very detailed or carefully scrutinized emissions inventories, it would be difficult to

quantify reductions from measures potentially incorporated in those areas. It is easy to imagine lawsuits stemming from allegations of inadequate out-of-area other control measure analyses. Again, further guidance would be helpful.

It is also noteworthy that there is the possible scenario of an upwind area having a fully approved attainment or maintenance plan but a downwind area identifying potential reductions in that upwind area that would help the downwind area reach attainment sooner, which would presumably require the upwind area to modify at least the projected inventory and modeling in its SIP also. Similarly, an upwind nonattainment area may have identified measures in a previously approved SIP on a timeframe adequate to reach attainment by its applicable attainment date, but then the state determines that a faster timeframe is needed for a downwind area to meet its applicable attainment date using out-of-area 172(c)(6) other control measures. In this case, the same measures in the same area would appear in two different SIP revisions with different timeframes, unless the upwind area does another SIP revision to align the timeframes.

As a separate issue, proposed §51.1312(c) is worded in such a way that it could result in confusion over which air agency must prepare the SIP revision that includes the attainment demonstration, RACM and out-of-area reductions. It says, "For each nonattainment area required to submit an attainment demonstration…, the state shall submit with the attainment demonstration a SIP revision demonstrating that *it* (emphasis added) has adopted all RACM necessary…. The SIP revision shall include… other control measures on sources of emissions… located outside the nonattainment area…."

Finally, the proposal does not address the possibility of using out-of-area reductions as Contingency Measures. It is quite possible that areas will be interested in doing this, particularly once the effort has been undertaken to quantify the potential reductions. It would be helpful for the final rule to take a stance on this subject.

IV(C) & §51.1310(a)(6). RFP Limitation on Out-of-Area "Other Control Measures"
Areas performing RFP demonstrations should be allowed the option to include reductions achieved through 172(c)(6) out-of-area "other control measures" simply because they are part of the process of progressing toward attainment. However, the proposed §51.1310(a)(6) disallows their use in demonstrating RFP by specifying, "…creditable emission reductions for fixed percentage reduction RFP must be obtained from emissions sources located within the nonattainment area." Presumably, reductions from out-of-area other control measures are to be included in the attainment demonstration (since they are used in establishing the most expeditious attainment date), so it seems unreasonable to preclude their use in RFP calculations. Also, it is not clear how an area should proceed if it can demonstrate attainment with out-of-area reductions, but is unable to demonstrate RFP without them.

In the 2008 Proposed Implementation Rule Preamble, EPA acknowledged that it seems like sound policy to allow upwind reductions in calculating downwind RFP, but encouraged people to comment on it because EPA was having trouble finding an adequate legal basis for it. For that rule, there wasn't the specific requirement for a SIP

revision addressing the reduction of upwind emissions under 172(c)(6). It seems like if the effect of reducing upwind emissions must be analyzed for the SIP, and measures implemented upwind that will advance the attainment year or enable the demonstration of attainment by the applicable attainment date, then that could rationally contribute to the establishment of a legal basis for counting upwind reductions toward RFP. The policy of requiring upwind reductions that result in progress but not being able to count them toward Reasonable Further Progress leads to absurd results. The doctrine of absurd results, commonly employed in the interpretation of written legislation, provides that when the literal meaning of the legislation (in this case, the term "in the area" in CAA 182(b)(1)(B)) would produce results that are absurd (in this case, making progress but not being able to count it), the meaning is instead taken in such a way as to not produce absurd results. The CAA apparently did not anticipate an attainment plan including emission reductions from measures incorporated upwind, and 172(c)(6) certainly does not specify out-of-area reductions among the various examples it gives. The transportable nature of ozone, including the atmospheric chemistry intricacies of precursor behavior, was not understood as well when the 1990 CAA amendments were developed as it is today. Had the CAA been amended in the past few years (as opposed to more than a quarter century ago), 182(b)(1)(A) or (B) might have included a provision for upwind emissions contributing to the nonattainment status of an area to be considered in demonstrating RFP.

One further justification for applying the "absurd results" doctrine is that when the CAA amendments were written, the ozone NAAQS was based on a 1-hour timeframe, which typically was only violated in urban areas. When the NAAQS was subsequently changed to an 8-hour ozone standard, suddenly a number of rural areas, which frequently don't have substantial nighttime "NOx scavenging" of ozone and sometimes experience elevated ozone throughout the night, became nonattainment due to ozone transport. For rural areas with limited emission sources and relatively tiny emissions inventories, it makes even more sense to allow reductions in upwind urban areas to count toward RFP. When the 1990 Amendments were authored, the effect of limiting RFP to emissions within a nonattainment area could not have been known with respect to an 8-hour averaging period.

CAPCOA MEETING NOTICE
The California Air Pollution Control Officers Association

**CAPCOA PLANNING MANAGERS**
Final Agenda

**Thursday, January 12, 2017**
**9:00 AM – 11:00 AM**
**Conference Call**
**Number: 1-913-312-9372**
Passcode: 398292#
Call Leader: Jillian Wong

I. Call to Order, Introductions

II. Administrative Items
1. Approval of minutes from December 1, 2016 meeting
2. Additions or Changes to the Agenda
3. Committee leadership
4. Change in conference call schedule – Options for discussion:
   i. 2nd Thursday, ~~9-11am or~~ 1-3pm
   ii. 2nd Tuesday, 9-11am or 10-12pm
   iii. Other options?

III. General Discussion Items
1. ARB's Cap and Trade Regulation – On December 21st, ARB posted a Notice of Availability of Modified Text and Availability of Additional Documents with additional changes to Cap and Trade (see https://www.arb.ca.gov/regact/2016/capandtrade16/15daynotice.pdf) Attachment A has the newly revised regulations, with 15-day changes in double-underline and double-strikethrough. Comments are requested by January 20th.
2. Possible formation of sub-committees to study the following topics:
   i. Increased risk of dementia near roadways – a recent news article (http://www.cnn.com/2017/01/04/health/dementia-risk-living-near-major-road/) reported the results of a study which found that living close to heavy traffic was associated with a higher incidence of dementia, but not with Parkinson's or multiple sclerosis (http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)32399-6/fulltext). The sub-committee would review the study to see if and how dementia might be analyzed in CEQA documents.
   ii. Implementation of 2015 OEHHA HRA Guidelines for CEQA Projects – Given that the 2015 OEHHA HRA Guidelines analyze cancer risks based on discrete age bins, there are questions as to the use of these guidelines in both construction and operation HRAs for CEQA documents when emissions are varying during the years analyzed but also spatially within the project site. The sub-committee would develop recommendations and methodologies for application of the 2015 OEHHA HRA Guidelines in CEQA documents.



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IV. Subcommittees and Work Groups
   1. CalEEMod Working Group – Barbara Radlein

V. EPA Update, John Kelly/Scott Mathias (scheduled for 9:30am)
   Implementation Rule for the 2015 ozone NAAQS, www.epa.gov/ozone-pollution/implementation-2015-national-ambient-air-quality-standards-naaqs-ozone-state
   Extension of comment period, https://www.epa.gov/sites/production/files/2016-12/documents/frn_o3_hearing_ext_of_comment_period_12_13_16.pdf

VI. ARB Update, Earl Withycombe

VII. District Updates

VIII. Adjourn

Next Meeting: conference call, TBD

For additional information, contact Jillian Wong, Planning & Rules Manager at SCAQMD and Chair, CAPCOA Planning Managers Committee, at (909) 396-3176 or jwong1@aqmd.gov.



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CAPCOA MEETING NOTICE
The California Air Pollution Control Officers Association

**CAPCOA PLANNING MANAGERS**
Final Agenda

**Thursday, April 13, 2017**
**1:00 PM – 3:00 PM**
**Conference Call**
**Number: 1-913-312-9372**
Passcode: 398292#
Call Leader: Jillian Wong

I. Call to Order, Introductions

Matt Jones- YOLO Solano
Ian J. Ledbetter- Glenn County
Sondra Spaethe- Feather River
Jason Mandly- Butte
Adam Baughman- El Dorado
Larry Robinson, Mark Loutzenhiser, Charles Anderson - SacMetro
Josh Pollack, Dave Vintze- BAAQMD
Jillian Wong, Barbara Radlein- South Coast
Alan DeSalvio- Mojave Desert
Chuck Thomas- Ventura
Rubi Rajbanshi, Gary Arcemont- San Luis Obispo
Dave Frisbey- Monterey
Molly Pearson, Ben Ellenberger- Santa Barbara
Earl Withycombe, Gabe Ruiz- ARB
John Kelly- EPA Region 9
Sam Longmire- Northern Sierra

II. Administrative Items

1. Approval of minutes from March 9, 2017 meeting. Jillian to incorporate edits to minutes from Molly. Approved.
2. Additions or Changes to the Agenda. None.
3. May 10 & 11 Meeting in Sacramento.
    i. Location will be SacMetro AQMD. Rooms are reserved for the afternoon of 5/10 and morning of 5/11. On 5/10 there will also be an EITAC meeting in the morning as well for those who are interested.
    ii. Molly P. recommends getting attendees from OPR, CAPCOA, and ARB (e.g. biomass working group) to the meeting. She will send a list of ideas.
    iii. Barbara R. suggested Chris from OPR as a speaker to give an update on SB 743.
    iv. Sam L. volunteered to report back on the EITAC meeting from the



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morning of 5/10.

**Action Item: Email Jillian with agenda topics.**

III. General Discussion Items

1. Implementation of AB197 Inventory Requirements, Gabe Ruiz, CARB

AB 197 requires ARB to develop a way to display CAPs, toxics, GHGs for facilities subject to mandatory reporting by Jan 1, 2018. ARB released the integrated emissions visualizations tool, with GHG and CAP data, in Dec 2016. The tool is an interactive platform to view facilities and allows for download of data on ARB's website. Users can select facilities by name, location, or industrial sector; view their reported emissions using maps, charts and tabular formats; and download data for later use.

Prior to releasing tool, ARB did extensive outreach to district management and inventory staff to give everyone an opportunity to review and resolve quality issues. ARB provided districts with facilities considered high priority, high emissions, or missing data to help match IDs from CEIDARs to the GHG database. ARB also identified facilities that need more review and asked districts to verify trends.

ARB is planning on release of the tool in mid-May- June with updated data. The tool will include GHG and CAP data for 2008-2015, as well as improved facility crosswalks between GHG and CAP database. The tool will also include layers for Enviroscreen 3.0, oil and gas fields, and sub facility locations.

The next steps are to add toxics to the tool by the end of the year (with fall review by districts), and a webinar in May. ARB will coordinate with industry for review as well. The goal is to release the tool by Dec 29 of this year, and by March/April 2018 to revise it to include 2016 data.

Molly P. asked about ARB's facility search engine—hazard index, HRA values, etc. Were they going to make sure that info is the same conveyed by districts? Gabe said that the facility search engine has been around since 2005 (or before) and is currently linked to CEIDARs. There is potential for the new tool and the search tool to give slightly different emissions risk if CEIDARS is updated more recently. However, ARB is looking to update the table at the same time. The difference between the new tool and the facility search engine tool that with the new tool users can get multiple years of emissions, but the facility search tool only gives you one year at a time.

Sondra asked if for toxics data will be reported or risk info will be on the new tool. Gabe is thinking of doing weighted emissions but hasn't settled on anything yet; this will be subject to review and comment by the districts. Jillian said South Coast is using OEHHA recommended methods.

**Action Item: Gabe will send us a link to the tool.**



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IV. Subcommittees and Work Groups

1. Legislative Update, Larry Robinson.

This week is spring recess for the state legislature. The last day for the policy committee to hear bills with fiscal implications is 3/28. Policy oriented bills have until 5/12. The legislative year ends in September.

AB 476 updates the statutory definition of heavy-duty vehicles and defines medium-duty vehicles. CAPCOA opposed the bill, particularly the change in weight classification of heavy trucks 6,000 tons to 26,000 tons. CAPCOA supported AB 1132, which provides more flexibility for the APCO to issue abatement orders without a hearing board. CAPCOA also supported SB 563, which sets aside funds for creating wood smoke reduction projects.

SB 1, a transportation reform and funding package, is moving forward. It may, however, negatively impact heavy duty truck regulation. Section 18 of the bill may make it difficult for regulators to require trucking companies to replace old, high-mileage trucks. Trucks must be at least 13 years old before companies can be forced to buy new ones — unless there are incentives to do so.

Larry sent out a matrix earlier; bills in bold on the matrix were those amended in the last month. Several those bills are no longer on list because they were gutted and amended. For example, AB 932 was previously related to affordable housing, but something else.

Sondra S. asked about SB 48, which makes existing federal laws – like the Clean Air and Clean Water Acts – enforceable under California law. Feather River had sent in come comments. Larry said CAPCOA is looking for support if the bill is amended. Implementation of the bill will be hard without it being re-worked. Mark L. said that CAPCOA attorneys are working on language and this is going to the CAPCOA board shortly.

Ben E. had a question about SB 1- it seems like ARB can't implement any more restrictive regulations. Larry said that is correct but he is not sure if the language will be interpreted that way; he will present a couple of different analyses to the group over the next few weeks. Jillian W. said South Coast was not in favor of the bill, and would check to see if a comment letter was submitted by South Coast. If so, she would share the letter with the group. Because the South Coast's 2016 AQMP relies on early deployment of clean vehicles and fleets, the bill might affect implementation of those measures in the sense of loosening of requirements that allow trucks to be used in service longer. Larry said Sacramento didn't weigh in, but CAPCOA did weigh in. Larry said he has also heard the argument that the bill provides real benefit to not allow trucks in violation to not be re-registered by DMV instead of ARB which is a tradeoff and may be more effective in reducing emissions that 13 additional years' timeframe. Larry said either Brendan or he can do a short talk at the May mtg.

Molly P asked about AB 398, which requires joint meetings of ARB and districts. Larry said the bill requires ARB to coordinate more with big 5 air districts (Imperial Valley, SacMetro, San Joaquin, South Coast, and Bay Area)



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**Action Item: Larry will be working from home for a little bit so please call him on his cell 530-845-3855 with any additional questions. South Coast did not send a comment letter on SB1.**

2. CalEEMod Working Group, Barbara Radlein

Trinity is working on updating CalEEMod to incorporate title 24 standards; they have completed 60% of the work. Two bug related to GHG report and user-define phase name have been fixed. They are also working on programming error types into the model.

Trinity is also fixing a few extra things without extra charge. For example, they are going to switch their installer without extra $. Currently they use installshield, but it is causing problems. Trinity is going to use WIX to separate installation folder from working folder and use as an installer. This will save time, esp. during test runs.

The focus group will be working on some consultant suggestions for future upgrades. By early April/May they will have a beta to play with, and plan to launch by June. The hardest part of beta testing will be title 24 stuff.

3. Climate Change Focus Group. No update.

V. EPA Update, John Kelly

EPA is moving fwd with their ozone designations and October target date. Before that happens, 120 day letters will be sent out in June and will go into the federal register.

VI. CARB Update, Earl Withycombe

At the March meeting, ARB adopted state strategy for SIP which lays out schedule and focus for additional motor vehicle controls for ozone and PM standards. They also adopted the SCLP strategy.

On the workshop front, a March 29 webinar looked at the potential for gentrification displacement because of increasing alternative transportation modes to disadvantaged communities. The webinar was based on a study by ARB and Berkeley which looked at relationships between fixed rail transportation and displacement in the Bay area and LA. There was an originally scheduled April 6 workshop to discuss the fiscal 17/18 funding plan for LTCOP, as well as the VW settlement. However, this workshop is now postponed with no new date announced. On April 25, ARB is going to hold a workshop on potential strategies for construction technologies for advancing clean truck technologies under the requirements of SB 350; strategies will include proposals to remove barriers for transportation electrification. On April 27, there will be a workshop to consider proposed revisions to Moyer. On April 24, ARB will host a webinar on modeling household vehicle choice. The webinar is based on work funded by ARB support the development and analysis of strategic community plans aligned with RTP SCS. Lastly, ARB is holding a seminar on May 3 on lifecycle analysis of cool pavements in conjunction with Lawrence Berkeley National Laboratory.



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On the grant end, ARB has announced a grant solicitation for applications for car sharing/mobility to bring benefits of clean transportation to disadvantaged communities. Applications due 5/22.

At the end of march, ARB released study on benefits of active transportation on air quality. Will provide link. ARB is reviewing draft guidance in response to SB 350 to help overcome barriers for clean transportation access in low income communities.

Barbara R. asked about the recent appellate court decision in POET vs. ARB, a legal challenge to ARB's Low Carbon Fuel Standard regulations. Earl said he doesn't know about it but he will track it down and include it in his report.

**Action Item: Earl will send out report (sent 5/2).**

VII. District Updates

- Monterey has an open recruitment for a planner to work on the emissions inventory, smoke management programs, and CEQA among other things. Closes next wed.
- BAAQMD is bringing its CAP to its board next Wed.
- Antelope and Mojave ozone plans was adopted on March 21. Hasn't been forwarded to state yet.
- No lawsuits yet related to South Coast's AQMP.
- Santa Barbara is starting a smoke reduction incentive program.
- Charles A. asked if SacMetro can get resource needs for the May meeting.

**Action Item: Jillian W. to coordinate resource needs with SacMetro for May meeting.**

VIII. Adjourn

Next Meeting: At the Sacramento Metropolitan AQMD, May 10th & 11th

For additional information, contact Jillian Wong, Planning & Rules Manager at SCAQMD and Chair, CAPCOA Planning Managers Committee, at (909) 396-3176 or jwong1@aqmd.gov.



ED_001361_00014757

**To:** Jessica L. Wood[Wood.Jessica@azdeq.gov]
**Cc:** Kay, Rynda[Kay.Rynda@epa.gov]; Williams, Jennifer[Williams.Jennifer@epa.gov]
**From:** LAWRENCE, LAURA
**Sent:** Wed 2/8/2017 9:29:52 PM
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Jessica,

No problem—that happens! We definitely understand! Do you have anytime at all today to talk? I'm working until 4pm Pacific Time and have no meetings. (I think Rynda and Jennifer have some conflicts, but I can fill them in if only you and I are able to connect.) 415-972-3407. If not, I'll try you later this week.

Thanks!

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 08, 2017 1:26 PM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am so sorry, I just had a meeting come up for one of my other projects and am going to have to cancel our call this afternoon. Sorry my schedule keeps not working out!

To answer your question though, there isn't an error in the NEI regarding that point source, but ADEQ only looked at state and local permitted major point sources for our analysis (see Chapter 3, page 6 of our recommendation). Please let me know if you have any other questions and we can reschedule our call for later this week or next week.

Again, sorry for this inconvenience!

Thanks,

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

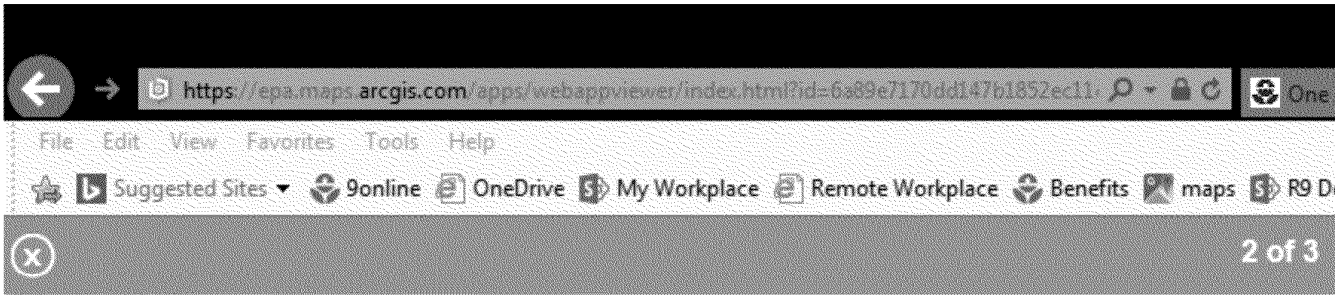
1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 08, 2017 12:21 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Great, thanks! It should just be a quick call. We were looking through the NEI for the Phoenix area, and there seems to be a discrepancy between the NEI data and what was submitted in the

ADEQ recommendation—a large (392tpd NOx) source in the Casa Grande area. It's possible there's an error in the NEI… just trying to get to the bottom of this and hope you can help! Screen shot of the relevant data below is from the ozone mapping tool.

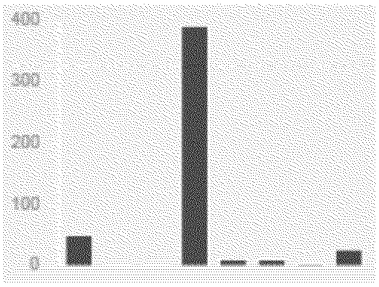



**CASA GRANDE**

EIS ID: 14432311
Facility Source Description: Rail Yard
NAICS Code: 488210 (link takes you to a different site)

Unknown
Unknown, AZ 00000
Latitude: 32.886346
Longitude: -111.772990

*Emissions (in tons):*
CO: 50.72
Lead: 0.00
NH3: 0.15
NOx: 392.94
PM10: 11.12
PM2.5: 10.79
SO2: 3.43
VOC: 27.23

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Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 08, 2017 11:12 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I hope you're feeling better as well! And 2pm pacific time today works for me.

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 08, 2017 12:00 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Jessica,

Sorry for the delay. It was my turn to be out sick. ☹ I hope you're feeling better! Could we call you at about 2pm Pacific Time today?

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Friday, February 03, 2017 8:53 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am out sick today, can we reschedule our call for this afternoon? I am really sorry for the inconvenience. I am free anytime next Wednesday, Thursday, and Friday after 2pm pacific time.

Thanks,

Jessica Wood

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 5:14 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Just sent a meeting invite for 2pm. We'll give you a call. Thanks!

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 01, 2017 4:09 PM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>

**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I can talk any time after 2pm pacific time, let me know what works best for you.

Thanks,

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 4:58 PM
**To:** Heidi Haggerty <Haggerty.Heidi@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Jessica L. Wood <Wood.Jessica@azdeq.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Heidi, congratulations on the new position! I'll miss working with you, but wish you the best!

Jessica, any chance you could chat for a few minutes on Friday afternoon? We're free after 2pm pacific time.

Thanks,
Laura

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Heidi Haggerty [mailto:Haggerty.Heidi@azdeq.gov]
**Sent:** Wednesday, February 01, 2017 1:43 PM
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Hi Laura,

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Jessica Wood

602-771-7576

Wood.Jessica@azdeq.gov

Things are pretty good; hope they are with you, too!

Thanks!

Heidi Haggerty

State Implementation Planner

Planning Unit, Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

602-771-4815

haggerty.heidi@azdeq.gov

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I hope all's well at ADEQ! We've been working through our technical analysis of the ozone designation recommendations, and had a couple of questions about the emissions data for the Phoenix area (section 3.1.2 in the recommendation). I think I remember you saying the technical lead for the project had changed—would it be best for us to work through you for our questions, or is there a new technical person assigned to ozone designations?

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Laura

Laura Lawrence

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**To:** Jessica L. Wood[Wood.Jessica@azdeq.gov]
**Cc:** Kay, Rynda[Kay.Rynda@epa.gov]; Williams, Jennifer[Williams.Jennifer@epa.gov]
**From:** LAWRENCE, LAURA
**Sent:** Wed 2/8/2017 7:21:21 PM
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

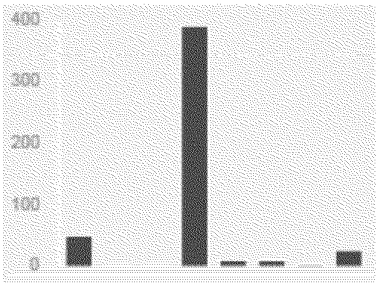
Great, thanks! It should just be a quick call. We were looking through the NEI for the Phoenix area, and there seems to be a discrepancy between the NEI data and what was submitted in the ADEQ recommendation—a large (392tpd NOx) source in the Casa Grande area. It's possible there's an error in the NEI… just trying to get to the bottom of this and hope you can help! Screen shot of the relevant data below is from the ozone mapping tool.

**CASA GRANDE**

EIS ID: 14432311
Facility Source Description: Rail Yard
NAICS Code: 488210 (link takes you to a different site)

Unknown
Unknown, AZ 00000
Latitude: 32.886346
Longitude: -111.772990

*Emissions (in tons):*
CO: 50.72
Lead: 0.00
NH3: 0.15
NOx: 392.94
PM10: 11.12
PM2.5: 10.79
SO2: 3.43
VOC: 27.23




***

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 08, 2017 11:12 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I hope you're feeling better as well! And 2pm pacific time today works for me.

Jessica L Wood

Environmental Scientist & Specialist II | Technical Analysis Unit

Air Quality Division | Arizona Department of Environmental Quality

1110 W. Washington St., Phoenix, AZ 85007

(602) 771-7576 | wood.jessica@azdeq.gov

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 08, 2017 12:00 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Williams, Jennifer <Williams.Jennifer@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Jessica,

Sorry for the delay. It was my turn to be out sick. ☹ I hope you're feeling better! Could we call you at about 2pm Pacific Time today?

Laura Lawrence

Air Planning Office

US EPA Region 9 (AIR-2)

75 Hawthorne St.

San Francisco, CA 94105

(415) 972-3407

**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Friday, February 03, 2017 8:53 AM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

I am out sick today, can we reschedule our call for this afternoon? I am really sorry for the

inconvenience. I am free anytime next Wednesday, Thursday, and Friday after 2pm pacific time.

Thanks,

Jessica Wood

**From:** LAWRENCE, LAURA [mailto:Lawrence.Laura@epa.gov]
**Sent:** Wednesday, February 01, 2017 5:14 PM
**To:** Jessica L. Wood <Wood.Jessica@azdeq.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Just sent a meeting invite for 2pm. We'll give you a call. Thanks!

Laura Lawrence

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San Francisco, CA 94105

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**From:** Jessica L. Wood [mailto:Wood.Jessica@azdeq.gov]
**Sent:** Wednesday, February 01, 2017 4:09 PM
**To:** LAWRENCE, LAURA <Lawrence.Laura@epa.gov>
**Cc:** Kay, Rynda <Kay.Rynda@epa.gov>; Heidi Haggerty <Haggerty.Heidi@azdeq.gov>; Chen, Eugene <Chen.Eugene@epa.gov>; Natalie Muilenberg <Muilenberg.Natalie@azdeq.gov>
**Subject:** RE: questions about emissions discussion in ADEQ O3 designations recommendation

Hi Laura,

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Thanks,

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**To:** LAWRENCE, LAURA[Lawrence.Laura@epa.gov]
**Cc:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]; CHANG, RANDALL[Chang.Randall@epa.gov]; Clover, Fletcher[Clover.Fletcher@epa.gov]
**From:** Grow, Richard
**Sent:** Tue 12/20/2016 4:11:38 PM
**Subject:** Question: Navajo Nation EPA Air Quality Control Program 2015 O3 NAAQS Designation Recommendation
New Mexico-c.pdf
2015 O3 NAAQS Federal Register Final Rule.pdf

Laura

Please take a look at the request from Navajo Nation below, any suggestions for a response (from you ? me ?) appreciated. Since October we have been fielding requests from Navajo to up their air monitoring program, which we fund, from "informational" to "regulatory." A few weeks a go Randy, Fletcher and I had a conversation with Michael King in which we laid our concerns. It seemed likely from the conversation that a main goal of the change in emphasis had to do with their designation under the CAA. Among our requests was that before proceeding any further they provide a written rationale for such a shift.

Richard

**From:** Michael Z. King [mailto:mzking@navajo-nsn.gov]
**Sent:** Thursday, December 15, 2016 3:34 PM
**To:** Grow, Richard <Grow.Richard@epa.gov>
**Cc:** Tennille B. Begay <tbbegay@navajo-nsn.gov>; eugeniaquintana@navajo-nsn.gov
**Subject:** Navajo Nation EPA Air Quality Control Program 2015 O3 NAAQS Designation Recommendation

Hello Richard,

I was wondering if Navajo Nation can still submit a recommendation letter to designate the reservation as attainment/unclassifiable of the revised O3 NAAQS? I understand that October 1, 2016 was the deadline in which states, and any tribes that wish to do so (but is not required), are required to submit their initial O3 designation recommendations for the revised O3 NAAQS. So we are a bit late on submitting the initial designation recommendation for Navajo Nation. I did review the state of New Mexico Environmental Department recommendation (see attached) and

they recommend San Juan County, Rio Arriba County, and Sandoval County to be in attainment of the revised 2015 O3 NAAQS. Navajo Nation trust land makes up portions of these aforementioned counties and we monitor for O3 in San Juan County, at the Shiprock air monitoring site with our 2013-2015 design values indicating attainment of the revised 2015 O3 NAAQS (70ppb).

Thanks,

Michael King

Sr. Environmental Specialist

Navajo Enivronmental Protection Agency

Air Quality Control Program

Route 112 North, Bldg. #2427

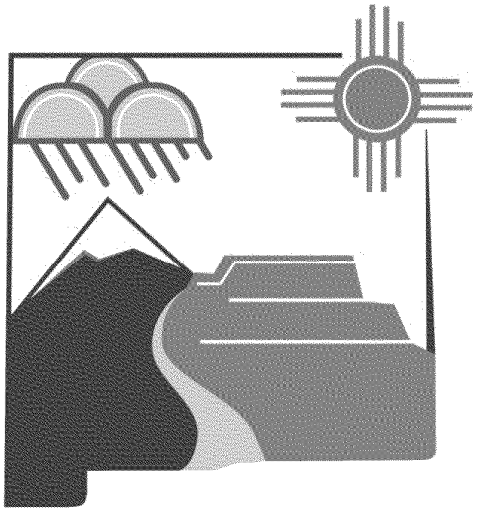
P.O. Box 529 Fort Defiance, AZ 86504

Phone (505) 368-1046

Fax (505) 398 1042

NMED

New Mexico Environment Department



# 2015 Ozone NAAQS

## DESIGNATION RECOMMENDATION REPORT

Air Quality Bureau

September 2, 2016

ED_001361_00014973

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ED_001361_00014973

# 1 Introduction

On October 1, 2015, the United States Environmental Protection Agency (EPA) revised the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) from 0.075 parts per million to 0.070 parts per million (ppm) (80 FR 65291; October 26, 2015). Section 107(d)(1)(A) of the Federal Clean Air Act (CAA) requires states to submit to EPA recommendations on area designations no later than one year after the promulgation of a new or revised NAAQS. Areas are to be identified as attainment, nonattainment, or unclassifiable. The deadline for submitting these recommendations is October 1, 2016.

The State of New Mexico recommends that the counties under the jurisdiction of the New Mexico Environment Department (NMED), exclusive of tribal lands and Bernalillo County, be designated as identified in Table 1-1 below. These recommendations rely on air quality monitoring data using the most recent three consecutive years of quality-assured data (2013-2015) and EPA's February 25, 2016 Memorandum, Area Designations for the 2015 Ozone National Ambient Air Quality Standards (Guidance Memo), as the basis for its recommendations. The Guidance Memo can be found on EPA's website at www.epa.gov/ozone-designations/ozone-designations-guidance-and-data. The data for 2013-2015 for all ozone monitors are presented in Appendix A.

NMED conducted an analysis to determine whether New Mexico would recommend the presumptive boundary for Doña Ana County area designation, or propose an alternate boundary. EPA recommends that the Core Based Statistical Area (CBSA) serve as the presumptive boundary when considering the geographic boundaries of an ozone nonattainment area. Since the CBSA that covers Doña Ana County includes El Paso and Hudspeth Counties in Texas, NMED will use the Las Cruces Metropolitan Statistical Area (MSA). The Las Cruces MSA includes the entirety of Doña Ana County and serves as the presumptive boundary. To assist with the nonattainment boundary recommendation, NMED evaluated the 5 factors listed in Attachment 3 of the Guidance Memo, as follows:

- Air quality data;
- Emissions and emissions-related data;
- Meteorological data;
- Geography/topography; and
- Jurisdictional boundaries.

Based on the results of the analysis, NMED has decided to recommend an area smaller than the Las Cruces MSA as nonattainment.



ED_001361_00014973

**Table 1-1: New Mexico County Designation Recommendations for the 2015 Ozone NAAQS.**

| County | 2013-2015 Design Value (ppm) | Designation Recommendation |
|---|---|---|
| Bernalillo County | Not in NMED's jurisdiction | Not in NMED's jurisdiction |
| Catron County | No data | Attainment/Unclassifiable |
| Chaves County | No data | Attainment/Unclassifiable |
| Cibola County | No data | Attainment/Unclassifiable |
| Colfax County | No data | Attainment/Unclassifiable |
| Curry County | No data | Attainment/Unclassifiable |
| De Baca County | No data | Attainment/Unclassifiable |
| Doña Ana County | La Union --- 0.066 | **Nonattainment - partial** |
| | Chaparral --- 0.067 | |
| | **Desert View --- 0.072** | |
| | **Santa Teresa --- 0.072** | |
| | Solano --- 0.065 | |
| Eddy County | Carlsbad --- 0.069 | Attainment |
| Grant County | No data | Attainment/Unclassifiable |
| Guadalupe County | No data | Attainment/Unclassifiable |
| Harding County | No data | Attainment/Unclassifiable |
| Hidalgo County | No data | Attainment/Unclassifiable |
| Lea County | Hobbs --- 0.067 | Attainment |
| Lincoln County | No data | Attainment/Unclassifiable |
| Los Alamos County | No data | Attainment/Unclassifiable |
| Luna County | No data | Attainment/Unclassifiable |
| McKinley County | No data | Attainment/Unclassifiable |
| Mora County | No data | Attainment/Unclassifiable |
| Otero County | No data | Attainment/Unclassifiable |
| Quay County | No data | Attainment/Unclassifiable |
| Rio Arriba County | Coyote Ranger District --- 0.065 | Attainment/Unclassifiable |
| Roosevelt County | No data | Attainment/Unclassifiable |
| Sandoval County | Bernalillo --- 0.065 | Attainment |
| San Juan County | Bloomfield --- 0.064 | Attainment |
| | Navajo Lake --- 0.067 | |
| | Substation --- 0.063 | |
| San Miguel County | No data | Attainment/Unclassifiable |
| Santa Fe County | Santa Fe Airport --- 0.064 | Attainment/Unclassifiable |
| Sierra County | No data | Attainment/Unclassifiable |
| Socorro County | No data | Attainment/Unclassifiable |
| Taos County | No data | Attainment/Unclassifiable |
| Torrance County | No data | Attainment/Unclassifiable |
| Union County | No data | Attainment/Unclassifiable |
| Valencia County | Los Lunas --- .066 | Attainment/Unclassifiable |
| (**Bold** – exceeds NAAQS) | | |



ED_001361_00014973

# 2 Air Quality Data

The ozone monitoring network in Doña Ana County contains 5 federal regulatory design-value monitors operated and maintained in accordance with 40 CFR Parts 50, 53, and 58. Table 2-1 below contains information on the current ozone monitors in Doña Ana County. To determine compliance with the 2015 Ozone NAAQS, a design value must be calculated to compare to the level of the standard. The design value is determined by the 3-year average of the annual 4th highest 8-hour ozone average.

**Table 2-1: Doña Ana County Monitoring Data (ppm).**

| Site Name | AQS ID # | 4th Max 8-hour Average | | | Design Value (2013 – 2015) |
|---|---|---|---|---|---|
| | | 2013 | 2014 | 2015 | |
| **Desert View** | **35-013-0021** | **.071** | **.072** | **.074** | **.072** |
| **Santa Teresa** | **35-013-0022** | **.080** | .066 | .070 | **.072** |
| La Union | 35-013-0008 | .067 | .065 | .070 | .066 |
| Chaparral | 35-013-0020 | .069 | .067 | .065 | .067 |
| Solano Road | 35-013-0023 | .064 | .066 | .066 | .065 |
| (**Bold** – exceeds NAAQS) | | | | | |

Within the Doña Ana County monitoring network, two monitors have recorded levels that exceed the revised 8-hour ozone standard of 0.070 ppm for the years 2013-2015 (Figure 2-1). Both the Desert View and Santa Teresa monitors have a 2013-2015 design value of 0.072 ppm. Other monitors within Doña Ana County have design values between 0.065 and 0.067 ppm. Figure 2-2 below shows the location of ozone monitoring sites in Doña Ana County.

**Figure 2-1: Doña Ana County 2013-2015 Ozone Monitoring Data.**

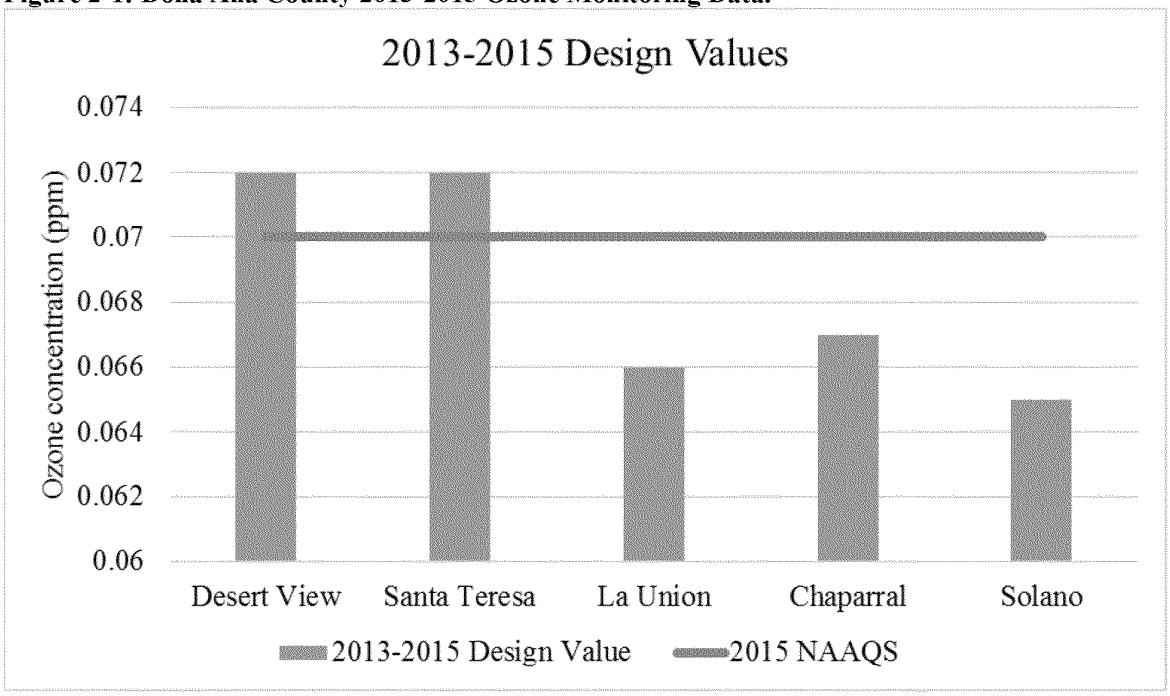




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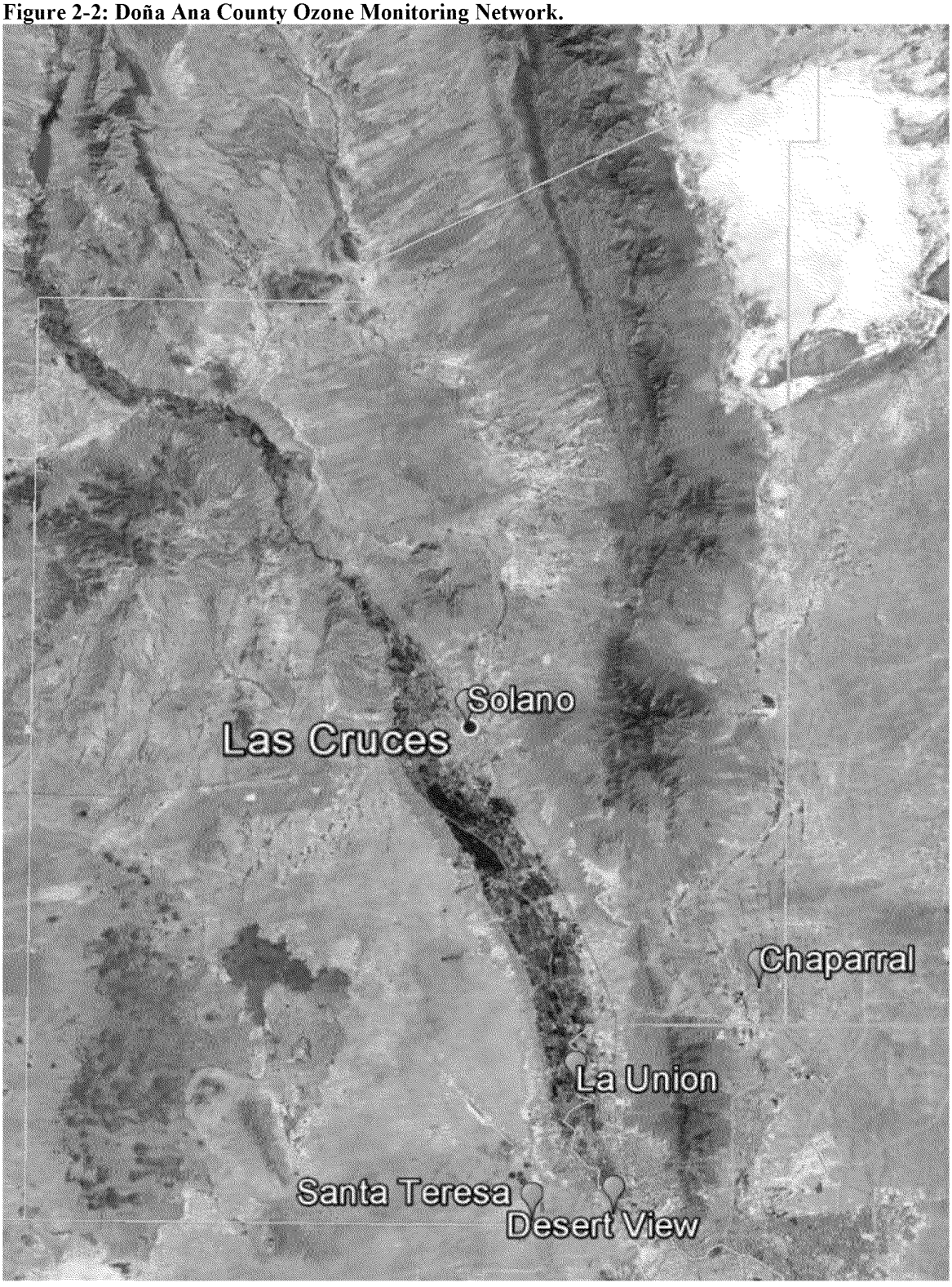
**Figure 2-2: Doña Ana County Ozone Monitoring Network.**



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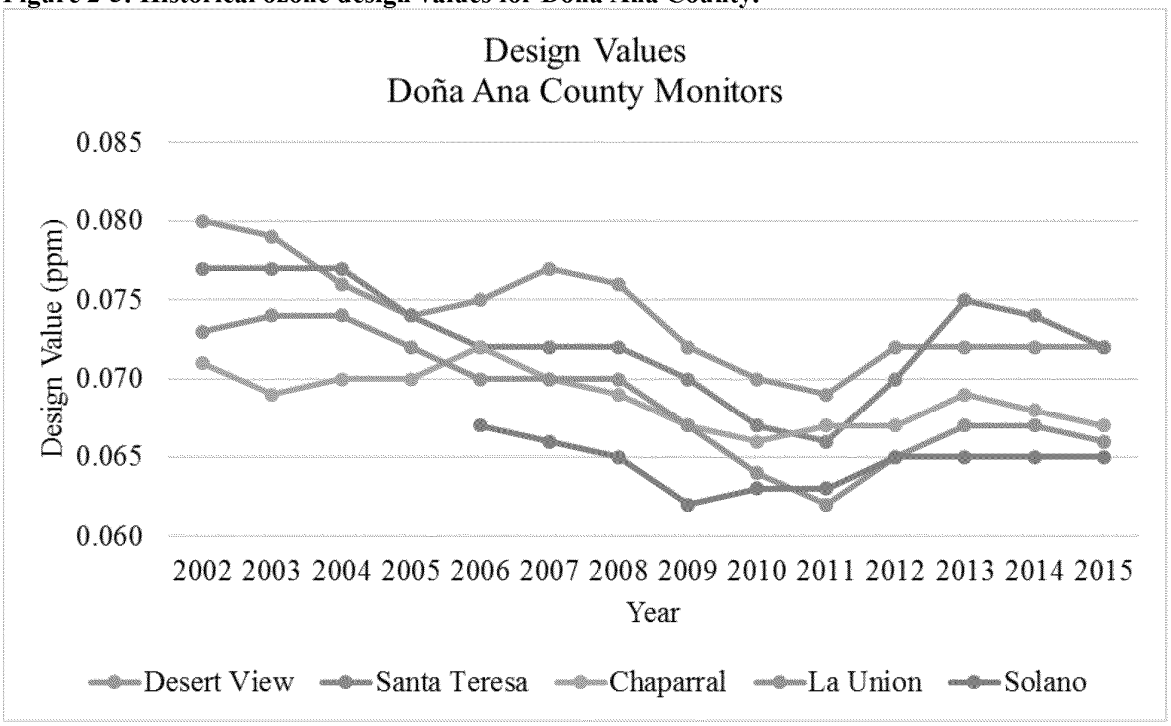
The two monitors that violate the NAAQS are both located in the southern-most portion of the county, north of Mexico and west of Texas. The monitors are located in the city of Sunland Park and the unincorporated area of Santa Teresa, New Mexico, near the international border with Mexico and the state line of Texas.

Established in June 2004, the Desert View monitor is located at 5935 Valle Vista in Sunland Park, New Mexico at an elevation of 3860 feet. This monitoring site measures $NO_2$, $O_3$, $PM_{10}$, $PM_{2.5}$, and meteorological data. Also established in June 2004, the Santa Teresa monitor is located at 104-2 Santa Teresa International Blvd, west of Sunland Park, New Mexico at an elevation of 4100 feet. This monitoring site measures $NO_2$, $O_3$, and meteorological data.

Historical 8-hr ozone design values for the Doña Ana County ozone monitors are shown in Figure 2-3 below.

**Figure 2-3: Historical ozone design values for Doña Ana County.**




# 3 Emissions and Emissions-related Data

Ozone is not emitted directly from specific sources, but rather is formed as the result of complex atmospheric processes of precursor gases. The primary precursor pollutants are nitrogen oxides ($NO_x$) and Volatile Organic Compounds (VOC). To determine the sources and levels of $NO_x$ and VOC, NMED evaluated emissions data from Doña Ana County and nearby sources using the 2011 National Emissions Inventory (2011 NEIv2). For purposes of this analysis, NMED interpreted nearby sources to include those sources located in counties (U.S.) and municipalities (Mexico) surrounding the violating monitors within the El Paso-Las Cruces CBSA.



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## 3.1 $NO_x$ Emissions

Total $NO_x$ emissions in Doña Ana County were estimated at 11,506 tons/year for 2011. On-road mobile sources comprise the majority of $NO_x$ emissions, with 7,535 tons/year or 65% of all $NO_x$ emissions. Area sources account for the second largest amount of $NO_x$ emissions, with 2,278 tons/year. One point source in the county, the Rio Grande Generating Station, emitted more than 100 tons/year of $NO_x$ (717 tons/year), accounting for 84% of point source $NO_x$ emissions. The nearby counties have a similar emissions profile, as shown in Figure 3-1.

Emissions data for Ciudad Juárez is coarser than that for the U.S. counties, being classified only by area, mobile, and point sources. For purposes of comparison, NMED classified emissions into these three source categories by including fire emissions into area sources and combining nonroad and onroad emissions into mobile sources. Although a similar pattern for Cd. Juárez emission sources is seen in Figure 3-2, point sources account for a much larger portion of total $NO_x$ emissions.

**Figure 3-1: $NO_x$ emissions by county and source category.**

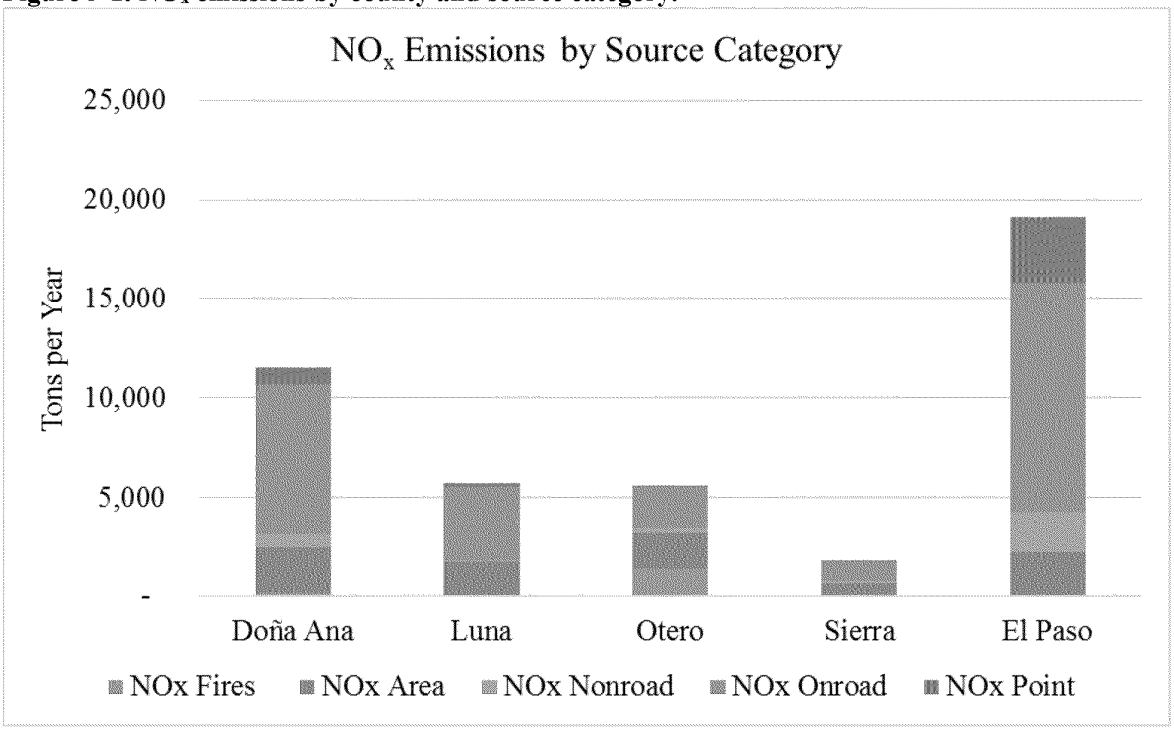




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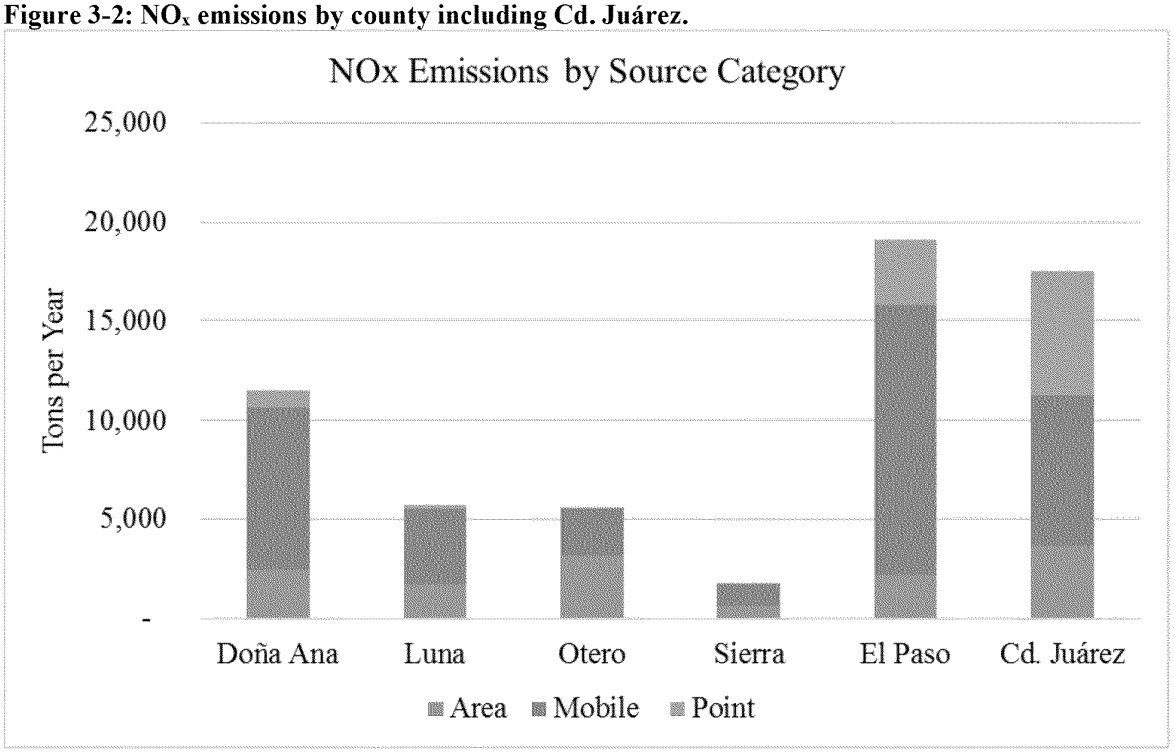
**Figure 3-2: $NO_x$ emissions by county including Cd. Juárez.**




The areas with the highest $NO_x$ emissions – Doña Ana County, El Paso County, and Cd. Juárez – comprise the Paso del Norte Airshed. El Paso County and Cd. Juárez account for 76% of total $NO_x$ emissions in the airshed (Figure 3-3). Facilities in El Paso County and Cd. Juárez account for 92% of point source $NO_x$ emissions in the airshed (Figure 3-4).



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**Figure 3-3: Percentage of total $NO_x$ emissions in the Paso del Norte Airshed.**

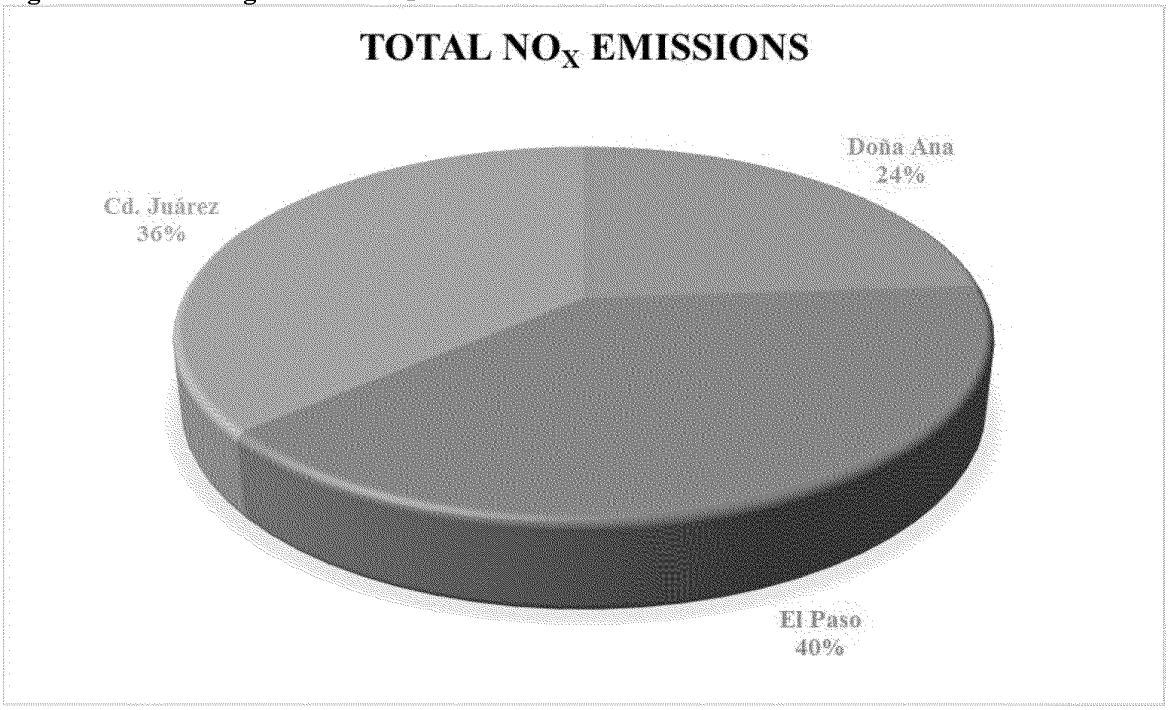
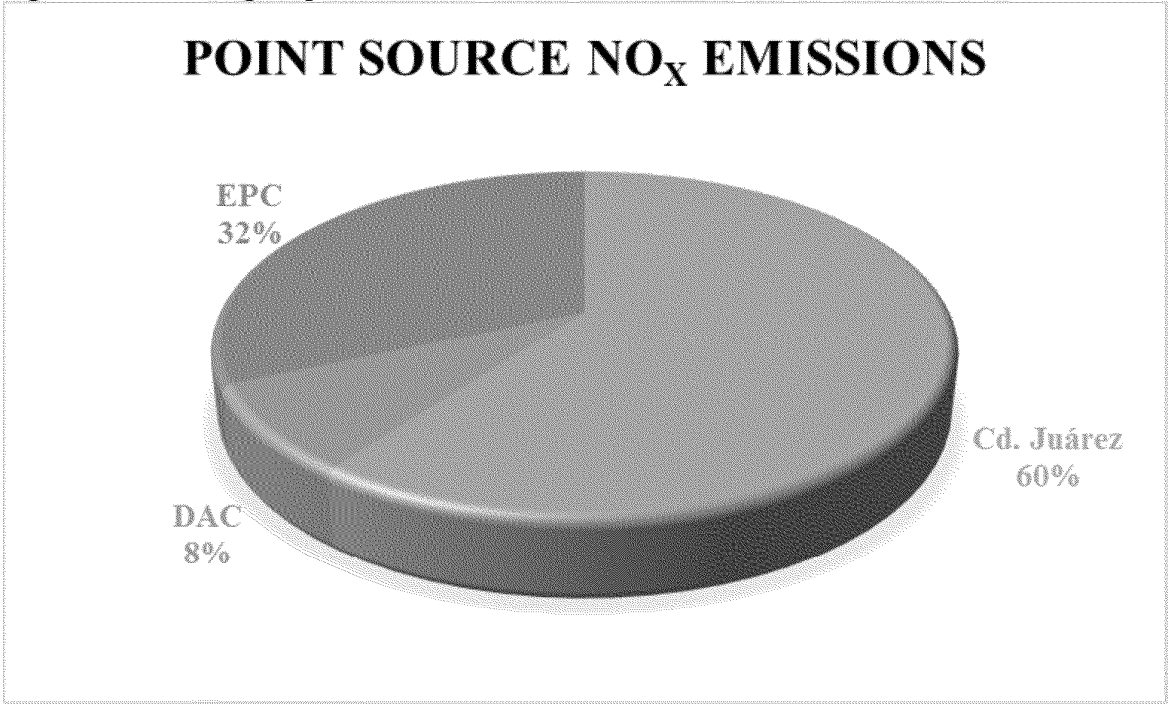



**Figure 3-4: Percentage of point source $NO_x$ emissions in the Paso del Norte Airshed.**



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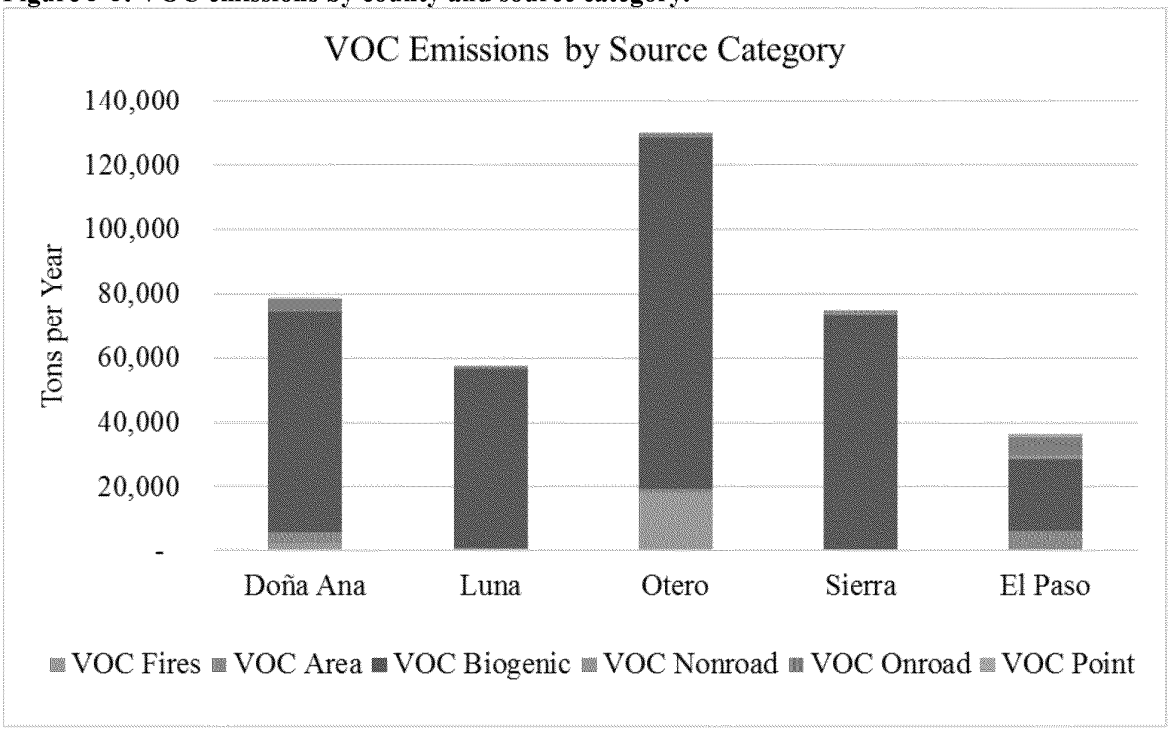
## 3.2 VOC Emissions

Total VOC emissions for Doña Ana County were 78,432 tons/year in 2011. Biogenic emissions from plants and soil account for the largest source of emissions, with 68,667 tons/year or approximately 88% of all emissions. On-road mobile and area sources account for nearly the same amount of VOC emissions, with 3,154 tons/year and 3,140 tons/year respectively, followed by fires, with 2,869 tons/year. Most of the nearby counties follow this pattern with the exception of Otero County, which had much higher VOC emissions from fire than the other counties. This is most likely due to the 2011 Donaldson wildfire in the Lincoln National Forest.

**Figure 3-5: VOC emissions by county and source category.**




Similar to the $NO_x$ emissions profile, the data for Cd. Juárez was classified only by area, mobile, and point sources. To compare emissions from the U.S. and Mexico, NMED classified emissions into these three source categories, but did not include biogenic VOC emissions. Although a similar pattern for Cd. Juárez emission sources is seen in Figure 3-6, area sources account for a much larger portion of total VOC emissions, excluding Otero County where fire accounted for 94% of area source VOC emissions in 2011.

In the Paso del Norte Airshed, El Paso County and Cd. Juárez account for 84% of total VOC emissions in the airshed (Figure 3-7). Facilities in El Paso County and Cd. Juárez account for 99% of point source VOC emissions in the airshed (Figure 3-8).



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**Figure 3-6: VOC emissions by county including Cd. Juárez.**

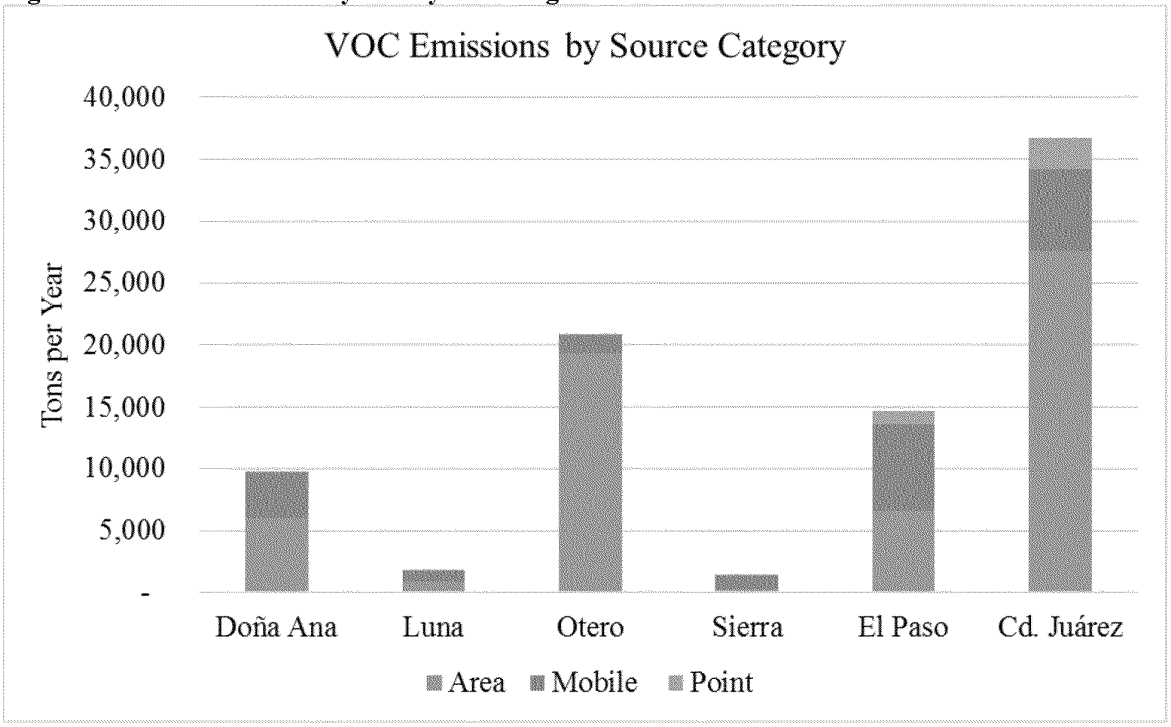


**Figure 3-7: Percentage of total VOC emissions in the Paso del Norte Airshed.**

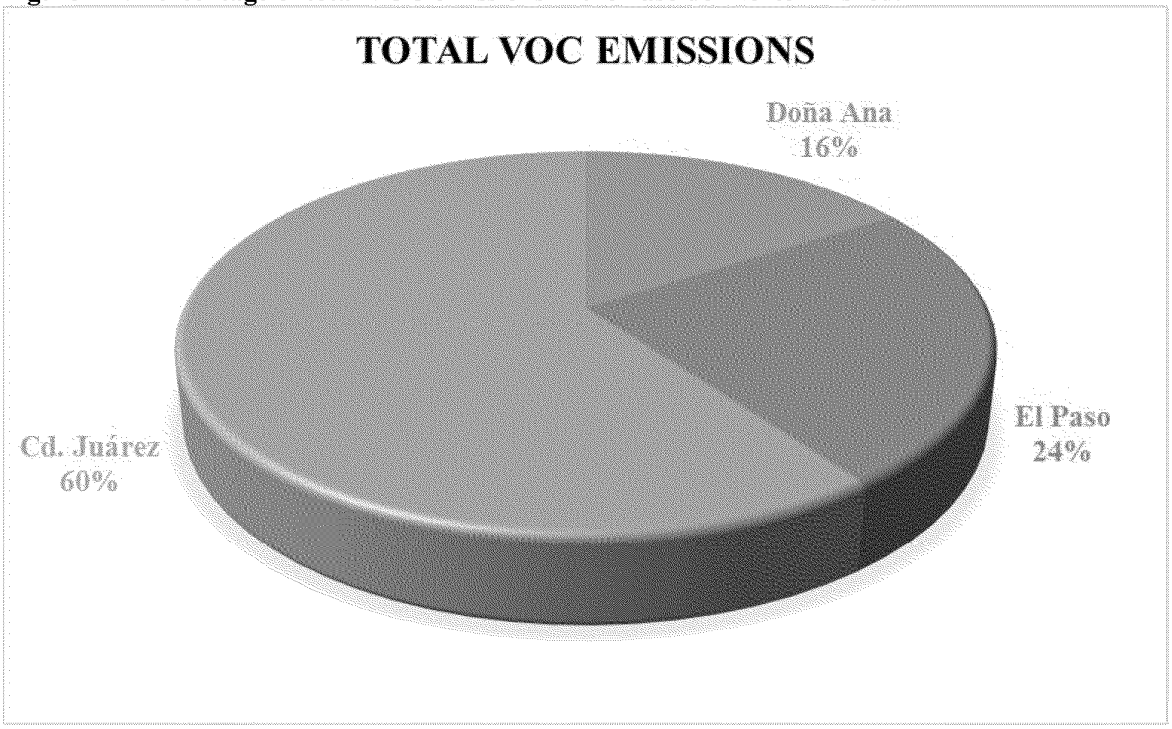




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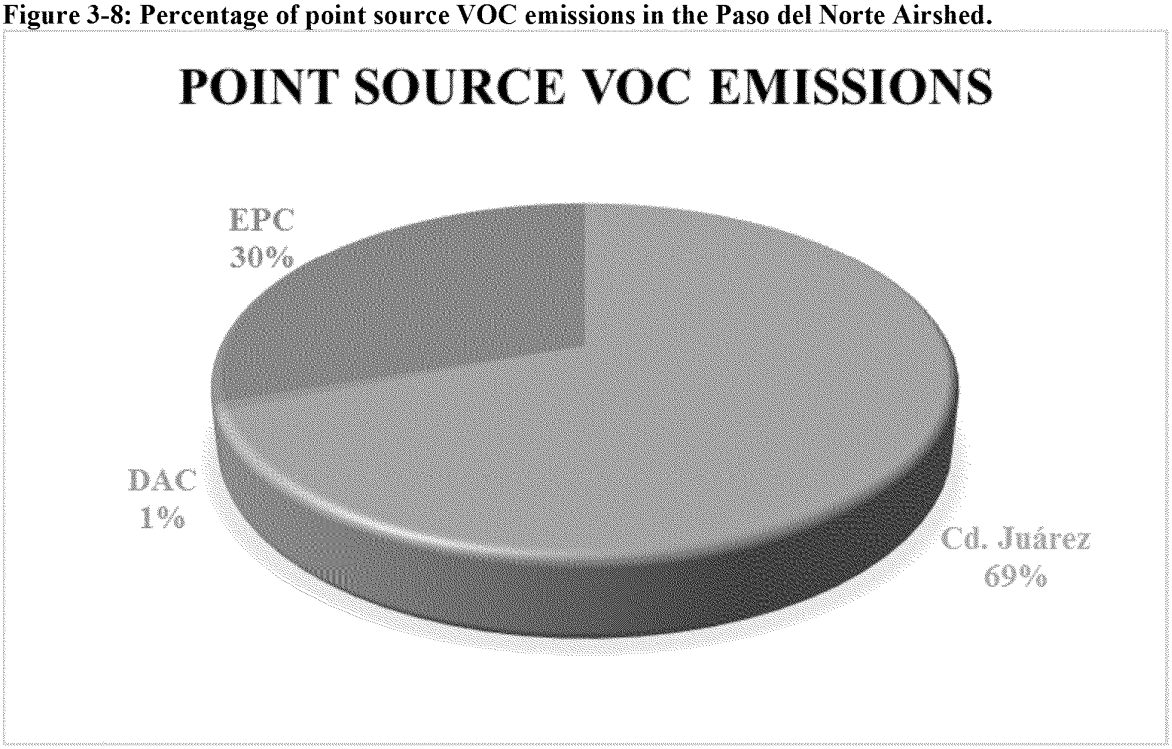
**Figure 3-8: Percentage of point source VOC emissions in the Paso del Norte Airshed.**




## 3.3 Population and Degree of Urbanization

Population estimates and related data were obtained from the U.S. Census Bureau and the National Institute of Statistics and Geography in Mexico and are summarized in Table 3-1, below. Estimates for 2014 indicate that approximately 2.4 million people live in Doña Ana County, El Paso County and Cd. Juárez. The majority of the population in the airshed lives in the heavily urbanized areas in the city of El Paso and Cd. Juárez. Doña Ana County residents make up approximately 9% of this population with the majority living in and around the city of Las Cruces, nearly 40 miles to the north of the violating monitors.

To estimate the population in Doña Ana County living near the violating monitors, NMED used 2014 U.S. Census estimates from the city of Sunland Park, and the Census Designated Places of La Union and Santa Teresa (Sunland Park Area). These areas cover approximately 26.5 $mi^2$ with a population of 20,324. Although the resulting population density of 767 people/$mi^2$ would classify this area as rural, the U.S. Census Bureau classifies them as urban due to the close proximity and interconnectedness to El Paso and Cd. Juárez.

**Table 3-1: Population and Population Density.**

| | Doña Ana County | El Paso County | Cd. Juárez | Sunland Park Area |
|---|---|---|---|---|
| Population | 212,942 | 823,862 | 1,341,717 | 20,324 |
| Land Area ($mi^2$) | 3,808 | 1,013 | 73 | 26.5 |
| Density (people/$mi^2$) | 56 | 813 | 18,380 | 767 |



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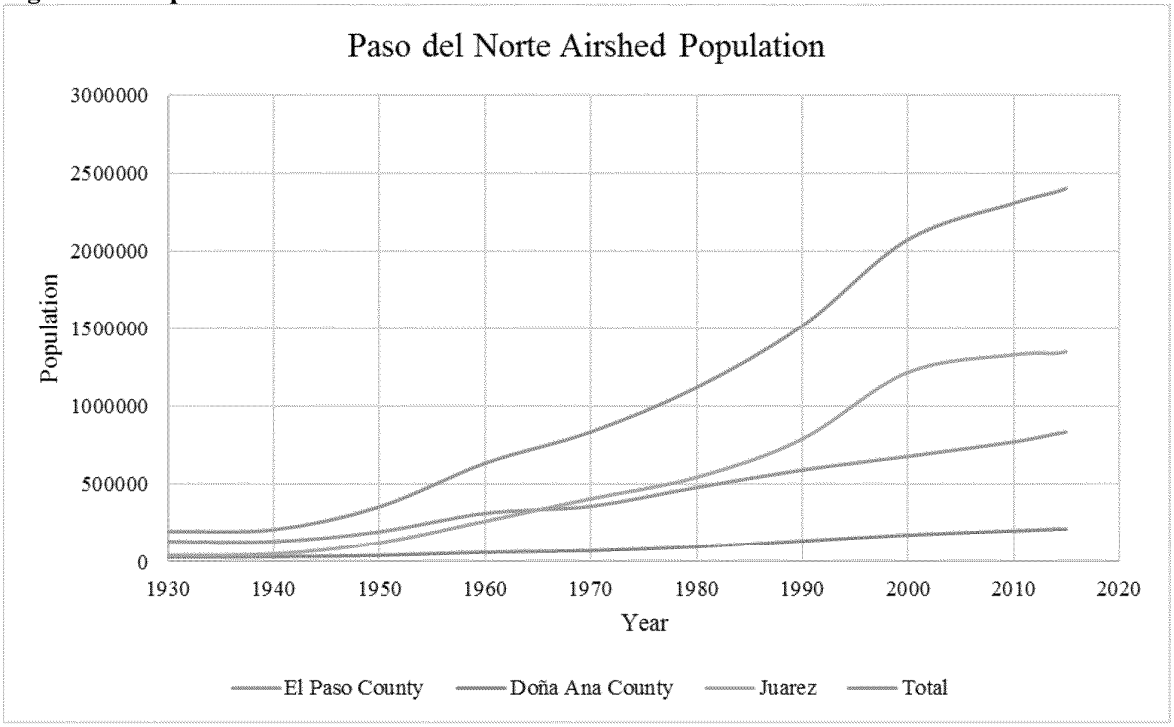
After experiencing steady population growth of 4.2% annually throughout the 20th century, Doña Ana County, El Paso County, and Cd. Juárez saw slow to moderate growth from 2000 to 2010 with a 1.1% annual growth rate. This slowdown in growth continued from 2010 to 2014. Much of these population trends are driven by the core urban areas of El Paso and Cd. Juárez (Figure 3-9).

From 2010 to 2014 the Sunland Park Area grew from 18,903 to 20,324 residents for an annual growth rate of 1.9%. Although this is much larger than the 0.79% growth rate for the entire area during this time, the absolute number of people is small.

**Figure 3-9: Population trends in the Paso del Norte Airshed.**




## 3.4 Traffic and Commuting Patterns

The major thoroughfares in Doña Ana County are Interstate 25 and Interstate 10. Most vehicular traffic in the county is concentrated in the central and southern parts of the county, in and around Las Cruces, as well as along Interstate 10 which connects to El Paso. Using the Vehicle Miles Traveled (VMT) spreadsheet provided by EPA, Doña Ana County had a total VMT of 2.3 billion miles in 2011. El Paso County had more than double this VMT in 2011 with a total of 5.6 billion miles.

In the Sunland Park Area, the majority of vehicular traffic is limited to a few major thoroughfares, including but not limited to NM Hwy. 28, McNutt Rd., the Pete V. Domenici Memorial Hwy., Country Club Rd., Sunland Park Dr., and Racetrack Dr. Using average daily traffic (ADT) data provided by the El Paso Metropolitan Planning Organization (Appendix B),



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NMED calculated the Sunland Park Area's VMT to be 62.9 million or 2.7% of the total county VMT (Table 3-2).

**Table 3-2. VMT for the Sunland Park Area.**

| Road/Highway | Distance in miles | ADT | VMT |
|---|---|---|---|
| Hwy 225 | 3.35 | 4,560 | 5,575,740 |
| Hwy 28 | 5.91 | 5,510 | 5,950,778 |
| Hwy 183 | 1.00 | 1,080 | 394,200 |
| Hwy 182 | 0.98 | 2,010 | 718,977 |
| Alvarez Rd/Hwy 273 | 8.08 | 11,410 | 7,233,862 |
| McNutt Rd/Hwy 273 | 6.69 | 34,050 | 20,331,814 |
| Pete Domenici/Hwy 136 | 7.55 | 18,360 | 15,090,852 |
| Airport Rd | 1.55 | 2,920 | 1,651,990 |
| Sunland Park Dr | 0.5 | 15,390 | 2,808,675 |
| Racetrack Dr | 0.9 | 1,860 | 611,010 |
| Country Club Rd | 0.57 | 12,360 | 2,571,498 |
| **Total** | **37.08** | **109,510** | **62,939,396** |

According to U.S. Census Bureau's 2009-2013 American Community Survey, 14,423 or 16.6% of Doña Ana County residents travel to another county for work (Table 3-3). Although only 5.8% of El Paso County residents travel to another county for work, the absolute number of commuters is the greatest at 18,901. For the remaining counties in New Mexico, 3,991 residents travel to another county for work.

**Table 3-3. Travel patterns to work by county.**

| County Name | Total Workers | Work in Another County | Percent |
|---|---|---|---|
| Doña Ana County | 86,740 | 14,423 | 16.6% |
| Luna County | 8,538 | 1,059 | 12.4% |
| Otero County | 24,232 | 2,827 | 11.7% |
| Sierra County | 3,740 | 105 | 2.8% |
| El Paso County | 326,519 | 18,901 | 5.7% |
| **Total** | **449,769** | **37,315** | **8.3%** |

Approximately 42% of all inter-county work trips originated in Doña Ana County with a final destination of El Paso County (Table 3-4). Trips originating in El Paso County with a destination of Doña Ana County comprise nearly 29% of all inter-county work trips. More than 70% of the work trips in the region occur between Doña Ana County and El Paso County. Approximately 14% of residents in the U.S. travel to Mexico for work with most of the commuters residing in El Paso County. Another 8.6% of inter-county work trips originate in Luna, Otero, or Sierra Counties with a final destination of Doña Ana County or El Paso County.



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**Table 3-4. Inter-county work trips.**

| Residence | Place of Work | Commuting Flow | Percent of Total |
|---|---|---|---|
| Doña Ana County | Luna County | 372 | 1.3% |
| Doña Ana County | Otero County | 528 | 1.9% |
| Doña Ana County | Sierra County | 245 | 0.9% |
| Doña Ana County | El Paso County | 11,941 | 42.0% |
| Doña Ana County | Mexico | 105 | 0.4% |
| Luna County | Doña Ana County | 339 | 1.2% |
| Luna County | El Paso County | 55 | 0.2% |
| Luna County | Mexico | 70 | 0.2% |
| Otero County | Doña Ana County | 820 | 2.9% |
| Otero County | El Paso County | 1,181 | 4.2% |
| Sierra County | Doña Ana County | 21 | 0.1% |
| El Paso County | Doña Ana County | 8,211 | 28.9% |
| El Paso County | Luna County | 263 | 0.9% |
| El Paso County | Otero County | 550 | 1.9% |
| El Paso County | Mexico | 3,740 | 13.2% |

# 4 Meteorology

To determine the predominant wind patterns in the area, NMED used data from 2013 to 2015 to create wind rose charts for each violating monitor in Doña Ana County. In addition, the NMED ran HYSPLIT 24-hour back trajectory models for the two violating monitors in Doña Ana County.

Figures 10-1a to 10-24b in Appendix C depict wind data for each violating monitor on the dates with the 4 highest 8-hr ozone averages from 2013-2015. These are arranged by monitoring site and date and include wind roses, which show the frequency of wind direction, and HYSPLIT 24-hour back trajectories, which show the air parcels' likely origins before reaching the monitoring sites. Each trajectory image includes a close-up inset created as a Flash Map from the same kmz file as the Google Earth view.

The majority of wind roses show that winds were relatively calm (below 10 mph) and blew from the east to west, east-southeast to west-northwest, or south-southeast to north-northwest direction. Likewise, the back trajectories show that air parcels moved from these directions to the monitoring sites during the hours contributing to the elevated ozone concentrations. This indicates that winds passed through El Paso and Cd. Juárez before reaching the monitoring sites in New Mexico.

Figure 10-25 in Appendix C shows HYSPLIT back trajectories arriving at the El Paso, TX violating monitor using the EPA designations mapping tool. The trajectories similarly show that air parcels primarily originate from Texas and Mexico. The EPA designations mapping tool may be found at www.epa.gov/ozone-designations/ozone-designations-guidance-and-data.



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# 5 Geography/Topography

The Paso del Norte region lies along the Rio Grande Valley, encompassing El Paso County, TX; Doña Ana County, NM; and Municipio de Ciudad Juárez, Chihuahua, MX. The Rio Grande flows south through Doña Ana County and the Mesilla Valley, serving as a common boundary for the City of Sunland Park, NM, the City of El Paso, TX and Ciudad Juárez, Chihuahua, MX. As the Rio Grande exits New Mexico, the river bends around a large igneous formation named Mount Cristo Rey. The river continues through the valley in a southeasterly direction between El Paso and Ciudad Juárez into the Brad Valley of Texas.

The topography of the Paso del Norte region plays an important part in the transportation of air pollution and is used as a starting point to define the region's air basin boundaries. Elevations in the Paso del Norte region range from 3,773 feet above mean sea level at the valley floor to 6,070 feet above mean sea level at Ranger Peak in the Franklin Mountains. The Franklin Mountains lie to the east/northeast of the Sunland Park area in Texas and the Sierra Juárez range lies to the south in Mexico. Both the Franklin and Sierra Juárez ranges help to define airflow patterns in the Sunland Park area through the creation of downward wind flows off the mountains into the valley areas.

# 6 Jurisdictional Boundaries

The Paso del Norte region is a unique bi-national, tristate community with shared air pollution problems. The Paso del Norte Air Basin is defined as El Paso County, TX, portions of Doña Ana County, NM and Cd. Juárez, Chihuahua. Within the state of New Mexico, NMED has jurisdictional authority to implement and enforce state and federal air quality regulations with the exception of Bernalillo County in central New Mexico and tribal lands. No tribal lands exist within Doña Ana County.

Transportation planning and programing for the southern portion of Doña Ana County falls under the jurisdiction of the El Paso Metropolitan Planning Organization (MPO). The planning boundary for the MPO covers much of the Paso del Norte airshed in the U.S. For past and present nonattainment areas in the southern portion of Doña Ana County, the El Paso MPO conducts transportation conformity planning.

# 7 Recommended Nonattainment Area Boundary

The Sunland Park Area was previously designated nonattainment for the 1-hour ozone NAAQS in 1995. At that time, the state of New Mexico maintained that the predominant sources contributing to the ozone exceedances at the violating monitors were not within Doña Ana County or NMED's jurisdiction. Presently, the information provided above also supports this assertion. Although designations for nonattainment areas are presumptively based on the CBSA or MSA, basing the boundary on the Las Cruces MSA would result in limited emissions reductions outside of the Sunland Park Area.

NMED recommends a nonattainment area shown in Figure 7-1 and described as follows:



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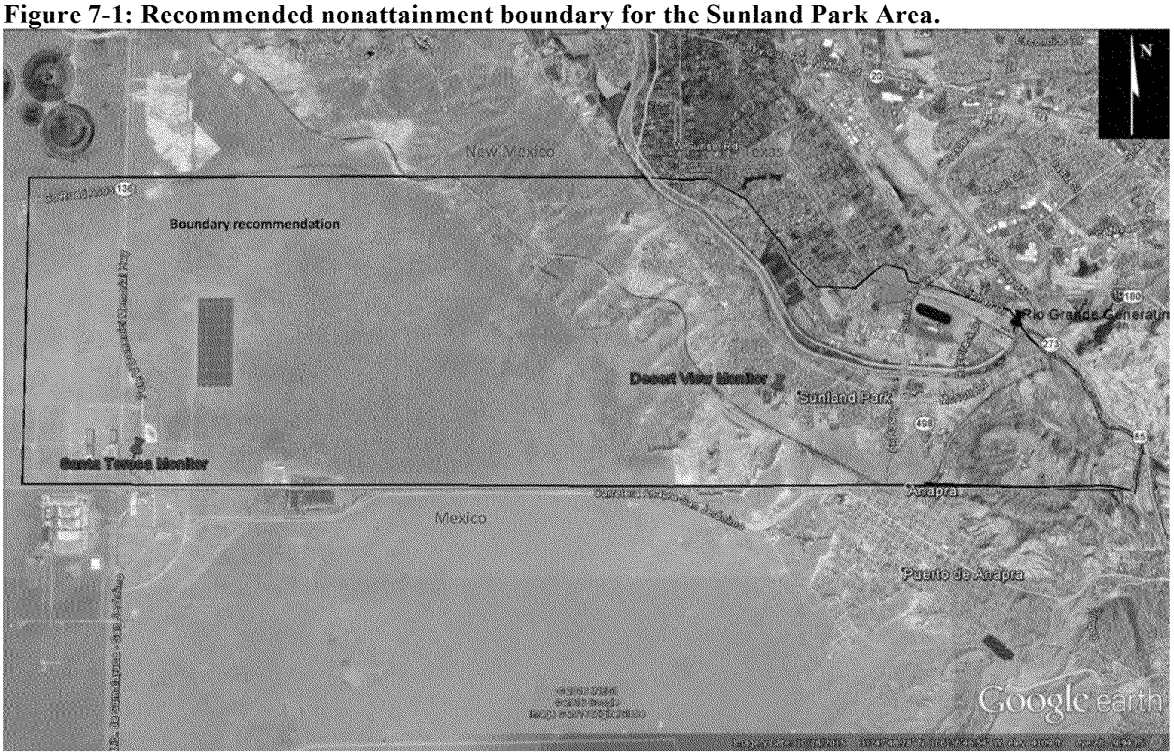
1. Bounded on the north by latitude N31°49'30" (red line);
2. Bounded on the south by the international border between New Mexico and Mexico (yellow line);
3. Bounded on the east by the New Mexico and Texas state line (gray line); and
4. Bounded on the west by longitude W106°42' (red line).

**Figure 7-1: Recommended nonattainment boundary for the Sunland Park Area.**




Doña Ana County as a whole accounts for 24% of total $NO_x$ emissions (Figure 3-3) and 16% of total VOC emissions (Figure 3-7) in the region. Point sources within Doña Ana County contribute even less, accounting for 8% of $NO_x$ emissions (Figure 3-4) and 1% of VOC emissions (Figure 3-8) in the region.

The largest and only major source for $NO_x$ in Doña Ana County, the Rio Grande Generating Station, accounts for 84% of point source $NO_x$ emissions and 80% of point source VOC emissions in the county. This facility is located in the Sunland Park Area and is included within the recommended nonattainment area.

The violating monitors (Desert View and Santa Teresa) are located in the southern most portion of the county near El Paso and Cd. Juárez. These monitors are approximately 35 miles south of the Solano monitoring site in Las Cruces, the second largest metropolitan area in New Mexico. As Figure 2-3 shows, the design values for the violating monitors are 0.004 ppm and 0.006 ppm higher than the Solano and La Union monitoring sites, respectively. The design value for the nearest site to the violating monitors, La Union, has not exceeded 0.070 ppm since 2005. The design value for the Solano site has never exceeded 0.067 ppm (2006). In contrast, the 2013-



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2015 design value for El Paso is 0.071 ppm, slightly lower than the violating monitors in the Sunland Park Area. This indicates that ozone concentrations at the violating monitors are more indicative of the level monitored in El Paso than the La Union, Chaparral and Solano monitoring sites.

Based on the topography, prevailing winds, and close proximity to two major urban areas, it is evident that the violating monitors in the Sunland Park Area are not the result of emissions from New Mexico sources outside of the recommended nonattainment area.

## 7.1 Alternative Boundary Recommendation

The Guidance Memo indicates that EPA will use data from 2014 to 2016 when determining final nonattainment boundaries. Preliminary data collected through August 2016 indicates that the Santa Teresa monitor will be in attainment of the standard. Although NMED will need to quality assure and validate this data before it can be used for a regulatory determination, the department would like to offer an alternative boundary recommendation for consideration should the current trend hold and the Santa Teresa monitor meets the standard. The alternative boundary recommendation would still include the majority of the population and emission sources in the Sunland Park Area while excluding uninhabited and largely undeveloped desert land.

NMED recommends an alternative nonattainment area shown in Figure 7-2 and described as follows:

1. Bounded on the north by latitude N31°49'30" (red line);
2. Bounded on the south by the international border between New Mexico and Mexico (yellow line);
3. Bounded on the east by the New Mexico and Texas state line (gray line); and
4. Bounded on the west by longitude W106°36'36" (red line).



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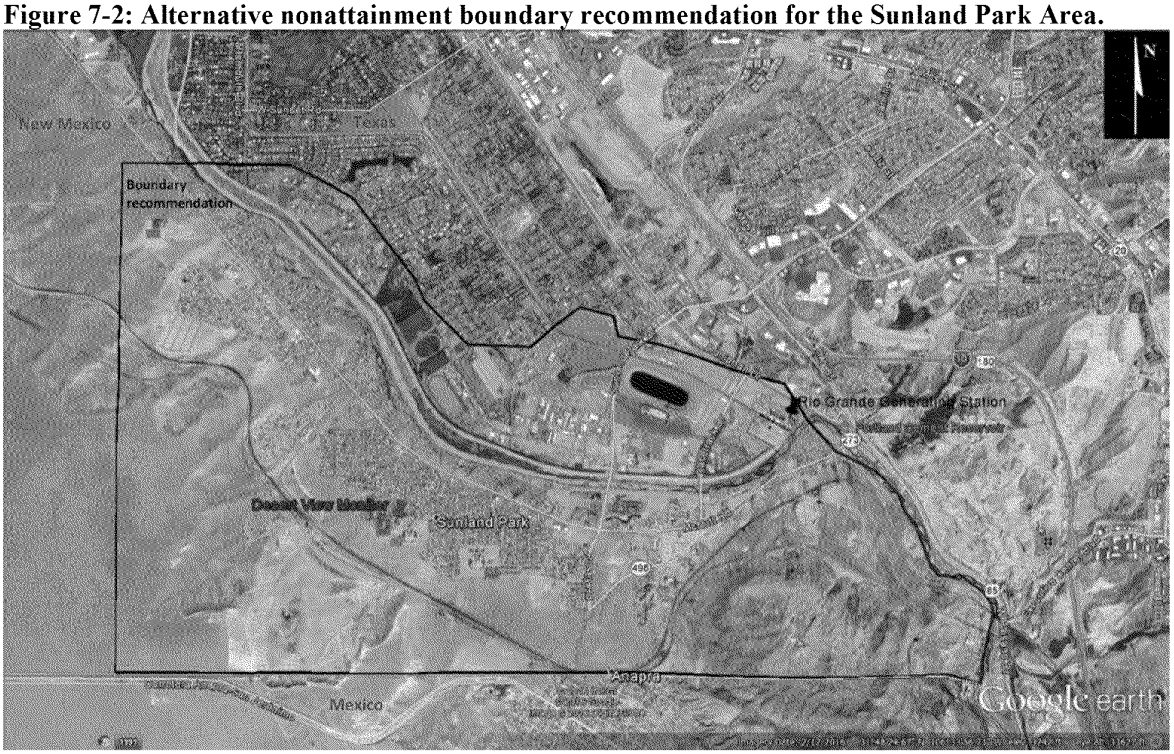
**Figure 7-2: Alternative nonattainment boundary recommendation for the Sunland Park Area.**



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# 8 Appendix A: Ozone Monitoring Data

| County | Site Name | AQS ID # | 4th Max ozone 8-hr average (ppm) | | | Design Value (2013-2015) |
|---|---|---|---|---|---|---|
| | | | 2013 | 2014 | 2015 | |
| Doña Ana | La Union | 35-013-0008 | .064 | .065 | .070 | .066 |
| | Chaparral | 35-013-0020 | .070 | .067 | .065 | .067 |
| | **Desert View** | **35-013-0021** | **.071** | **.072** | **.074** | **.072** |
| | **Santa Teresa** | **35-013-0022** | **.080** | .066 | .070 | **.072** |
| | Solano | 35-013-0023 | .064 | .066 | .066 | .065 |
| Eddy | Carlsbad | 35-015-1005 | .069 | .072 | .067 | .069 |
| Lea | Hobbs | 35-025-0008 | .068 | .068 | .067 | .067 |
| Rio Arriba | Coyote Ranger District | 35-039-0026 | .066 | .065 | .064 | .065 |
| Sandoval | Bernalillo | 35-043-1001 | .067 | .062 | .066 | .065 |
| San Juan | Bloomfield | 35-045-0009 | .069 | .062 | .061 | .064 |
| | Navajo Lake | 35-045-0018 | .070 | .063 | .068 | .067 |
| | Substation | 35-045-1005 | .065 | .063 | .061 | .063 |
| Santa Fe | Santa Fe Airport | 35-049-0021 | .068 | .064 | .062 | .064 |
| Valencia | Los Lunas | 35-061-0008 | .072 | .064 | .064 | .066 |
| (**Bold** – exceeds 2015 NAAQS) | | | | | | |



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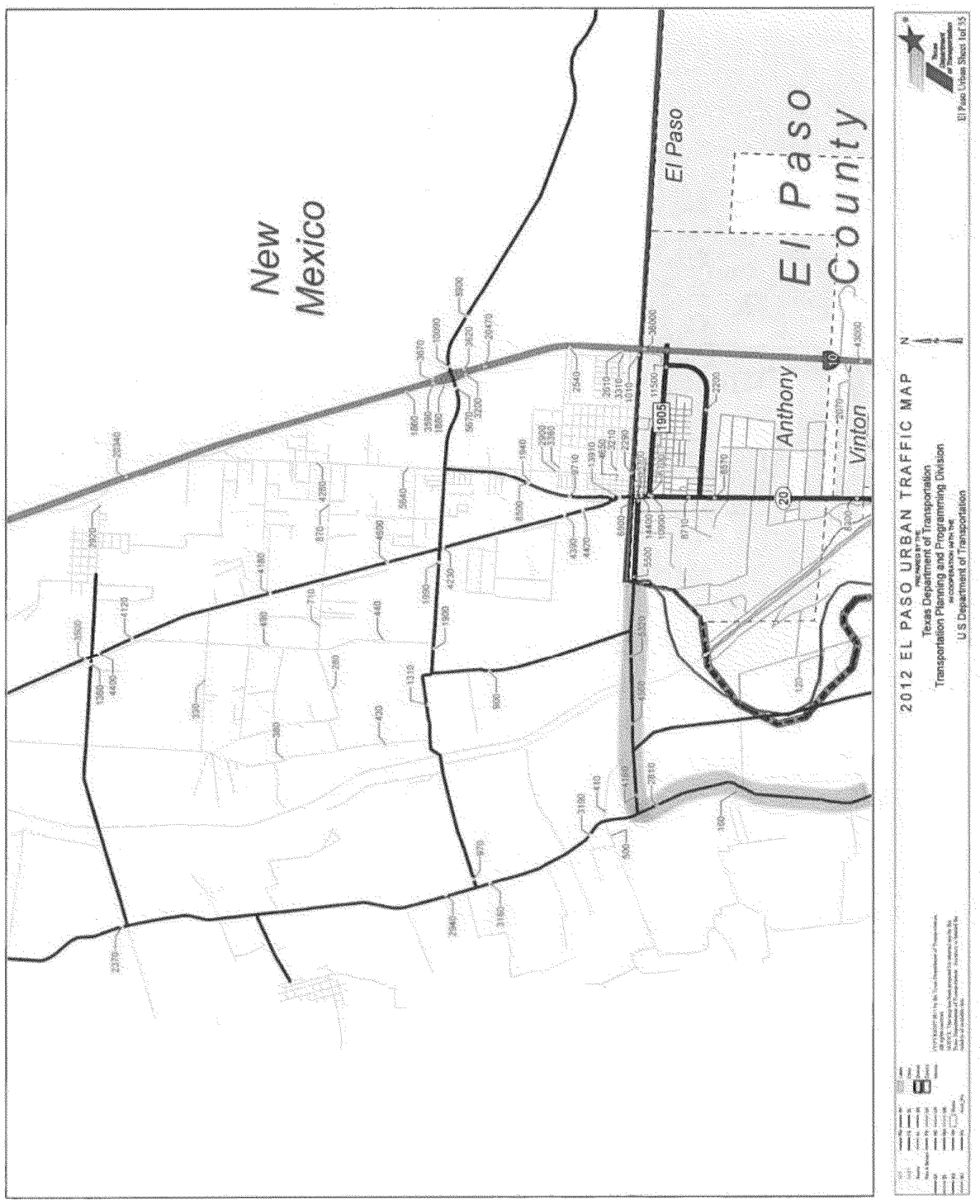
# 9 Appendix B: Sunland Park Area Traffic Flow Maps

The highlighted road segments in the maps below were used to estimate annual VMT.



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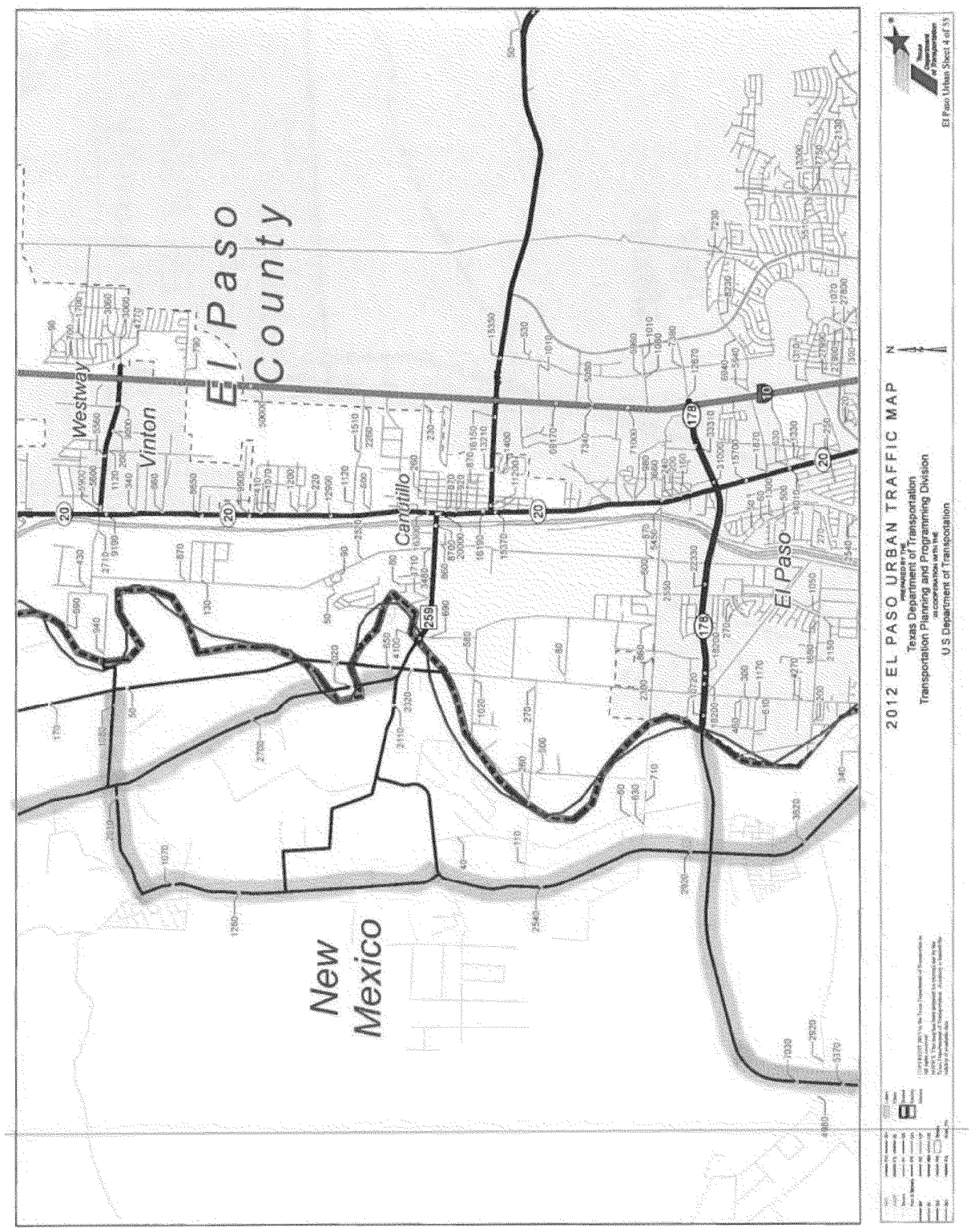




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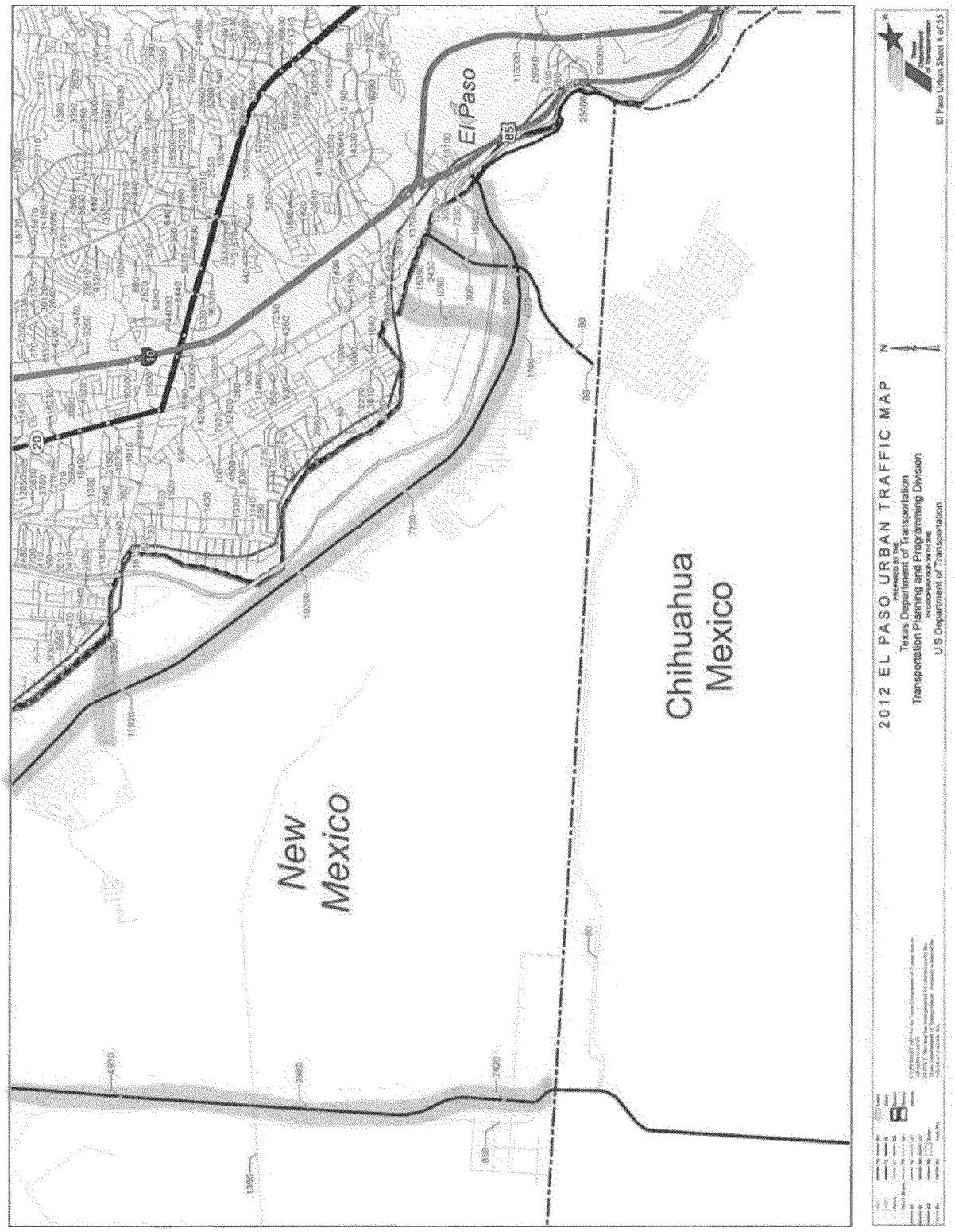




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# 10 Appendix C: Meteorological Data

Wind roses were created by NMED using each NMED station's meteorological data, at http://drdasnm1.alink.com/.

HYSPLIT[1] 24-hour back trajectories were created by NMED on June 24, 2016 as follows:

- Model[2] found at http://ready.arl.noaa.gov/hypub-bin/trajtype.pl?runtype=archive, modified January 5, 2016;
- Meteorological data: NAM 12 km (archive); GDAS 0.5 degree (archive) for 8/16/2013 only (NAM 12 data not available for this date);
- Desert View latitude: 31.79611, longitude: -106.58389;
- Santa Teresa latitude: 31.78778, longitude: -106.68278;
- Times are listed as UTC, which corresponds to Mountain Daylight Time (MDT) + 6 hrs.;
- Contributing hours include the 8 hours from which the 8-hr average is calculated;
- 2400 or 2500 hrs. UTC corresponds to 0000 hrs. and 0100 hrs., respectively, of the following day.

[1] *Stein, A.F., Draxler, R.R, Rolph, G.D., Stunder, B.J.B., Cohen, M.D., and Ngan, F., (2015). NOAA's HYSPLIT atmospheric transport and dispersion modeling system, Bull. Amer. Meteor. Soc.,* ***96****, 2059-2077.*

[2] *Rolph, G.D. (2016). Real-time Environmental Applications and Display sYstem (READY) Website (http://www.ready.noaa.gov). NOAA Air Resources Laboratory, College Park, MD.*



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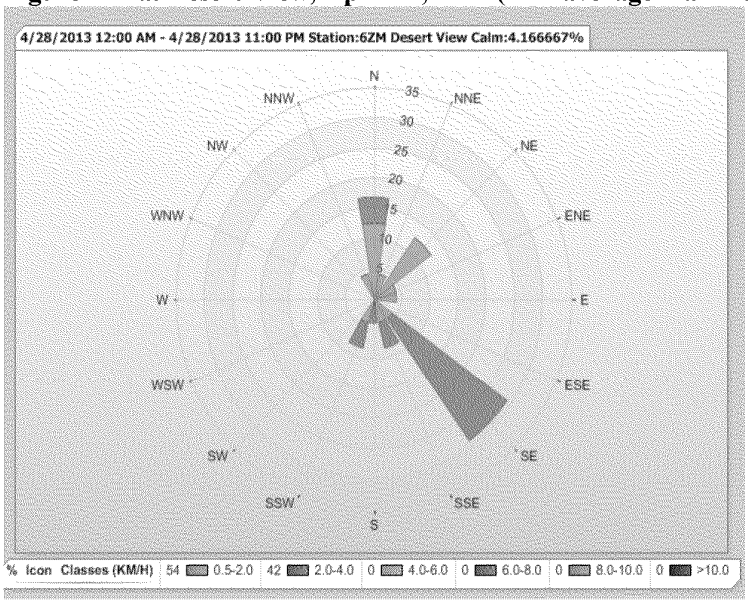
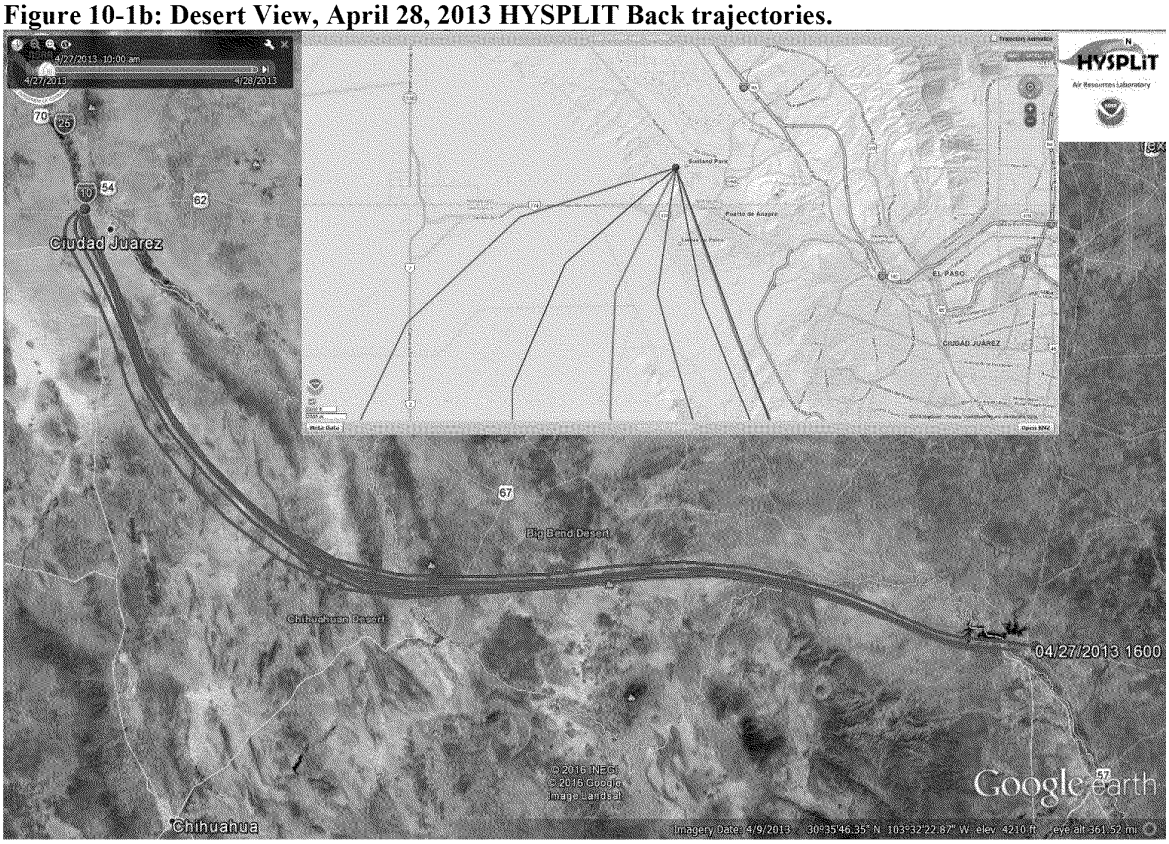
## 10.1 Desert View

**Figure 10-1a: Desert View, April 28, 2013 (8-hr average maximum .071 ppm)**




Approximately 66% of the winds on this date blew from the direction of El Paso and Juárez.

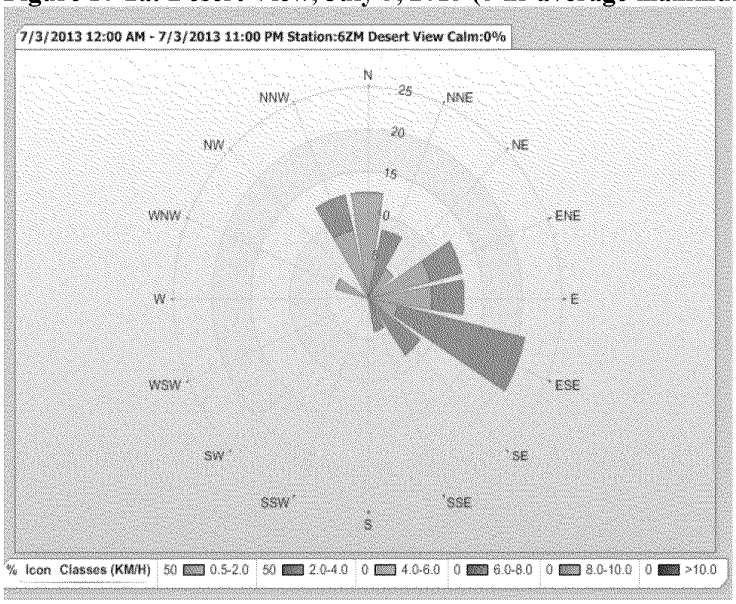
**Figure 10-1b: Desert View, April 28, 2013 HYSPLIT Back trajectories.**





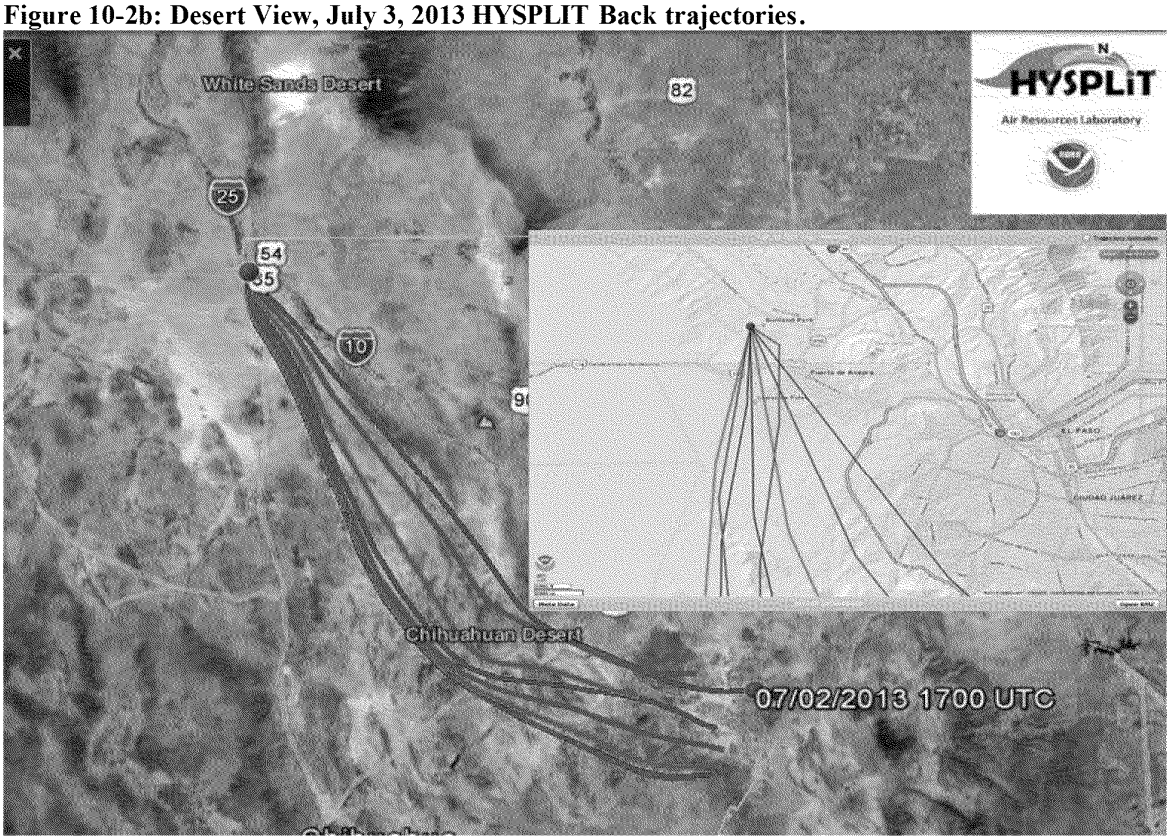

ED_001361_00014973

**Figure 10-2a: Desert View, July 3, 2013 (8-hr average maximum .076 ppm)**




Approximately 61% of the winds on this date blew from the direction of El Paso and Juárez.

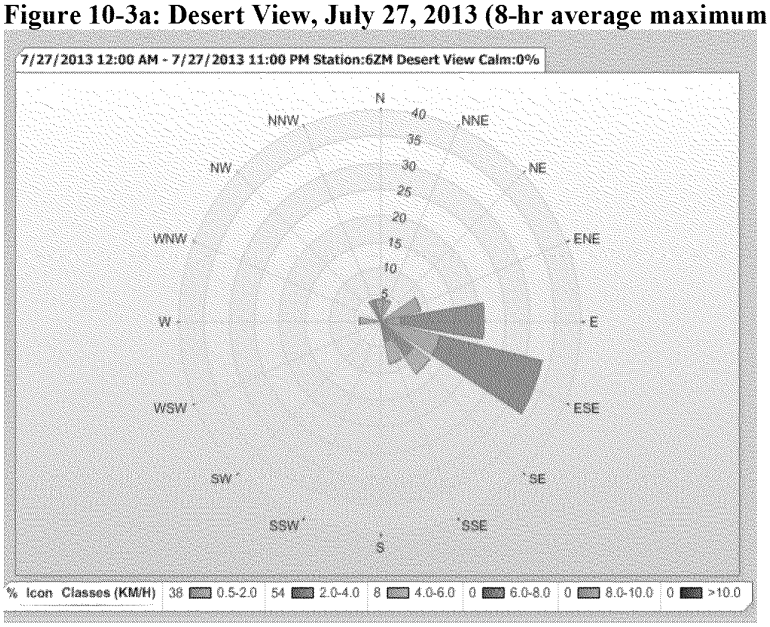
**Figure 10-2b: Desert View, July 3, 2013 HYSPLIT Back trajectories.**






ED_001361_00014973

**Figure 10-3a: Desert View, July 27, 2013 (8-hr average maximum .072 ppm)**




Approximately 84% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-3b: Desert View, July 27, 2013 HYSPLIT Back trajectories.**

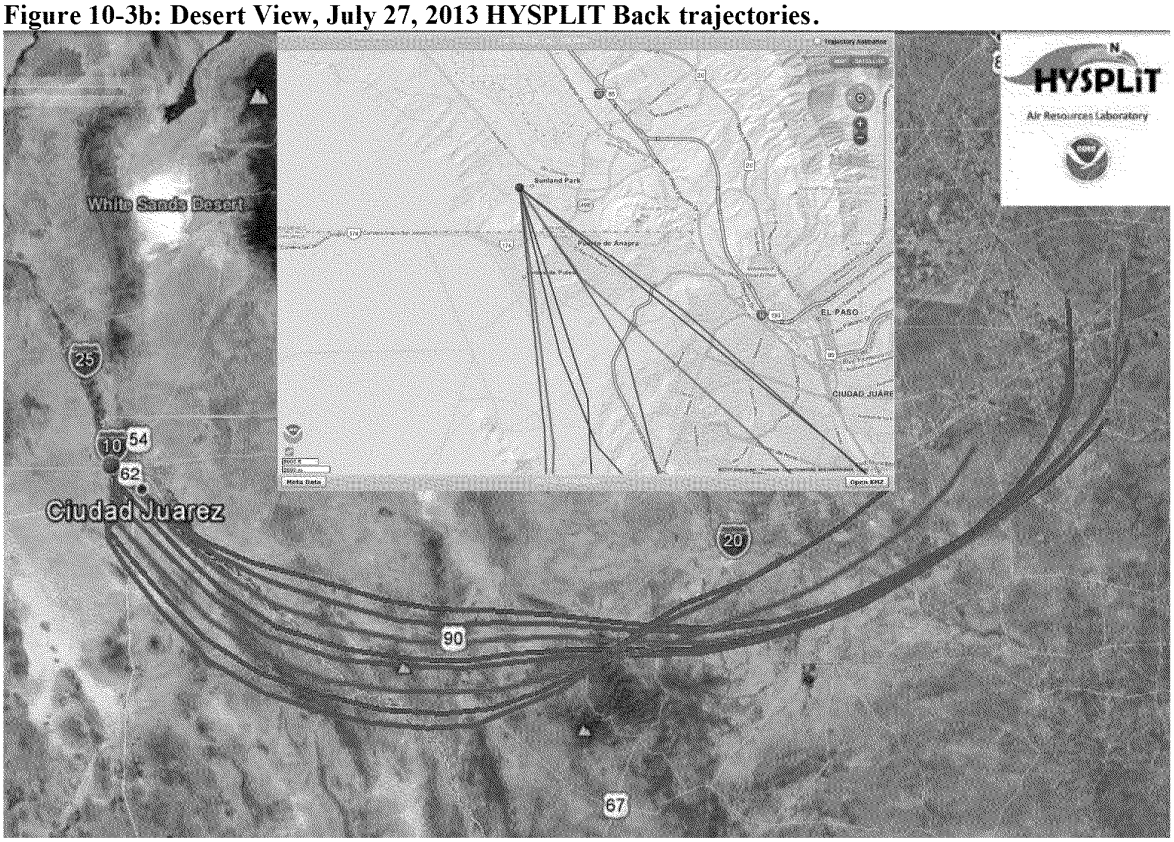





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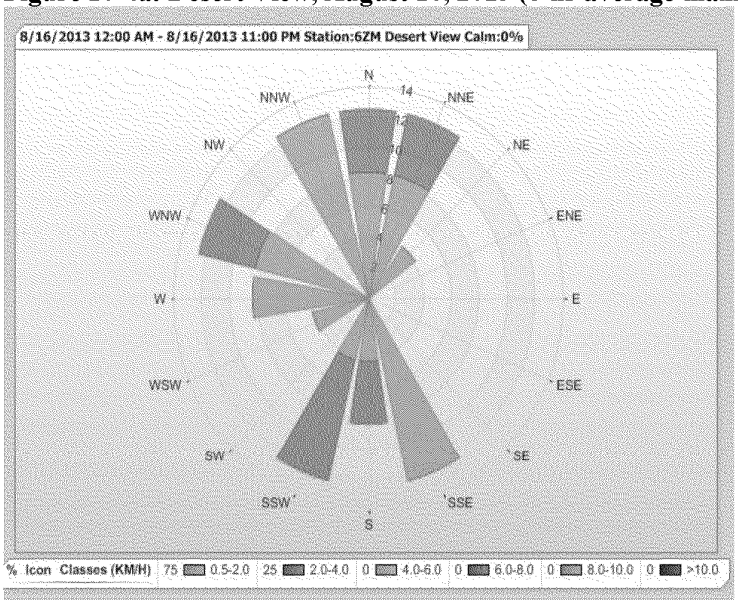
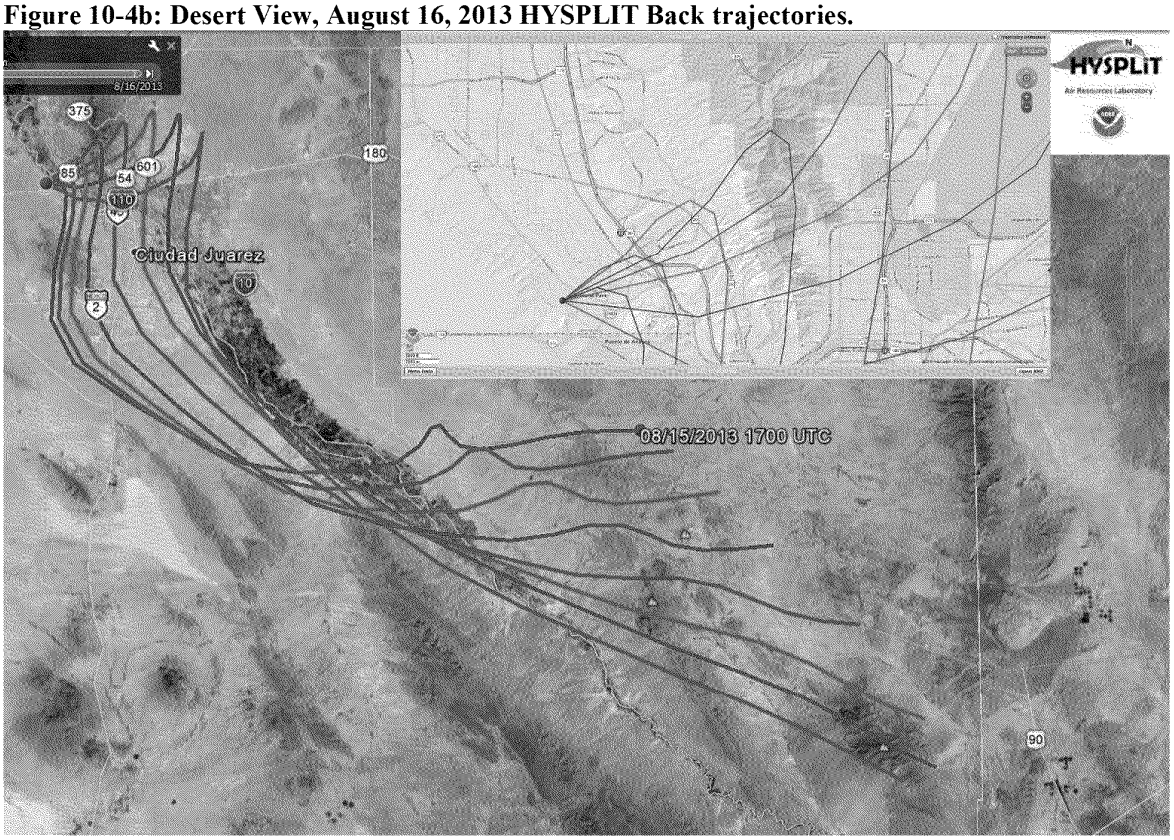
**Figure 10-4a: Desert View, August 16, 2013 (8-hr average maximum .072 ppm)**




Approximately 49% of the winds on this date blew from the direction of El Paso and Juárez.

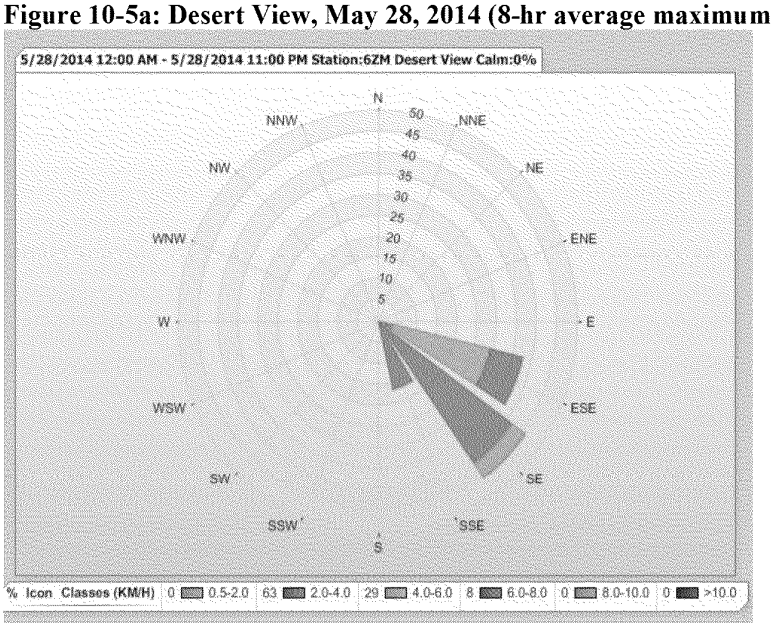
**Figure 10-4b: Desert View, August 16, 2013 HYSPLIT Back trajectories.**





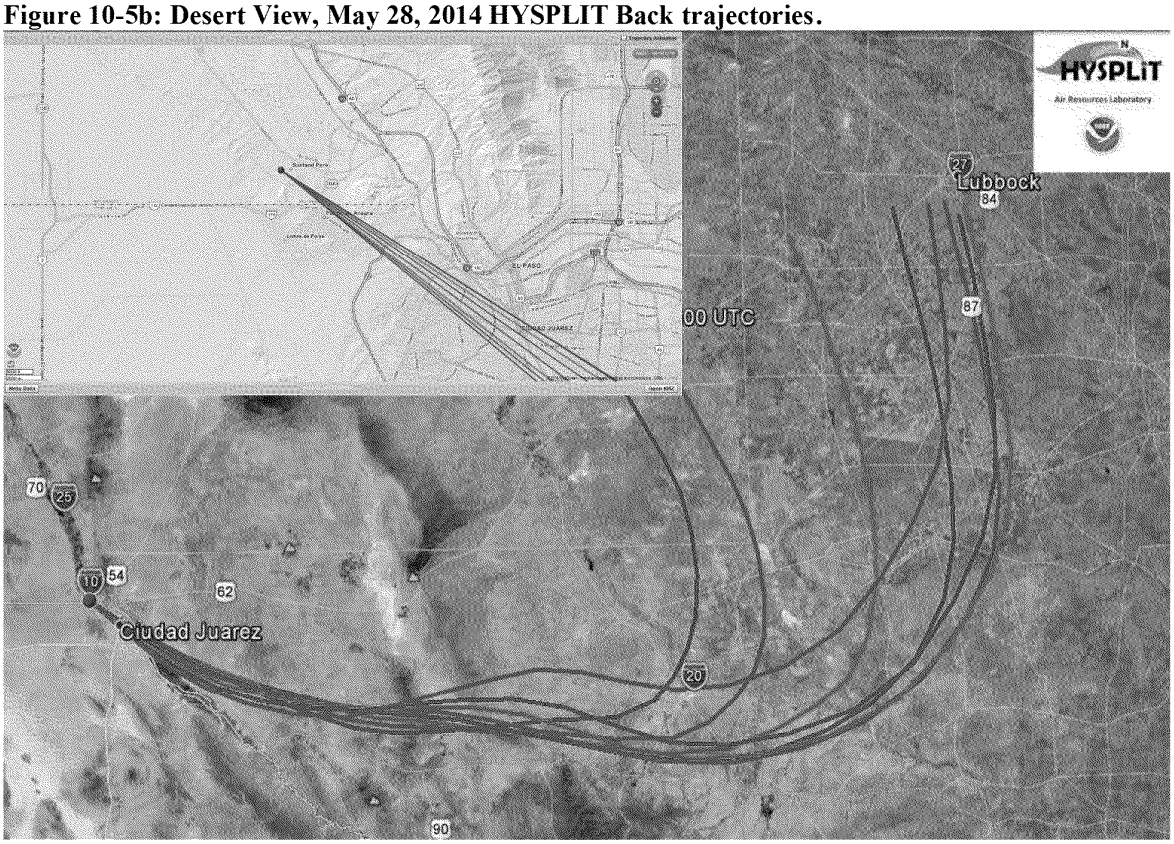

ED_001361_00014973

**Figure 10-5a: Desert View, May 28, 2014 (8-hr average maximum .072 ppm)**




100% of the winds on this date blew from the direction of El Paso and Juárez.

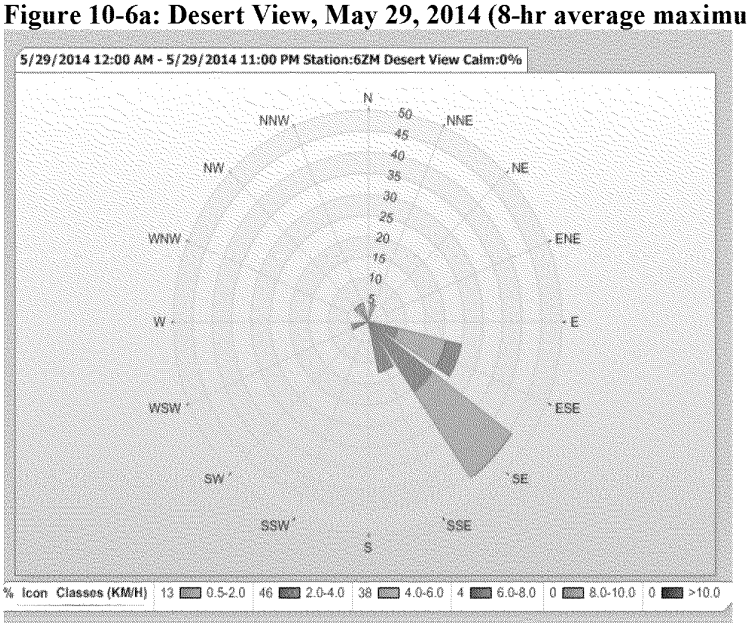
**Figure 10-5b: Desert View, May 28, 2014 HYSPLIT Back trajectories.**





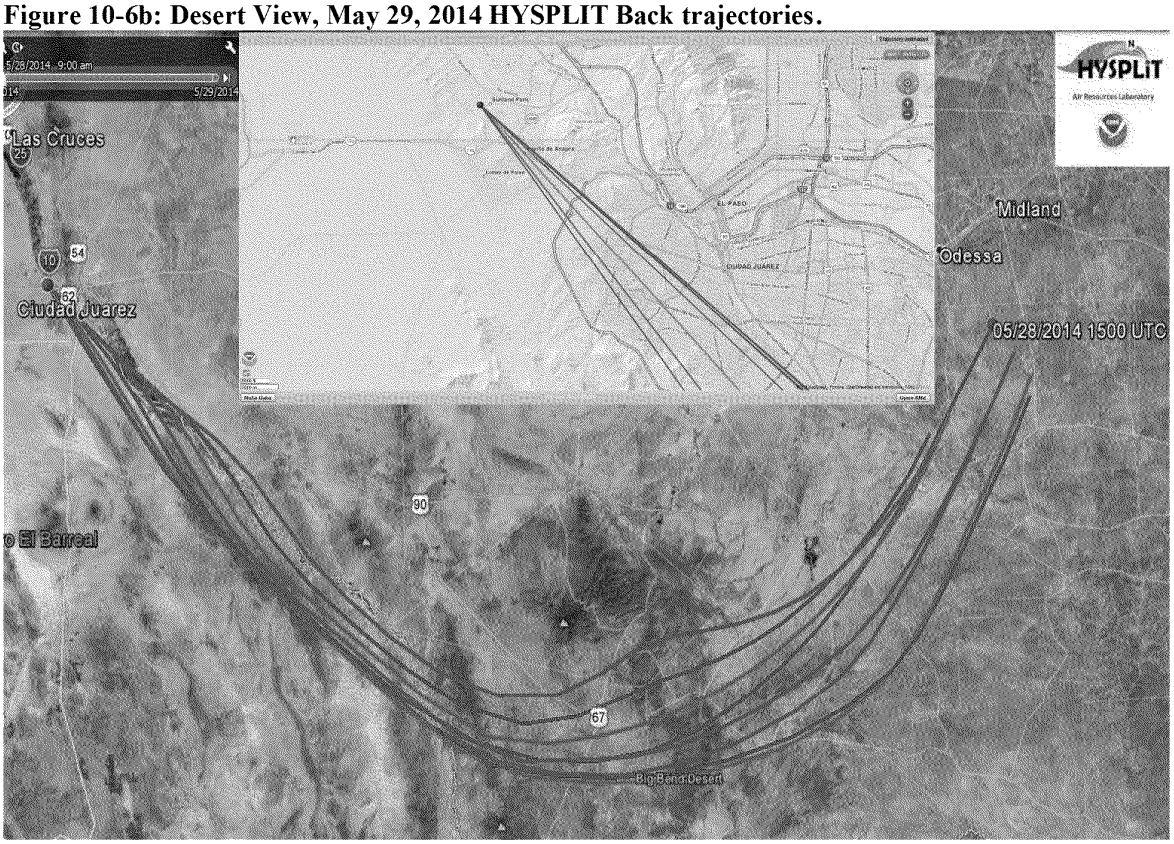

ED_001361_00014973

**Figure 10-6a: Desert View, May 29, 2014 (8-hr average maximum .072 ppm)**




Approximately 83% of the winds on this date blew from the direction of El Paso and Juárez.

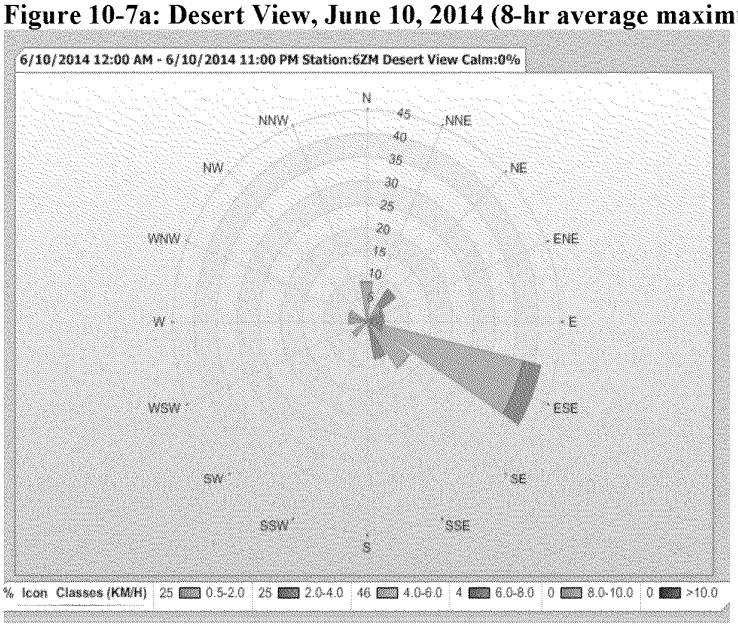
**Figure 10-6b: Desert View, May 29, 2014 HYSPLIT Back trajectories.**





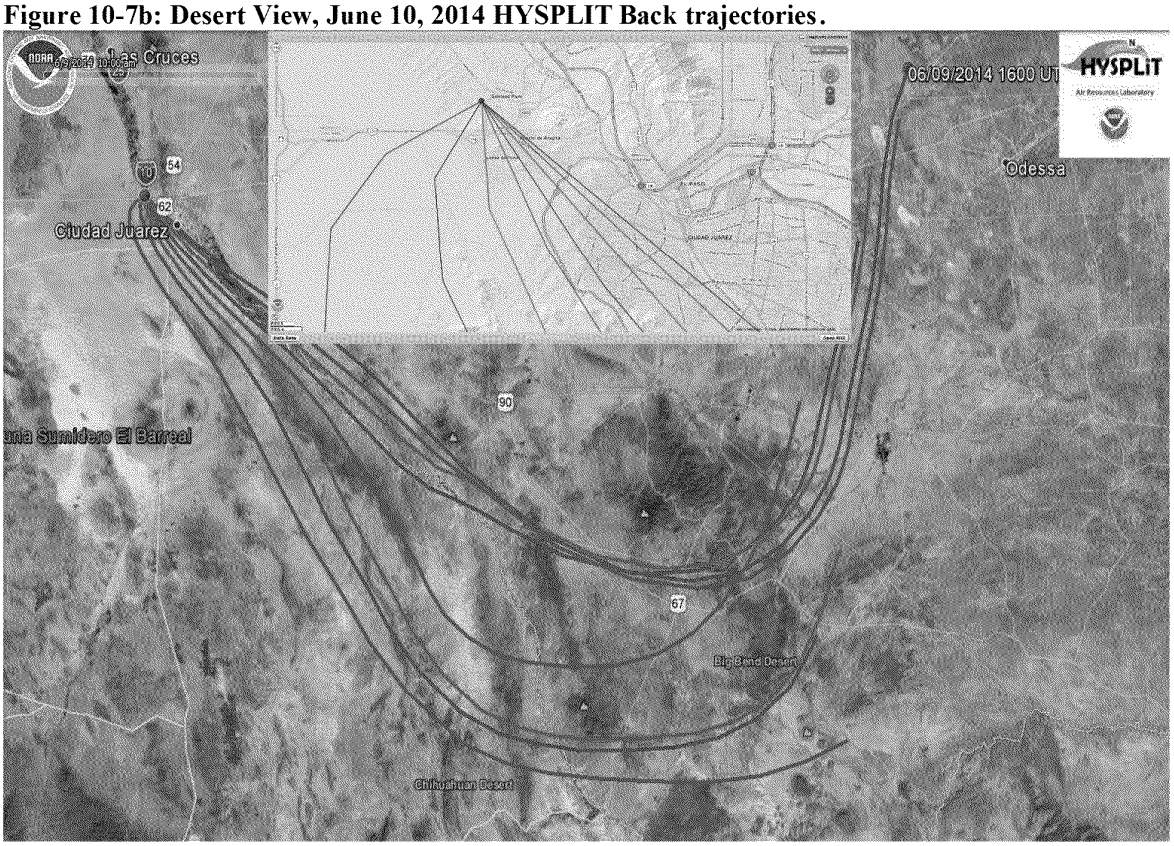

ED_001361_00014973

**Figure 10-7a: Desert View, June 10, 2014 (8-hr average maximum .076 ppm)**




Approximately 79% of the winds on this date blew from the direction of El Paso and Juárez.

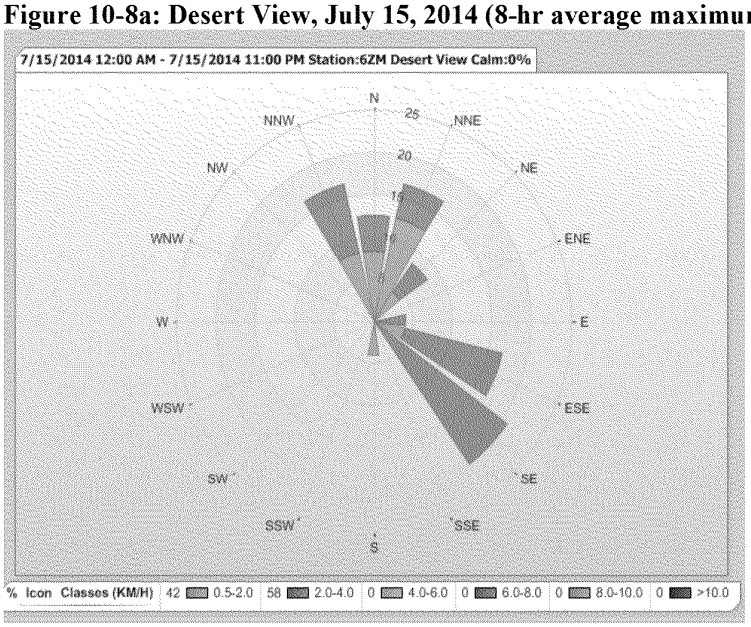
**Figure 10-7b: Desert View, June 10, 2014 HYSPLIT Back trajectories.**






ED_001361_00014973

**Figure 10-8a: Desert View, July 15, 2014 (8-hr average maximum .072 ppm)**




Approximately 70% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-8b: Desert View, July 15, 2014 HYSPLIT Back trajectories.**

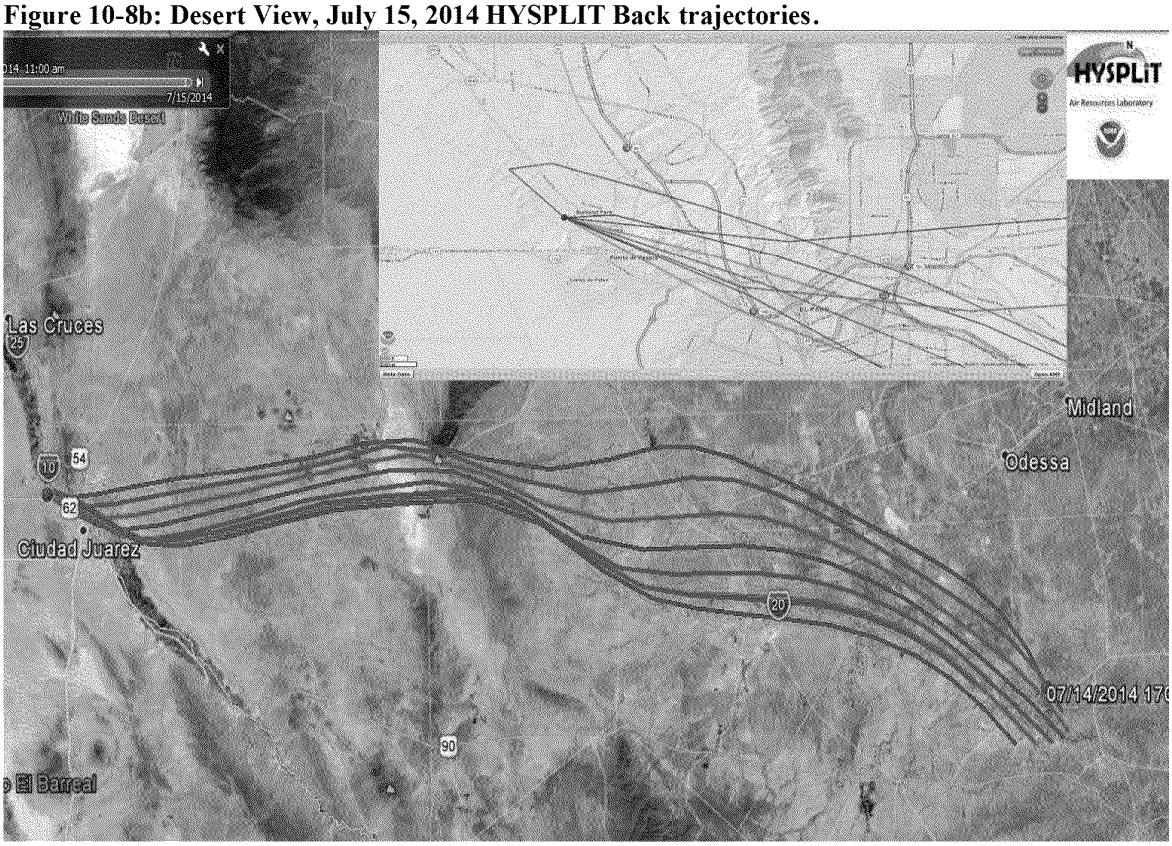





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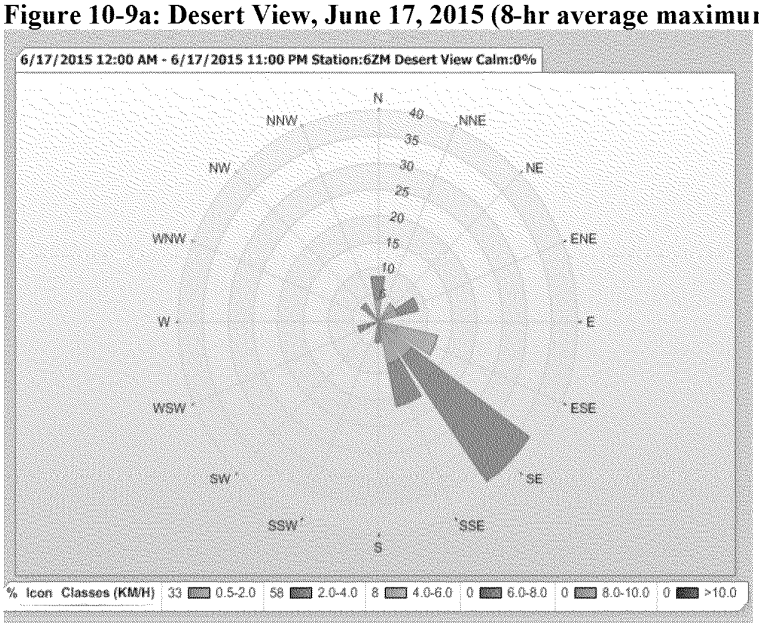
**Figure 10-9a: Desert View, June 17, 2015 (8-hr average maximum .077 ppm)**




Approximately 80% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-9b: Desert View, June 17, 2015 HYSPLIT Back trajectories.**

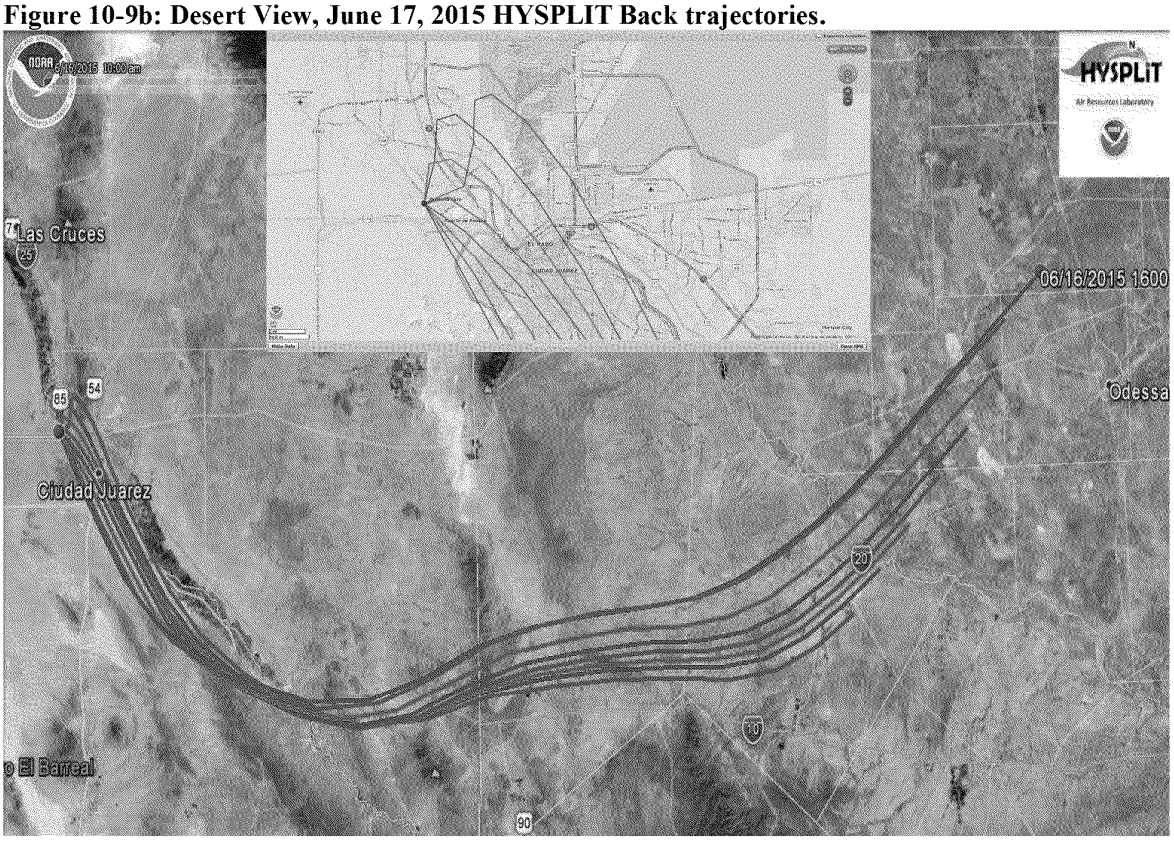





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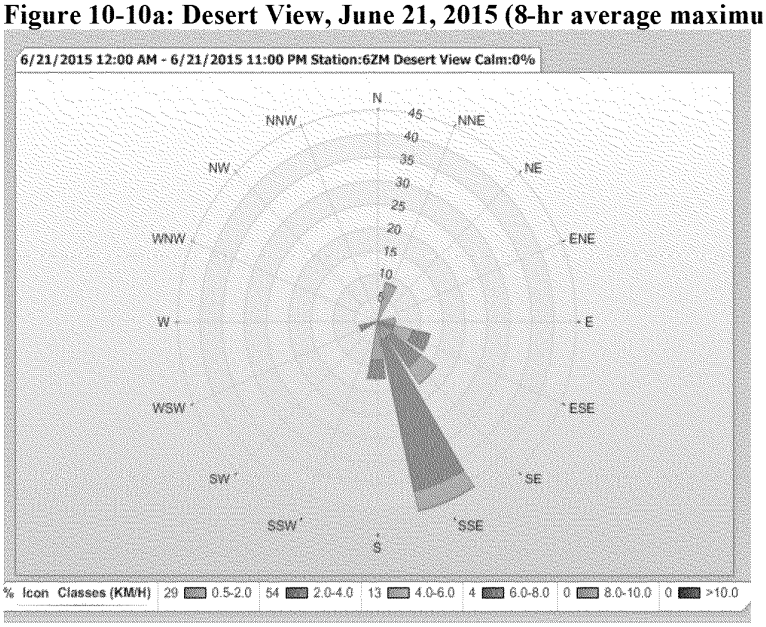
**Figure 10-10a: Desert View, June 21, 2015 (8-hr average maximum .074 ppm)**




Approximately 96% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-10b: Desert View, June 21, 2015 HYSPLIT Back trajectories.**

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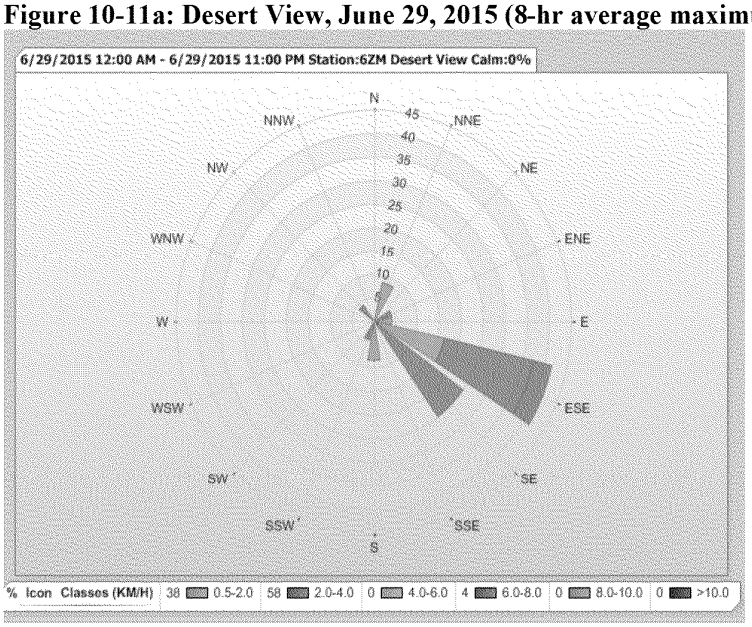
**Figure 10-11a: Desert View, June 29, 2015 (8-hr average maximum .076 ppm)**




Approximately 96% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-11b: Desert View, June 29, 2015 HYSPLIT Back trajectories.**

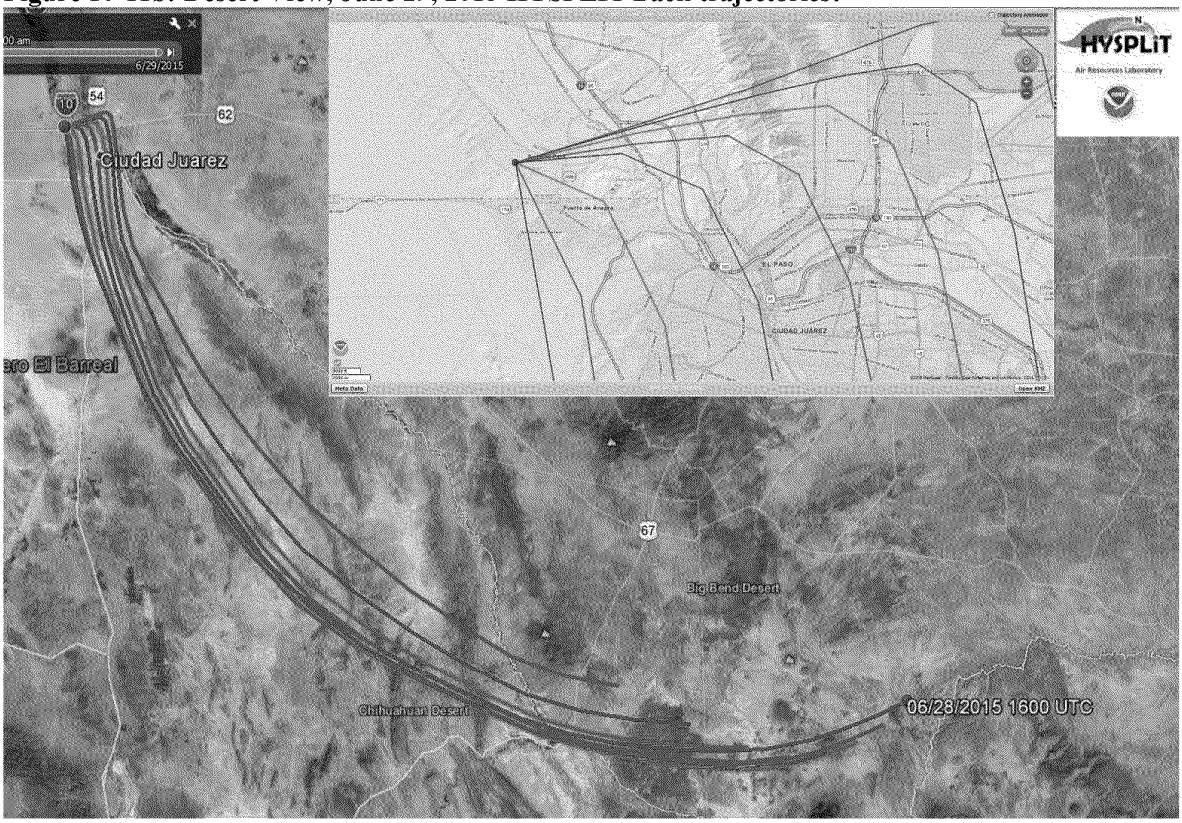





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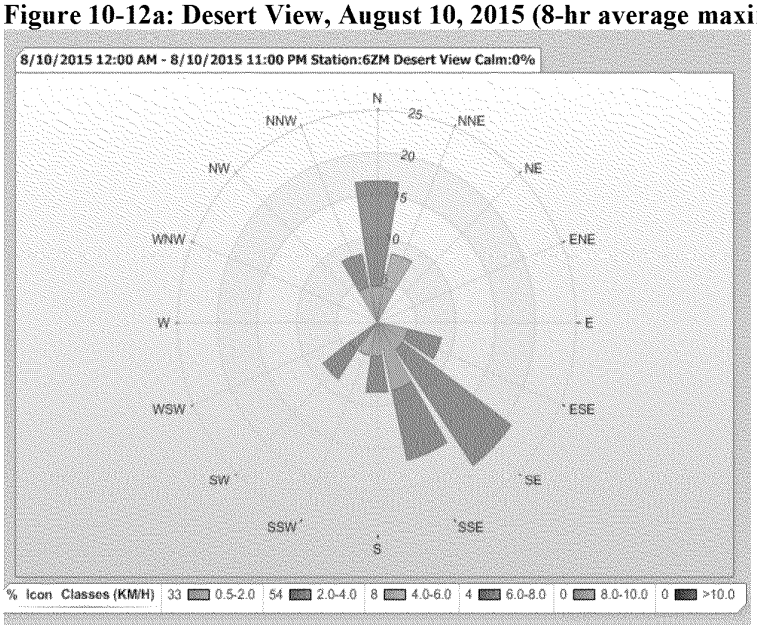
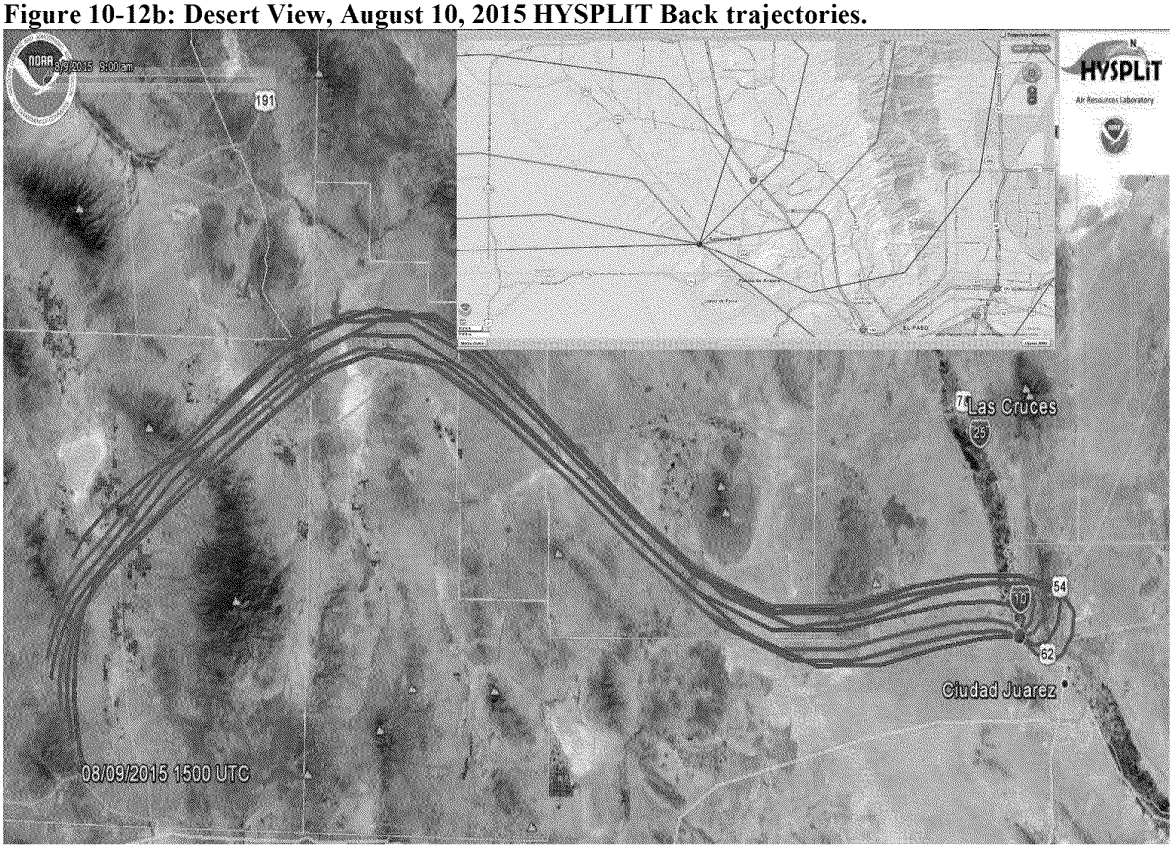
**Figure 10-12a: Desert View, August 10, 2015 (8-hr average maximum .077 ppm)**




Approximately 74% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-12b: Desert View, August 10, 2015 HYSPLIT Back trajectories.**



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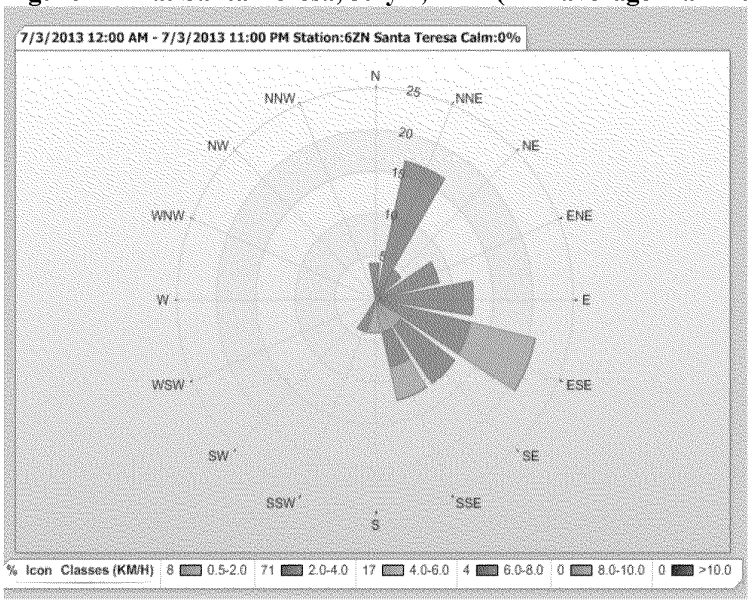
## 10.2 Santa Teresa

**Figure 10-13a: Santa Teresa, July 3, 2013 (8-hr average maximum .084 ppm)**




Approximately 74% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-13b: Santa Teresa, July 3, 2013 HYSPLIT Back trajectories.**

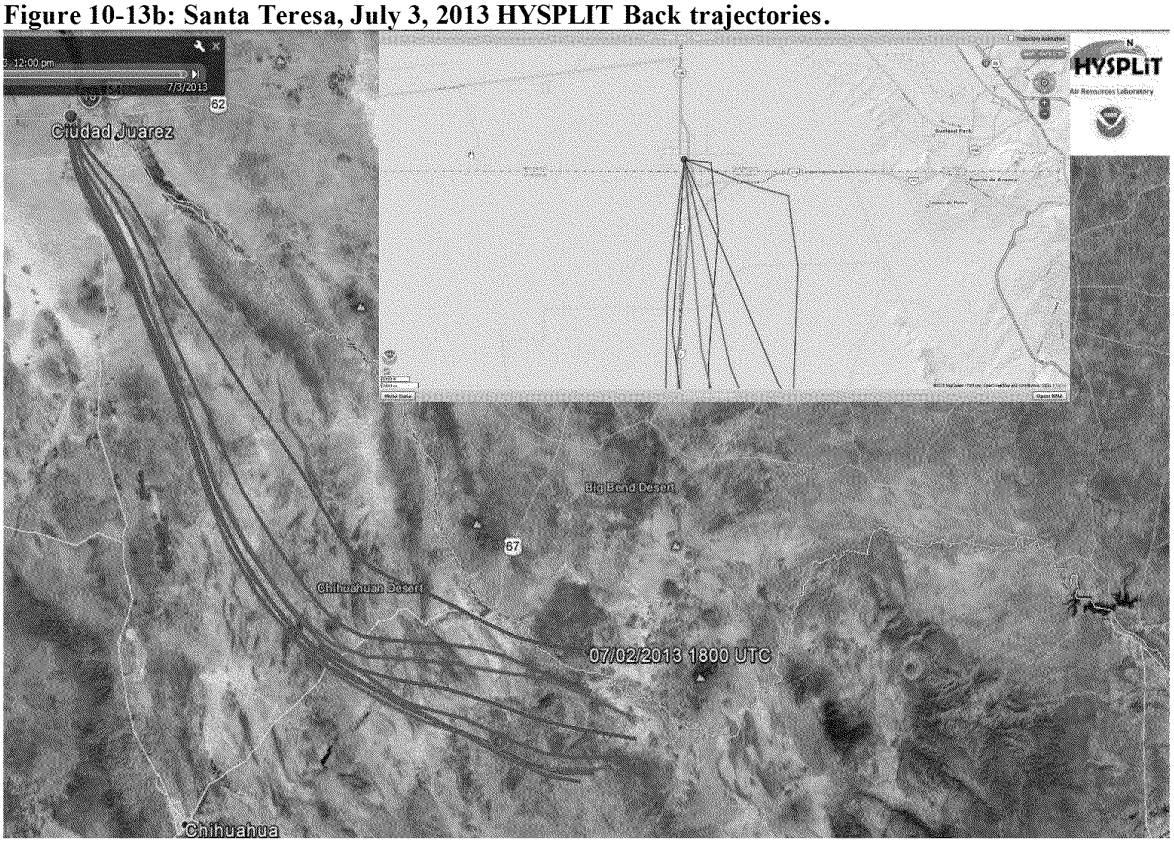





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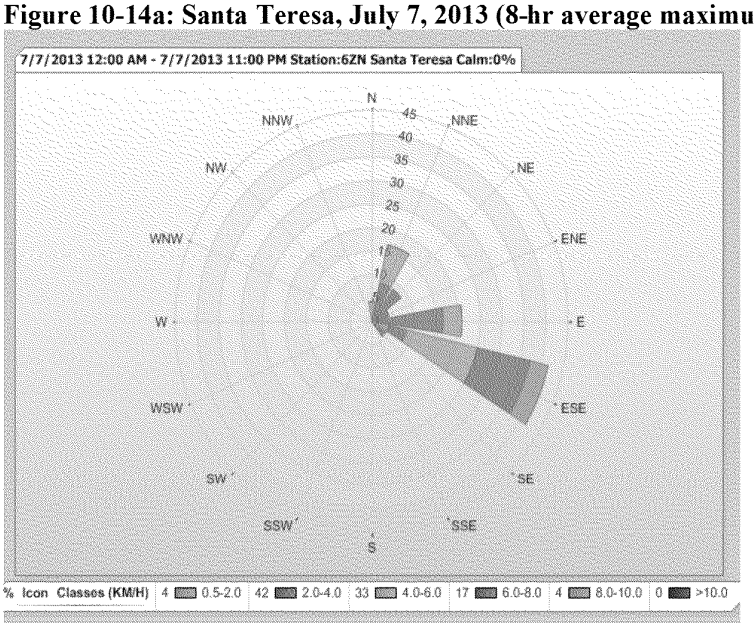
**Figure 10-14a: Santa Teresa, July 7, 2013 (8-hr average maximum 0.080 ppm)**




Approximately 77% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-14b: Santa Teresa, July 7, 2013 HYSPLIT Back trajectories.**

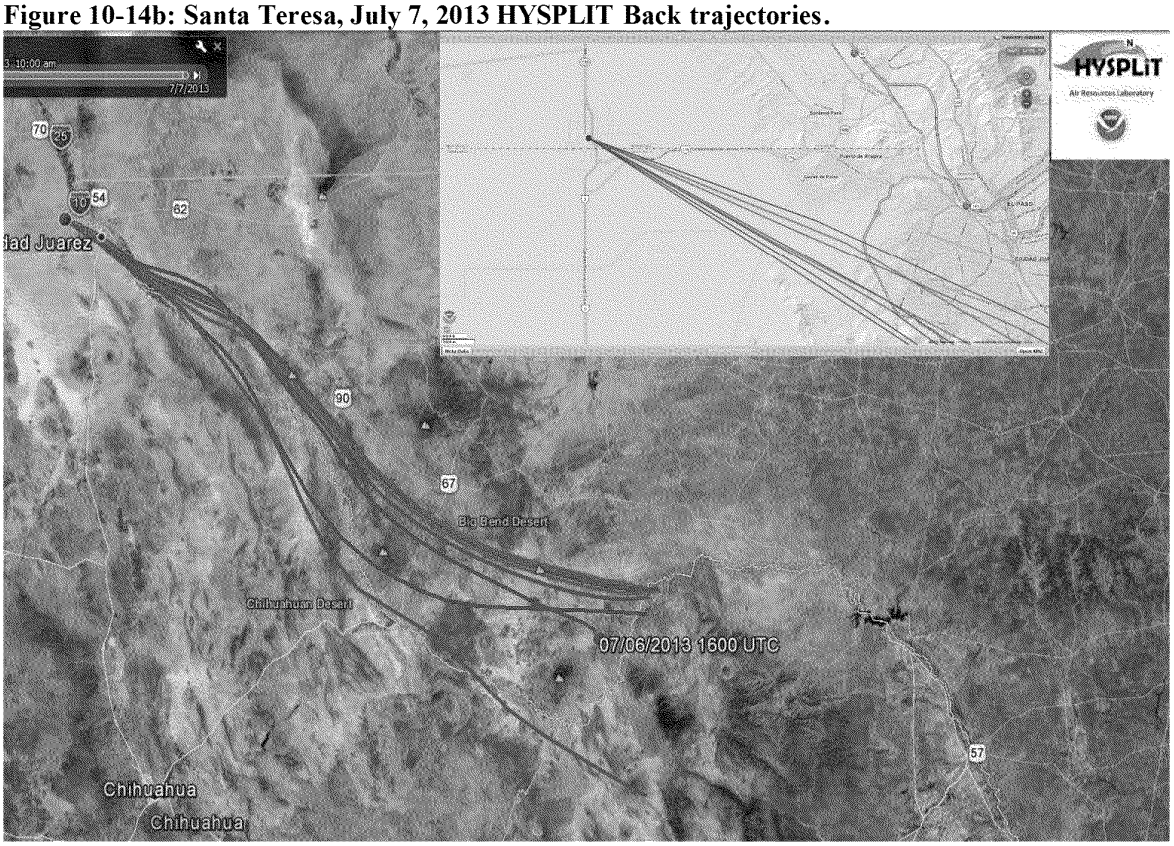





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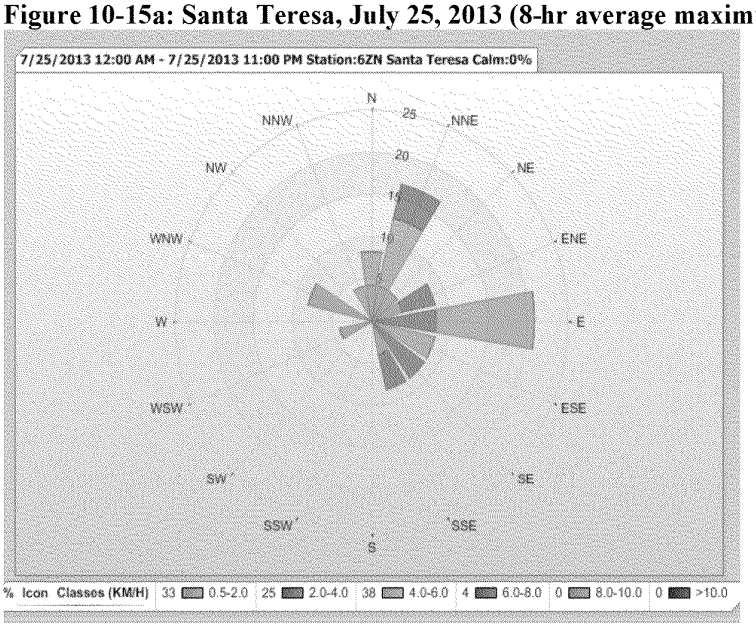
**Figure 10-15a: Santa Teresa, July 25, 2013 (8-hr average maximum .081 ppm)**




Approximately 57% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-15b: Santa Teresa, July 25, 2013 HYSPLIT Back trajectories.**

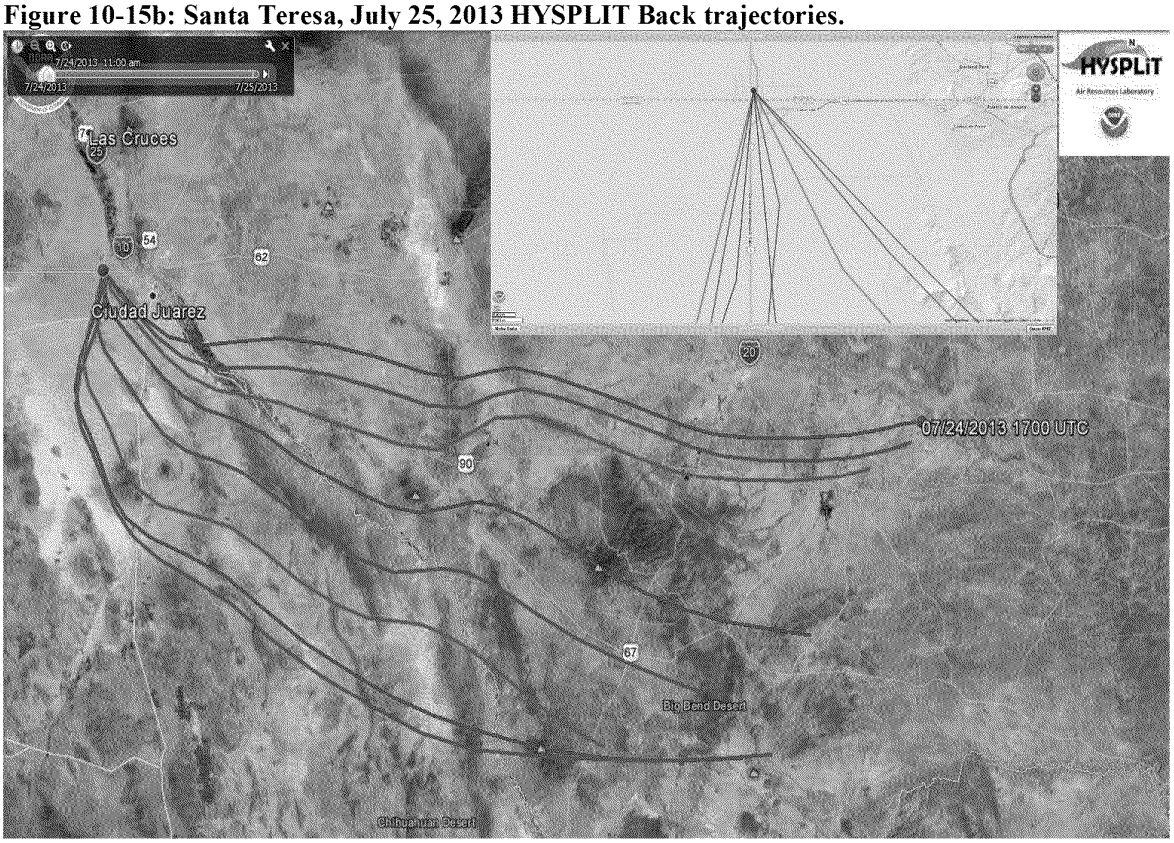





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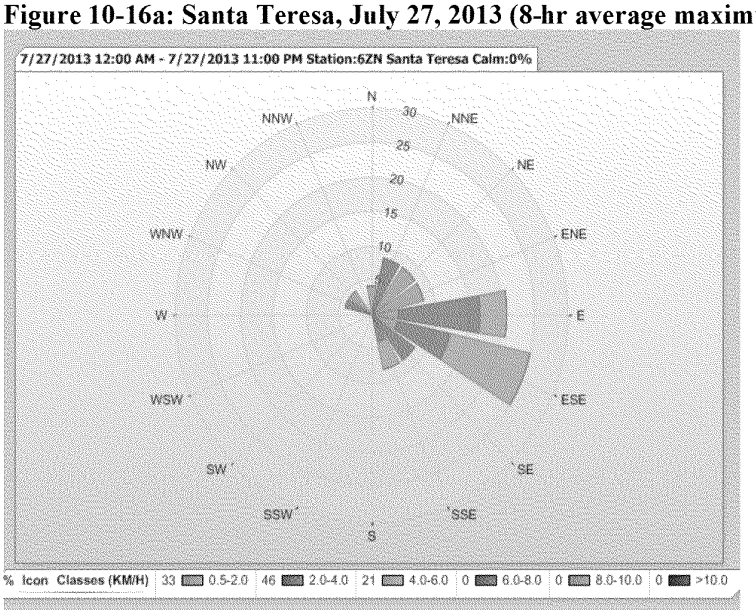
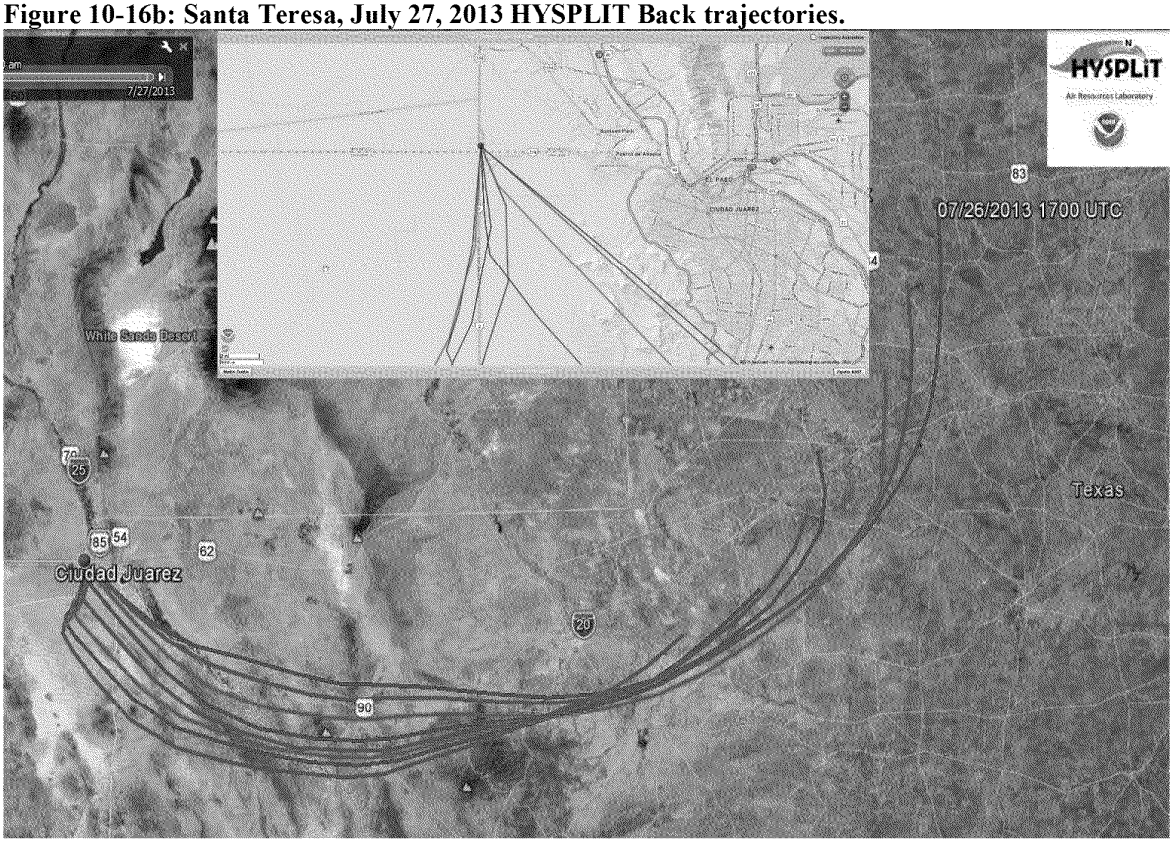
**Figure 10-16a: Santa Teresa, July 27, 2013 (8-hr average maximum .089 ppm)**




Approximately 76% of the winds on this date blew from the direction of El Paso and Juárez.

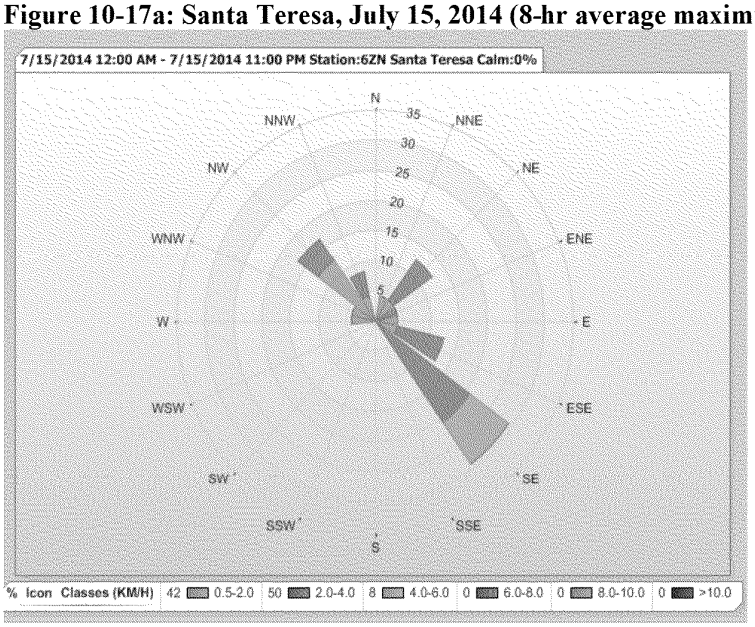
**Figure 10-16b: Santa Teresa, July 27, 2013 HYSPLIT Back trajectories.**






ED_001361_00014973

**Figure 10-17a: Santa Teresa, July 15, 2014 (8-hr average maximum .077 ppm)**




Approximately 61% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-17b: Santa Teresa, July 15, 2014 HYSPLIT Back trajectories.**

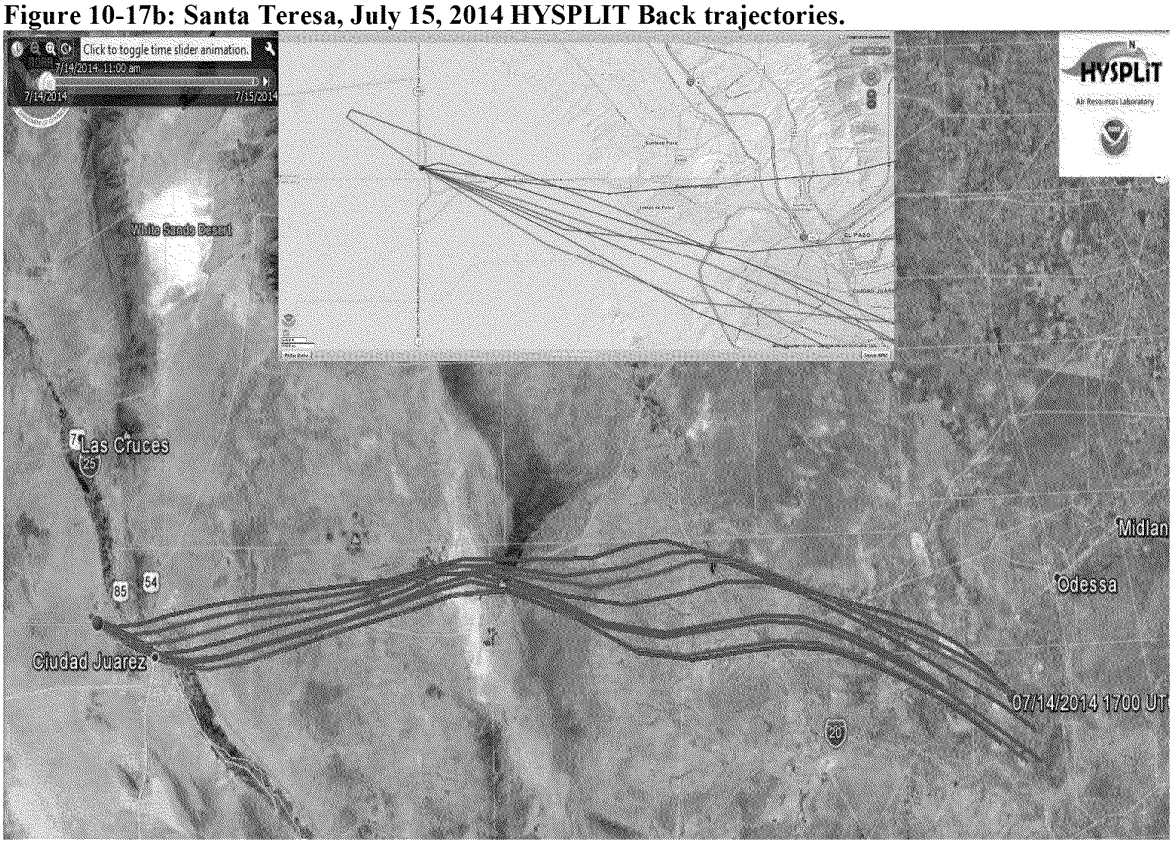





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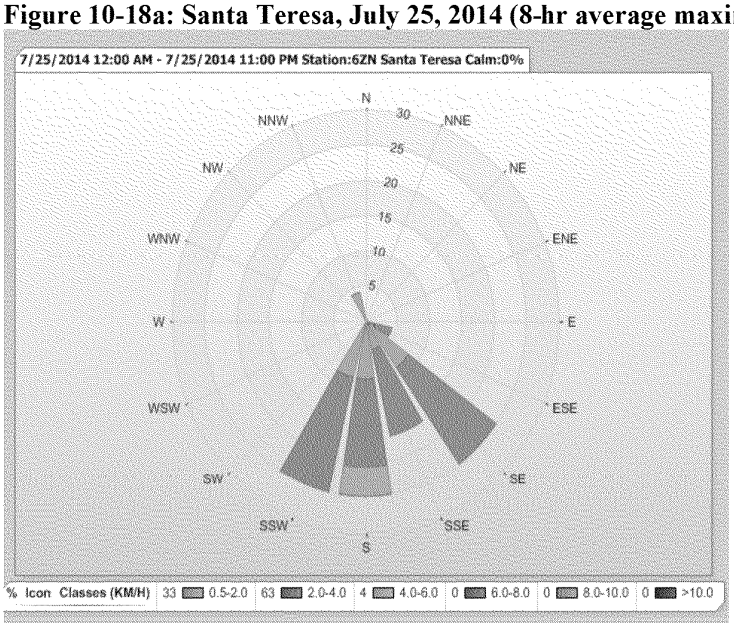
**Figure 10-18a: Santa Teresa, July 25, 2014 (8-hr average maximum .064 ppm)**




Approximately 96% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-18b: Santa Teresa, July 25, 2014 HYSPLIT Back trajectories.**

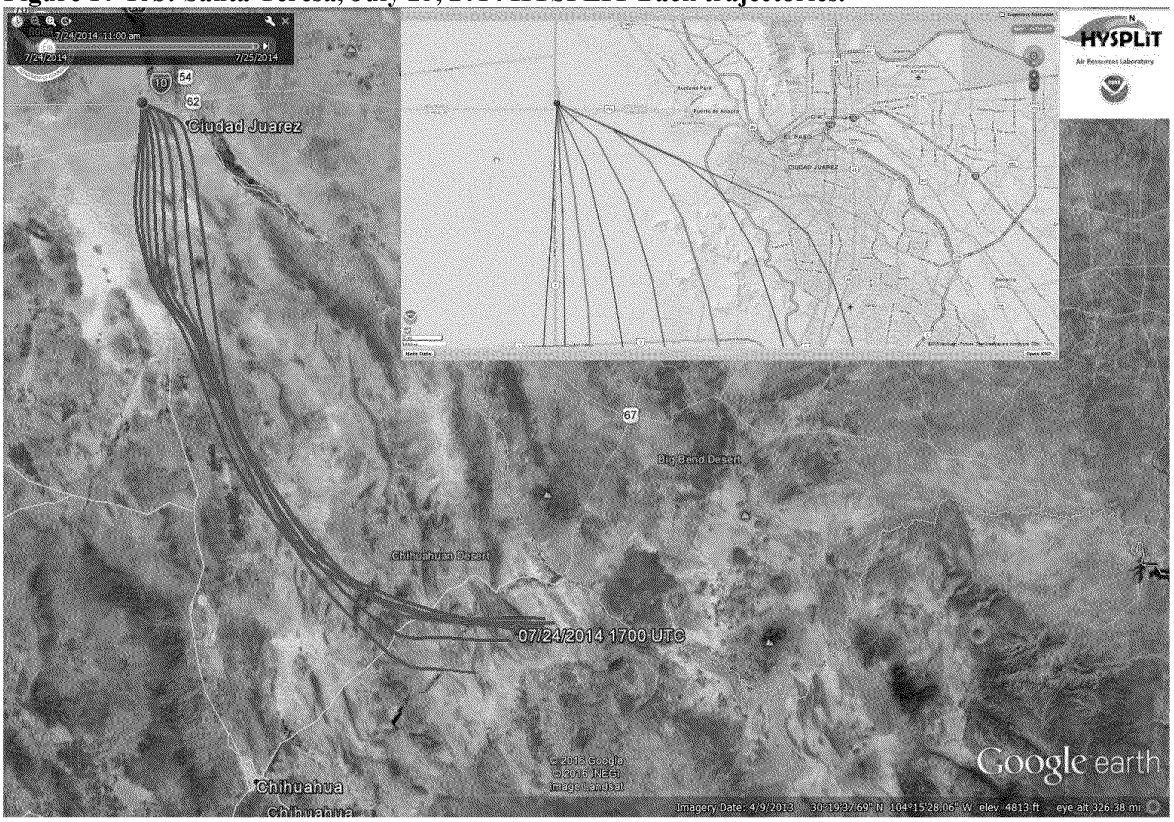





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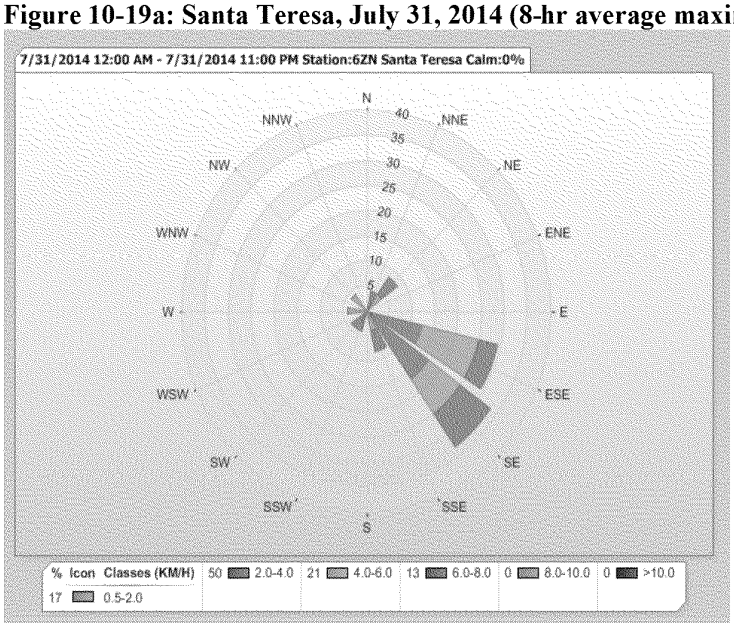
**Figure 10-19a: Santa Teresa, July 31, 2014 (8-hr average maximum .068 ppm)**




Approximately 72% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-19b: Santa Teresa, July 31, 2014 HYSPLIT Back trajectories.**

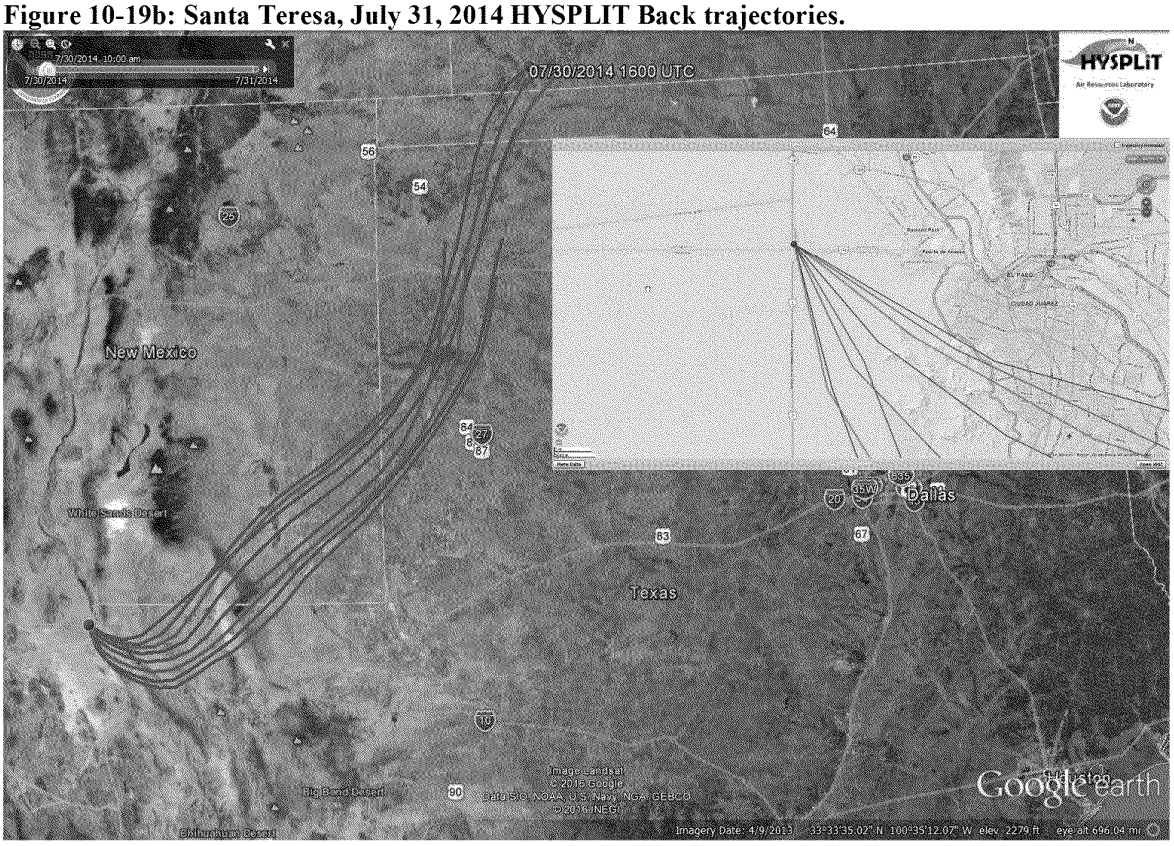





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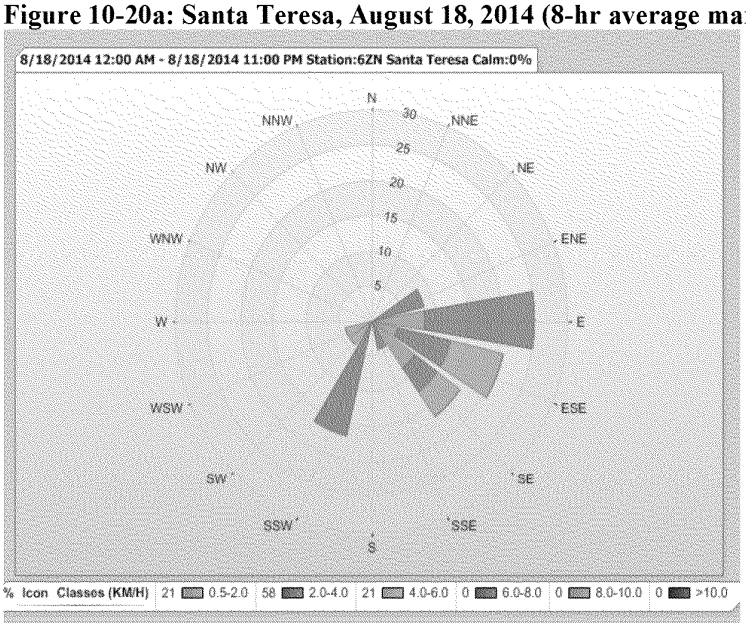
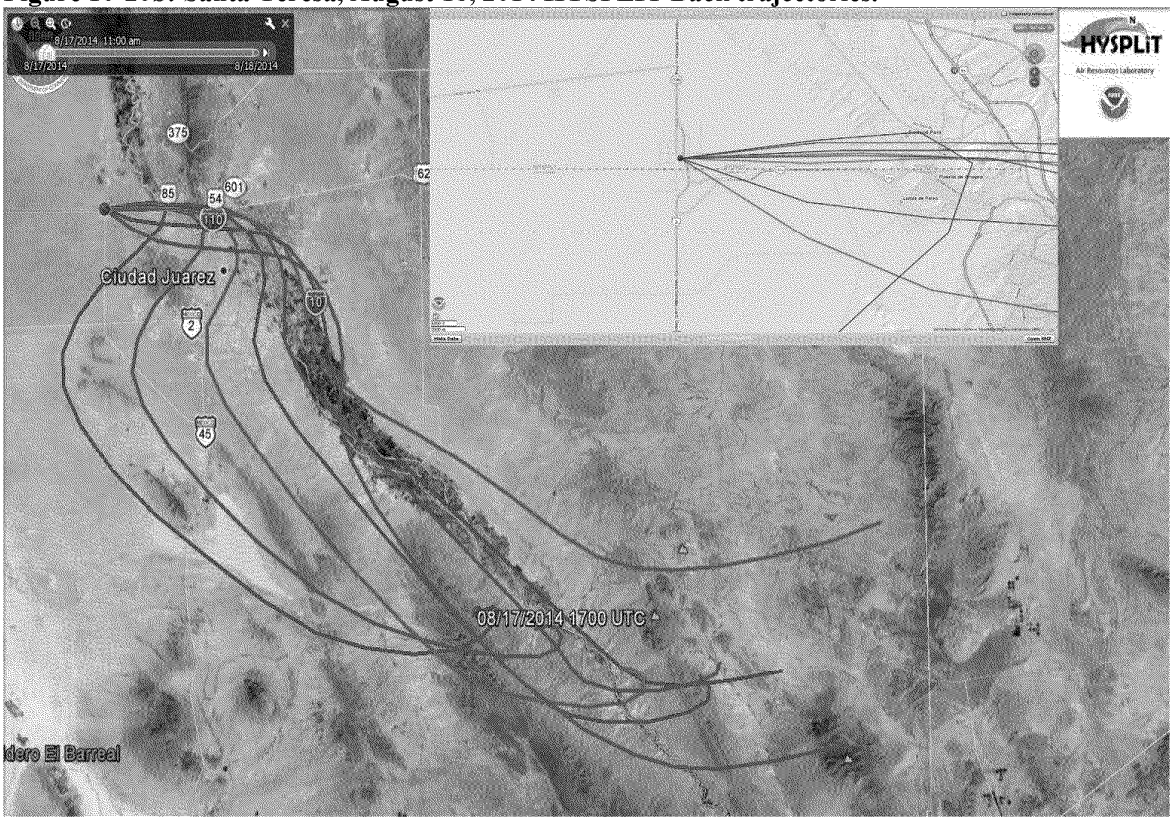
**Figure 10-20a: Santa Teresa, August 18, 2014 (8-hr average maximum .069 ppm)**




Approximately 92% of the winds on this date blew from the direction of El Paso and Juárez.

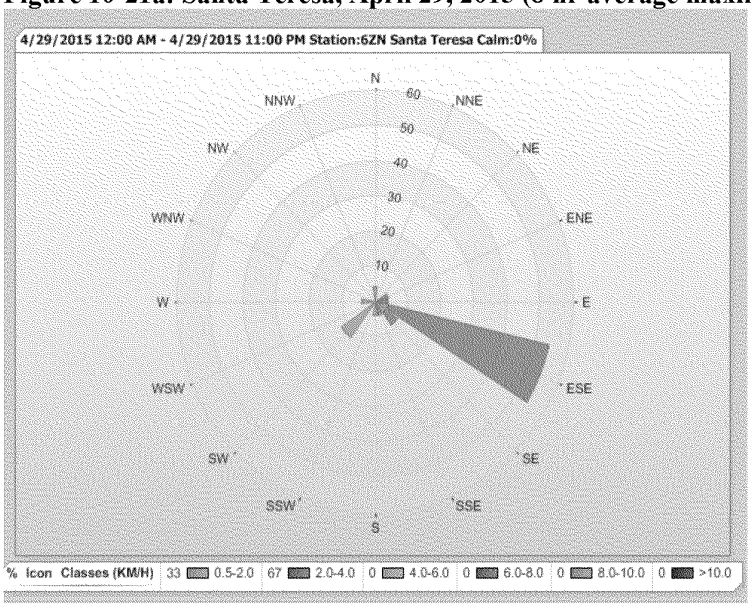
**Figure 10-20b: Santa Teresa, August 18, 2014 HYSPLIT Back trajectories.**





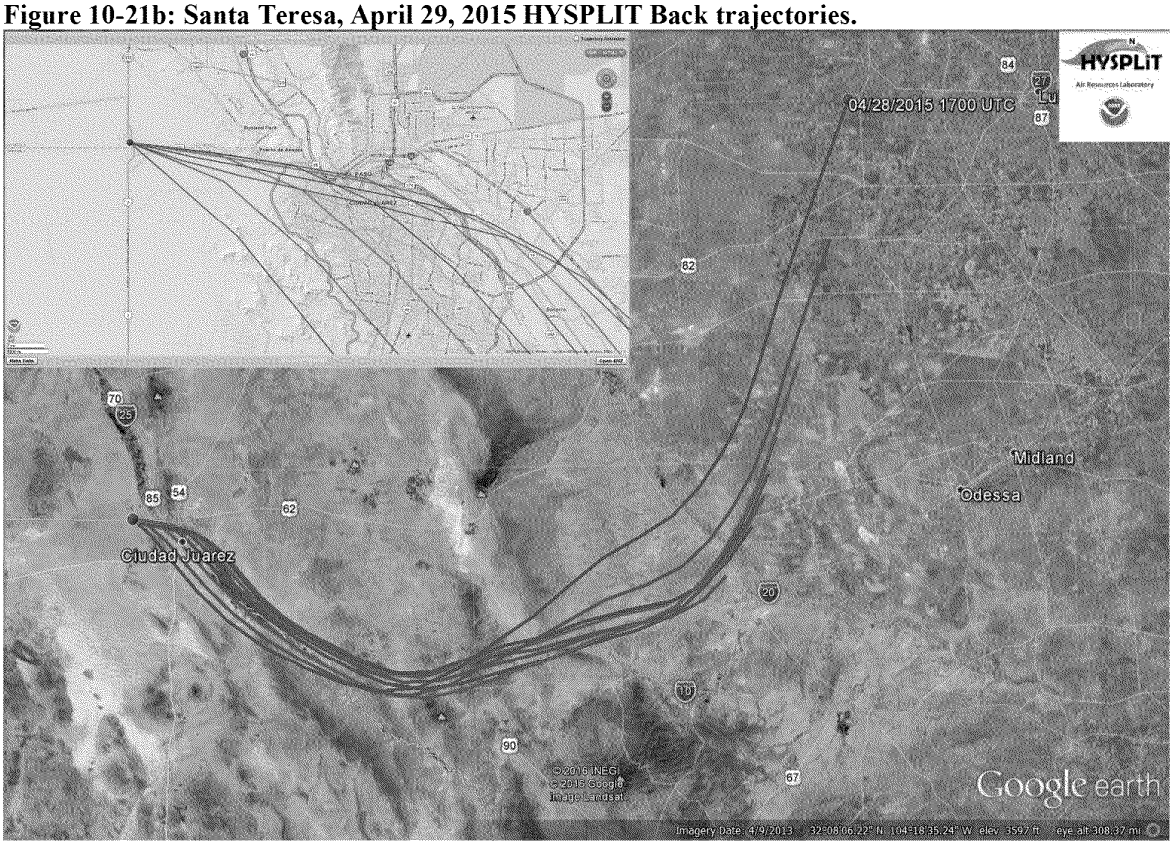

ED_001361_00014973

**Figure 10-21a: Santa Teresa, April 29, 2015 (8-hr average maximum .070 ppm)**




Approximately 77% of the winds on this date blew from the direction of El Paso and Juárez.

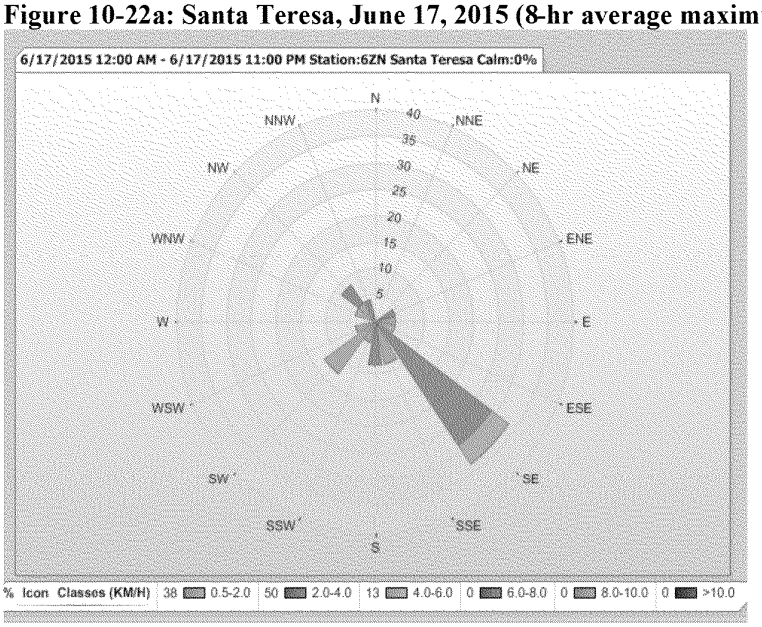
**Figure 10-21b: Santa Teresa, April 29, 2015 HYSPLIT Back trajectories.**






ED_001361_00014973

**Figure 10-22a: Santa Teresa, June 17, 2015 (8-hr average maximum .070 ppm)**




Approximately 66% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-22b: Santa Teresa, June 17, 2015 HYSPLIT Back trajectories.**

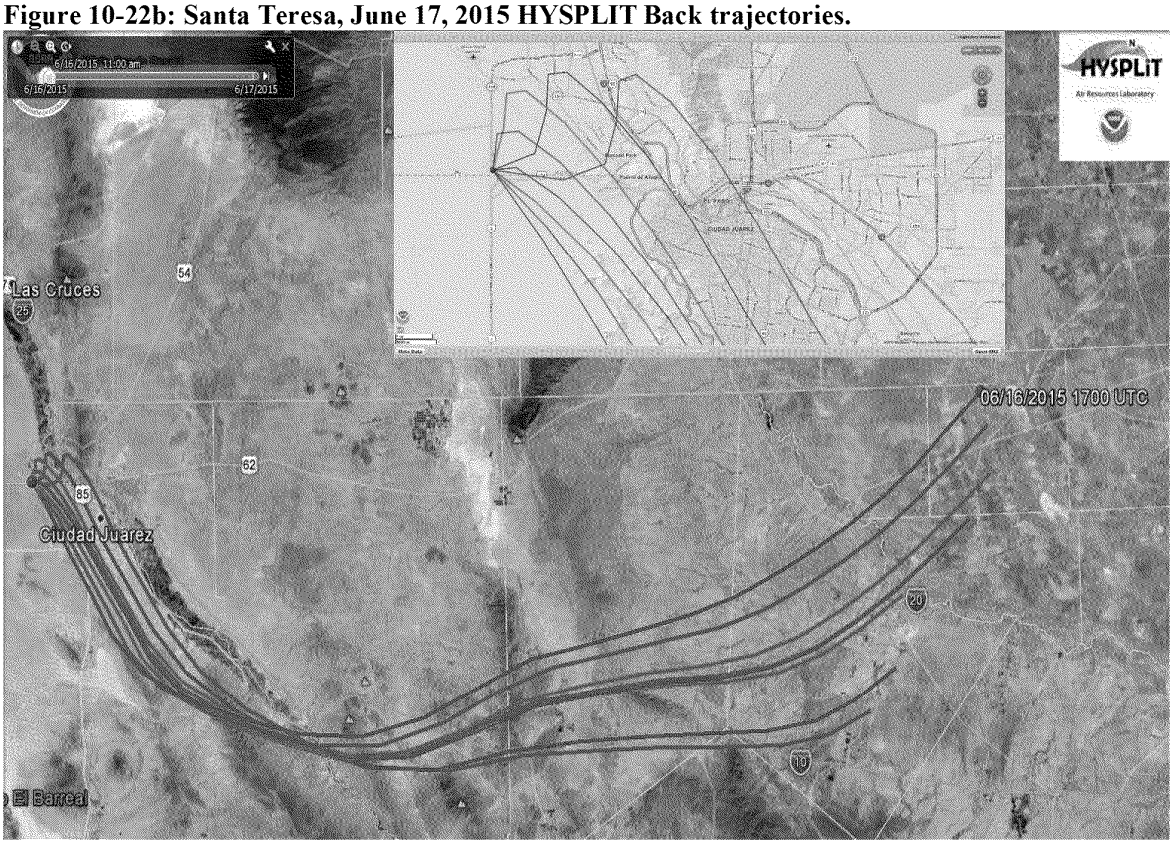





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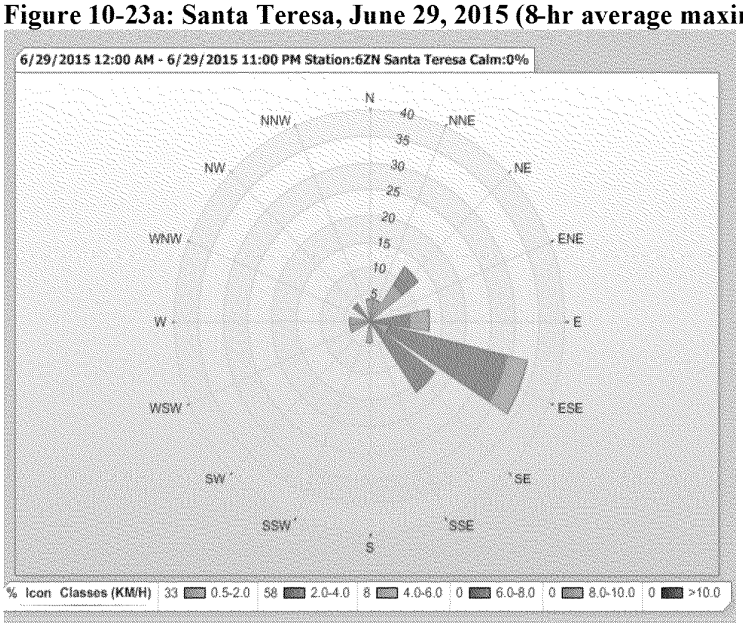
**Figure 10-23a: Santa Teresa, June 29, 2015 (8-hr average maximum .074 ppm)**




Approximately 84% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-23b: Santa Teresa, June 29, 2015 HYSPLIT Back trajectories.**

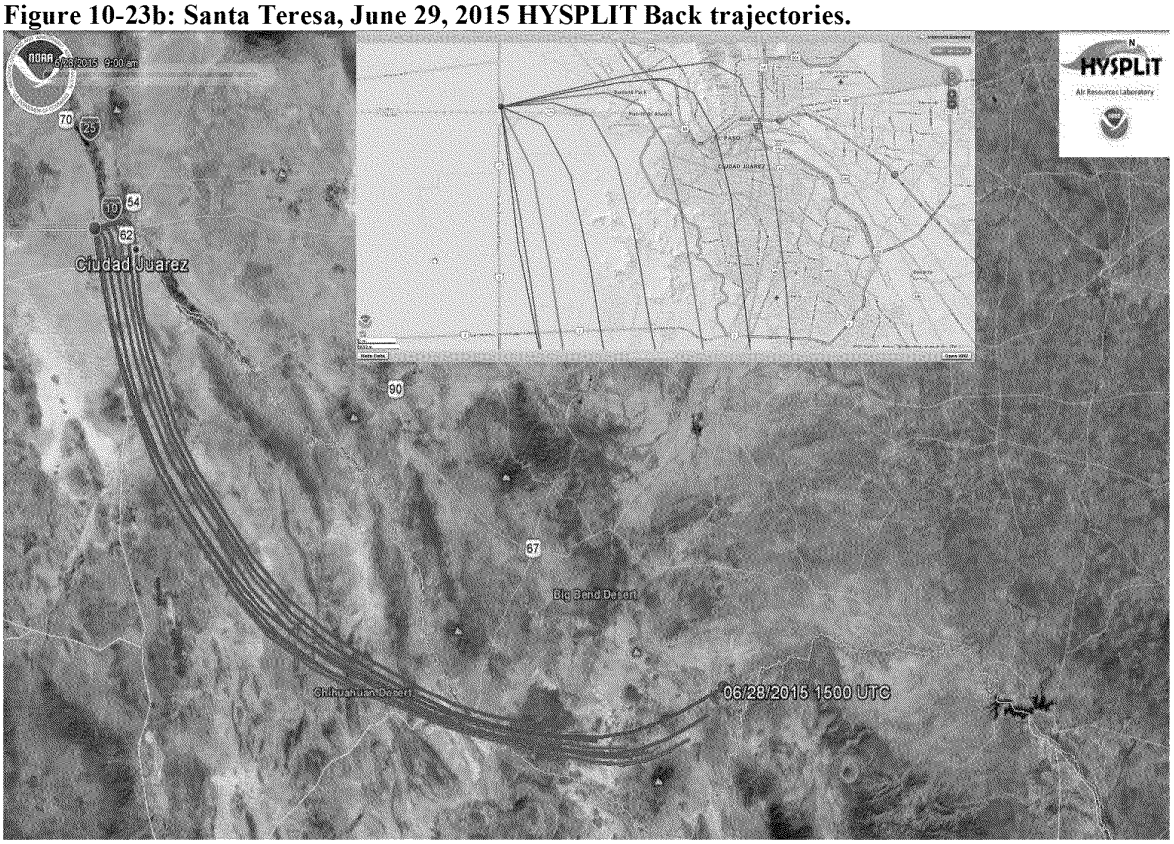





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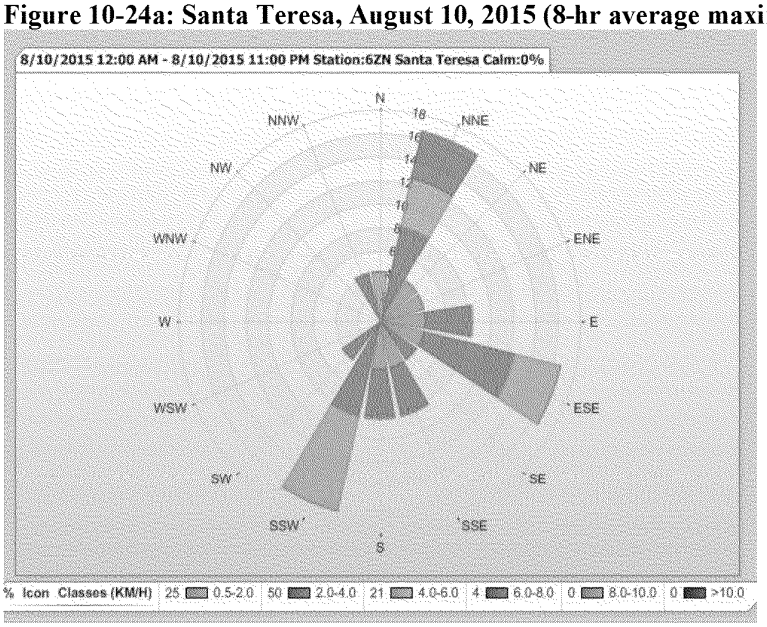
**Figure 10-24a: Santa Teresa, August 10, 2015 (8-hr average maximum .072 ppm)**




Approximately 70% of the winds on this date blew from the direction of El Paso and Juárez.

**Figure 10-24b: Santa Teresa, August 10, 2015 HYSPLIT Back trajectories.**

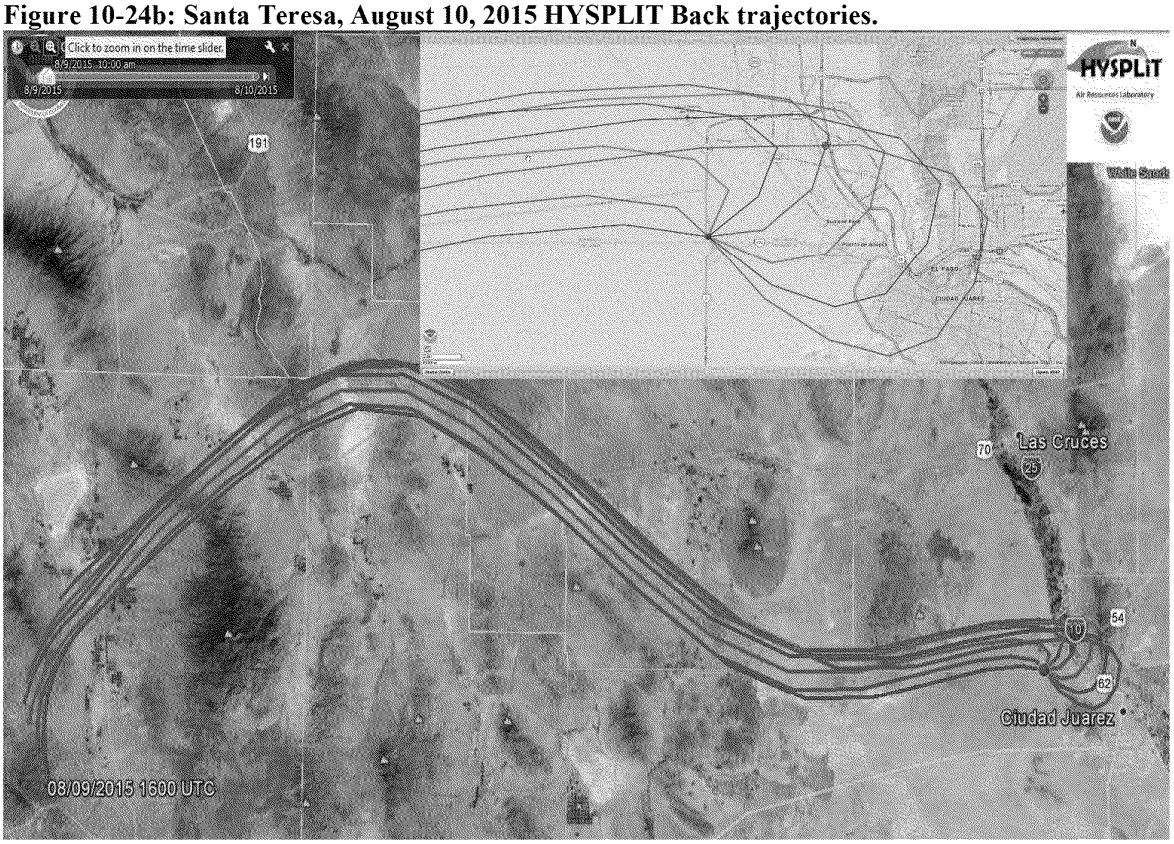





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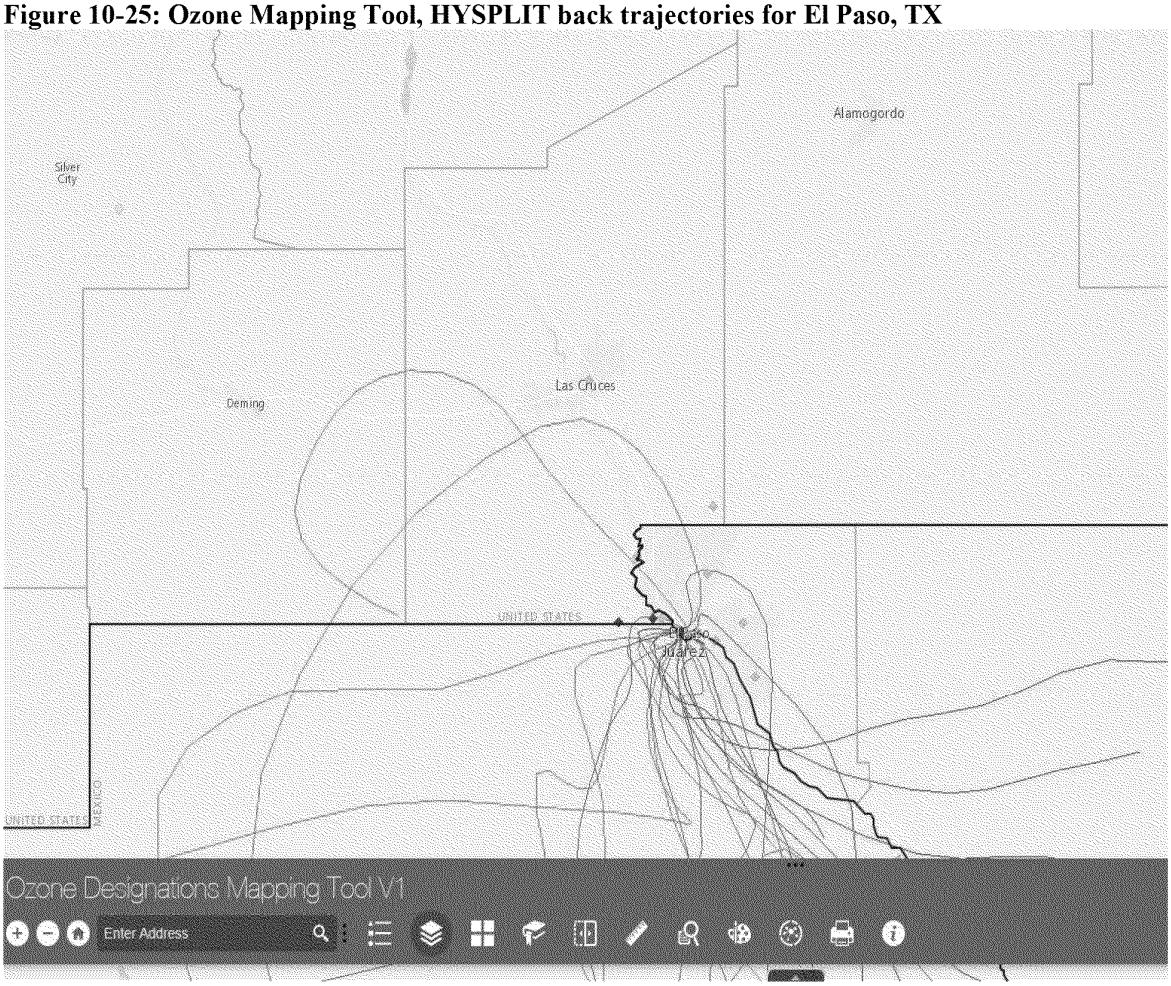
**Figure 10-25: Ozone Mapping Tool, HYSPLIT back trajectories for El Paso, TX**






ED_001361_00014973

**To:** Lo, Doris[Lo.Doris@epa.gov]; YOSHIMURA, GWEN[Yoshimura.Gwen@epa.gov]; Flagg, MichaelA[Flagg.MichaelA@epa.gov]; Danilo Dragoni (ddragoni@ndep.nv.gov)[ddragoni@ndep.nv.gov]
**Cc:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Robert Tekniepe[Tekniepe@ClarkCountyNV.gov]; huys@clarkcountynv.gov[huys@clarkcountynv.gov]; Marci Henson[Mhenson@ClarkCountyNV.gov]; Phillip Wiker[wiker@ClarkCountyNV.gov]
**From:** Mike Sword
**Sent:** Thur 12/22/2016 8:42:52 PM
**Subject:** Initial Notifications for Exceptional Events that occurred in 2016
201612 DAQ Initial Notification August 23-24.docx
201612 DAQ Initial Notification July 26-29.docx
201612 DAQ Initial Notification June 24-27.docx

Gwen,

The Clark County Department of Air Quality (DAQ) is pleased to submit Initial Notifications for Exceptional Events that occurred in 2016, in accordance with the 2015 revision of the rule for the Treatment of Data Influenced by Exceptional Events (40 CFR Parts 50 and 51).

Throughout the summer of 2016, Clark County was impacted by smoke from multiple wildfires in central and southern California. More specifically, the National Ambient Air Quality Standard (NAAQS) for Ozone (70 ppb) was violated due to the impacts of the wildfires on June 24, July 23-24, and August 24-29, 2016. DAQ is planning to submit exceptional event packages for these events by the May 31, 2017 deadline (National Ambient Air Quality Standards for Ozone; Final Rule, p 65413). The Initial Notifications for the events are attached.

Please contact Jean-Paul or myself at (702) 455-1647 if you have any questions.

Thank you for your attention to this matter.

Mike Sword, P.E., CEM

Planning Manager

Clark County Department of Air Quality

702-455-1615

sword@ClarkCountyNV.gov

**To:** randya@cskt.org[randya@cskt.org]; Gordon Pierce[gordon.pierce@state.co.us]; julies@nezperce.org[julies@nezperce.org]; maryf@nezperce.org[maryf@nezperce.org]; mel.joseph@lppsr.org[mel.joseph@lppsr.org]; Carolyn Kelly CKelly@quinault.org[CKelly@quinault.org]; jwalker@nwbshoshone.com[jwalker@nwbshoshone.com]; Dave Collier <COLLIER.David@deq.state.or.us>[COLLIER.David@deq.state.or.us]; Danilo Dragoni (ddragoni@ndep.nv.gov)[ddragoni@ndep.nv.gov]; 'LeBaron, Brock'[blebaron@utah.gov]; Tiffany Floyd <tiffany.floyd@deq.idaho.gov>[tiffany.floyd@deq.idaho.gov]; Carol McCoy carol_mccoy@nps.gov[carol_mccoy@nps.gov]; 'John Vimont'[john_vimont@nps.gov]; Linda Geiser lgeiser@fs.fed.us[lgeiser@fs.fed.us]; Bret Anderson (baanderson02@fs.fed.us)[baanderson02@fs.fed.us]; Theresa Alexander[talexander@blm.gov]; Dave Maxwell dmaxwell@blm.gov[dmaxwell@blm.gov]; Ursula Nelson Ursula.Nelson@pima.gov[Ursula.Nelson@pima.gov]; Brad Poiriez[bradp@mdaqmd.ca.gov]; Tamara L. McCandless (tamara_mccandless@fws.gov)[tamara_mccandless@fws.gov]; Tim Allen[tim_allen@fws.gov]; McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Viswanathan, Krishna[Viswanathan.Krishna@epa.gov]
**Cc:** Mary Uhl[maryuhl@westar.org]; Bob Lebens[blebens@westar.org]; pbarickman@utah.gov[pbarickman@utah.gov]; Jay Baker[jbaker@utah.gov]
**From:** Tom Moore
**Sent:** Mon 4/24/2017 5:37:16 PM
**Subject:** WRAP Board - review materials for April 28th Board meeting at Bahia Resort

April 24, 2017

To: WRAP Board Members and Alternates

Re: review materials to prepare for April 28th Board meeting at Bahia Resort

If you are able to participate in the meeting, either in-person or remotely, files for your review and subsequent discussion at the meeting are being posted at: https://www.wrapair2.org/calendar/viewitem.jsp?&cal_item_id=13137. If you are joining remotely, the agenda file posted at this calendar item contains the remote access information for both the conference all and webinar.

Here is the agenda, with highlighted items that will have files linked for your review. It may be convenient for you to print this E-Mail to assist you in assembling and looking at linked files in the appt.

**Friday, April 28th**

8:30 Welcome and Roll Call – Gordon Pierce and Randy Ashley, Board Co-Chairs

- Agenda Review
- Board call schedule
- Status of Board Member Terms – Tom Moore

8:45 Approval of 2017 Annual WRAP Workplan, critical path steps forward, and discussion of activities for each Work Group – Julie Simpson and Patrick Barickman, Technical Steering Committee Co-Chairs and Tom

- Workplan Materials for discussion and approval (Schedules) (Deliverables) (Budget Request) (Workplan document)
  - Inter-Work Group coordination
  - Funding matters and direction from the Board

10:00 Break

10:10 Discuss needs / options for Regional Exceptional Event Analyses (PDF) – Tom

11:00 Regional Haze analysis and planning support needs and work planned (PDF) – Jay Baker, Regional Haze Planning Work Group Co-Chair, followed by discussion and questions

12:00 Adjourn

Look forward to seeing or hearing you in San Diego. As a reminder, breakfast on the 28th is on your own.

You can reach me by E-Mail or office phone today, or at my mobile number highlighted below with any questions starting April 25th.

Thank you.

*Tom Moore, WRAP Air Quality Program Manager*

*Western States Air Resources Council (WESTAR) | e: tmoore@westar.org | o: 970.491.8837 |c: 970.988.4055*

*Western Regional Air Partnership | www.wrapair2.org*

**To:** Marina Mejia[Mejia.Marina@azdeq.gov]; Ryan C. Templeton[Templeton.Ryan@azdeq.gov]
**Cc:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Lo, Doris[Lo.Doris@epa.gov]; Kaibah Tsosie[Tsosie.Kaibah@azdeq.gov]
**From:** Viswanathan, Krishna
**Sent:** Mon 8/15/2016 8:19:55 PM
**Subject:** RE: AZ Quarterly Meetings

Hi Marina,

No worries, my pleasure!

All that seems good. So I will forward that invitation as well.

Yes, inviting Balaji would be good for RH.

For Hayden Pb we'll have Ginger on the line to listen and provide feedback.

Thanks and looking forward to seeing all of you this week,

Krishna

Krishna Viswanathan

520.999.7880

**From:** Marina Mejia [mailto:Mejia.Marina@azdeq.gov]
**Sent:** Monday, August 15, 2016 1:13 PM
**To:** Viswanathan, Krishna <Viswanathan.Krishna@epa.gov>; Ryan C. Templeton <Templeton.Ryan@azdeq.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>;

Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

Hi Krishna,

That is great! Depending on how the meetings go for SO2, I think chatting about it afterwards is a good idea. I think the 3 hot topics look good, I will talk to Balaji to see if he can sit in the meeting for the Regional Haze portion so he can hear the comments as well. I think for Hayden lead we just want to talk about steps moving forward and about the options we are looking at for modeling, and for ozone designations we can def. give an update on what the status is during the call (we should be close to submitting to the Governor at that point). If you want to add maybe another two topics at the end to cover if we have time to do so we can have them on there just in case, I know that's what we did before, but I don't know if there is anything else you would like to touch base on?

August 31st from 11-12 works great! Thank you again for your help in scheduling this.

Thank you,

Marina

**From:** Viswanathan, Krishna [mailto:Viswanathan.Krishna@epa.gov]
**Sent:** Friday, August 12, 2016 11:09 AM
**To:** Ryan C. Templeton <Templeton.Ryan@azdeq.gov>; Marina Mejia <Mejia.Marina@azdeq.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>; Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

Hi Marina,

Thanks for the note!

The idea of the hot topics is to keep it to no more than 3 issues and since we no overlaps we have some decisions to make.

On the SO2 SIPs, since we will be meeting next week at the facilities, why don't we set aside some time after facility visits to talk about the progress on those? I'll make sure to inform our crew, if you can do the same; we'll have to find a venue like our hotel lobby or something.

I can pull out Yuma PM10 and substitute with Hayden Pb with the proviso that we talk next week about Yuma PM10 separately. It seems that project has some staffing and work started from your side and we'd like to make sure we are aligned before a lot of work is done on it. I will set up a meeting for us talk about Yuma PM10 either early next week or the week after ('d like to check internally before I do that).

So the hot topics will now look like this –

•□□□□□□□ Hayden Pb – do you want a specific issue resolved or update provided?

•□□□□□□□ Regional Haze SRP Coronado – we'll provide our perspective on the SIP/permit out for public comment

•□□□□□□□ Ozone Designations – do you have any updates? What are your next steps and how can we assist?

Anything else will be as time allows and will be addressed in monthly meetings on those topics. Do these sound feasible?

Timing wise, how about Weds, August 31st from 11-12? If yes, I'll send you the invitation with number to call.

Thanks,

Krishna

Krishna Viswanathan

520.999.7880

**From:** Ryan C. Templeton [mailto:Templeton.Ryan@azdeq.gov]
**Sent:** Thursday, August 11, 2016 1:21 PM
**To:** Marina Mejia <Mejia.Marina@azdeq.gov>; Viswanathan, Krishna <Viswanathan.Krishna@epa.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>; Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

Hey Marina,

I think the three projects you listed below are the hottest of hot topics for us currently.

Ryan Templeton

Environmental Program Supervisor

Technical Analysis Unit, Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

(602) 771-4230

rct@azdeq.gov

**From:** Marina Mejia
**Sent:** Thursday, August 11, 2016 12:57 PM
**To:** Viswanathan, Krishna <Viswanathan.Krishna@epa.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>; Ryan C. Templeton <Templeton.Ryan@azdeq.gov>; Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

Hi Krishna,

Thank you for your response. I will let the team know that it is expected they meet with their counterparts at EPA on a monthly basis to get/give plan updates.

I think that some hot topics to add might be: Hayden Lead, Hayden SO2 and Miami SO2. Kaibah and Ryan, do you think there are other hot topics that we might be missing?

For the week of the 29th we are available:

August 29- Any time before 12PM

August 31- Anytime between 10AM-2PM

September 1st: Anytime between 1PM-4PM

September 2nd: Anytime between 1:30PM-4PM.

Thank you again for getting this scheduled and for your help,

Marina

**From:** Viswanathan, Krishna [mailto:Viswanathan.Krishna@epa.gov]
**Sent:** Wednesday, August 10, 2016 3:03 PM
**To:** Marina Mejia <Mejia.Marina@azdeq.gov>; Ryan C. Templeton <Templeton.Ryan@azdeq.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>
**Subject:** AZ Quarterly Meetings

Hi Marina,

I'm writing on behalf of Colleen on your request to have quarterly meetings with management + relevant staff. Based on your input and some internal discussion we feel it may be best to have a quarterly call that focuses on 2-3 key topics. These hot topics or key issues are ones on which we'd like to provide or receive a significant decision or update.

If after these 2-3 topics, if time allows we can update each other on the remaining topics. An expectation is that on all the topics we are actively working on we'll have regular monthly meetings between key staff to keep each other coordinated, as we mentioned in the Maintenance Plan Kaizen. Oher things such as personnel updates can be communicated via email. For this month, our key topics tentatively are:

**Hot Topics:**

- Yuma PM10
- Regional Haze – SRP Coronado
- Ozone Designations

Let's know if these topics resonate with you as needing discussion or if you identify other topics as critical. After our internal meeting, I'll have a list of other issues as time allows that follows this.

Timing: Please sand 2-3 times the week of the 29th that work for you and I'll schedule a call.

Thanks,

Krishna

NOTICE: This e-mail (and any attachments) may contain PRIVILEGED OR CONFIDENTIAL information and is intended only for the use of the specific individual(s) to whom it is addressed. It may contain information that is privileged and confidential under state and federal law. This information may be used or disclosed only in accordance with law, and you may be subject to penalties under law for improper use or further disclosure of the information in this e-mail and its attachments. If you have received this e-mail in error, please immediately notify the person named above by reply e-mail, and then delete the original e-mail. Thank you.

NOTICE: This e-mail (and any attachments) may contain PRIVILEGED OR CONFIDENTIAL information and is intended only for the use of the specific individual(s) to whom it is addressed. It may contain information that is privileged and confidential under state and federal law. This information may be used or disclosed only in accordance with law, and you may be subject to penalties under law for improper use or further disclosure of the information in this e-mail and its attachments. If you have received this e-mail in error, please immediately notify the person named above by reply e-mail, and then delete the original e-mail. Thank you.

**To:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]
**From:** Timothy Franquist Jr.
**Sent:** Wed 8/31/2016 12:04:43 AM
**Subject:** RE: Yuma Ozone and Pinal Ozone

Colleen,

You've given me the information I need and I truly appreciate that! We've submitted our recommendation package to the Governor's Office today and I briefed them that it is in our very best interest to submit NAA recommendations by 10/1. Honestly, I'm not sure the underlying reason for MAG and Pinal County's objections to ADEQ submitting our recommendations, if we knew, we might be able to find a solution, but all we know is they want the 2008 boundary, which we can't in good faith recommend as a primary recommendation.

Tim

Timothy S. Franquist, Director

Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

(602) 771-4684

**From:** McKaughan, Colleen [mailto:McKaughan.Colleen@epa.gov]
**Sent:** Tuesday, August 30, 2016 4:07 PM
**To:** Timothy Franquist Jr. <FranquistJr.Timothy@azdeq.gov>
**Subject:** RE: Yuma Ozone and Pinal Ozone

I got your message. Have I given you the information you need for the designations? Do you have any idea why Maricopa and Pinal are so desperate about this?

**From:** Timothy Franquist Jr. [mailto:FranquistJr.Timothy@azdeq.gov]
**Sent:** Tuesday, August 30, 2016 4:05 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** Re: Yuma Ozone and Pinal Ozone

Totally agree, we have no intention in delaying.

Tim

Sent from my iPhone

On Aug 30, 2016, at 2:55 PM, McKaughan, Colleen <McKaughan.Colleen@epa.gov> wrote:

> I don't think EPA would be inclined to agree with a delay.
>
> Sent from my iPhone
>
> On Aug 30, 2016, at 2:22 PM, Timothy Franquist Jr. <FranquistJr.Timothy@azdeq.gov> wrote:
>
> > Colleen,
> >
> > Thank you for the quick response. We pulled the same section of the CAA and also believe we have sufficient data, but it helps that we share the same conclusion.
> >
> > Tim
> >
> > Timothy S. Franquist, Director
> >
> > Air Quality Division
> >
> > Arizona Department of Environmental Quality
> >
> > 1110 W. Washington Street
> >
> > Phoenix, AZ 85007
> >
> > (602) 771-4684
> >
> > **From:** McKaughan, Colleen [mailto:McKaughan.Colleen@epa.gov]

**Sent:** Tuesday, August 30, 2016 11:39 AM
**To:** Timothy Franquist Jr. <FranquistJr.Timothy@azdeq.gov>
**Subject:** RE: Yuma Ozone and Pinal Ozone

Tim,

Here is the citation for a 1-year delay in case the Governor's office asks:

**(B) Promulgation by EPA of designations**

(i) Upon promulgation or revision of a national ambient air quality standard, the Administrator shall promulgate the designations of all areas (or portions thereof) submitted under subparagraph (A) as expeditiously as practicable, but in no case later than 2 years from the date of promulgation of the new or revised national ambient air quality standard. Such period may be extended for up to one year in the event the Administrator has insufficient information to promulgate the designations.

I don't think there is a lack of data in Maricopa and Pinal Counties.

Colleen

**From:** Timothy Franquist Jr. [mailto:FranquistJr.Timothy@azdeq.gov]
**Sent:** Monday, August 29, 2016 8:02 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** Re: Yuma Ozone and Pinal Ozone

Colleen,

I just found out about the delay and thank you for passing that along. As far as Yuma-multistate approach, we should talk about that for sure.

Tim

Sent from my iPhone

On Aug 29, 2016, at 12:10 PM, McKaughan, Colleen <McKaughan.Colleen@epa.gov> wrote:

> Hi, Tim,
>
> I grabbed time on your calendar for next week. I spoke with Paul Melcher, and promised that EPA would lay out all the designation options for Yuma, plus pros and cons. He wants to have a call with both of us the first week in October. He was not totally opposed to having a multi-state nonattainment area with CA , surprisingly enough, when I explained the issues with a small nonattainment area. I also spent some time explaining where we are on PM-10. I thought we should brainstorm.
>
> Also, Pinal County notified me that both Pinal and Maricopa will be requesting a 1-year delay for the ozone designations. I will look into this but I'm not sure you were aware of the forthcoming requests.
>
> Colleen

**To:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]
**From:** Timothy Franquist Jr.
**Sent:** Tue 8/30/2016 11:04:36 PM
**Subject:** Re: Yuma Ozone and Pinal Ozone

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Sent from my iPhone

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> Also, Pinal County notified me that both Pinal and Maricopa will be requesting a 1-year delay for the ozone designations. I will look into this but I'm not sure you were aware of the forthcoming requests.
>
> Colleen

**To:** randya@cskt.org[randya@cskt.org]; Gordon Pierce[gordon.pierce@state.co.us]; julies@nezperce.org[julies@nezperce.org]; maryf@nezperce.org[maryf@nezperce.org]; mel.joseph@lppsr.org[mel.joseph@lppsr.org]; Carolyn Kelly CKelly@quinault.org[CKelly@quinault.org]; jwalker@nwbshoshone.com[jwalker@nwbshoshone.com]; Dave Collier <COLLIER.David@deq.state.or.us>[COLLIER.David@deq.state.or.us]; Danilo Dragoni (ddragoni@ndep.nv.gov)[ddragoni@ndep.nv.gov]; 'LeBaron, Brock'[blebaron@utah.gov]; Tiffany Floyd <tiffany.floyd@deq.idaho.gov>[tiffany.floyd@deq.idaho.gov]; Carol McCoy carol_mccoy@nps.gov[carol_mccoy@nps.gov]; 'John Vimont'[john_vimont@nps.gov]; Linda Geiser lgeiser@fs.fed.us[lgeiser@fs.fed.us]; Bret Anderson (baanderson02@fs.fed.us)[baanderson02@fs.fed.us]; Theresa Alexander[talexander@blm.gov]; Dave Maxwell dmaxwell@blm.gov[dmaxwell@blm.gov]; Ursula Nelson Ursula.Nelson@pima.gov[Ursula.Nelson@pima.gov]; Brad Poiriez[bradp@mdaqmd.ca.gov]; Tamara L. McCandless (tamara_mccandless@fws.gov)[tamara_mccandless@fws.gov]; Tim Allen[tim_allen@fws.gov]; McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Viswanathan, Krishna[Viswanathan.Krishna@epa.gov]
**Cc:** Mary Uhl[maryuhl@westar.org]; Bob Lebens[blebens@westar.org]; pbarickman@utah.gov[pbarickman@utah.gov]
**From:** Tom Moore
**Sent:** Sat 3/11/2017 12:02:58 AM
**Subject:** WRAP Board - posting of materials for March 13th Board call

March 10, 2017

To: WRAP Board Members and Alternates

Re: posting of materials for March 13th Board call

The Board will hold its March call on the 13th at 200 PM MDT. Please call 1-800-768-2983 and use access code 4918837.

**The materials for Items 2 and 5 are in the process of being posted on the WRAP calendar at: https://www.wrapair2.org/calendar/viewitem.jsp?&cal_item_id=13135. These materials do not require extensive review prior to the call and will be available on Monday morning.**

Agenda items

-

1) Welcome and Roll Call – Gordon Pierce and Randy Ashley

2) San Diego meeting – updated April 26-27 and April 28th agendas – Tom Moore

3) Informational items - status of other meetings - Tom

- March 28-29 Background Ozone Scientific Assessment
- Summer 2017 Western Modeling Workshop

4) Progress on filling Board seats – Tom

5) Progress and next step on 2017 WRAP Workplan – Patrick Barickman and Julie Simpson

6) Proposed cancellation of April 10th Board call - all

Thank you.

*Tom Moore, WRAP Air Quality Program Manager*

*Western States Air Resources Council (WESTAR) | e: tmoore@westar.org | o: 970.491.8837*

*Western Regional Air Partnership | www.wrapair2.org*

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**Cc:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Lo, Doris[Lo.Doris@epa.gov]; Kaibah Tsosie[Tsosie.Kaibah@azdeq.gov]
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•□□□□□ Hayden Pb – do you want a specific issue resolved or update provided?

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•□□□□□ Ozone Designations – do you have any updates? What are your next steps and how can we assist?

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Thanks,

Krishna

Krishna Viswanathan

520.999.7880

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Environmental Program Supervisor

Technical Analysis Unit, Air Quality Division

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**Sent:** Thursday, August 11, 2016 12:57 PM
**To:** Viswanathan, Krishna <Viswanathan.Krishna@epa.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>; Ryan C. Templeton <Templeton.Ryan@azdeq.gov>; Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

Hi Krishna,

Thank you for your response. I will let the team know that it is expected they meet with their counterparts at EPA on a monthly basis to get/give plan updates.

I think that some hot topics to add might be: Hayden Lead, Hayden SO2 and Miami SO2. Kaibah and Ryan, do you think there are other hot topics that we might be missing?

For the week of the 29th we are available:

August 29- Any time before 12PM

August 31- Anytime between 10AM-2PM

September 1st: Anytime between 1PM-4PM

September 2nd: Anytime between 1:30PM-4PM.

Thank you again for getting this scheduled and for your help,

Marina

**From:** Viswanathan, Krishna [mailto:Viswanathan.Krishna@epa.gov]
**Sent:** Wednesday, August 10, 2016 3:03 PM
**To:** Marina Mejia <Mejia.Marina@azdeq.gov>; Ryan C. Templeton <Templeton.Ryan@azdeq.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>
**Subject:** AZ Quarterly Meetings

Hi Marina,

I'm writing on behalf of Colleen on your request to have quarterly meetings with management + relevant staff. Based on your input and some internal discussion we feel it may be best to have a quarterly call that focuses on 2-3 key topics. These hot topics or key issues are ones on which we'd like to provide or receive a significant decision or update.

If after these 2-3 topics, if time allows we can update each other on the remaining topics. An expectation is that on all the topics we are actively working on we'll have regular monthly meetings between key staff to keep each other coordinated, as we mentioned in the Maintenance Plan Kaizen. Oher things such as personnel updates can be communicated via email. For this month, our key topics tentatively are:

**Hot Topics:**

•□□□□□□ Yuma PM10

•□□□□□□ Regional Haze – SRP Coronado

•□□□□□□ Ozone Designations

Let's know if these topics resonate with you as needing discussion or if you identify other topics as critical. After our internal meeting, I'll have a list of other issues as time allows that follows this.

Timing: Please sand 2-3 times the week of the 29th that work for you and I'll schedule a call.

Thanks,

Krishna

---

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**To:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]
**From:** Timothy Franquist Jr.
**Sent:** Tue 8/30/2016 3:02:22 AM
**Subject:** Re: Yuma Ozone and Pinal Ozone

Colleen,
I just found out about the delay and thank you for passing that along. As far as Yuma-multistate approach, we should talk about that for sure.
Tim

Sent from my iPhone

On Aug 29, 2016, at 12:10 PM, McKaughan, Colleen <McKaughan.Colleen@epa.gov> wrote:

> Hi, Tim,
>
> I grabbed time on your calendar for next week. I spoke with Paul Melcher, and promised that EPA would lay out all the designation options for Yuma, plus pros and cons. He wants to have a call with both of us the first week in October. He was not totally opposed to having a multi-state nonattainment area with CA , surprisingly enough, when I explained the issues with a small nonattainment area. I also spent some time explaining where we are on PM-10. I thought we should brainstorm.
>
> Also, Pinal County notified me that both Pinal and Maricopa will be requesting a 1-year delay for the ozone designations. I will look into this but I'm not sure you were aware of the forthcoming requests.
>
> Colleen

**To:** Ryan C. Templeton[Templeton.Ryan@azdeq.gov]; Marina Mejia[Mejia.Marina@azdeq.gov]; Viswanathan, Krishna[Viswanathan.Krishna@epa.gov]
**Cc:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Lo, Doris[Lo.Doris@epa.gov]
**From:** Kaibah Tsosie
**Sent:** Fri 8/12/2016 5:33:28 PM
**Subject:** RE: AZ Quarterly Meetings

I agree, the Hayden projects are definitely significant.

Kaibah

**From:** Ryan C. Templeton
**Sent:** Thursday, August 11, 2016 1:21 PM
**To:** Marina Mejia <Mejia.Marina@azdeq.gov>; Viswanathan, Krishna <Viswanathan.Krishna@epa.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>; Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

Hey Marina,

I think the three projects you listed below are the hottest of hot topics for us currently.

Ryan Templeton

Environmental Program Supervisor

Technical Analysis Unit, Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

(602) 771-4230

rct@azdeq.gov

**From:** Marina Mejia
**Sent:** Thursday, August 11, 2016 12:57 PM
**To:** Viswanathan, Krishna <Viswanathan.Krishna@epa.gov>
**Cc:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>; Lo, Doris <Lo.Doris@epa.gov>; Ryan C. Templeton <Templeton.Ryan@azdeq.gov>; Kaibah Tsosie <Tsosie.Kaibah@azdeq.gov>
**Subject:** RE: AZ Quarterly Meetings

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I think that some hot topics to add might be: Hayden Lead, Hayden SO2 and Miami SO2. Kaibah and Ryan, do you think there are other hot topics that we might be missing?

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**Subject:** AZ Quarterly Meetings

Hi Marina,

I'm writing on behalf of Colleen on your request to have quarterly meetings with management + relevant staff. Based on your input and some internal discussion we feel it may be best to have a quarterly call that focuses on 2-3 key topics. These hot topics or key issues are ones on which we'd like to provide or receive a significant decision or update.

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**Hot Topics:**

- Yuma PM10
- Regional Haze – SRP Coronado
- Ozone Designations

Let's know if these topics resonate with you as needing discussion or if you identify other topics as critical. After our internal meeting, I'll have a list of other issues as time allows that follows this.

Timing: Please sand 2-3 times the week of the 29th that work for you and I'll schedule a call.

Thanks,

Krishna

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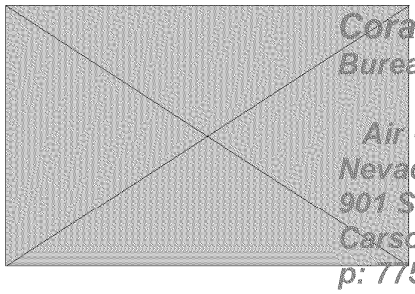
**To:** Albee, Charlene (CAlbee@washoecounty.us)[CAlbee@washoecounty.us]; McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Carr, Danielle[Carr.Danielle@epa.gov]; dwinkelman@ndep.nv.gov[dwinkelman@ndep.nv.gov]; Gutierrez, Roberto[Gutierrez.Roberto@epa.gov]; Jordan, Deborah[Jordan.Deborah@epa.gov]; sjaunara@ndep.nv.gov[sjaunara@ndep.nv.gov]
**From:** Coral L. Newton
**Sent:** Mon 1/30/2017 7:11:15 PM
**Subject:** EPA Bi-Annual Report
removed.txt
epa bian rpt Jul-Dec 2016.doc

Please find attached the EPA Bi-Annual Report for the period July 1st-December 31, 2016 from the Nevada Division of Environmental Protection.



*Coral Newton*
*Bureau of Air Pollution Control and*
*Air Quality Planning*
*Nevada Division of Environmental Protection*
*901 South Stewart Street, Suite 4001*
*Carson City, NV 89701*
*p: 775.687.9494*
*clnewton@ndep.nv.gov*
***www.ndep.nv.gov***

**To:** McKaughan, Colleen[McKaughan.Colleen@epa.gov]
**From:** Ryan Eberle
**Sent:** Thur 6/8/2017 4:49:23 PM
**Subject:** RE: EPA extends deadline for 2015 ozone NAAQS designations

Thanks, Colleen.

**Ryan Eberle, P.E.**

Air Quality Program Manager

Gila River Indian Community

Department of Environmental Quality

Main Office: P.O. Box 97 / 45 S. Church St.

Sacaton, AZ 85147

AQ Office: 1576A South Nelson Dr.

Chandler, AZ 85226

**c|** 480.622-3326

**d|** 520.796.3781

**f** | 520.796.3973

**Website:** http://www.gricdeq.org/

**From:** McKaughan, Colleen [mailto:McKaughan.Colleen@epa.gov]
**Sent:** Thursday, June 08, 2017 9:44 AM
**To:** Ryan Eberle; christopher.horan@srpmic-nsn.gov; bball@ak-chin.nsn.us
**Subject:** EPA extends deadline for 2015 ozone NAAQS designations

Hi, All,

Here is the letter that Administrator Pruitt sent to Governor Ducey. Designations for the 2015 ozone standard will now occur in October 2018. Let me know if you have questions.

Colleen

This message contains confidential information and is intended only for the individual(s)named. If you are not the named addressee you should not disseminate, distribute or copy this email. Please notify the sender immediately by e-mail if you have received the e-mail by mistake and permanently delete this e-mail from your system. E-mail transmission cannot be guaranteed to be secure or error-free as information could be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. The sender therefore does not accept liability for any errors or omissions in the contents of this message, which arise as a result of e-mail transmission. If verification is required please request a hard-copy version.

**To:** Adams, Elizabeth[Adams.Elizabeth@epa.gov]; McKaughan, Colleen[McKaughan.Colleen@epa.gov]; Bradley Crowell[bcrowell@dcnr.nv.gov]; Jeffrey Kinder[jkinder@ndep.nv.gov]; Lisa Kremer[lkremer@ndep.nv.gov]
**Cc:** sjaunara@ndep.nv.gov[sjaunara@ndep.nv.gov]; Patricia Bobo[pbobo@ndep.nv.gov]; glovato@ndep.nv.gov[glovato@ndep.nv.gov]
**From:** Danilo Dragoni
**Sent:** Tue 5/16/2017 12:39:09 AM
**Subject:** Nevada DEP comments on Executive Order 13777
NDEP Comments EPA-HQ-OA-2017-0190.pdf

Please find attached a copy of the NDEP comments on Docket ID No. EPA-HQ-OA-2017-0190; Executive Order to create a Regulatory Reform Task Force to evaluate existing regulations and to identify regulations that should be repealed, replaced, or modified.

Comments were submitted on Regulations.gov on May 15th, 2017 and the Tracking Number is 1k1-8weo-enmr

Best Regards,

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

# Nevada Division of Environmental Protection

Bureaus of Air Quality Planning & Air Pollution Control

## 105 GRANT BIANNUAL REPORT

July 1 – December 31, 2016

## ACTIVITY: AIR MONITORING AND DATA REPORTING

The goals of the Nevada Division of Environmental Protection's (NDEP) air monitoring and data reporting programs are to ensure the scientific accuracy of the ambient air quality data base and the representativeness of the ambient air quality monitoring network as set forth by the Clean Air Act and to improve the timeliness of the ambient air quality data.

All required reports and correspondence related to the following actions will be submitted with the biannual report to the EPA monitoring contact. All data submittals will be directly submitted through the Air Quality System (AQS).

### *Actions: Network Operation*

1. Network Operation: The State or Local Air Monitoring Stations (SLAMS) network was operated in accordance with the requirements of 40 CFR Parts 50 and 58. The NDEP Bureau of Air Quality Planning (BAQP) operates SLAMS gaseous ozone monitors in Carson City, Fallon, and Fernley. The BAQP operates a SLAMS $PM_{10}$ monitor in Elko, and a SLAMS $PM_{10}$ monitoring network in Pahrump. The NDEP also operates two SLAMS $PM_{2.5}$ monitors in Carson City (collocated site) and one $PM_{2.5}$ SLAMS monitor in Gardnerville (Ranchos site). The BAQP monitoring network includes meteorological stations in Pahrump, Carson City and a mobile met tower.

2. Precision and Accuracy: The required precision and accuracy checks were conducted during the reporting period as per Appendix A of 40 CFR Part 58. All gas analyzers passed the quarterly audits by an independent quality assurance (QA) auditor and all PM monitors passed all flow/leak checks for the past biannual period except for Ranchos and Manse 1. Ranchos did pass the leak check in September and Manse 1 did not pass the leak check in September. One Performance Evaluation Program (PEP) audit was conducted on July 13th and two PEP audits were conducted on December 14th at the Carson City Armory $PM_{2.5}$ monitoring site and at the Ranchos $PM_{2.5}$ monitoring site. NDEP is still waiting for the results for each of the site evaluations.

3. SLAMS Network Review and Modification: The monitoring objectives of the SLAMS network are being met as outlined in Appendix D of 40 CFR Part 58. They are also described in the BAQP's Annual Monitoring Network Plan and in its draft Quality Assurance Project Plan.



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4. SLAMS Data Submissions: Data recovery this time period, as entered into AQS, was calculated and averaged for all $PM_{10}$, $PM_{2.5}$, and ozone sites. Data completion for the $PM_{2.5}$ sites was 93%. For the $PM_{10}$ sites, it was 96%. For ozone, data completion was 94%.

5. Annual SLAMS Data Certification: The 2016 data certification package will be submitted to the Region 9 office by May 1, 2017 (40 CFR Part 58.15).

6. Audits: All monitoring stations have been audited by independent QA personnel and are in compliance with standards for calibration and function.

7. Air Pollution Episodes: There were five (5) exceedances of the $PM_{10}$ National Ambient Air Quality Standard during this reporting period. 4 exceedances in Pahrump (July 30th) and one exceedance in Elko (October 15th). No PM 2.5 exceedances occurred during this reporting period. Also, there were two ozone exceedances. One at our Fallon monitoring site (August 28th) and one at our Fernley Site (July 3rd and 4th). We will be evaluating these exceedances to determine if a data exclusion request is needed.

## ACTIVITY: RULEMAKING

The goal of this activity is to develop and implement effective regulations that will protect public health and the environment from the detrimental effects of air pollution.

### *Action:*

- November 2 - Adopt by Reference to update rulemakings under 40 CFR Part 51, "Requirements for preparation, adoption, and submittal of implementation plans", Part 52, "Prevention of significant deterioration of air quality" (PSD), Part 60, "Standards of performance for new stationary sources" (NSPS), and Part 63, "National emission standards for hazardous air pollutants for source categories" (NESHAP).
- November 2 - Class III, IV Amendments to Eliminate the permit requirement for Class III and Class IV sources and redefine a Class II source. Amend the public notice requirements for Class II permits to (1) add a requirement for public notice if the source is/will locate near a sensitive population, (2) add a threshold for PM2.5 emissions, and (3) develop a timeline for acting on an application for a Class II permit that requires public notice.

## ACTIVITY: AIR QUALITY PLANNING

The goal of this activity is the timely submittal of state implementation plans (SIPs) by the NDEP and the timely processing of SIPs by EPA. The NDEP tracks pending State and County SIP activities.



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## Action: Submittal and Tracking of State Implementation Plans

1. The following SIP activity was submitted during this semi-annual period:
   - August 15 NDEP transmittal to EPA: Revision to the Washoe County portions of Nevada's CO & $PM_{10}$ SIP – woodstove regulations
   - August 26 2016 Supplement to the April 3, 2012 Second 10-Year CO Limited Maintenance for Lake Tahoe
   - September 22 Letter to EPA: Area Designations for the 2015 Ozone NAAQS

2. The status of all pending SIP submittals is contained in Table 1, below. Shading indicates submittal that may be withdrawn.

**TABLE 1**

| DATE OF SUBMITTAL | DOCUMENT NAME | EPA ACTION |
|---|---|---|
| October 30, 1991 | Washoe County $PM_{10}$ SIP for the Truckee Meadows Air Basin – moderate nonattainment | *Subsequent to December 8, 2015 FR, 76232, Washoe County will withdraw this submittal.* |
| September 18, 1992 | Washoe County revision to the $PM_{10}$ SIP for the Truckee Meadows Air Basin - moderate nonattainment | *Subsequent to December 8, 2015 FR, 76232, Washoe County will withdraw this submittal.* |
| August 5, 2002 | Washoe County revision to the $PM_{10}$ SIP for the Truckee Meadows Air Basin - serious nonattainment | Actions on part of the submittal:<br>March 22, 2006 FR14386, Direct final; eff 5/22/06.<br>Approved rules 040.031-032, Street Sanding & Sweeping Operations.<br>May 8, 2007 FR 25969, Direct final, eff 7/9/07. Approved rule 040.030, Dust Control.<br><br>June 18, 2007 FR 33397, Direct final, eff 8/17/07. Approved rule 040.051 submitted 5/5/06; supersedes 8/5/02 submittal of this rule.<br>*Subsequent to December 8, 2015 FR, 76232,* Washoe County will withdraw *appropriate portions of this submittal.* |
| January 12, 2006 | Revision to Volume I of the February 2005 submittal, *Proposed ASIP Update* | Unresolved/uncompleted actions as of December 31, 2016:<br>▪ December 18, 2006 FR 75690, proposed rule. January 8, 2007 72 FR 698<br>▪ Rescission request – UEPA (NRS 704.820-900) and Rule 25 of General Order No. 3 |
| | Redesignation Request and Maintenance Plan for the Truckee Meadows 24-Hour $PM_{10}$ Non-Attainment Area | *Subsequent to December 8, 2015 FR, 76232, Washoe County will withdraw this submittal.* |
| September 20, 2010 | DAQEM direct submittal to EPA: Program Revision to Clark County's Approved Part 70 Permitting Program | No action as of December 31, 2016. *(This is not a SIP revision.)* |
| May 3, 2011 | Recommended area designations | February 6, 2013 letter to the Governor |



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| | | |
|---|---|---|
| | for the 2010 $SO_2$ NAAQS | proposing to defer designating Nevada until more data is collected. EPA action was to develop $SO_2$ Data Requirements Rule (8-21-2015) Designations expected by December 2017. |
| April 3, 2012 | 2nd 10-year Maintenance Plan for CO at Lake Tahoe | August 26, 2016 NDEP submitted supplement to the April 3, 2012 Second 10-Year CO Limited Maintenance for Lake Tahoe. *EPA signed Direct Final Notice approving plan on December 22, 2016.* |
| March 21, 2013 | Washoe County Transportation Conformity SIP | No action as of December 31, 2016. Washoe to provide supplemental information. |
| April 10, 2013 | The Nevada SIP for the 2008 Ozone NAAQS | November 3, 2015 FR 67652, final action (partial approval/disapproval) with exception of 110(a)(2)(D)(i)(I) – transport. See 3/25/2016 Supplement to Interstate Transport element, 2008 Ozone NAAQS infrastructure SIP. |
| June 3, 2013 | The Nevada SIP for the 2010 $SO_2$ Primary NAAQS | November 3, 2015 FR 67652, final action (partial approval/disapproval) with exception of 110(a)(2)(D)(i)(I) – transport. |
| November 26, 2013 | Revision to the Washoe County portions of Nevada's CO and $PM_{10}$ SIP (wood stoves/outdoor boilers) | This submittal has been superseded by the August 15, 2016 submittal: NDEP transmittal to EPA: Revisions to the Washoe County portions of Nevada's CO & PM10 SIP – woodstove regulations. |
| March 28, 2014 | Washoe County CO SIP revision: suspension of oxyfuel program | No action as of December 31, 2016. |
| November 7, 2014 | Washoe County 2nd 10-Year CO Maintenance Plan | August 30, 2016 FR 59593 Air Plan Approval; Reno, NV; Second 10-Year CO Maintenance Plan. Proposed Rule. August 30, 2016 FR 59490 Air Plan Approval; Reno, NV; Second 10-Year CO Maintenance Plan. Direct Final Rule. |
| November 18, 2014 | Nevada Regional Haze 5-Year Progress Report | September 17, 2015 FR 55805, proposed approval. No final approval as of December 31, 2016. |
| November 20, 2014 | Clark County AQR: amendments to sections 26 & 92; repeal of sections 29,30,52 & 60 | January 14, 2016 FR 1882 (partial approval / disapproval) acted on rescission requests; did not act on rule amendments. (Clark County may work on this in the future). |
| June 26, 2015 | Clark County AQR: Amendments to sections 26 (Emission of Visible Air Contaminants) | No action as of December 31, 2016. |
| October 19, 2015 | NDEP request to remove Reid Gardner FIP (in comment ltr) | See NDEP comments on EPA's proposal to approve Nevada's RH 5-year progress report. See March 25, 2016 - NDEP request to remove Mohave FIP. (Note: December 2016 EPA requested for NDEP to resubmit request to remove both Reid Gardner and Mohave FIP as one request.) |
| December 11, | The Nevada SIP for the 2012 | No action as of December 31, 2016. |



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| | | |
|---|---|---|
| 2015 | Annual $PM_{2.5}$ NAAQS | |
| March 25, 2016 | NDEP request to remove Mohave FIP | No action as of December 31, 2016. (Note: December 2016 EPA requested for NDEP to resubmit request to remove both Reid Gardner and Mohave FIP as one request.) |
| March 25, 2016 | Supplement to Interstate Transport element, 2008 Ozone NAAQS infrastructure SIP | No action as of December 31, 2016. |
| August 15, 2016 | August 15, 2016. NDEP transmittal to EPA: Revisions to the Washoe County portions of Nevada's CO & PM10 SIP – woodstove regulations. | This submittal supersedes the previous November 26, 2013 submittal. No action as of December 31, 2016. |
| August 26, 2016 | 2016 Supplement to the April 3, 2012 Second 10-Year CO Limited Maintenance for Lake Tahoe | No action as of December 31, 2016. *EPA signed Direct Final Notice approving plan on December 22, 2016.* |
| September 22, 2016 | Letter to EPA: Area Designations for the 2015 Ozone NAAQS | No action as of December 31, 2016. 120 day letter and designations expected in 2017. |
| July - December 2016 | Modeling Protocol and Modeling Report for North Valmy Generating Station, NV, for the 2015 SO2 DRR. Update on Recommended Area Designations for the 2010 Primary NAAQS for SO2. | EPA stated that no official action was to be taken on the Modeling Protocol submitted 6/24/2016. Modeling Report submitted to EPA 1/3/2017. |

### *Action: Major 2005 update of applicable SIP*

1. The NDEP is awaiting resolution of the excess emissions issue (reference NDEP's October 25, 2007 letter to EPA). The NDEP is currently developing revisions to its excess emissions and affirmative defense regulations.

### *Action: Regional Haze SIP*

*1.* On November 18, 2014, the NDEP submitted the *Nevada Regional Haze 5-Year Progress Report* to USEPA, fulfilling Regional Haze Rule requirements. On September 17, 2015, EPA proposed approval.

## ACTIVITY: EMISSIONS INVENTORY

The processing and timely submittal of the annual National Emissions Inventory is a goal of NDEP.

### *Action: NEI data processing and submission*



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The NDEP has submitted the emissions data for the 2015 National Emissions Inventory report.



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NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

May 15, 2017

Administrator Scott Pruitt
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue NW
Washington, D.C. 20460 (Submitted electronically to the docket at www.regulations.gov)

**Attention: Docket ID No. EPA-HQ-OA-2017-0190; Executive Order to create a Regulatory Reform Task Force to evaluate existing regulations and to identify regulations that should be repealed, replaced, or modified.**

Dear Administrator Pruitt:

Pursuant to the solicitation for input requested during the teleconference of April 24, 2017, and consistent with Executive Order 13777 issued February 24, 2017, the State of Nevada Division of Environmental Protection (NDEP), submits the following comments to the United States Environmental Protection Agency (USEPA) regarding existing Clean Air Act (CAA) regulations that should be modified.

The NDEP appreciates USEPA's willingness to consult with states on these matters. The NDEP requests that USEPA revisit and take into consideration the technical and administrative comments previously submitted by NDEP on CAA regulations. NDEP joins in the comments submitted by the Association of Air Pollution Control Agencies (AAPCA)[1] regarding the *Evaluation of Existing Regulations.* Please find enclosed a list of previously submitted NDEP comments pertaining to several of the air quality regulations in the AAPCA comment letter.

Some specific areas of concern with existing regulations are listed below.

- The 2015 Ozone National Ambient Air Quality Standard may not be achievable in many western locations because it is set at background levels. Significant sources of ozone in these areas are not controllable by the states, with international transport, inter-state transport, western wildfires, and stratospheric intrusion the principal contributors. To avoid burdensome and ineffective designation of non-attainment for these areas, the NDEP suggests that USEPA modify current regulations to account for these conditions during the attainment designation process. Additionally, wherever a non-attainment designation is unavoidable, USEPA should modify regulations to provide appropriate relief for sources in these areas.

[1] Letter to Docket ID No. EPA-HQ-2017-0190 from the Association of Air Pollution Control Agencies, dated May 15, 2017.



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- The use of air pollutant dispersion modeling in lieu of monitoring for National Ambient Air Quality Standard (NAAQS) designation purposes[2] creates an approach that essentially excludes the availability of the 'unclassifiable' designation originally and explicitly contemplated in the Clean Air Act for areas with insufficient information. The modeling approach, which is subject to potentially large errors and uncertainty, can lead to additional and unnecessary burden on local industry and businesses. The NDEP requests that EPA refrain from replacing monitoring with modeling in future regulations and guidance for NAAQS designation purposes.
- The Protection of Visibility: Amendments to Requirements for State Plans (Regional Haze Rule) includes outdated and overly stringent requirements for state implementation. During the first Regional Haze State Implementation Plan (SIP) development, EPA established and funded five Regional Planning Organizations (RPOS). RPOs assisted states and tribes with the complex technical and scientific requirements and necessary regional coordination among states, tribes and Federal Land Managers[3] (as required by the Rule). RPOs are not funded in this second SIP development, leaving to states and tribes the substantial burden to secure resources for this Federal mandate.
- The regulations governing stationary compression and spark ignition internal combustion engines covered by the 40 CFR Part 60 Subpart IIII and JJJJ New Source Performance Standards and 40 CFR Part 63 Subpart ZZZZ National Emissions Standards for Hazardous Air Pollutants Rules are overly complicated, confusing, and include references which are recursive. Additionally, these regulations require a significant amount of analysis to determine the correct requirements for owners and operators and include costly requirements for small engines. The NDEP suggests USEPA modify the regulations by explicitly including in the text the language of related subparts, rather than relying on references. Additionally, the NDEP suggests that all regulations regarding emergency engines be modified to allow for maintenance and testing requirements recommended by engine manufacturers.

Nevada recognizes the important partnership that exists with state environmental agencies under the system of cooperative federalism. We look forward to working with USEPA through this constructive process of evaluating and modifying select regulations.

Sincerely,

Greg Lovato
Administrator, NDEP

ec: Elizabeth Adams, Acting Director of Air Division, USEPA Region 9
Colleen McKaughan, Associate Director of Air Division, USEPA Region 9
Bradley Crowell, Director, Nevada Department of Conservation and Natural Resources
Jeffrey Kinder, Deputy Administrator, NDEP
Lisa Kremer, Chief Air Pollution Control, NDEP
Danilo Dragoni, Chief Air Pollution Control, NDEP

[2] Data Requirements Rule for the 1-Hour Sulfur Dioxide (SO2) Primary National Ambient Air Quality Standard (NAAQS) - USEPA
[3] Evaluation of National Air Quality Regional Planning Organization Program – Final Report. Jule 7, 2011. USEPA Office of Air and Radiation.



ED_001361_00015576

ED_001361_00015576

## Attachment: References to NDEP comments submitted in the past 3 years.

| Federal Register Notice | Rule Description | Subject | Docket and Document ID (link to comments) |
|---|---|---|---|
| 2017 | | | |
| 81 FR 391894 | Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements | 2/9/2017 NDEP comments on EPA's Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements | EPA-HQ-OAR-2016-0202-0069 |
| 81 FR 391894 | Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements | 2/13/2017 WESTAR comments on EPA's Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements | EPA-HQ-OAR-2016-0202-0080 |
| 2016 | | | |
| 80 FR 64966 | Federal Plan Requirements for Greenhouse Gas Emissions From Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations | 1/21/2016 NDEP comments on EPA's Final Clean Power Plan Federal Plan Model Trading Rules | EPA-HQ-OAR-2015-0199-0393 |
| NA | Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5 & Regional Haze | 3/12/2016 NDEP comments on Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5 & Regional Haze | submitted to Brian Timin, USEPA, AQMG |
| NA | Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone | 5/11/2016 WESTAR comments on EPA's Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone White Paper for Discussion | EPA-HQ-OAR-2016-0097-0034 |
| 81 FR 26942 | Protection of Visibility. Amendments to Requirements for State Plans | 8/10/2016 NDEP comments on EPA's Protection of Visibility. Amendments to Requirements for State Plans | EPA-HQ-OAR-2015-0531-0407 |
| 81 FR 26942 | Protection of Visibility: Amendments to Requirements for State Plans | 8/10/2016 WESTAR comments on EPA's Protection of Visibility: Amendments to Requirements for State Plans | EPA-HQ-OAR-2015-0531-0476 |
| 81 FR 38645 | Removal of Title V Emergency Affirmative Defense Provisions From State Operating Permit Programs and Federal Operating Permit Program | 8/15/2016 NDEP comments on the Removal of Title V Emergency Affirmative Defense Provisions from State Operating Permit Programs & Federal Operating Permit Program | EPA-HQ-OAR-2016-0186-0018 |
| 81 FR 44608 | Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period | 8/16/2016 NDEP comments on EPA's Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period | EPA-HQ-OAR-2016-0289-0035 |
| 81 FR 44608 | Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period | 8/22/2016 WESTAR comments on EPA's Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period | EPA-HQ-OAR-2016-0289-0057 |
| 81 FR 57822 | Revisions to the Petition Provisions of the Title V Permitting Program | 10/24/2016 NDEP comments on the Revisions to the Petition Provision of the Title V Permitting Program | EPA-HQ-OAR-2016-0194-0015 |
| 2015 | | | |
| 79 FR 75234 | National Ambient Air Quality Standards for Ozone | 3/12/2015 NDEP comments on National Ambient Air Quality Standards for Ozone | EPA-HQ-OAR-2008-0699-1741 |

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| | | | |
|---|---|---|---|
| 79 FR 75234 | National Ambient Air Quality Standards for Ozone | 3/16/2015 WESTAR comments on National Ambient Air Quality Standards for Ozone | EPA-HQ-OAR-2008-0699-1990 |
| 64 FR 35714 | Regional Haze Regulations | 3/26/2015 WESTAR comments on Revising the Regional Haze Rule and Guidance | Comment Letter |
| 80 FR 3962 | E-Enterprise for the Environmental Portal | 4/22/2015 NDEP comments on USEPA's E-Enterprise for the Environmental Portal | EPA-HQ-OEI-2015-0039-0007 |
| 80 FR 45340 | Revisions to the Guideline on Air Quality Models: Enhancement to the AERMOD Dispersion Modeling System and Incorporation of Approches to Address Ozone and Fine Particulate Matter | 10/16/2015 NDEP comments on USEPA's Proposed Rule Regarding AERMOD | EPA-HQ-OAR-2015-0310-0080 |
| 64 FR 35714 | Regional Haze Regulations | 11/16/2015 WESTAR comments on Revising the Regional Haze Rule and Guidance | Comment Letter |
| NA | Posting EPA-HQ-OAR-2015 -0734 to Regulations.gov for Public Access | 12/15/2015 NDEP comments on voluntary Clean Energy Incentive Program (part of the Clean Power Plan) | EPA-HQ-OAR-2015-0734-0073 |
| | | 2014 | |
| 78 FR 70935 | Notice of Availability of the Environmental Protection Agency's 2011 Emissions Modeling Platform | 3/31/2014 NDEP comments on EPA's 2011 NEI emissions modeling platform (for use in ozone transport modeling and more) | EPA-HQ-OAR-2013-0743-0047 |
| 78 FR 70935 | Notice of Availability of the Environmental Protection Agency's 2011 Emissions Modeling Platform | 4/9/2014 WESTAR comments on EPA's 2011 and 2018 Modeling Platforms | Comment Letter |
| 79 FR 6330 | Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces, and New Residential Masonry Heaters | 5/1/2014 WESTAR comments on Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces, and New Residential Masonry Heaters | EPA-HQ-OAR-2009-0734-1423 |
| 79 FR 1430 | Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Utility Generating Units | 5/9/2014 NDEP comments on EPA's proposed rule to regulate GHG (CO2) emissions from new EGUs | EPA-HQ-OAR-2013-0495-10105 |
| 78 FR 70935 | Notice of Availability of the Environmental Protection Agency's 2011 Emissions Modeling Platform | 6/11/2014 WESTAR comments on EPA's | Comment Letter |
| 79 FR 31325 | Proposed Consent Decree, Clean Air Act Citizen Suit | 7/2/2014 NDEP Comments on $SO_2$ Consent Decree | EPA-HQ-OGC-2014-0421-0026 |
| 79 FR 27446 | Data Requirements Rule for the 1-Hour Sulfur Dioxide (SO2) Primary National Ambient Air Quality Standard (NAAQS) | 7/14/2014 NDEP Comments on $SO_2$ Data Requirements Rule | EPA-HQ-OAR-2013-0711-0089 |
| 79 FR 34960 | Carbon Pollution Emission Guidelines for Carbon Pollution Standards for Modified and Reconstructed Stationary Sources: Electric Utility Generating Units | 10/16/2014 NDEP Comments on the 111(b) Modified Reconstruction Rule | EPA-HQ-OAR-2013-0603-0258 |
| 79 FR 54356 | Revisions to Ambient Monitoring Quality Assurance and Other Requirements | 11/10/2014 NDEP Comments on USEPA's Revisions to Ambient Monitoring Quality Assurance and Other Requirements | EPA-HQ-OAR-2013-0619-0029 |
| 79 FR 34830 | Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units | 11/24/2014 NDEP Comments on the Clean Power Plan | EPA-HQ-OAR-2013-0602-22723 |

**To:** Mhenson@ClarkCountyNV.gov[Mhenson@ClarkCountyNV.gov]
**Cc:** OConnor, Karina[OConnor.Karina@epa.gov]; Bunte, Laura[Bunte.Laura@epa.gov]; Lo, Doris[Lo.Doris@epa.gov]; ddragoni@ndep.nv.gov[ddragoni@ndep.nv.gov]; sword@clarkCountyNV.gov[sword@clarkCountyNV.gov]
**From:** McKaughan, Colleen
**Sent:** Mon 9/19/2016 10:41:39 PM
**Subject:** Clark County Ozone Advance--EPA Region 9 & HQ comments
EPA Comments on Clark County July 2016 Path Forward.docx
Federal Funds and Training.Sept 2016.docx
Local Resources Fact Sheet.pdf
Facebook & Twitter Messages.2016.xlsx

Dear Marci,

I would like to introduce myself. I am an Associate Director in the Air Division, and I recently had the opportunity to add Nevada to my geographic responsibilities. I know Amy Zimpfer did a great job working with you, and I will endeavor to provide the same level of communication and service.

Attached are EPA's comments and ideas for your consideration as you develop your path forward for 2017 under EPA's Ozone Advance program. As we mentioned in our comments on your 2015 Update, Nevada will be submitting recommendations for nonattainment designations for the 2015 Ozone National Ambient Air Quality Standard next month and EPA will be designating areas in October 2017. We understand that Clark County and NDEP are recommending that Clark County be designated nonattainment, and are anticipating that the area would be classified marginal. If classified as a marginal area, Clark County can continue to participate in the Ozone Advance program and to push forward new voluntary programs in the community. It will be important to continue to raise awareness of the new ozone standard and the increased need for local reduction of ozone precursors. The attached document provides ideas on ways to further proactively reduce emissions in Clark County. In addition to our comments, we have also attached the three documents listed below to assist you further with outreach and funding.

- Local Resources Fact Sheet
- Federal Funds and Training September 2016
- Facebook and Twitter Messages

Please contact me at 520-498-0118, or Karina O'Connor at 775-434-8176, if you have any questions, or would like to discuss.

Sincerely,

Colleen McKaughan

Associate Director

USEPA, Region 9, Air Division

520-498-0118

**To:** Danilo Dragoni[ddragoni@ndep.nv.gov]; sjaunara@ndep.nv.gov[sjaunara@ndep.nv.gov]
**Cc:** Lo, Doris[/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8f72beca767544938604194731d4bab0-DLO]; LAWRENCE, LAURA[Lawrence.Laura@epa.gov]; oconnor.karina@epa.gov[oconnor.karina@epa.gov]
**From:** McKaughan, Colleen
**Sent:** Thur 6/22/2017 8:41:23 PM
**Subject:** Response to I-SIP Question

Hi, Danilo and Sig,

I hope you are staying cool in this weird weather!

You had asked whether the delay in the 2015 ozone designations also applied to the 2015 ozone I-SIP. We checked with HQ on your question and just heard back from them. Unfortunately, the I-SIP is still due on October 1, 2018. The I-SIP requirement is triggered when the NAAQS is promulgated and is due three years after promulgation of the standard, so October 2018. We will keep you updated if something changes with respect to this requirement.

The good news is that, if circumstances haven't changed much from your last ozone I-SIP, you can recycle much of the old I-SIP, and just update it as you feel appropriate.

Let me know if you have questions.

Colleen

520-498-0118

**To:** tsf@azdeq.gov[tsf@azdeq.gov]; lcd@azdeq.gov[lcd@azdeq.gov]; parkey.brian@azdeq.gov[parkey.brian@azdeq.gov]
**From:** McKaughan, Colleen
**Sent:** Wed 6/7/2017 4:00:01 PM
**Subject:** EPA extends deadline for 2015 ozone NAAQS designations
AZ Ducey 6-6-17.pdf

Hi, All,

Here is the letter that Administrator Pruitt sent to Governor Ducey yesterday. Designations for the 2015 ozone standard will now occur in October 2018. Let me know if you have questions.

Colleen

**To:** Timothy Franquist Jr.[FranquistJr.Timothy@azdeq.gov]
**From:** McKaughan, Colleen
**Sent:** Wed 8/31/2016 12:23:57 AM
**Subject:** RE: Yuma Ozone and Pinal Ozone

Hi, Tim,

It will remain a mystery, then. I have to argue that previous designations have not stifled economic development which seems to be their major fear.

Colleen

**From:** Timothy Franquist Jr. [mailto:FranquistJr.Timothy@azdeq.gov]
**Sent:** Tuesday, August 30, 2016 5:05 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** RE: Yuma Ozone and Pinal Ozone

Colleen,

You've given me the information I need and I truly appreciate that! We've submitted our recommendation package to the Governor's Office today and I briefed them that it is in our very best interest to submit NAA recommendations by 10/1. Honestly, I'm not sure the underlying reason for MAG and Pinal County's objections to ADEQ submitting our recommendations, if we knew, we might be able to find a solution, but all we know is they want the 2008 boundary, which we can't in good faith recommend as a primary recommendation.

Tim

Timothy S. Franquist, Director

Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

(602) 771-4684

**From:** McKaughan, Colleen [mailto:McKaughan.Colleen@epa.gov]
**Sent:** Tuesday, August 30, 2016 4:07 PM
**To:** Timothy Franquist Jr. <FranquistJr.Timothy@azdeq.gov>
**Subject:** RE: Yuma Ozone and Pinal Ozone

I got your message. Have I given you the information you need for the designations? Do you have any idea why Maricopa and Pinal are so desperate about this?

**From:** Timothy Franquist Jr. [mailto:FranquistJr.Timothy@azdeq.gov]
**Sent:** Tuesday, August 30, 2016 4:05 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** Re: Yuma Ozone and Pinal Ozone

Totally agree, we have no intention in delaying.

Tim

Sent from my iPhone

On Aug 30, 2016, at 2:55 PM, McKaughan, Colleen <McKaughan.Colleen@epa.gov> wrote:

> I don't think EPA would be inclined to agree with a delay.
>
> Sent from my iPhone
>
> On Aug 30, 2016, at 2:22 PM, Timothy Franquist Jr. <FranquistJr.Timothy@azdeq.gov> wrote:
>
> > Colleen,
> >
> > Thank you for the quick response. We pulled the same section of the CAA and also believe we have sufficient data, but it helps that we share the same conclusion.

Tim

Timothy S. Franquist, Director

Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

(602) 771-4684

**From:** McKaughan, Colleen [mailto:McKaughan.Colleen@epa.gov]
**Sent:** Tuesday, August 30, 2016 11:39 AM
**To:** Timothy Franquist Jr. <FranquistJr.Timothy@azdeq.gov>
**Subject:** RE: Yuma Ozone and Pinal Ozone

Tim,

Here is the citation for a 1-year delay in case the Governor's office asks:

**(B) Promulgation by EPA of designations**

(i) Upon promulgation or revision of a national ambient air quality standard, the Administrator shall promulgate the designations of all areas (or portions thereof) submitted under subparagraph (A) as expeditiously as practicable, but in no case later than 2 years from the date of promulgation of the new or revised national ambient air quality standard. Such period may be extended for up to one year in the event the Administrator has insufficient information to promulgate the designations.

I don't think there is a lack of data in Maricopa and Pinal Counties.

Colleen

**From:** Timothy Franquist Jr. [mailto:FranquistJr.Timothy@azdeq.gov]
**Sent:** Monday, August 29, 2016 8:02 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** Re: Yuma Ozone and Pinal Ozone

Colleen,

I just found out about the delay and thank you for passing that along. As far as Yuma-multistate approach, we should talk about that for sure.

Tim

Sent from my iPhone

On Aug 29, 2016, at 12:10 PM, McKaughan, Colleen <McKaughan.Colleen@epa.gov> wrote:

> Hi, Tim,
>
> I grabbed time on your calendar for next week. I spoke with Paul Melcher, and promised that EPA would lay out all the designation options for Yuma, plus pros and cons. He wants to have a call with both of us the first week in October. He was not totally opposed to having a multi-state nonattainment area with CA , surprisingly enough, when I explained the issues with a small nonattainment area. I also spent some time explaining where we are on PM-10. I thought we should brainstorm.
>
> Also, Pinal County notified me that both Pinal and Maricopa will be requesting a

1-year delay for the ozone designations. I will look into this but I'm not sure you were aware of the forthcoming requests.

Colleen

**To:** Timothy Franquist Jr.[FranquistJr.Timothy@azdeq.gov]
**From:** McKaughan, Colleen
**Sent:** Tue 8/30/2016 11:07:22 PM
**Subject:** RE: Yuma Ozone and Pinal Ozone

I got your message. Have I given you the information you need for the designations? Do you have any idea why Maricopa and Pinal are so desperate about this?

**From:** Timothy Franquist Jr. [mailto:FranquistJr.Timothy@azdeq.gov]
**Sent:** Tuesday, August 30, 2016 4:05 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** Re: Yuma Ozone and Pinal Ozone

Totally agree, we have no intention in delaying.

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> >
> > Tim
> >
> > Timothy S. Franquist, Director
> >
> > Air Quality Division

Arizona Department of Environmental Quality

1110 W. Washington Street

Phoenix, AZ 85007

(602) 771-4684

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I don't think there is a lack of data in Maricopa and Pinal Counties.

Colleen

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**Sent:** Monday, August 29, 2016 8:02 PM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Subject:** Re: Yuma Ozone and Pinal Ozone

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Tim

Sent from my iPhone

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> Hi, Tim,
>
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>
> Also, Pinal County notified me that both Pinal and Maricopa will be requesting a 1-year delay for the ozone designations. I will look into this but I'm not sure you were aware of the forthcoming requests.
>
> Colleen

**To:** tsf@azdeq.gov[tsf@azdeq.gov]
**From:** McKaughan, Colleen
**Sent:** Mon 8/29/2016 7:11:18 PM
**Subject:** FW: Sept 7th Board Resolution
Ozone Boundary Extension_RESOLUTION_090716-AQ1.pdf

FYI

**From:** Michael Sundblom [mailto:Michael.Sundblom@pinalcountyaz.gov]
**Sent:** Monday, August 29, 2016 11:33 AM
**To:** McKaughan, Colleen <McKaughan.Colleen@epa.gov>
**Cc:** Gregory Stanley <Gregory.Stanley@pinalcountyaz.gov>
**Subject:** Sept 7th Board Resolution

Colleen,

I wanted to pass along to you a resolution going before our Board on September 7th regarding the 2015 ozone NAAQS. MAG is taking a similar item to their Regional Council on August 31.

Let me know if you have any questions.

Mike

**To:** tsf@azdeq.gov[tsf@azdeq.gov]
**From:** McKaughan, Colleen
**Sent:** Mon 8/29/2016 7:10:57 PM
**Subject:** Yuma Ozone and Pinal Ozone

Hi, Tim,

I grabbed time on your calendar for next week. I spoke with Paul Melcher, and promised that EPA would lay out all the designation options for Yuma, plus pros and cons. He wants to have a call with both of us the first week in October. He was not totally opposed to having a multi-state nonattainment area with CA , surprisingly enough, when I explained the issues with a small nonattainment area. I also spent some time explaining where we are on PM-10. I thought we should brainstorm.

Also, Pinal County notified me that both Pinal and Maricopa will be requesting a 1-year delay for the ozone designations. I will look into this but I'm not sure you were aware of the forthcoming requests.

Colleen

When recorded return to:
Clerk of the Board
Pinal County
P.O. Box 827
Florence, Arizona 85232

**PINAL COUNTY BOARD OF SUPERVISORS**
**RESOLUTION NO. 090716-AQ1**
**PINAL COUNTY AIR QUALITY CONTROL DISTRICT**

A RESOLUTION OF THE BOARD OF SUPERVISORS OF PINAL COUNTY REQUESTING A DELAY IN THE 2015 OZONE NAAQS BOUNDARY DESIGNATION FOR THE MARICOPA 8 -HOUR OZONE NONATTAINMENT AREA WHICH INCLUDES A PORTION OF PINAL COUNTY.

**WHEREAS**, on October 1, 2015, the Environmental Protection Agency revised and promulgated the National Ambient Air Quality Standard ("NAAQS") for ozone to 0.070 parts per million.

**WHEREAS**, Section 107(d)(A) of the Clean Air Act requires states, through the Governor, to recommend nonattainment boundaries for the revised ozone NAAQS by October 1, 2016.

**WHEREAS**, a draft ozone boundary recommendation published by the Arizona Department of Environmental Quality ("ADEQ") proposes to include portions of Pinal County, due to a measured exceedance of the NAAQS at the Queen Valley monitor located in north eastern Pinal County.

**WHEREAS**, the identified exceedance at Queen Valley during the period from 2013-2015 was 0.071 parts per million, thereby exceeding the NAAQS by 0.001 parts per million. Historic trends at the Queen Valley ozone monitor have shown significantly decreasing ozone concentrations over time.

**WHEREAS**, a nonattainment designation may lead to additional regulation for business and industry, conformity requirements for transportation projects and could limit future economic development.

**WHEREAS**, Section 107(d)(l)(B)(i) of the Clean Air Act grants EPA authority to delay a boundary decision for one (1) year.

**WHEREAS**, the Regional Council of the Maricopa Association of Governments ("MAG") has scheduled for action at their August 31, 2016 meeting to recommend that the Governor request that EPA delay for a period of one (1) year the boundary designations for the Maricopa 8-Hour Ozone Nonattainment area including the additional portion of Pinal County.

**THEREFORE, FOR THE PURPOSE OF PROTECTING AND PRESERVING THE QUALITY OF AIR WITHIN THE COUNTY IN A SENSIBLE AND ORDERLY MANNER, IT IS HEREBY RESOLVED BY THE BOARD TO:**

1. **Request the Governor of Arizona , through the ADEQ nonattainment boundary designation due to EPA on October 1, 2016, propose that EPA delay the boundary designation for the Maricopa 8-Hour Ozone Nonattainment area for one (1) year in accordance with CAA Section 107(d)(l)(B)(i).**
2. **Request that the EPA delay the boundary designation for theMaricopa 8-Hour Ozone Nonattainment area for one (1) year in accordance with CAA Section 107(d)(l)(B)(i).**

**IN WITNESS WHEREOF**, the undersigned, in accord with the vote of the Pinal County Board of Supervisors as duly reflected in the minutes of the Board meeting, have executed this document on behalf of the Board of Supervisors on this____ day of _____, 2016.

PINAL COUNTY, a political subdivision of the State of Arizona,

By: _____
Chairman of the Board of Supervisors

ATTEST: _____
Clerk of the Board of Supervisors

APPROVED AS TO FORM:

By: _____
Kevin Costello, Deputy County Attorney

**To:** Mebust, Anna[Mebust.Anna@epa.gov]
**From:** Danilo Dragoni
**Sent:** Wed 9/7/2016 3:24:13 PM
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Anna,

Would now be ok?

**From:** Mebust, Anna [mailto:Mebust.Anna@epa.gov]
**Sent:** Wednesday, September 07, 2016 8:17 AM
**To:** Danilo Dragoni
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Danilo,

Would you mind giving me a call sometime this morning when you're available to discuss this? I have a meeting from 9am-10am but otherwise should be around.

Anna Mebust

415.972.3265

mebust.anna@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Tuesday, September 06, 2016 4:16 PM
**To:** Mebust, Anna <Mebust.Anna@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Anna,

Daren told me about the phone conversation you guys just had (sorry I couldn't be present).

It is my understanding that there is some good chance that the rule won't be signed until the end of September (if not later). Is that right?

If so, we (Washoe and NDEP) are operating on a tight and uncertain schedule. If the rule is not approved by September 30th, we won't be able to do the concurrent submission and will be late, no matter what.

At this point, I am looking for starting our comment period on October 1st, and therefore submit the demonstration on November 1st.

Would EPA accept this? Please consider that Washoe is in a similar situation as we are, and their demonstration has more regulatory impact than ours.

With this respect, I understand if EPA is not considering reviewing the NDEP demonstrations for the wildfire of August 21st 2015 and SI of June 2015. But NDEP is moving forward with the submission anyway, because we haven't ruled out for sure that we won't need those EE demonstrations to stay in attainment. So, we would need at least confirmation that our submissions won't be excluded (for potential future reviews) because late.

If possible, I'd like to sort this out before the end of the week, as I am leaving for 2 weeks starting next Monday.

Many thanks in advance!

Regards

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Mebust, Anna [mailto:Mebust.Anna@epa.gov]
**Sent:** Thursday, August 18, 2016 1:12 PM
**To:** Danilo Dragoni; Flagg, MichaelA; Kurpius, Meredith; Lee, Anita
**Cc:** Daren Winkelman; 'Dan Inouye (DInouye@washoecounty.us)'; CHANG, RANDALL; Lee, Anita
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Danilo,

We had our quarterly call with Washoe County early this morning. We told Dan on the call we would discuss this with our EE workgroup colleagues on another call we had scheduled afterwards and follow up.

We learned on the workgroup call that the proposed rule is expected to be published, and therefore effective, in early September. They are pushing hard to ensure it is published before the October 1st deadline for demonstration submittals. Once the rule is effective, the public comment period can run concurrently with EPA review. So, assuming the rule is published as planned, **you would be able to submit the demonstrations on October 1st and begin your public comment period at the same time.**

Please note that this is dependent on the final rule being published before you submit the demonstration. If you were to submit the demonstration before the proposed rule is published, then it would be subject to the old 2007 rule and concurrent public review would not be acceptable. So, don't submit too early (I don't think you were worried about that but thought I should mention it!).

Also, there is a desire to hold more strictly to the deadline than we have in the past. After the deadline, there may be opportunities to improve areas of the demonstration that are lacking, but you are strongly encouraged to submit as much as you can by October 1st.

I understand this is different than what we have said in previous conversations. Michael, Randy, or I would be happy to answer any follow up questions you might have.

Anna Mebust

415.972.3265

mebust.anna@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Wednesday, August 17, 2016 5:27 PM
**To:** Flagg, MichaelA <Flagg.MichaelA@epa.gov>; Kurpius, Meredith <Kurpius.Meredith@epa.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Cc:** dwinkelman@ndep.nv.gov; 'Dan Inouye (DInouye@washoecounty.us)' <DInouye@washoecounty.us>; CHANG, RANDALL <Chang.Randall@epa.gov>; Mebust, Anna <Mebust.Anna@epa.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Michael,

Thanks for the message and clarification, I really appreciate the prompt response. However, I am a bit confused. We have been doing some CFR digging, and the new proposed rule seems to allow for concurrent public notice. At 50.14(c)(3)(v)(A) it says

"With the submission of the demonstration […] the State must:

(A) Document that the public comment process was followed and that the comment period was open for a minimum of 30 days, **which could be concurrent with the Administrator's review** of the associated demonstration provided the State can meet all requirements in this paragraph;"

In the preamble, this situation is described as occurring in very limited cases, like claims as part of near-term regulatory action such as

" demonstration for events in the third year of a 3-year design value that will be used in initial area designations for a new or revised NAAQS under a 2-year designation schedule, the public comment period could be concurrent with the EPA's review provided the submitting air agency sends any public comments and responses to the EPA by a specified date should comments be submitted. If an air agency receives public comment disputing the technical

elements of a demonstration during a comment period that runs concurrent with the EPA's review and these comments result in the air agency's need to reanalyze or reassess the validity of a claimed event, a second public comment period may be necessary"

Our situation seems to fit these very limited cases.

Clearly, this rule hasn't be finalized yet, but I had the impression the EPA was already following it for certain aspects (e.g., the initial notification process).

I really appreciate the availability of extending the deadline of October 1st, which, as you say, would result anyway in more time for us to provide a better technical documentation. However, I feel a bit uneasy to take this path, as it could lead to an undesirable situation where we have been missing a critical deadline, even with all the best intentions from Nevada and Region 9.

As alternative, and I am not sure if something like this would be even possible, I am open to discuss the possibility of some sort of 'agreement' between Region 9 and Nevada that would somewhat give us an official one-month extension on the submission.

Again, thanks for your time and prompt response. Looking forward to continuing this discussion.

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Flagg, MichaelA [mailto:Flagg.MichaelA@epa.gov]
**Sent:** Wednesday, August 17, 2016 3:25 PM
**To:** Kurpius, Meredith; Danilo Dragoni; Lee, Anita
**Cc:** Daren Winkelman; 'Dan Inouye (DInouye@washoecounty.us)'; CHANG, RANDALL; Mebust, Anna; Lee, Anita
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Danilo,

I am not sure what we can allow a concurrent public notice at the same time as the deadline.

We have to make a determination that the public comment process was complete as part of our review and while you do not anticipate comments, if some are received, you would have to address them and possibly have to resubmit anyway.

If more technical analysis is needed, I would focus on that rather than meeting the October 1, 2016 deadline. As long as we know there is a good faith effort to get the demonstrations in as soon as possible, it should not be a barrier for review.

Let me know if you have questions.

**From:** Kurpius, Meredith
**Sent:** Wednesday, August 17, 2016 2:50 PM
**To:** Danilo Dragoni <ddragoni@ndep.nv.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Cc:** dwinkelman@ndep.nv.gov; 'Dan Inouye (DInouye@washoecounty.us)' <DInouye@washoecounty.us>; Flagg, MichaelA <Flagg.MichaelA@epa.gov>; CHANG, RANDALL <Chang.Randall@epa.gov>; Mebust, Anna <Mebust.Anna@epa.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Michael/Randy/Anna,

Can one of you please get back to Danilo on his time-sensitive question below? Thanks!

Meredith

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]

**Sent:** Wednesday, August 17, 2016 2:03 PM
**To:** Lee, Anita <Lee.Anita@epa.gov>; Kurpius, Meredith <Kurpius.Meredith@epa.gov>
**Cc:** dwinkelman@ndep.nv.gov; 'Dan Inouye (DInouye@washoecounty.us)' <DInouye@washoecounty.us>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Meredith,

This is Danilo from Nevada BAQP. We (NDEP and Washoe) were trying to get in touch with Anita Lee with a question about exceptional event demonstration submission and public notice, but she will be back on Monday.

Given that we are in a bit of time constrain, I thought that you may help us, or know someone else who could. I pasted the original message to Anita below, but in essence, our question is if we can have the beginning of the public notice coinciding with the date of submission. This would save us quite some time and allow to better refine our work.

Any help would be very much appreciated.

Many thanks in advance

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Danilo Dragoni
**Sent:** Wednesday, August 17, 2016 1:41 PM
**To:** Lee, Anita
**Cc:** Daren Winkelman; Dan Inouye (DInouye@washoecounty.us)
**Subject:** Exceptional Event Demonstration submission and public notice

Hi Anita,

This is Danilo from BAQP Nevada. I have a question about the possibility of overlapping our 30-day public notice with submission of an exceptional event demonstration.

As you probably are aware, both BAQP and Washoe County are preparing a demonstration for a wild fire event that occurred in August of 2015, and BAQP is working on a stratospheric intrusion occurred in June of 2015.

The deadline for such submissions is October 1st, which pushes the beginning of the public notice to September 1st.

We are working as fast and diligently as we can, but there are a few factors that are making these submissions more difficult: a) there are not so many previously approved demonstrations for SI; b) the wild fire EE was caused by several fires in the region (rather than just a big one), which complicates considerably the analysis.

If I am not wrong, it is possible for SIP submissions to have a parallel process that makes the beginning of the public notice coincide with the submission due date. We are not expecting that our demonstration conclusions will change as results of the public notice, so I was wondering if we could do the same here. This would allow us and Washoe to have a few more days to prepare and submit a more refined work.

Any help will be very appreciated. Please, don't hesitate to call me if you have questions or

comments.

Thanks!

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**To:** Mebust, Anna[Mebust.Anna@epa.gov]
**From:** Katherine Hoag
**Sent:** Fri 6/16/2017 5:35:52 PM
**Subject:** note about O3 designation and PAMS EMPs

Hi Anna –

I noticed on the notes for the CAPCOA call last month that someone asked about what happens to the PAMS EMPs if O3 designations are delayed. I just wanted to give you a heads up that the answer that was in the call notes (that the EMPs would come after designations) is different than what was shared on the last PAMS workgroup call, where they discussed using areas current classification to drive the next EMPs. Perhaps things changed between the calls, but I figured it might be helpful to know in case you didn't have anyone on the PAMS call.

Kate

---

*Katherine Hoag, Ph.D.*

*QA Officer / Principal Air Quality Engineer*

*Bay Area Air Quality Management District*

*375 Beale Street, Suite 600 | San Francisco, CA 94105*

*(415) 749-4619*

*khoag@baaqmd.gov*

**To:** Mebust, Anna[Mebust.Anna@epa.gov]
**From:** Danilo Dragoni
**Sent:** Wed 9/28/2016 9:35:47 PM
**Subject:** RE: New EE rule publication date and demonstration due date [WARNING: SPF validation failed]

Thanks! Good news!

I was a the WESTAR meeting and Anna Wood was giving us real-time updates on the status of the rule.

And so, hypothetically speaking, if we submit our demonstration(s) after October 3rd we could take advantage of the concurrent public comment provision and submit and start such a period, for example, on November 28, 2016.

Is that right?

Again thanks!

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Mebust, Anna [mailto:Mebust.Anna@epa.gov]
**Sent:** Wednesday, September 28, 2016 2:25 PM
**To:** Danilo Dragoni; Daren Winkelman
**Cc:** Flagg, MichaelA; CHANG, RANDALL
**Subject:** RE: New EE rule publication date and demonstration due date

Sorry, I'm just now looking more closely at the email we received and it says the effective date will be September 30, 2016. I'm not sure what the reason for the difference between the effective date and the publication date is—perhaps Michael knows more.

So, if you want your demonstration to be subject to the new rule, do not submit until after September 30, 2016. (It wouldn't hurt to wait until October 3, if you wanted to.)

Anna Mebust

415.972.3265

mebust.anna@epa.gov

**From:** Mebust, Anna
**Sent:** Wednesday, September 28, 2016 2:16 PM
**To:** 'Danilo Dragoni' <ddragoni@ndep.nv.gov>; dwinkelman@ndep.nv.gov
**Cc:** Flagg, MichaelA <Flagg.MichaelA@epa.gov>; CHANG, RANDALL <Chang.Randall@epa.gov>
**Subject:** New EE rule publication date and demonstration due date

Hi Danilo and Daren,

I wanted to share with you -- we were just notified by our colleagues that the new Exceptional Events rule is scheduled for publication in the Federal Register on **October 3, 2016**. The publication date will be the effective date for the rule.

With the new rule, the new deadline for 2013-2015 demonstrations that could be used in the initial area designations process for the 2015 Ozone NAAQS is “no later than the later of November 29, 2016 or the date that state and tribal recommendations are due to the Administrator” (see page 240 in the pdf document available at the Federal Register link below). This provides an effective deadline of **November 29, 2016**.

Please note that any EPA review of a demonstration must be done according to the rule in effect when it is submitted. If you would like a demonstration to be subject to the new rule (including provisions for concurrent public comment), **please do not submit it until after the new rule is published** (October 3, 2016).

The document can be found at the following website:

https://www.federalregister.gov/agencies/environmental-protection-agency

Please feel free to call or email myself, Michael, or Randy if you have any questions about this.

Anna K. Mebust, Ph.D.

U.S. EPA Region 9, Air Quality Analysis Office

75 Hawthorne Street (AIR-7)

San Francisco, CA 94105

Phone: 415.972.3265

Email: mebust.anna@epa.gov

**Agenda topics for EPA R9 / BAAQMD monitoring call – November 3, 1:00 PM**

- **New requirement for 1-point QC check and PE levels**
  - Any agencies succeeding already (here or other regions)? If so, can you provide information about the concentrations, methods, standards and instrumentation being used?
  - Have any agencies asked for R9 to approve an alternative?
- **PAMS – start discussing waivers needed**
  - Would like to have PAMS at Livermore, not SJ-Jackson
    - Will measure $O_3$, true $NO_2$, $NO/NO_y$, VOCs with auto GC, aldehydes (3:3) and required meteorology as well as $PM_{2.5}$ mass, $PM_{2.5}$ speciation, black carbon, and 1:12 toxics (canisters)
    - Data in Livermore more relevant for understanding local $O_3$ formation than in San Jose, also just as good for supporting national modeling
    - We currently have a waiver for met at NCore to use a nearby airport since logistics don't allow a met tower at the SJ-Jackson site. The airport doesn't have mixing height measurements.
    - NCore site will still have trace level CO and $SO_2$, $O_3$, $NO_2$, $PM_{10-2.5}$ (filter-based), $PM_{2.5}$ (continuous FEM), CSN, NATTS (met from airport)
  - Waiver needed for alternative site
  - Waiver needed to move $NO_y$ from SJ-Jackson to Livermore
- **Ozone designations and Patterson Pass data**
  - Background – seasonal research site that ran non-FEM since mid-2010. The instrument was designated FEM in fall 2014.
  - Regulatory data from April 2015 until present as an SPM (~18 months)
  - As one might expect for a site at elevation, it is highly variable, not representative of population exposure to ozone formation caused by pollution sources in the area, and seems likely to have a significant component of vertical transport. We are working up some examples to share in advance of the call.
  - Site will not have a valid 2015-2017 design value. Also – there were many days in 2016 where the $O_3$ concentration was likely affected by wildfire emissions – and it looks like it would make the difference in our $O_3$ NAA classification. We haven't looked to see how much of 2015 was affected. We'd like to discuss how this data will be used in designations to determine whether we need to think about pursuing exceptional events requests.
- **Reporting requirement for $PM_{2.5}$ flow rate verifications**
  - Isn't feasible with our data management system. This is requiring a complete re-coding of how this information is recorded and stored (not exactly resource-neutral). Our estimated timeframe for the ability to complete this is at least a few years. We'd like to discuss the path forward.
- **Possibility for flexibility to allow future network-wide $PM_{2.5}$ primary instrument changes**
  - A long-term project we have been considering is to evaluate the API T640 as a potential for network-wide replacement for the BAMs – this would have to include an evaluation period and then, depending on funding, a staged replacement.
  - Discuss options for collocation requirement flexibility during 2-year evaluation period.

        - Run for 2 years. At least one collocation with BAM and FRM, but not the primary; some at sites alone for operational testing. Can all the <2yr evaluation SPMs be not subject to App A collocation?
    - Transition period – could we have flexibility to meet collocation for both BAM and the T640's at the same site (e.g. our 2nd FEM-FRM site) during a transition period until we can have all primary monitors of one type?
    - Long term collocation question: We were considering having some PM2.5-only instruments, and some configured to do both PM2.5 and PM10. However, it seems that the method code for PM2.5 from the base instrument is different than the MC for PM2.5 from the PM2.5&PM10 instrument (640x option) (info from website below). Does this mean that if we had sites with primary API T640s and other sites with primary T640x's, we would have to meet the 15% collocation for both separately? This would severely discourage the inclusion of more PM-coarse measurements in a network. Is this OAQPS/ORD's intention about how the method codes should work?
        - http://www.teledyne-api.com/Resources/Documents/T640_data_sheet.pdf
        - https://www.gpo.gov/fdsys/pkg/FR-2016-07-13/html/2016-16578.htm

          Certifications US EPA $PM_{2.5}$ Federal Equivalent Method EQPM-0516-236

          US EPA $PM_{2.5}$ Federal Equivalent Method EQPM-0516-238*

          US EPA $PM_{10}$ Federal Equivalent Method EQPM-0516-239*

          US EPA $PM_{10-2.5}$ Federal Equivalent Method EQPM-0516-240*

          *with 640x option
    - If these seem like reasonable paths forward, BAAQMD may draw up a proposal for R9 approval over the next year depending on how things here progress
- **Standing items**
    - Update / questions about 2015 Air Monitoring Network Plan
    - TSA Report update
    - EPA update on Criteria Pollutant QAPP review (timeframe)
    - BAAQMD update for other QA docs (timeframe)

**To:** Inouye, Daniel[DInouye@washoecounty.us]; jdhunter@washoecounty.us[jdhunter@washoecounty.us]; Albee, Charlene[CAlbee@washoecounty.us]
**Cc:** Mebust, Anna[Mebust.Anna@epa.gov]; Danilo Dragoni[ddragoni@ndep.nv.gov]; Adams, Elizabeth[Adams.Elizabeth@epa.gov]; McKaughan, Colleen[McKaughan.Colleen@epa.gov]; bschnieder@washoecounty.us[bschnieder@washoecounty.us]; Yann Ling-Barnes[ylbarnes@washoecounty.us]
**From:** Flagg, MichaelA
**Sent:** Thur 6/1/2017 10:39:01 PM
**Subject:** Wildfire Ozone Exceptional Event Concurrence
05-30-2017_Washoe_Albee.pdf
Washoe 2015 Wildfire Ozone Exceptional Event TSD Final.pdf
Washoe 2016 Wildfire Ozone Exceptional Event TSD Final.pdf

Charlene & Dan,

Attached is EPA Region 9's concurrence with your request for exclusion flags for six 8-hour ozone exceedances affected by wildfire emissions measured at the Reno3 monitoring site in 2015 and 2016. The technical support documents include EPA's evaluation of your request against the requirements of the exceptional events rule and the principles outlined in the ozone wildfire guidance.

I would like to thank you and your staff (especially Julie, Brendan, and Yann) for all your hard work throughout this process. We especially appreciate the close collaboration and coordination on this project, which allowed us to meet these extremely short timeframes and accelerated deadlines.

As this is the first concurrence under the new rule and guidance, this will serve as a great example of solid technical work on these types of demonstrations.

Please let us know if you have any questions.

We look forward to working with you all on future wildfire issues.

Thanks!

**To:** CHANG, RANDALL[Chang.Randall@epa.gov]
**Cc:** Mebust, Anna[Mebust.Anna@epa.gov]; Sheryl Fontaine[sfontaine@ndep.nv.gov]; Kurpius, Meredith[Kurpius.Meredith@epa.gov]; Danilo Dragoni[ddragoni@ndep.nv.gov]
**From:** Daren Winkelman
**Sent:** Wed 5/31/2017 11:52:03 PM
**Subject:** 2016 Ozone Wildfire EE Packages
Cover_Letter.pdf
July_2016_Wildfire_EE_Fernley_FINAL.pdf
Aug_2016_Wildfire_EE_Fallon_FINAL.pdf

Hi Randall:

This email is to inform you that we are submitting two exceptional events packages with concurrent public review. Our packages are posted on NDEP's internal and external websites starting today and will remain for at least 30 days. Please let me know if you need any additional information.

Thanks!

Daren

---

Daren Winkelman
Supervisor

Bureau of Air Quality Planning
Nevada Division of Environmental Protection
901 S. Stewart St., Ste 4001
Carson City NV 89701
p: 775.687.9342 f: 775.687.6396
www.ndep.nv.gov

**To:** Kurpius, Meredith[Kurpius.Meredith@epa.gov]
**Cc:** Mebust, Anna[Mebust.Anna@epa.gov]; CHANG, RANDALL[Chang.Randall@epa.gov]; Danilo Dragoni[ddragoni@ndep.nv.gov]; Sheryl Fontaine[sfontaine@ndep.nv.gov]
**From:** Daren Winkelman
**Sent:** Tue 11/29/2016 5:53:14 PM
**Subject:** Exceptional Event Packages
removed.txt
Cover_letter_11292016.pdf
August_2015_Wildfire_EE_Fallon_Final.pdf
June_2015_SI_EE_GBNP_Final.pdf

Hey Meredith:

I have attached our EE packages for your review. Please let me know if you need any additional information.

Thanks!

Daren

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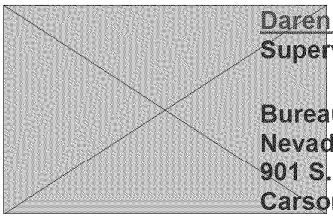
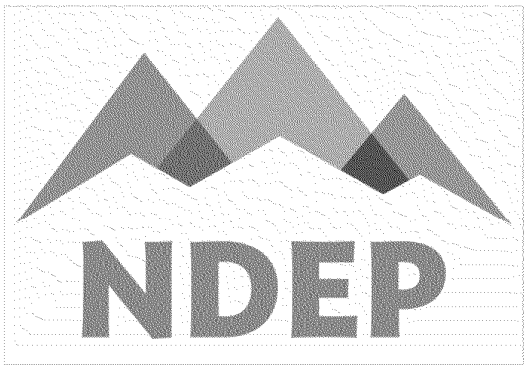


**Daren Winkelman**
**Supervisor**

**Bureau of Air Quality Planning**
**Nevada Division of Environmental Protection**
**901 S. Stewart St., Ste 4001**
**Carson City NV 89701**
**p: 775.687.9342 f: 775.687.6396**
**www.ndep.nv.gov**

# NEVADA DIVISION OF ENVIRONMENTAL PROTECTION




# ANALYSIS OF 2016 CALIFORNIA WILDFIRES AS EXCEPTIONAL EVENTS AND THEIR CONTRIBUTION TO HIGH OZONE CONCENTRATIONS IN FALLON, NEVADA

FINAL Report
May 2017

Authors
Daren Winkelman
Sheryl Fontaine

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **agl** | Above ground level |
| **amsl** | Above mean sea level |
| **AQI** | Air Quality Index |
| **AQS** | Air Quality System |
| **BAQP** | Bureau of Air Quality Planning |
| **CFR** | Code of Federal Regulations |
| **EER** | Exceptional Event Rule |
| **FEM** | Federal Equivalence Method |
| **HMS** | Hazard Mapping System |
| **HYSPLIT** | Hybrid Single Particle Lagrangian Integrated Trajectory |
| **km** | kilometers |
| **m** | Meters |
| **mph** | Miles per hour |
| **NAAQS** | National Ambient Air Quality Standards |
| **NDEP** | Nevada Division of Environmental Protection |
| **NEI** | National Emissions Inventory |
| **NO** | Nitrogen Monoxide |
| **$NO_x$** | Oxides of Nitrogen |
| **$O_3$** | Ozone |
| **ppb** | Parts per billion |
| **Preparedness Level** | PL |
| **$PM_{2.5}$** | Particulate Matter Smaller than 2.5 Micrometers |
| **$PM_{10}$** | Particulate Matter Smaller than 10 Micrometers |
| **PST** | Pacific Standard Time |
| **tpd** | Tons per day |
| **U.S.** | United States |
| **USEPA** | United States Environmental Protection Agency |
| **UTC** | Coordinated Universal Time |
| **VOCs** | Volatile Organic Compounds |



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# ANALYSIS OF 2016 CALIFORNIA WILDFIRES AS EXCEPTIONAL EVENTS AND THEIR CONTRIBUTION TO HIGH OZONE CONCENTRATIONS IN FALLON, NEVADA ON AUGUST 28, 2016

## 1.0 INTRODUCTION

The Nevada Division of Environmental Protection (NDEP) Bureau of Air Quality Planning (BAQP) operates a network of ambient air quality monitors at a variety of locations throughout the state of Nevada. In 2016, air quality monitoring was represented by eleven ambient air quality monitoring stations (Carson City ( ozone [$O_3$], particulate matter smaller than 2.5 micrometers in diameter [$PM_{2.5}$]), Elko (particulate matter smaller than 10 micrometers [$PM_{10}$]), Fallon ($O_3$), Fernley ($O_3$), Pahrump ($PM_{10}$) and Gardnerville ($PM_{2.5}$)) under the jurisdiction of the NDEP - BAQP. The United States Environmental Protection Agency's ( USEPA) provides minimum site requirements to monitor for $O_3$ and PM based on M etropolitan Statistical Area population (40 Code of Federal Regulations [ CFR] Part 58, Appendix D). The NDEP-BAQP's air monitoring network meets or, in most cases, exceeds the minimum network requirements. Ambient air monitoring data is collected and data quality is assured in accordance with 40 CFR 58; this data is submitted to the USEPA Air Quality System (AQS) database. The approval letter for the 2016 NDEP-BAQP Annual Network Plan is included in Appendix A. The data for 201 6 was certified in May 2017. The Data Certification Letter was submitted to USEPA Region IX in May 2017 as well, and is included in Appendix B.

### 1.1 SCOPE OF REPORT

Several wildfires were active in late August 2016. Smoke from two of the wildfires, the Soberanes Fire in Monterey County and the Mokulmne Fire in El Dorado County, impacted the Fallon, Nevada ozone monitoring site on August 28, 2016. The Soberanes Fire started on July 22, 2016 approximately ten miles south of Monterey Bay, California and burned a total of 132,127 acres. The fire was caused by an abandoned, illegal campfire. The lightning-caused Mokulmne Fire, located approximately 25 miles south of South Lake Tahoe, California , started August 18, 2016 and burned 655 acres. On August 26, 2016, smoke from the California wildfires began to impact western Nevada. Wildfire smoke continued to affect western Nevada through August 31, 2016. On August 28, 2016, the NDEP monitoredan exceedance of the 2015 8-hour $O_3$ National Ambient Air Quality Standards (NAAQS) at the Fallon air quality monitoring site (AQS Site Code 32-001-0002) due to the smoke plume impacts. Both fires were 100 percent contained by October 11, 2016.

The NDEP is requesting exclusion of the August 28, 2016 8 -hour $O_3$ data from the Fallon air monitoring site that met or exceeded the NAAQS as an exceptional event under the US EPA's regulation for *The Treatment of Dat a Influenced by Exceptional Even ts;* (81 Federal Register



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68216; USEPA, 2016), known as the Exceptional Even ts Rule (EER; 40 CFR Parts 50 and 51). The purpose of this report is to provide documentation in support of this request. The wildfires in California were natural events that caused an exceedance of the federal standardfor one of NDEP's Federal Equivalent Method (FEM) ozone monitors on August 28, 2016. The 8-hour average $O_3$ concentration reached 73 parts per billion ( ppb) at the Fallon air monitoring station in Churchill County (AQS Site Code 32-001-0002). This document demonstrates that the 8-hour ozone exceedance on August 28, 2016 at the Fallon monitoring site meets the requirements for having been influenced by an exceptional event as stipulated in the EER. Table 1 lists the 8-hour ozone concentration at Fallon that is included in this request.

**Table 1. Eight-hour Federal Ozone Values at the Fallon Monitoring Site**

| Monitoring Site | AQS Site Code | Maximum Daily 8-hour Average $O_3$ Concentration (ppb) | Date |
|---|---|---|---|
| Fallon | 32-001-0002 | 73 | 08/28/2016 |

The elevated ozone concentration observed on August 28 , 201 6 occurred as a result of the emissions from wildfires in California. The NDEP-BAQP has submitted the 1-hour $O_3$ data from the affected monitor on the affected day to the US EPA AQS database and has placed the appropriate AQS flags throughout the data to indicate that the data was affected by an exceptional event due to wildfire. Informational flags (IT) were also included for other ozone NDEP-BAQP monitoring sites for the same time period. This flagging indicates that the ambient air quality data was influenced by the wildfire emissions, and ensures that the data is properly represented in the regulatory process.

### 1.2 EXCEPTIONAL EVENT DEFINITION AND DEMONSTRATION CRITERIA

The EER defines an exceptional event in 40 CFR Part 50 as an event that 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 is a natural event.

The following analysis will address this definition and provide documentation to establish that the 2016 California wildfires meet the criteria for classification as an exceptional event as set forth in 40 CFR Part 50 . Specifically, this document provides evidence that the wildfire s affected air quality by demonstrating that:

1. there was a clear causal relationship between the 8-hour $O_3$ concentrations at Fallon and the wildfires;
2. the $O_3$ concentrations during the event were significantly higher than normal historical concentrations, and;
3. the 8-hour $O_3$ concentration at Fallon would not have exceeded the standard without the emissions contributed by the wildfires in California.



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In addition, documentation is provided demonstrating that the California wildfires were natural events whose emissions were not reasonably controllable or preventable. Finally, information regarding reasonable and appropriate actions taken to protect public health is included in Appendix C.

In addition to the EER, this document follows the guidance recently issued by the US EPA regarding the treatment of $O_3$ concentration data affected by wildfire (*Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*; USEPA, 2015). Specifically, the elevated $O_3$ 8-hour average concentration at the Fallon air monitoring site on August 28, 2016 was significantly higher (by more than 15 ppb) than the average concentration for this site during the month of August (2012 through 2016). The measured maximum 8-hour average for the exceedance day was also significantly higher (by more than 15 ppb) than non-event related concentrations during the month of August at the Fallon site.



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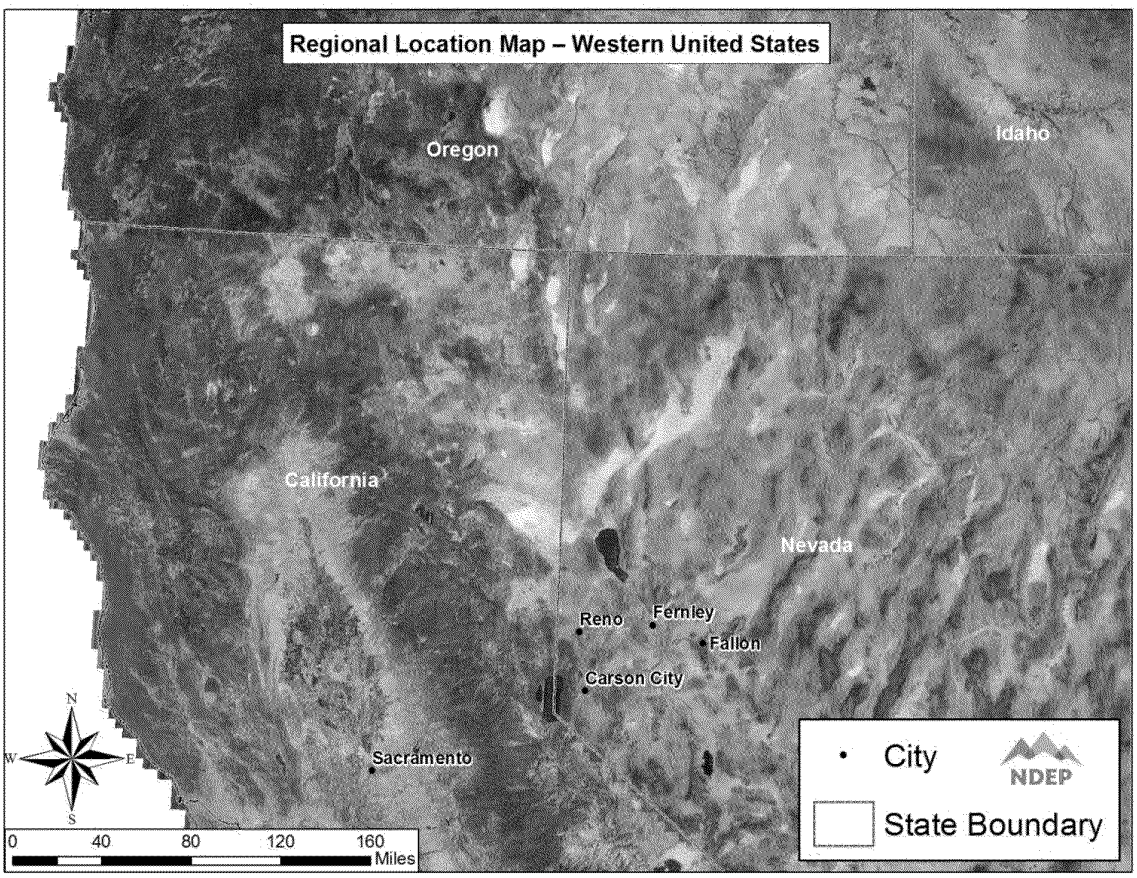
## 2.0 SETTING AND BASIC CONCEPTUAL MODEL

### 2.1 REGIONAL DESCRIPTION

Fallon is part of Churchill County, Nevada, approximately 60 miles east of Reno, Nevada (Figure 1). The city is located in Lahontan Valley, in the southern portion of the Carson Sink, a low-lying dry lakebed that was once the terminus of the Carson River. The sink is currently fed by drainage canals of the Truckee-Carson Irrigation District, which provide water for the Stillwater Wildlife Management Area.

**Figure 1. Regional Location Map**




Lahontan Valley is bordered by the Stillwater Range to the northeast; the Lahontan Mountains, Bunejug Mountains, White Throne Mountains, Desert Mountains, and Dead Camel Mountains to the south; the Virginia Range to the west; and the Hot Springs Mountains and West Humboldt Range to the northwest and north. Interstates 50 and 95 bisect Lahontan Valley east-west and north-south, respectively. Both travel directly through Fallon (Figure 2).



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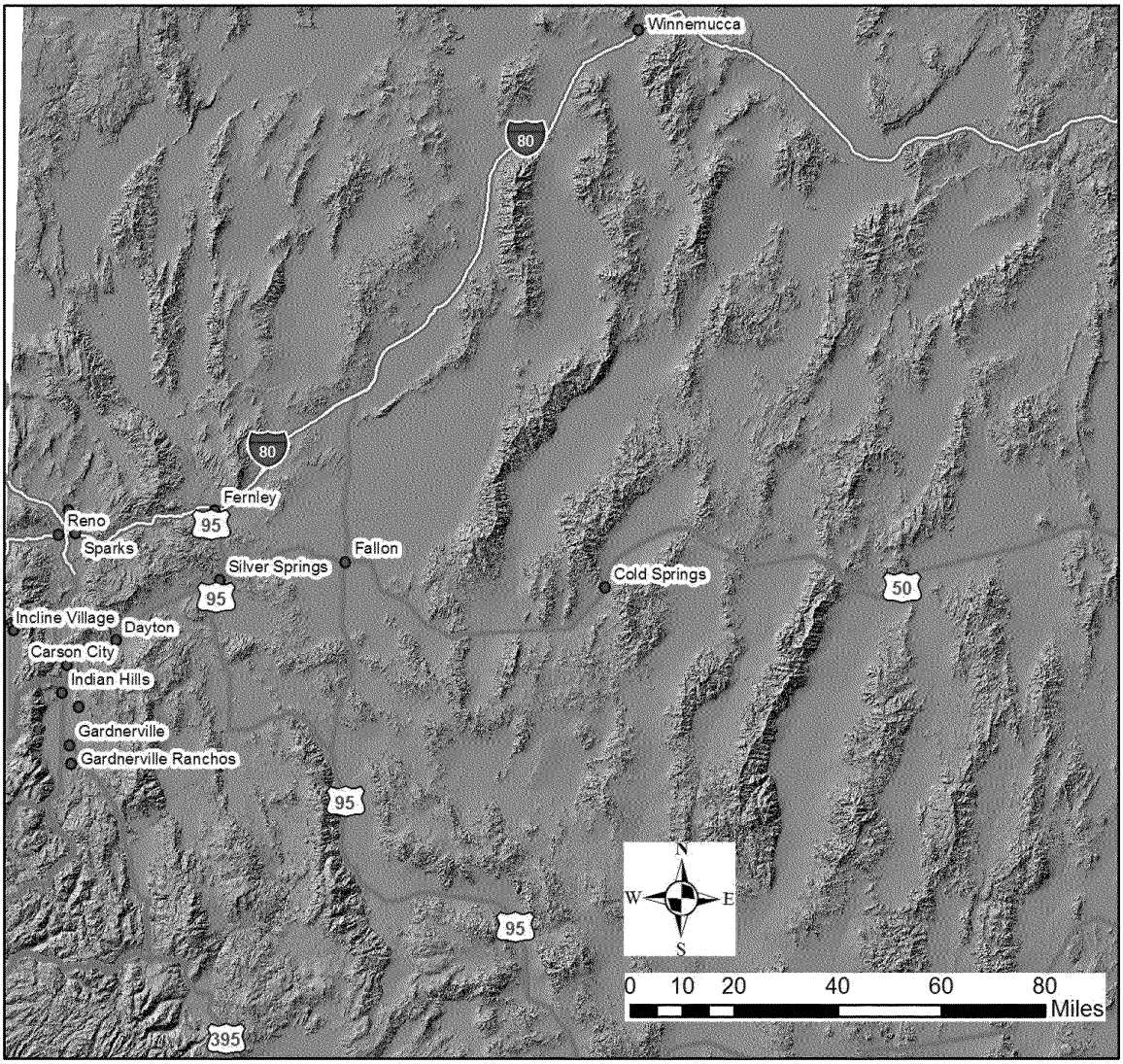
**Figure 2. Shaded Relief Map of West-Central Nevada**




## 2.2 CLIMATE AND WEATHER

Lahontan Valley is part of the Basin and Range Physiographic Province, a region of internal drainage characterized by north - to northeast -trending mountain ranges separated by lower elevation valleys. The elevation in Fallon is 3,965 feet above mean sea level (amsl), and the surrounding mountains exceed 8,500 feet amsl.

Due to the rain shadow effect of the Sierra Nevada and other mountain r anges to the west and southwest, moisture associated with Pacific storms rarely reaches the valley. As a result, Fallon has an arid climate (an average of approximately five inches of precipitation per year), typical of the Great Basin region. Most of th e precipitation in the area occurs in the winter (between December and May). The average daily maximum tempera ture is approximately 92 degrees



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Fahrenheit (°F) in July and approximately 44 °F in January. Average daily minimum temperatures vary from 54 °F in July to 18 °F in January.

Weather conditions during the summer months of July, August, and September are typically dominated by a large, upper-level, synoptic-scale high pressure system over the western United States (U.S.). For northern Nevada, this usually results in very warm temperatures and light to moderate west winds. These winds are strongest during the afternoon hours and generally decrease overnight. When upper-level high pressure systems are located over the four-corners area (Arizona, New Mexico, Colorado, and Utah), south to southeast winds transport subtropical moisture into the southwestern deserts, resulting in afternoon and evening thunderstorms. This moisture sometimes extends as far north as northern Nevada. The accompanying monsoonal storms are also accompanied by strong, gusty winds, rain, and sometimes hail. The winds associated with these storms often create blowing dust conditions with reduced visibility.

Section 3 provides a more detailed discussion of the specific meteorological conditions on the event day included in this request as part of the clear causal connection between the 2016 California wildfires and the elevated ozone concentrations. Section 3 also provides information to demonstrate that the 8-hour ozone concentration at Fallon on August 28, 2016 would not have exceeded the federal standard without the impacts of the wildfire emissions.

### 2.3 DEMOGRAPHICS

The Fallon Combined Statistical Area consists of Churchill County, Nevada. Churchill County covers approximately 4,930 square miles and has a population of 24,200. The City of Fallon has a population of approximately 8,900 (USCB, 2016).

### 2.4 POLLUTANT SEASONALITY

Periods of high pressure and stagnant air masses, which are conducive to pollutant build up, occur during both the winter and summer seasons in northern Nevada. Particulate matter generated in winter months, and the presence of ozone in the summerresult in a seasonal pollutant pattern, with the highest particulate matter concentrations usually occurring during the winter months (except during wildfires) and the highest ozone concentrations observed during the summer months.

The ozone season in western Nevada therefore occurs from April through October. In general, the synoptic (large-scale) weather conditions leading to elevated ozone concentrations are slow moving, high pressure weather systems, which cause the air to subside, or sink. As the air sinks, it warms, forming a subsidence temperature inversion several hundred meters (m) above the surface that stabilizes and dries the atmosphere. This process limits vertical mixing of the boundary layer and traps pollutants below the height of the inversion. This process also limits cloud production, thereby increasing ozone photochemistry. In addition, calm surface winds are



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conducive to high ozone concentrations because these conditions prevent t he dispersion of pollutants.

Figure 3 shows the typical summer diurnal pattern of ozone concentrations in western Nevada; the highest concentrations occur in the early to mid -afternoon, during the time of highest solar radiation. The 95$^{th}$, 50$^{th}$, and 5$^{th}$ percentiles of hourly ozone concentrations at the Fallon site are shown for all days of June, July, and August , from 2012 through 2016, excluding wildfire days (August 20-21, 2015 and August 28, 2016; Figure 3).



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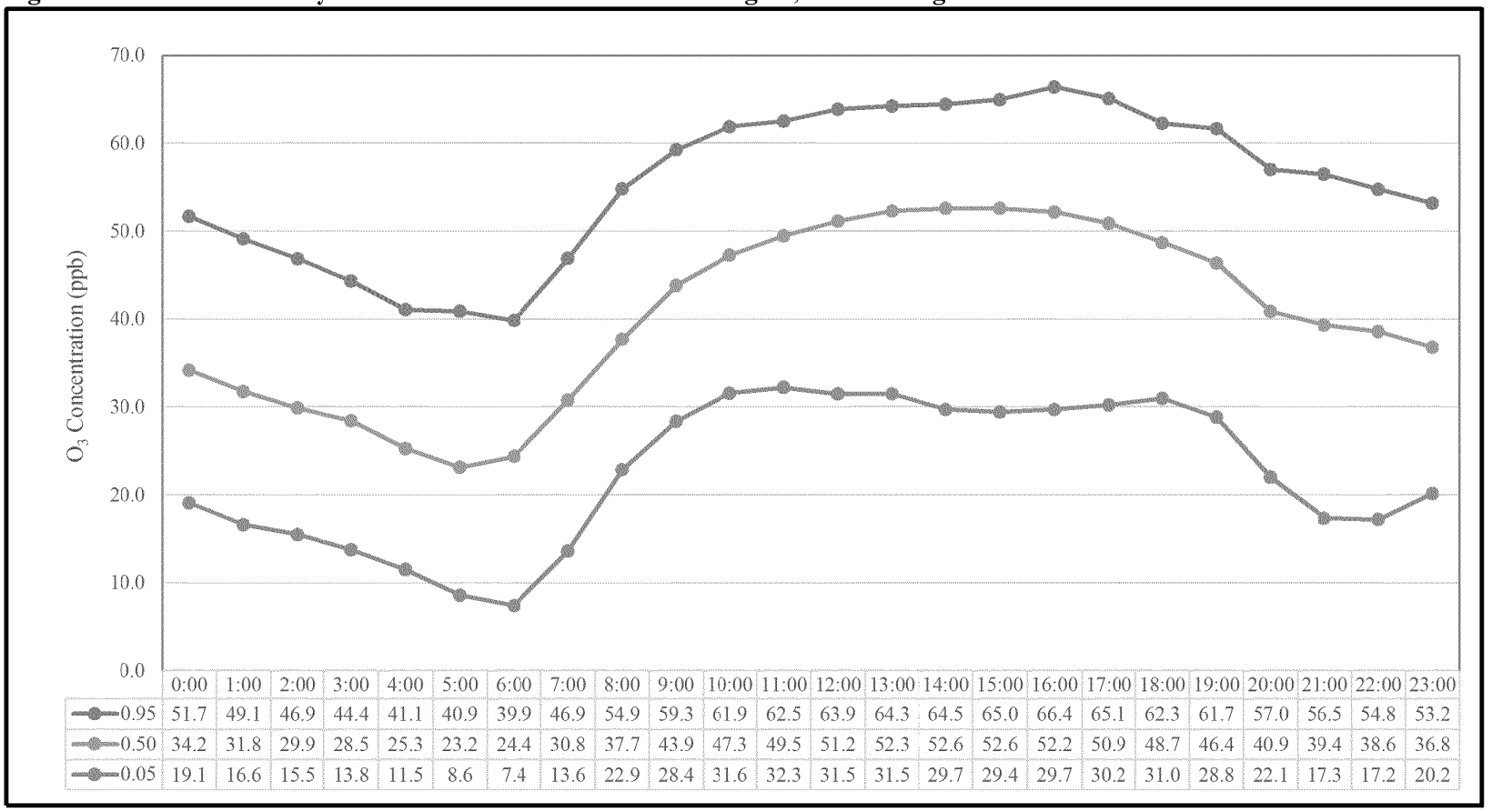
**Figure 3. Fallon Hourly Ozone Concentrations for June-August, 2012 through 2016.**




| | 0:00 | 1:00 | 2:00 | 3:00 | 4:00 | 5:00 | 6:00 | 7:00 | 8:00 | 9:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 17:00 | 18:00 | 19:00 | 20:00 | 21:00 | 22:00 | 23:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.95 | 51.7 | 49.1 | 46.9 | 44.4 | 41.1 | 40.9 | 39.9 | 46.9 | 54.9 | 59.3 | 61.9 | 62.5 | 63.9 | 64.3 | 64.5 | 65.0 | 66.4 | 65.1 | 62.3 | 61.7 | 57.0 | 56.5 | 54.8 | 53.2 |
| 0.50 | 34.2 | 31.8 | 29.9 | 28.5 | 25.3 | 23.2 | 24.4 | 30.8 | 37.7 | 43.9 | 47.3 | 49.5 | 51.2 | 52.3 | 52.6 | 52.6 | 52.2 | 50.9 | 48.7 | 46.4 | 40.9 | 39.4 | 38.6 | 36.8 |
| 0.05 | 19.1 | 16.6 | 15.5 | 13.8 | 11.5 | 8.6 | 7.4 | 13.6 | 22.9 | 28.4 | 31.6 | 32.3 | 31.5 | 31.5 | 29.7 | 29.4 | 29.7 | 30.2 | 31.0 | 28.8 | 22.1 | 17.3 | 17.2 | 20.2 |

## 2.5 CHARACTERISTICS OF NON-EVENT OZONE FORMATION

The anthropogenic emissions contributing to ozone formation include volatile organic compounds (VOCs) and oxides of nitrogen ($NO_x$). The main sources of these emissions are mobile sources (cars, trucks, locomotives, off-road equipment) along with stationary and area sources (industrial processes, consumer products, and pesticides ). Mobile source emissions dominate the anthropogenic emissions in Churchill County, accounting for the majority of the total $NO_x$ inventory.

VOC and $NO_x$ emissions over the last decade have remained fairly constant in Churchill County, and are well below 10 tons per day (tpd). In 2014 (the most recent National Emissions Inventory for which VOC and $NO_x$ values are available), VOC and $NO_x$ precursor emissions for Churchill County were estimated at 2 and 3 tpd, respectively. VOC and $NO_x$ emissions have not changed significantly despite increases in population, vehicle activity, and economic development.

## 2.6 CHARACTERISTICS OF WILDFIRE-RELATED OZONE FORMATION

Wildfires generate both $NO_x$ and VOC, with different burning stages generating different types of emissions. Biogenic VOCs are generated by vegetation throughout the burning cycle. $NO_x$ is generated primarily during the hot, flaming stage of the fire, while small reactive hydrocarbons, such as ethane and acetylene, are generated during the smoldering phase (Finlayson-Pitts and Pitts, 2000; Jaffe et al., 2008).

Very near fires, ozone concentrations can potentially be suppressed, despite the increase in ozone precursors generated by the wildfires. Bytnerowicz et al. (2010), Finlayson-Pitts and Pitts (2000), and Sandberg et al. (2002) provide several explanations why ozone can potentially be low at fire sites: 1) thick smoke can prevent sufficient UV light from reaching the surface, thereby inhibiting photochemical reactions, and 2) the wildfire plume typically contains high nitrogen monoxide (NO) concentrations, which can titrate ozone concentrations. Downwind of the fire (or at the top of the plume; Sith et al., 1981, quoted in Sandberg et al., 2002), away from fresh NO sources and with reduced aerosol optical depth, considerable amounts of ozone can be generated. The plume does not need to be very far downwind of fire emissions to generate ozone. Sith et al. (1981) found ozone beginning 10 kilometers (km) downwind of wildfires, in plumes less than one -hour old (quoted in Sandberg et al., 2002). Ozone and ozone precursors can also be transported quite far from a wildfire site (Finlayson-Pitts and Pitts, 2000 and Jaffe et al., 2008). Therefore, similar to the impacts of anthropogenic emissions in urban airsheds, the highest ozone concentrations due to wildfires are often found downwind of the area of greatest precursor emissions.

The impact of wildfires on ozone concentrations at both the local and regional level has been extensively evaluated in recent years. Field observations of ozone formation in smoke plumes from fires date back nearly 25 years when aircraft measurements detected elevated ozone at the edge of forest fire smoke plumes far downwind. More recently, aircraft flights through smoke



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plumes have demonstrated increased ozone concentrations of 15 to 30 ppb in California (Bush, 2008), while ozonesonde measurements in Texas found enhanced ozone aloft ranging fr om 25 to 100 ppb attributable to long -range transport of smoke plumes from Canada and Alaska (Morris, 2006).

In addition, air quality modeling has shown increased levels of ozone from a number of large fires. McKeen (2002) found that Canadian fires in 1995 enhanced ozone concentrations by 10 to 30 ppb throughout a large region of the central and eastern United States. Lamb (2007) found similar results simulating the impacts of fires in the Pacific Northwest in 2006, with increases of over 30 ppb. Junquera (2005) further found that within 10 km of a fire, ozone concentrations could be enhanced by up to 60 ppb. Finally, in one of the most recent studies, Pfister (2008) simulated the large 2007 fires in both northern and southern California and found ozon e increases of approximately 15 ppb in many locations, concludingthat "Our findings demonstrate a clear impact of wildfires on surface ozone nearby and potentially far downwind from the fire location, and show that intense wildfire periods frequently can cause ozone levels to exceed current health standards."



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## 3.0 CLEAR CAUSAL RELATIONSHIP

This section demonstrates a clear causal relationship between the California wildfires and the 8-hour ozone exceedance that occurred at the Fallon monitor on August 28, 2016. Specifically, this section provides evidence that: 1) the wildfires occurred, 2) the smoke plumes from the wildfires reached the Fallon monitor, and 3) that the pollutants within the smoke plumes increased ozone concentrations at the Fallon monitor.

This comprehensive weight of evidence includes: documentation of the extensive nature of the fires; a meteorological analysis; satellite imagery; ozone air quality data; ozone chemistry leading to elevated 8-hour ozone concentrations; forward and backward trajectories showing that emissions from the wildfires were transported to the Fallon monitoring location; and finally a discussion of how the 8-hour ozone concentrations exceed the normal, non-event related concentrations for the Fallon ozone monitor.

### 3.1 DESCRIPTION OF THE EVENT

Wildfire activity typically begins to increase through the United States in late spring. Temperatures during the winter months leading into the 2016 wildfire season were generally above normal for the much of the United States, including northern California. Most of the Pacific Northwest, northern California, and parts of the Great Basin received normal to slightly above normal precipitation, generally as rain instead of the more-typical snow; however, severe to exceptional drought conditions continued to worsen across much of California, Nevada, and southern Oregon. The warm trend continued into the spring across most of the nation, with above normal temperatures stretching from the Pacific Northwest and northern California, east through the central states. The summer of 2016 was the warmest in California on record. As a result, drought conditions continued to worsen in the west, where severe to exceptional drought continued across much of California, Nevada, and Oregon (NICC, 2016). The North American Drought Monitor for August 2016 showed severe to exceptional drought over the far west (Figure 4).



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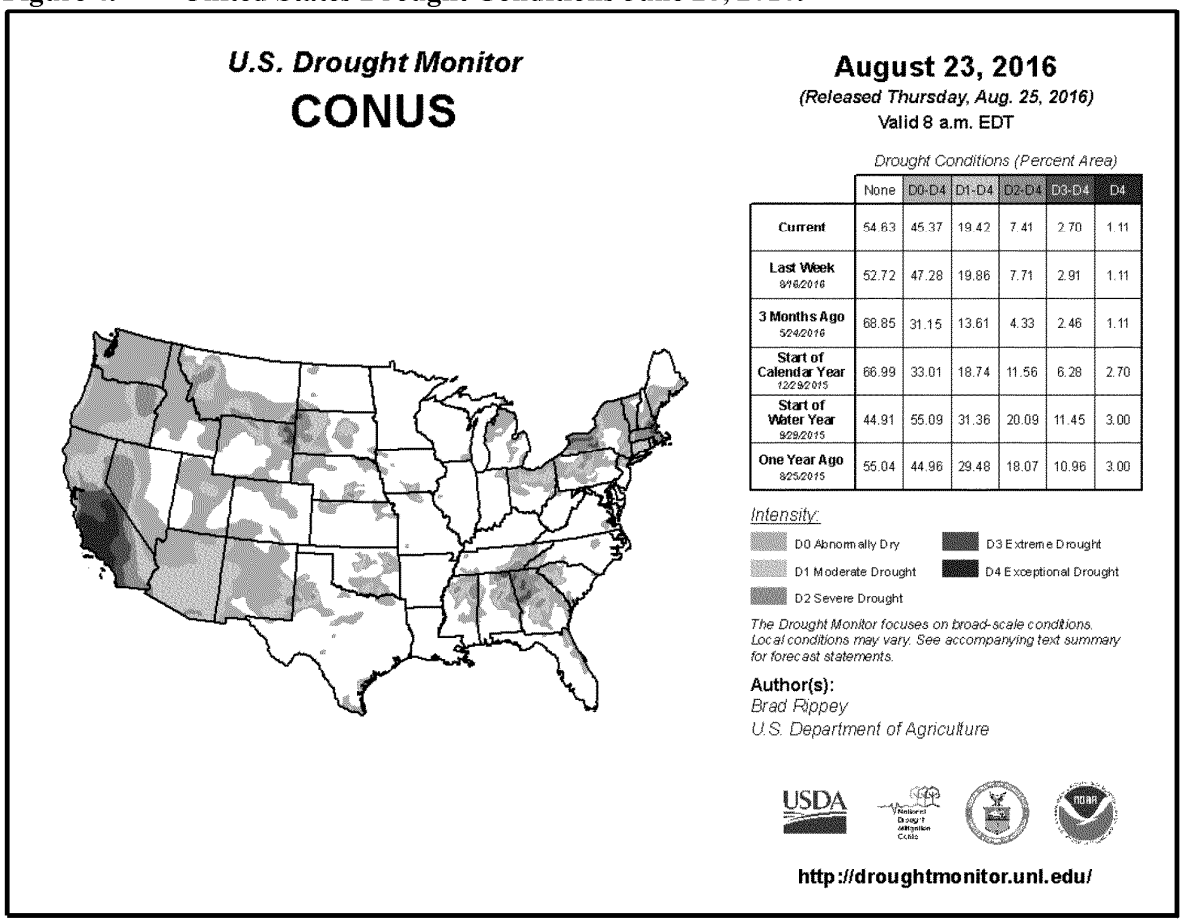
**Figure 4. United States Drought Conditions June 28, 2016.**




Although conditions were present to support significant fire activity throughout the summer fire season, for the most part these conditions fell within the average range and fire activity was generally normal, potentially due to the significant decrease in li ghtning strikes as compared to recent years (Rolinski, 2017).

Although most of the fire activity in the United States was below normal in 2016, numerous fires in California contributed to smoke transport in to Nevada. There were approximately 242 significant fires in the Pacific Northwestin 2016; 68 of those fires were in California. The national Preparedness Level (PL) was elevated to PL 2 on June 7, 2016 then was further raised to PL 3 on July 26 where it remained for three and a half weeks. On August 20 it was raised further to PL 4 where it remained for two weeks. On September 3 the PL dropped to 3 and quickly dropped to PL 2 three days later. On September 30 the PL was lowered to 1 where it remained for the rest of the calendar year (NICC, 2016). By the end of the 2016 fire season, due to large wildland fires, a total of 560,815 acres had burned in California. Figure 5 shows the locations of large wildfires during the 2016 fire season.



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**Figure 5. Large Wildfires in the United States – 2016.**

The Soberanes Fire started on July 22, 2016 in Monterey County, in central California. The Mokulmne Fire started on August 19, 2016 in a rugged, remote part of Alpine County, California. Smoke from these wildland fires impacted areas in northern California and western Nevada. Figure 6 provides a map of the wildfires in California that were active on August 27, 2016, as well as the Fallon, Nevada monitoring site. Table 2 shows the number of acres burned by the Soberanes and Mokulmne Fires on August 26, 27, and 28, 2016. The Cedar and Chimney Fires are also included, as the smoke from these fires may have affected air quality in western Nevada as well.



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**Figure 6. Location Map of August 27, 2016 Active Wildfires and the Fallon, Nevada Monitoring Site.**

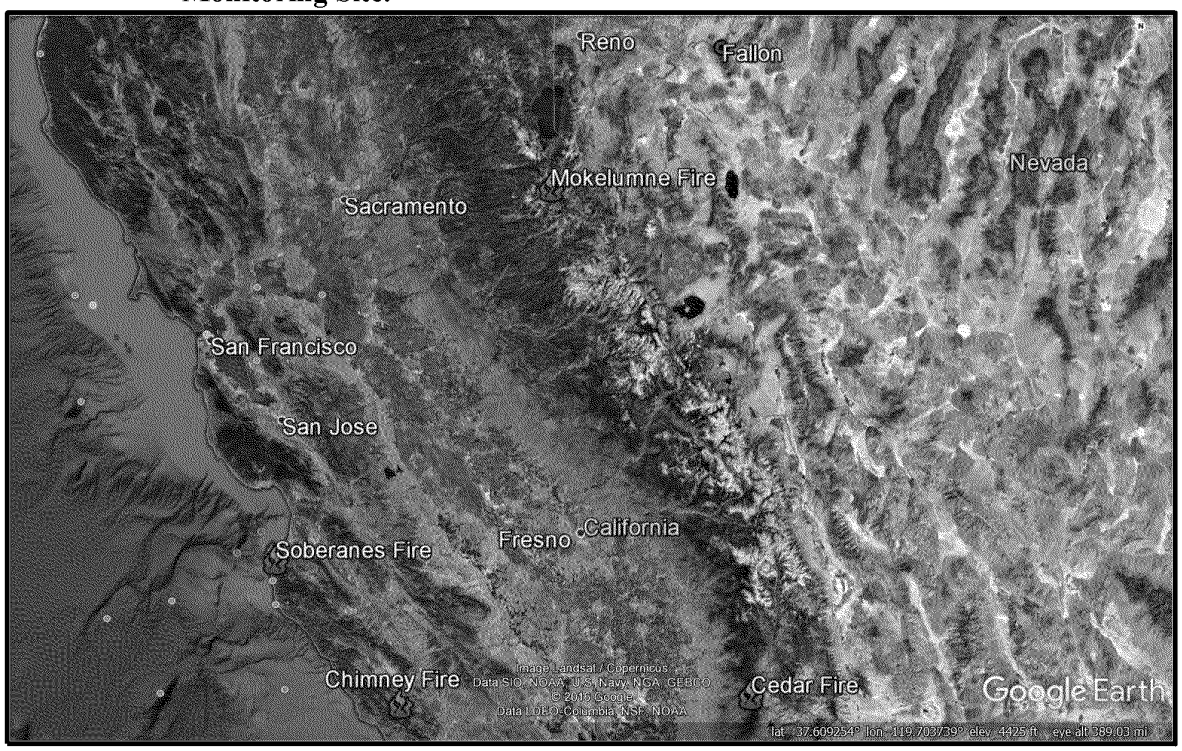


**Table 2. Acres Burned for California Wildfires from August 25 through 29, 2016.**

| NAME | FIRE START | | ACRES BURNED BY DATE | | | | |
|---|---|---|---|---|---|---|---|
| | LATITUDE | LONGITUDE | 8/25/2016 | 8/26/2016 | 8/27/2016 | 8/28/2016 | 8/29/2016 |
| Soberanes Fire | 36.461°N | 121.901°W | 88,654 | +1,408 | +1,038 | +353 | +349 |
| Mokulmne Fire | 38.578°N | 120.007°W | 152 | N/A | N/A | N/A | +68 |
| Chimney Fire | 35.670°N | 121.004°W | 41,675 | +41 | +51 | +100 | +0 |
| Cedar Fire | 35.745°N | 118.584°W | 23,239 | +20 | +20 | +200 | +0 |

USDA, 2016; http://www.predictiveservices.nifc.gov/intelligence/intelligence.htm
Numbers after the '+' indicate an increase in acreage burned from the previous day.
N/A: Information not available.

Air quality in northern Nevada was moderate to poor from August 26 through 31, 2016 due to smoke from California wildfires. AirNow Air Quality Index (AQI) maps showing air quality from August 25 through September 1, 2016 are included in Appendix C. Many air quality monitors in northern Nevada recorded elevated ozone concentrations during this time, along with increased concentrations of particulate matter. Figures 7 and 8 provide satellite images illustrating the extent of the smoke impacts on August 27 and 28, 2016.



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**Figure 7. Satellite Imagery of Smoke Plumes – August 27, 2016.**

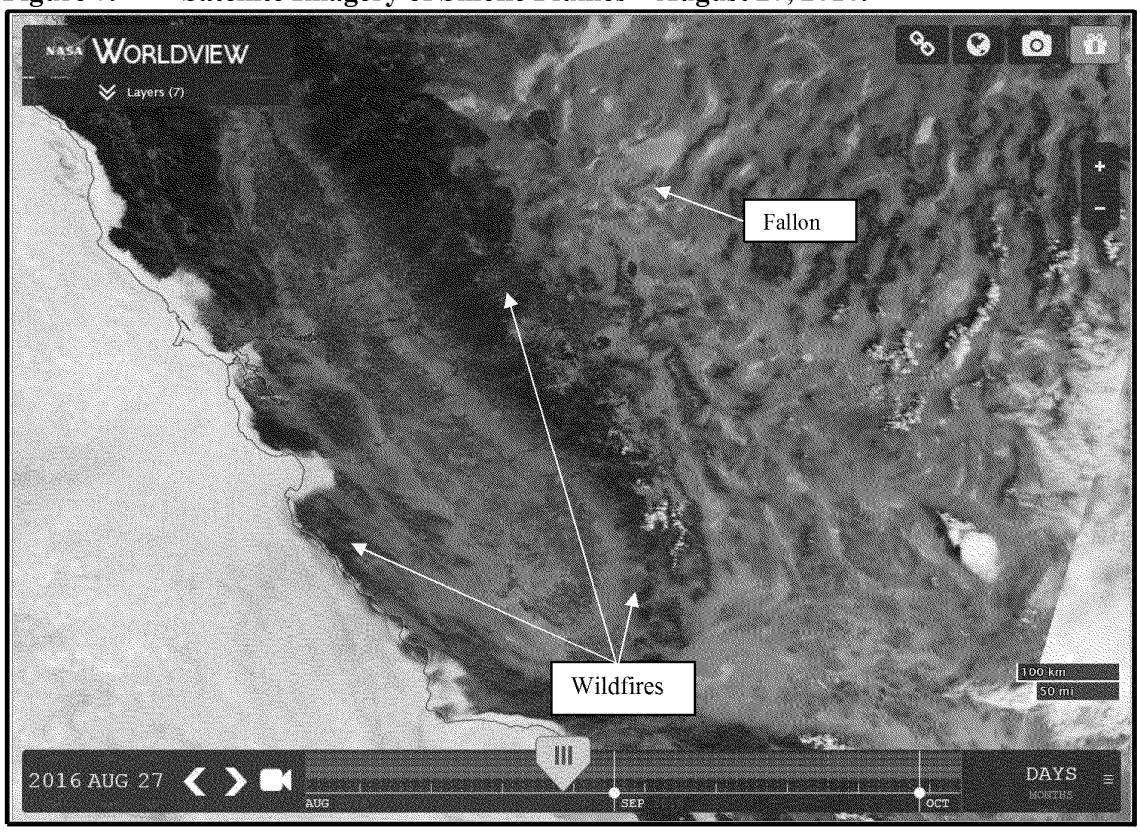




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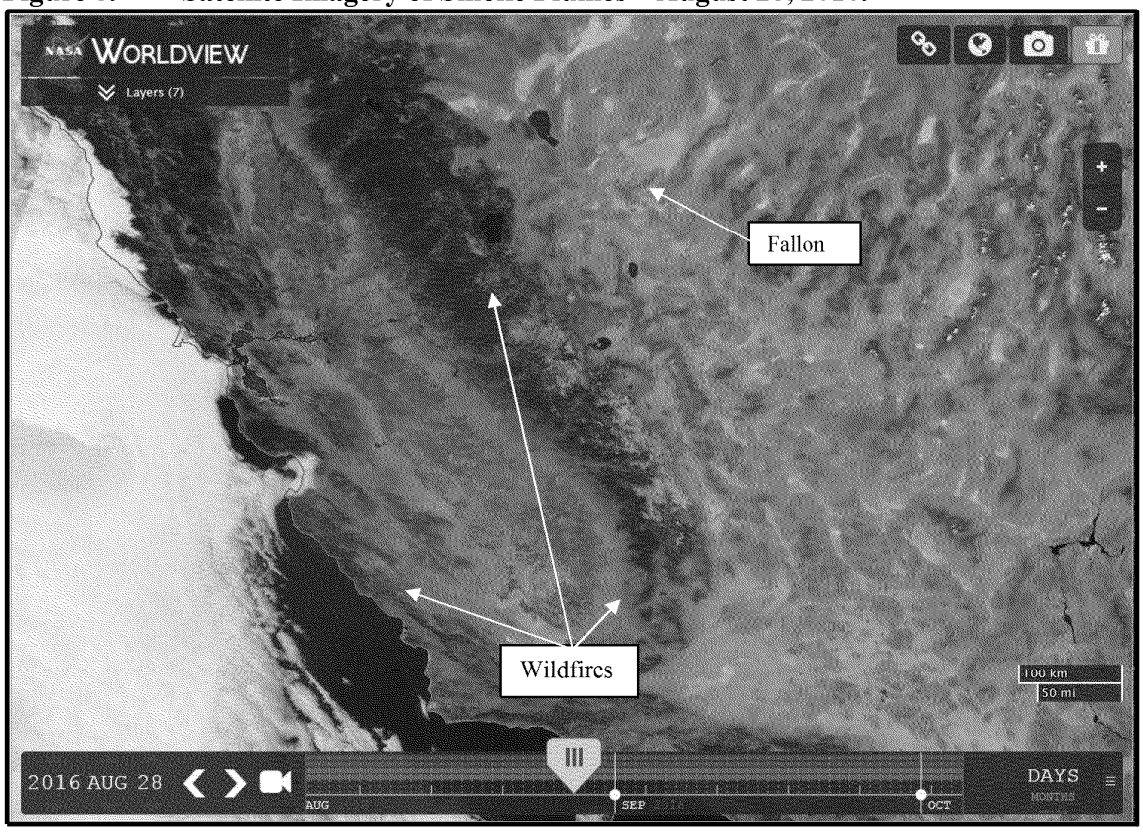
**Figure 8. Satellite Imagery of Smoke Plumes – August 28, 2016.**




### 3.2 METEOROLOGICAL CONDITIONS AND TRANSPORT PATTERNS

Substantial amounts of NOx and VOCs were generated from the wildfires in California, causing the 8-hour ozone exceedance at Fallon on August 28, 2016. Due to the buoyancy of fire plumes, these precursors mixed throughout the boundary layer, making them available for long-range transport.

Upper level and surface weather maps for August 23 through 31, 2016 are included in Appendix D. According to the National Weather Service (NWS) in Reno, Nevada, transport winds were out of the west and ranged from 10 to 20 mph on August 27 and 28, 2016 for the West Central Nevada Basin and Range forecast area, which includes Fallon. Mixing heights for the area were 17,000-18,000 feet amsl on August 27, and increased to 18,000 to 19,000 feet amsl on August 28, before dropping to 15,000 to 16,000 feet amsl on August 29. The west transport winds coupled with the increase in mixing height on August 28 allowed smoke and ozone precursors emitted by the California wildfires to be transported to the Fallon area and mixed down to the surface on August 28, 2016. In addition, the Area Forecast Discussion for August 27 and 28, 2016 provided by the NWS Reno office include the mention of smoke and haze from California wildfires in the forecast for late August 27 and early August 28, 2016. This provides additional evidence that smoke from



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the fires impacted northern and western Nevada on those days. The NWS text products are included in Appendix C.

Temperature and surface wind data was analyzed from August 21 through September 4, 2016. Summer surface winds at the Fallon Naval Air Station are most commonly from the northwest or the south; Figure 9 shows wind speeds and directions for June 1 through August 31, 2016. For the two-week period before and after the event day, as well as on the event day itself, surface winds were typical of summer winds in the area (Figures 10 and 11).

Table 3 shows the temperatures and wind speeds for the Fallon Naval Air Station for the seven days before and after the exceedance. Wind speeds in northern Nevada for late August and early September average between five and seven miles per hour (mph). Surface winds throughout the two-week period before and after the event day were generally light. Overall, the weather conditions on the event day were very similar to those for the week prior to and after the exceedance; no unusual weather conditions occurred on August 28, 2016, although the ozone concentration was considerably higher than on any days preceding or following the event. This suggests that the elevated ozone values were due to smoke transported to the site from California wildfires rather than any local or regional weather phenomenon.

**Figure 9. Wind Rose for Fallon Naval Air Station, June 1 through August 31, 2016**

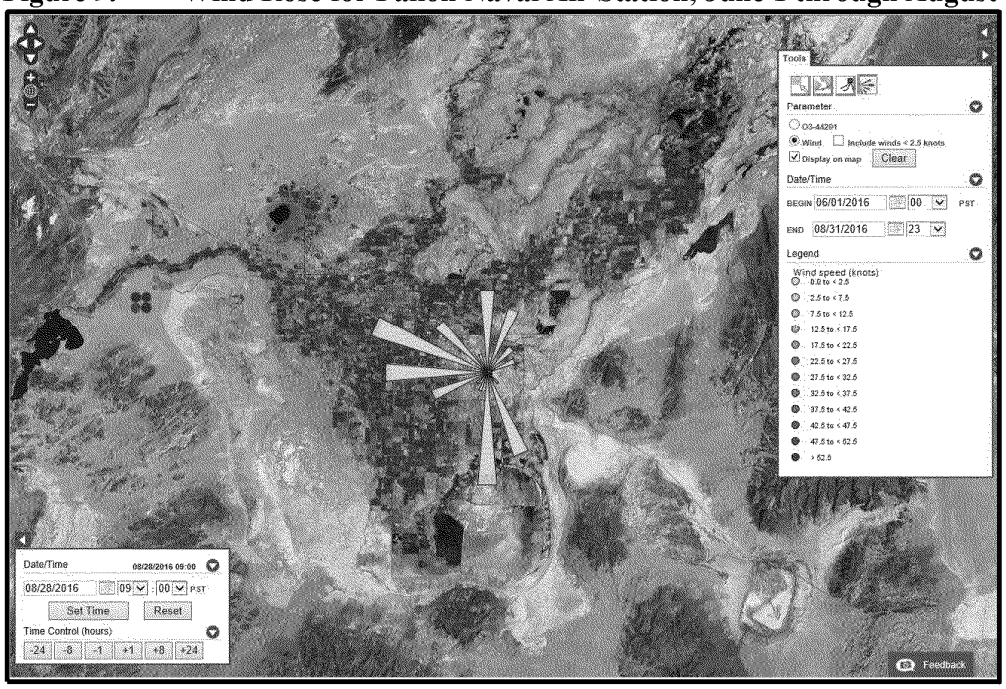




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**Figure 10. Wind Rose for Fallon Naval Air Station , August 14 through September 11, 2016**

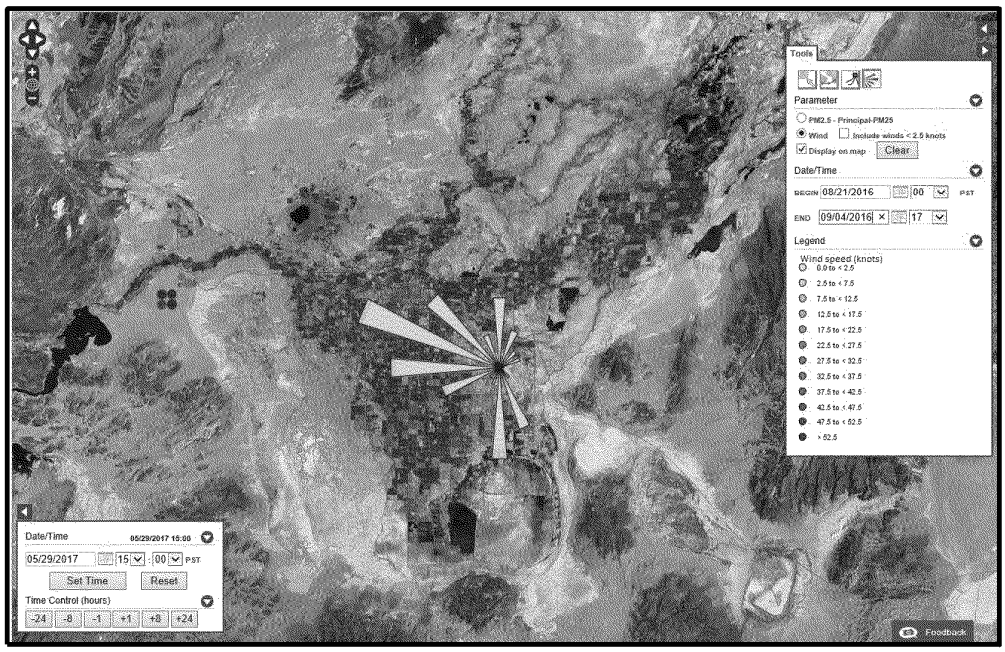


**Figure 11. Wind Rose for Fallon Naval Air Station, August 27-28, 2016**

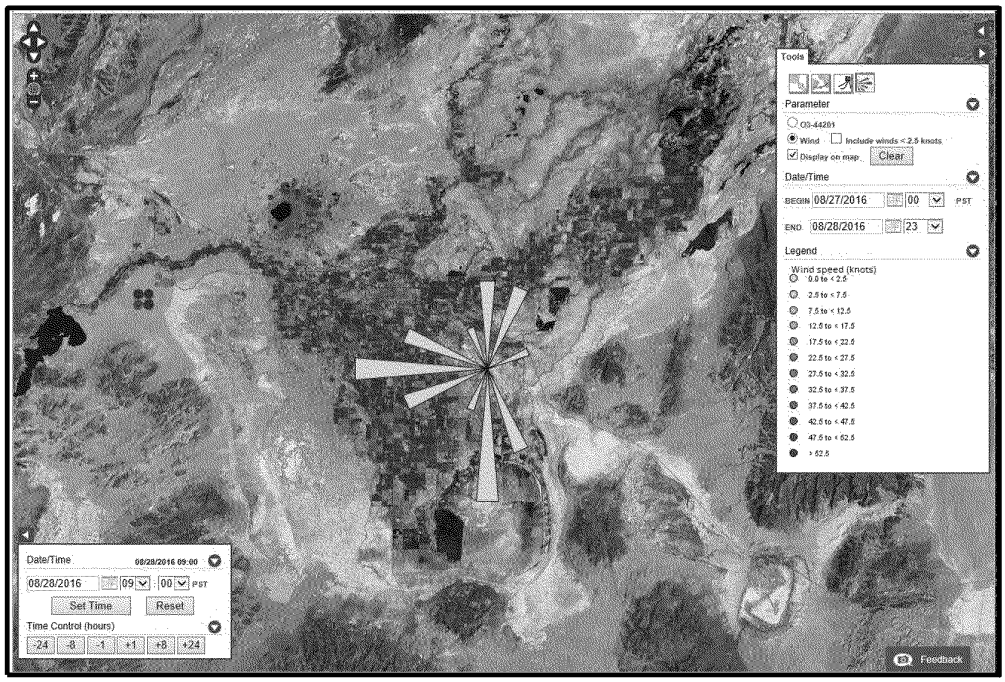




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**Table 3. Historical and Event-Related Temperature Data for Fallon Naval Air Station**

| | Non-event | | | | | | | Event Day | Non-event | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 08/21 | 08/22 | 08/23 | 08/24 | 08/25 | 08/26 | 08/27 | 08/28 | 08/29 | 08/30 | 08/31 | 09/01 | 09/02 | 09/03 | 09/04 |
| Ozone | | | | | | | | | | | | | | | |
| 8-hour Maximum Concentration (ppb) | 51 | 53 | 54 | 56 | 43 | 51 | 57 | 73 | 59 | 52 | 53 | 50 | 49 | 42 | 46 |
| Temperature | | | | | | | | | | | | | | | |
| Max Observed (°F) | 100 | 93 | 93 | 93 | 89 | 91 | 93 | 93 | 97 | 99 | 95 | 91 | 88 | 82 | 77 |
| Historical Average (°F) | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 86 | 85 | 86 | 86 | 86 | 85 |
| Wind | | | | | | | | | | | | | | | |
| Max Observed (mph) | 7 | 8 | 8 | 5 | 5 | 4 | 7 | 5 | 4 | 6 | 5 | 4 | 5 | 5 | 8 |

In general, higher temperatures are associated with higher surface ozone concentrations (Jacob and Winner, 2009). Temperatures in Fallon, Nevada were generally higher than historical averages for the approximate two-week period surrounding the event day. However, ozone concentrations at the Fallon site were within the range of historical concentrations except on the event day, when they were significantly higher. This suggests that the elevated ozone concentrations were caused by smoke from the Soberanes and Mokulmne fires as opposed to high temperatures. Surface winds also increased slightly on the event day, supporting the interpretation that smoke from the fire was transported to the Fallon site and caused the elevated ozone concentrations.

To further demonstrate that smoke from the California wildfires impacted the Fallon ozone monitoring site, trajectory analyses were created using the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT ; Stein, 2015; Rolph, 2016 ) tool in the A irNow Tech online platform. HYSPLIT trajectories were generated for August 27 and 28, 2016; both forward (from the fire forward 24 hours) and backward (from the site back 24 hours) trajectories were analyzed. The Soberanes and Mokelumne Fires were approximately 250 and 75 km away from the Fallon ozone monito r, respectively . The emissions from the fire s therefore traveled a considerable distance, including passing over significant topographic features. Because of this distance, as well as the heat of the plume, the smoke plume dispersed upward into the atmosphere. To account for this vertical motion, and the fact that the HYSPLIT models do not account for turbulence or vertical mixing within the troposphere, trajectories were generated at 100 m, 700 m, a nd 1,500 m above ground level ( agl). These heights are representative of the base, middle, and top of the typical daytime planetary boundary layer, and are consistent with the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire E vents that May Influence Ozone Concentrations* (USEPA, 2015). HYSPLIT trajectories are shown in Figures 12a through 13b, for August 27 and 28, 2016. According to the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations,* the starting heights of trajectories should be between 100 and 1,500 m agl to avoid terrain interference and to stay within the mixed layer of the atmosphere (USEPA, 2015). Forward trajectories were initiated from the start locations of both the Soberanes and Mokulmne Fires at 1700 Coordinated Universal Time (UTC; 0900 Pacific Standard Time (PST)) on August 27, 2016, and were run forward for 24 hours. Backward trajectories were initiated from the Fallon ozone monitoring site beginning at 1700 UTC (0900 PST) August 28, 2016, and were run for 24 and 48 hours. These times correspond to the hour of the maximum daily 8-hour average at the Fallon site on the event day. Forward trajectories from the fire origins show that the air masses above each fire traveled northeast toward the Fallon monitoring site. Backward trajectories from the Fallon monitoring site show that the air mass above the Fallon site during the exceedance traveled to Fallon from the area of both the Mokulmne and Soberanes smoke plumes.



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Figures 12a through 13b also show Hazard Mapping System (HMS) smoke plumes for August 27 and 28, 2016. The smoke plumes from the California wildfires were clearly transported to and impacted the Fallon monitoring site. The HYSPLIT trajectories also intersect with the smoke plumes from the wildfires, providing more evidence that the plumes impacted the site.



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**Figure 12a. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8 -Hour Ozone Concentrations, and HYSPLIT Trajectories Forward from the Mokelumne Fire – August 27, 2016 (24 hours)**

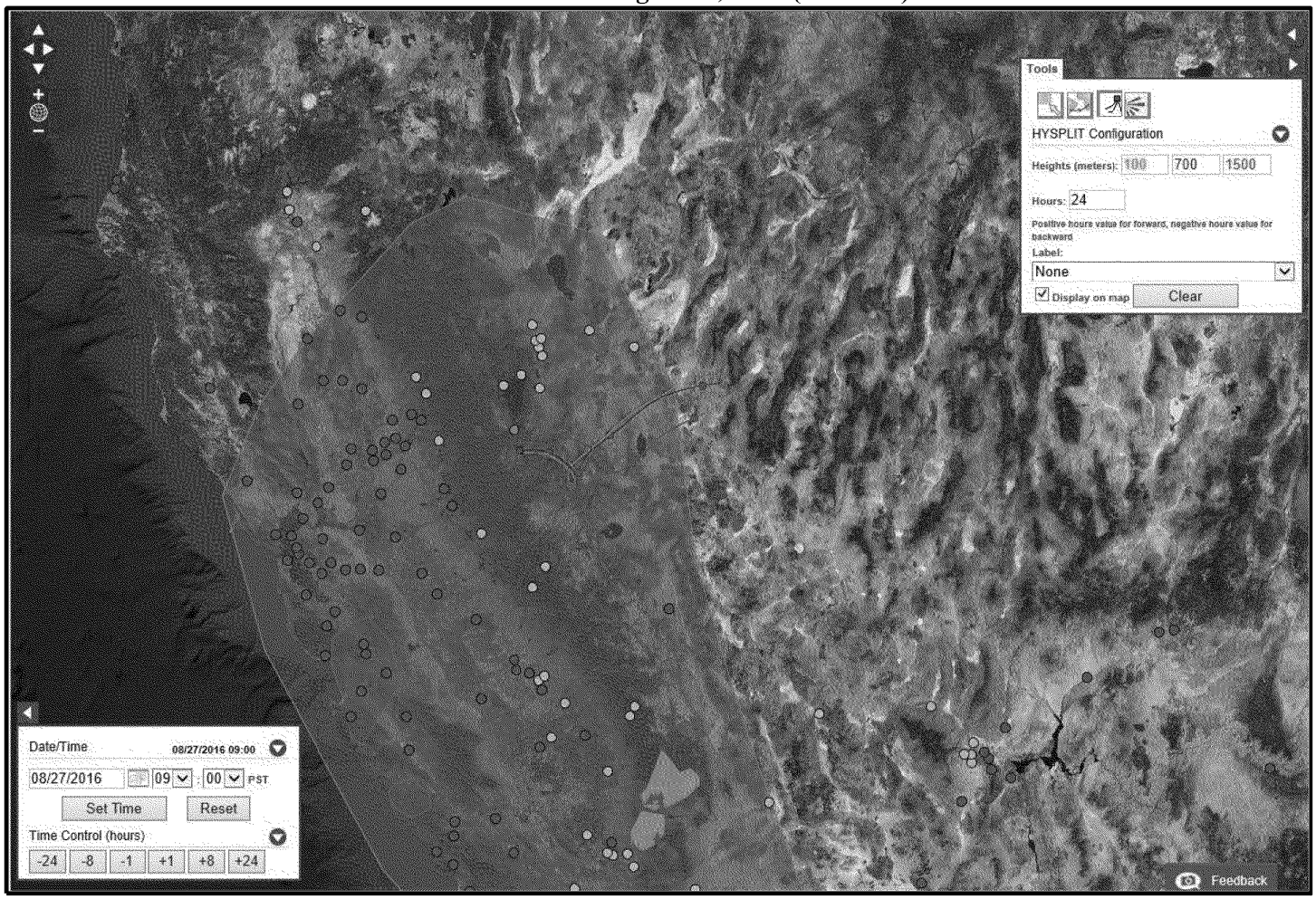

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**Figure 12b. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8 -Hour Ozone Concentrations, and HYSPLIT Trajectories Forward from the Soberanes Fire – August 27, 2016 (24 Hours)**

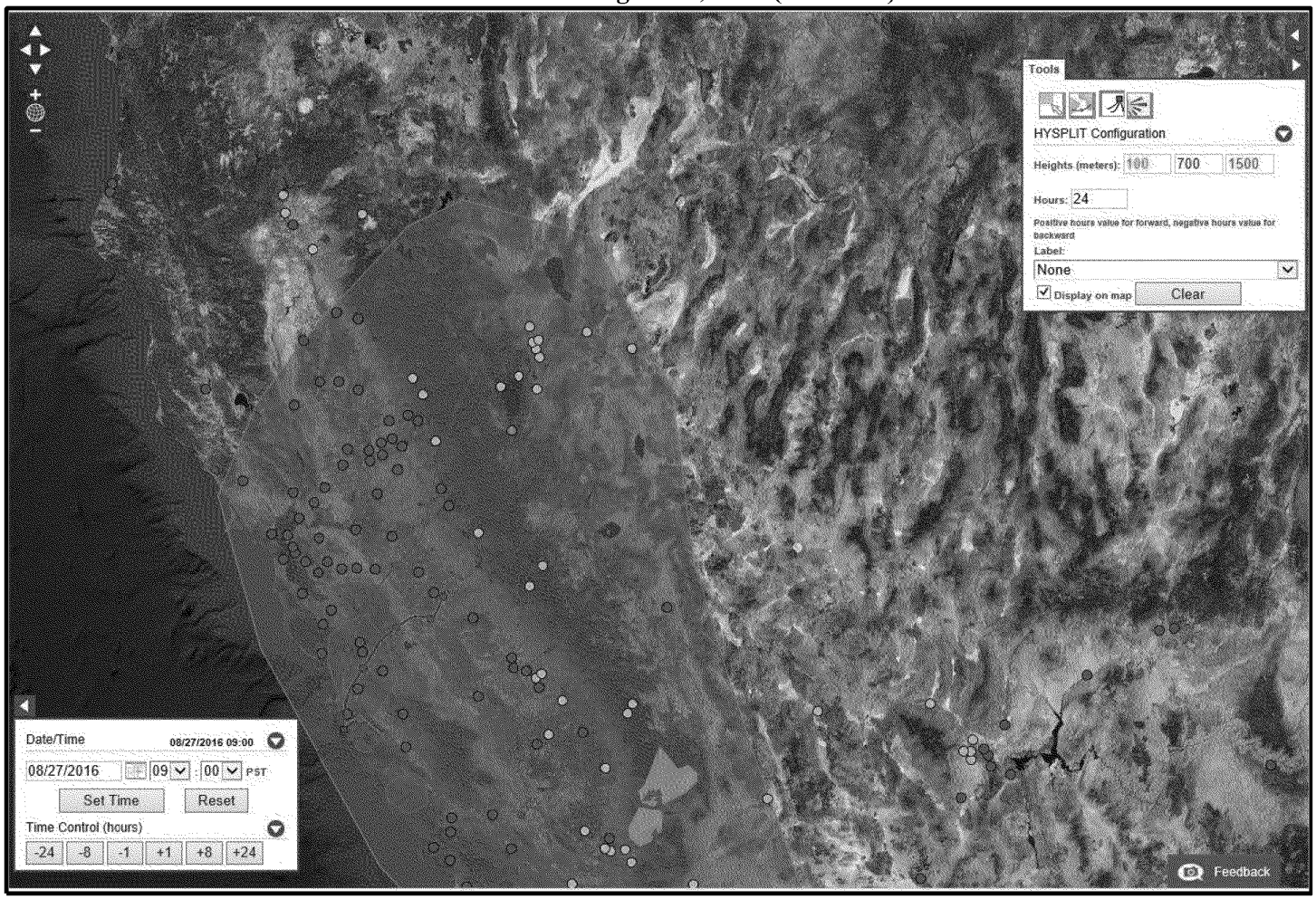

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**Figure 13a. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8-Hour Ozone Concentrations, and HYSPLIT Trajectories Backward from Fallon – August 28, 2016 (24 hours)**

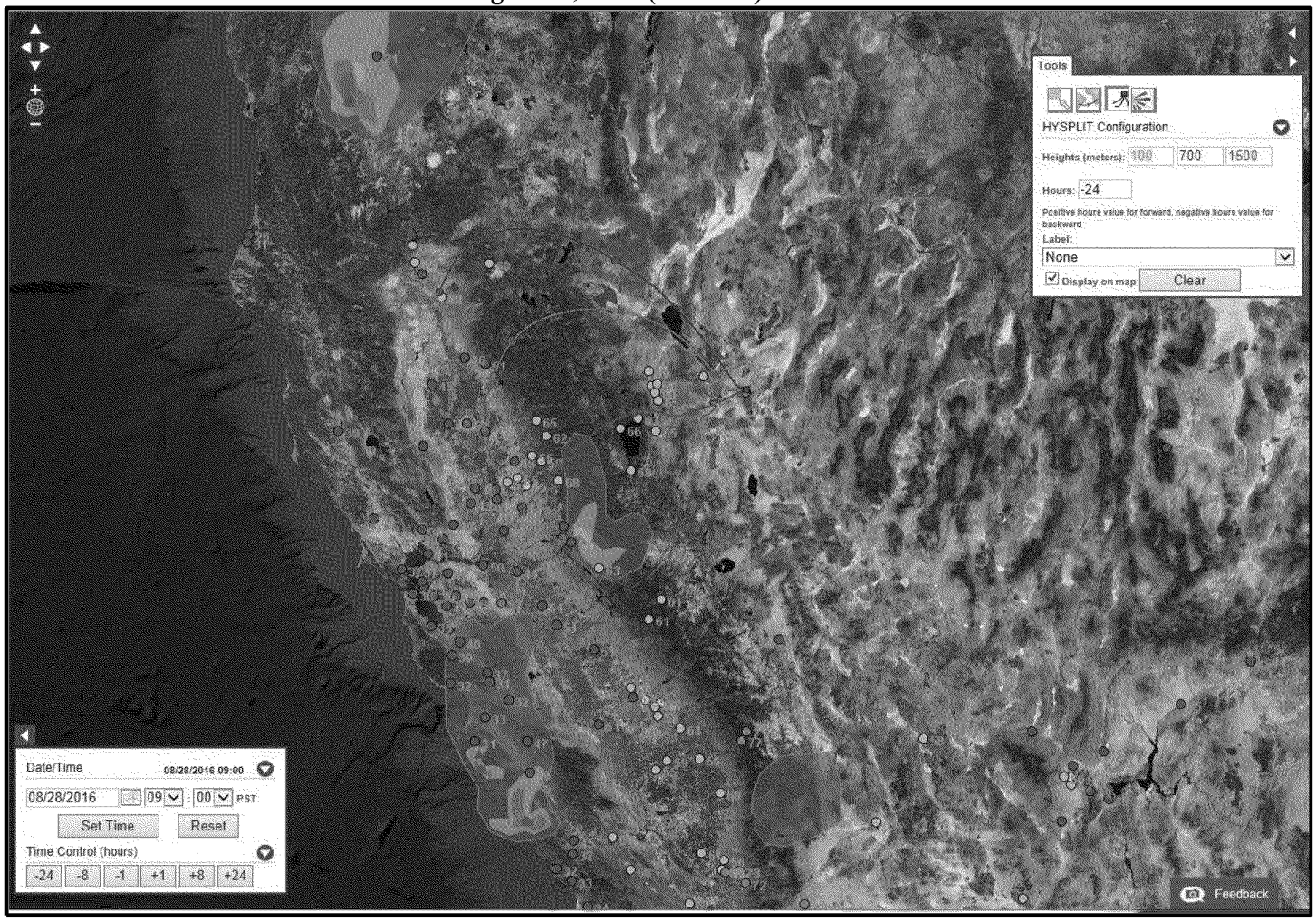


**Figure 13b. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8-Hour Ozone Concentrations, and HYSPLIT Trajectories Backward from Fallon – August 28, 2016 (48 Hours)**

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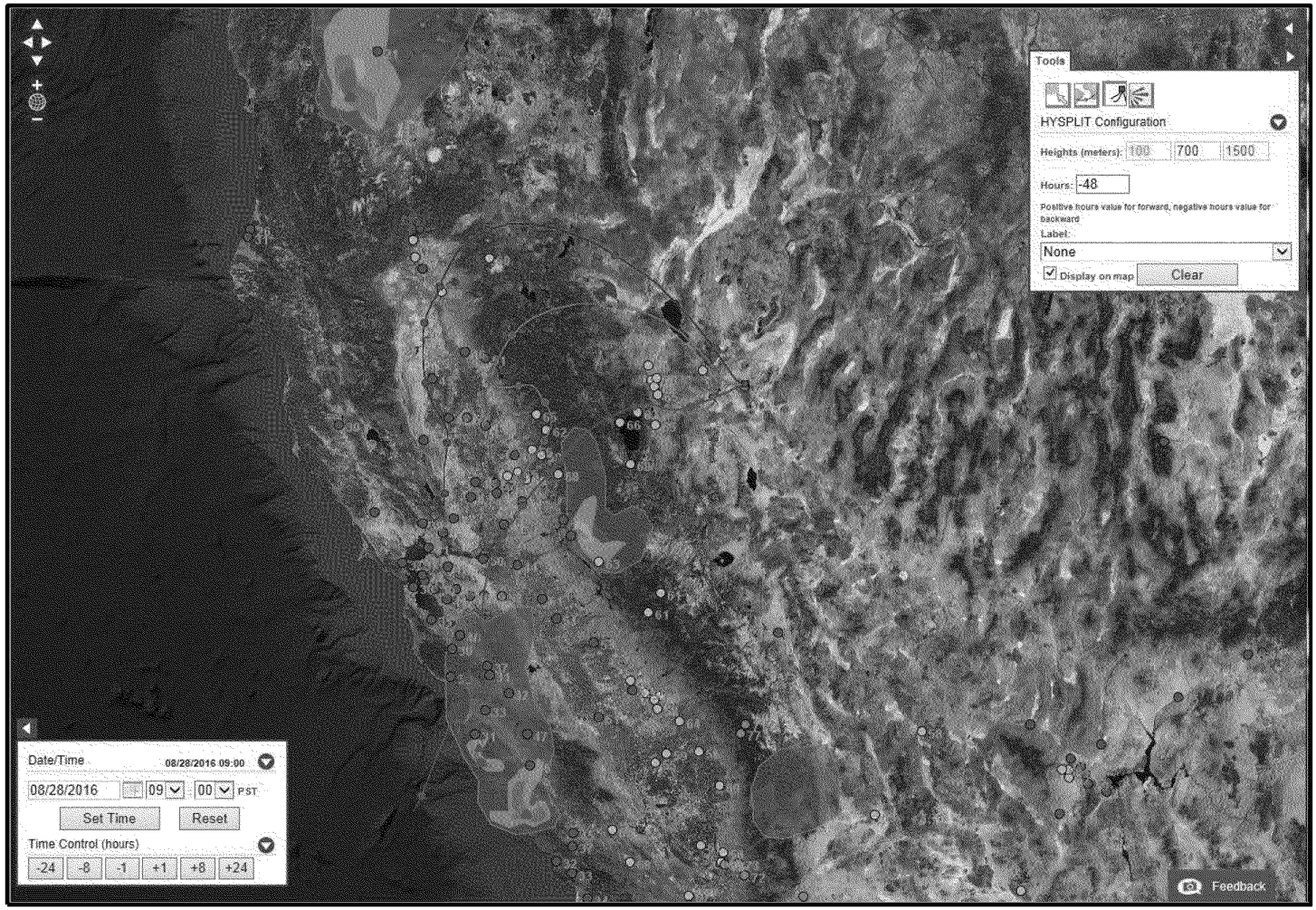

### 3.3 $PM_{2.5}$ CONCENTRATIONS

$PM_{2.5}$ is directly emitted during combustion. Elevated concentrations of $PM_{2.5}$ were measured at air monitors in Washoe County on August 27 and 28, 2016, providing additional evidence that emissions from the California wildfires reached ground level monitors in northern Nevada. (Appendix C).

### 3.4 OZONE CHEMISTRY AND CONCENTRATIONS

On August 28, 2016, the NDEP monitored an exceedance of the 2015 8-hour $O_3$ NAAQS, with the ozone concentration reaching 73 ppb at the Fallon monitoring site. Wildfire smoke and $O_3$ precursors from wildfires in California were transported east into Nevada on upper level winds. Ozone concentrations were elevated across Nevada, including the $O_3$ exceedance at the Fallon monitoring site. Ozone exceedances were also recorded at air monitoring sites in Reno, Nevada, within the Washoe County Air Quality Monitoring District. Table 4 lists $O_3$ concentrations across the NDEP-BAQP ambient air monitoring network for the seven days before and after the event, highlighting the exceedance at the Fallon site. Figure 14 shows the hourly ozone concentrations measured by ozone monitors within the NDEP-BAQP monitoring network for the same time period.

Although, as discussed earlier, NO from fires can result in ozone titration very close to the source of a fire, Fallon is sufficiently far enough downwind (150 km) that a reduction in ozone concentrations due to this phenomena was unlikely. In addition, while the increased smoke from the fire may have reduced the amount of solar insolation, thereby potentially reducing photochemical activity, this was offset by the substantially increased levels of ozone precursors generated by the fire, resulting in a net ozone enhancement.



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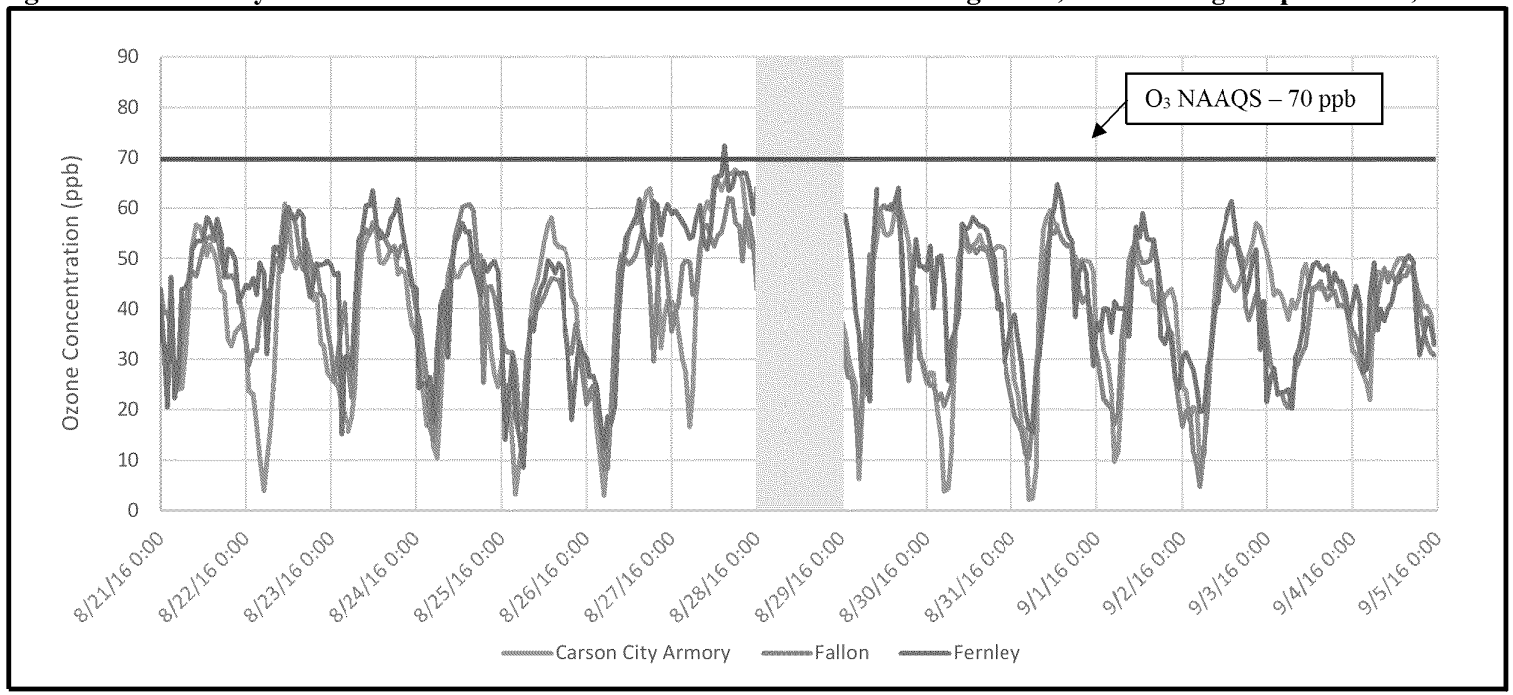
**Table 4. Maximum Daily 8-hour Ozone Concentrations (in ppb) Across the Monitoring Network for August 21, 2016 through September 4, 2016.**

| | Non-event | | | | | | | California Wildfire Impacts | Non-event | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | 08/21 | 08/22 | 08/23 | 08/24 | 08/25 | 08/26 | 08/27 | 08/28 | 08/29 | 08/30 | 08/31 | 09/01 | 09/02 | 09/03 | 09/04 |
| Carson City | 52 | 52 | 52 | 48 | 53 | 59 | 52 | 66 | 57 | 52 | 55 | 47 | 52 | 44 | 48 |
| Fallon | 52 | 53 | 55 | 56 | 43 | 51 | 52 | 73 | 60 | 52 | 53 | 50 | 50 | 43 | 46 |
| Fernley | 55 | 56 | 57 | 52 | 46 | 59 | 61 | 70 | 60 | 56 | 56 | 53 | 53 | 47 | 46 |

**Figure 14. Hourly Ozone Concentrations for Network Monitors from August 21, 2016 through September 4, 2016.**



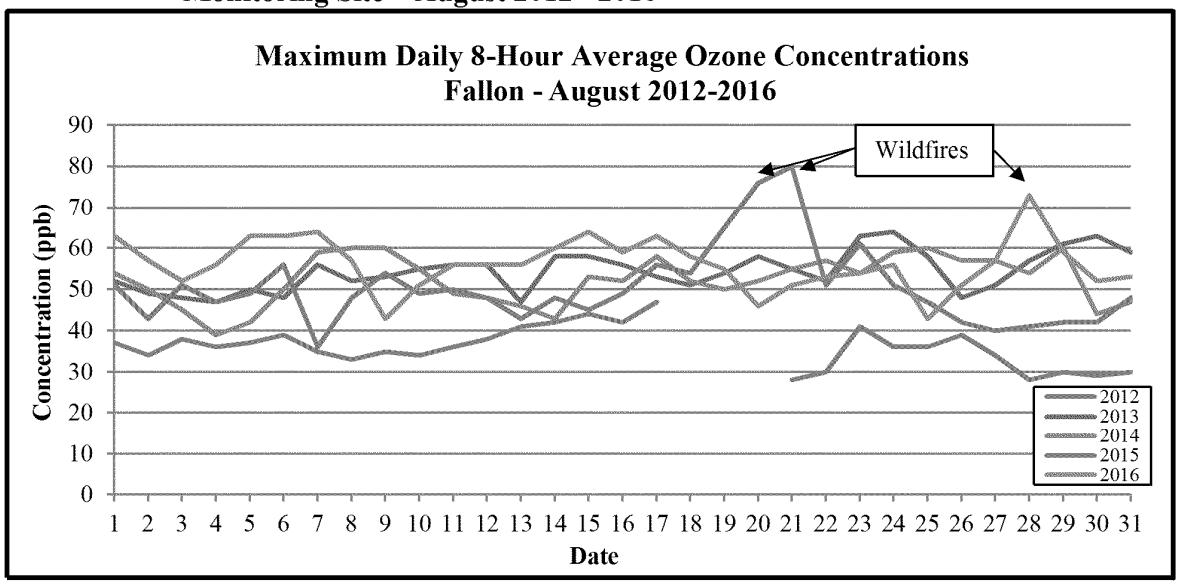
The increased precursor emissions from the fires throughout California resulted in substantial ozone formation, leading to the 8-hour ozone exceedance at Fallon on August 28, 2016. Section 2.6 summarizes the key mechanisms by which emissions from wildfires can increase ozone, as well as past research that documents increases in ozone formation downwind of wildfires.

The daily maximum 8-hour ozone concentration at the Fallon site on August 28, 2016, were more than 15 ppb higher than the average and median maximum daily 8-hour ozone concentrations historically measured during the month of August at the Fallon site (2012 through 2016). The measured concentration was approximately two standard deviations higher than the mean ozone concentrations at the site for the month of August (Table 5). In addition to the exceedance at Fallon, ozone was elevated throughout much of northern Nevada; air quality monitors in Washoe County also recorded exceedances of the 8-hour ozone standard.

### 3.5 BEYOND HISTORICAL AND BACKGROUND CONCENTRATIONS

Ozone concentrations in western Nevada are historically at their highest in the afternoon during the summer months. The measured 8-hour ozone concentration at the Fallon monitoring site on August 28, 2016 was significantly higher than the average and median concentrations for the month of August, as well as for similar non-event day concentrations. Figure 15 shows a time-series plot of 8-hour ozone concentrations at the Fallon site for all August days from 2012 through 2016.

**Figure 15. Maximum Daily 8-Hour Average Ozone Concentrations at the Fallon Ozone Monitoring Site – August 2012 - 2016**




The one-hour ozone concentrations on the event day were well above the 95$^{th}$ percentile for summer ozone concentrations at the Fallon monitoring site (June through August, 2012 through



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2016, excluding wildfire data [August 20 -21, 2015 and August 28, 2016] ) for sev eral hours on both days (Figure 16).



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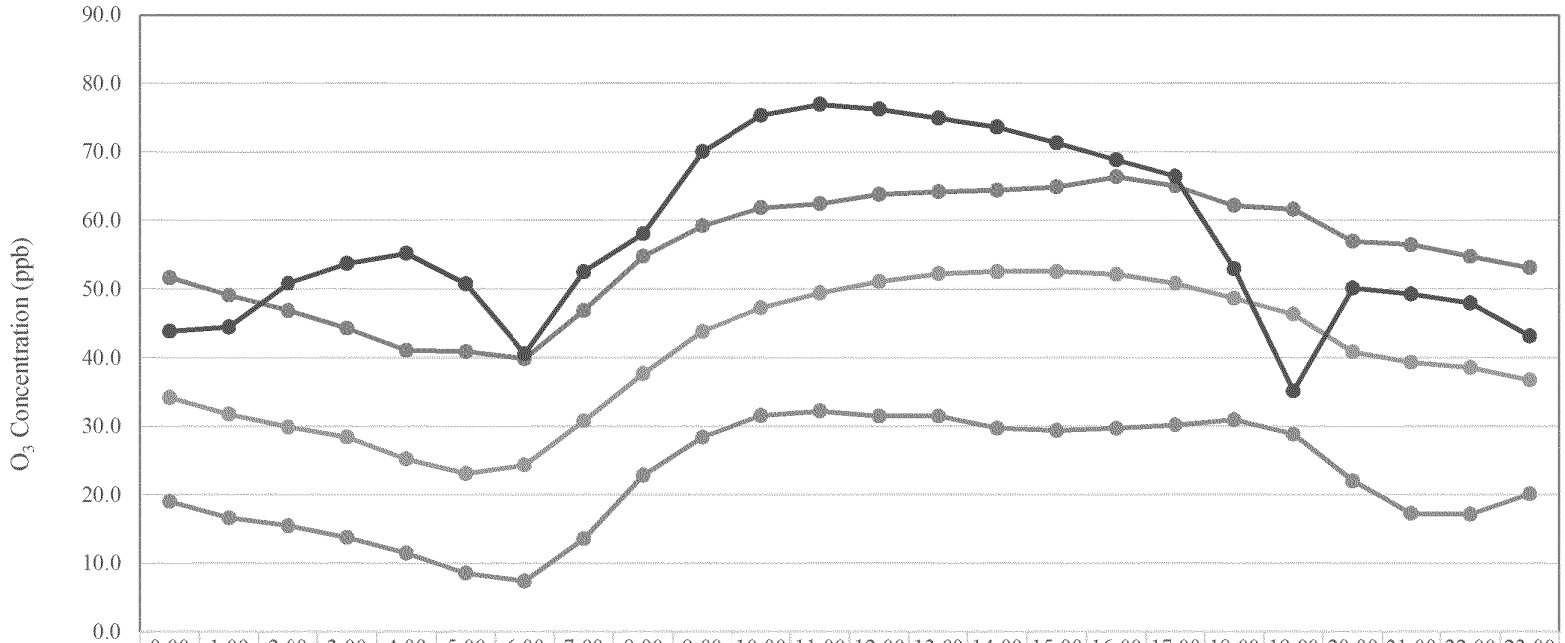
**Figure 16. Fallon Hourly Ozone Concentrations for June-August, 2012 through 2016, with August 28, 2016.**




| | 0:00 | 1:00 | 2:00 | 3:00 | 4:00 | 5:00 | 6:00 | 7:00 | 8:00 | 9:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 17:00 | 18:00 | 19:00 | 20:00 | 21:00 | 22:00 | 23:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.95 | 51.7 | 49.1 | 46.9 | 44.4 | 41.1 | 40.9 | 39.9 | 46.9 | 54.9 | 59.3 | 61.9 | 62.5 | 63.9 | 64.3 | 64.5 | 65.0 | 66.4 | 65.1 | 62.3 | 61.7 | 57.0 | 56.5 | 54.8 | 53.2 |
| 0.50 | 34.2 | 31.8 | 29.9 | 28.5 | 25.3 | 23.2 | 24.4 | 30.8 | 37.7 | 43.9 | 47.3 | 49.5 | 51.2 | 52.3 | 52.6 | 52.6 | 52.2 | 50.9 | 48.7 | 46.4 | 40.9 | 39.4 | 38.6 | 36.8 |
| 0.05 | 19.1 | 16.6 | 15.5 | 13.8 | 11.5 | 8.6 | 7.4 | 13.6 | 22.9 | 28.4 | 31.6 | 32.3 | 31.5 | 31.5 | 29.7 | 29.4 | 29.7 | 30.2 | 31.0 | 28.8 | 22.1 | 17.3 | 17.2 | 20.2 |
| 28-Aug-16 | 43.9 | 44.5 | 50.9 | 53.8 | 55.3 | 50.8 | 40.6 | 52.6 | 58.1 | 70.1 | 75.4 | 77 | 76.3 | 75 | 73.7 | 71.4 | 68.9 | 66.5 | 53 | 35.2 | 50.2 | 49.3 | 48 | 43.2 |

Historical data from the Fallon site show that the average ozone concentration for August from 2012 through 2016, (excluding August 20 and 21, 2015 and August 28, 2016) is 49.6 ppb. This data is summarized in Table 5 and shown graphically in Figure 17.

**Table 5. August Maximum Daily 8-Hour Average Ozone Statistics for Fallon**

| | 2012-2016 | | 2012 | 2013 | 2014 | 2015* | 2016 | |
|---|---|---|---|---|---|---|---|---|
| | All Data | No Fire | | | | | All Data | No Fire |
| **Mean** | 50.2 | 49.6 | 36.0 | 54.5 | 52.3 | 48.5 | 56.3 | 56.0 |
| **Median** | 51 | 51 | 36 | 55 | 53 | 48 | 56 | 56 |
| **Std. Dev.** | 9.6 | 8.9 | 4.9 | 4.8 | 5.9 | 6.2 | 6.4 | 5.7 |
| **Max.** | 80 | 65 | 47 | 64 | 60 | 65 | 73 | 64 |

* Exceptional Events excluded
Concentrations are in ppb.

**Figure 17. Historical Data – August Ozone FEM Mean and Maximum Daily 8-Hour Average Concentrations for Fallon**

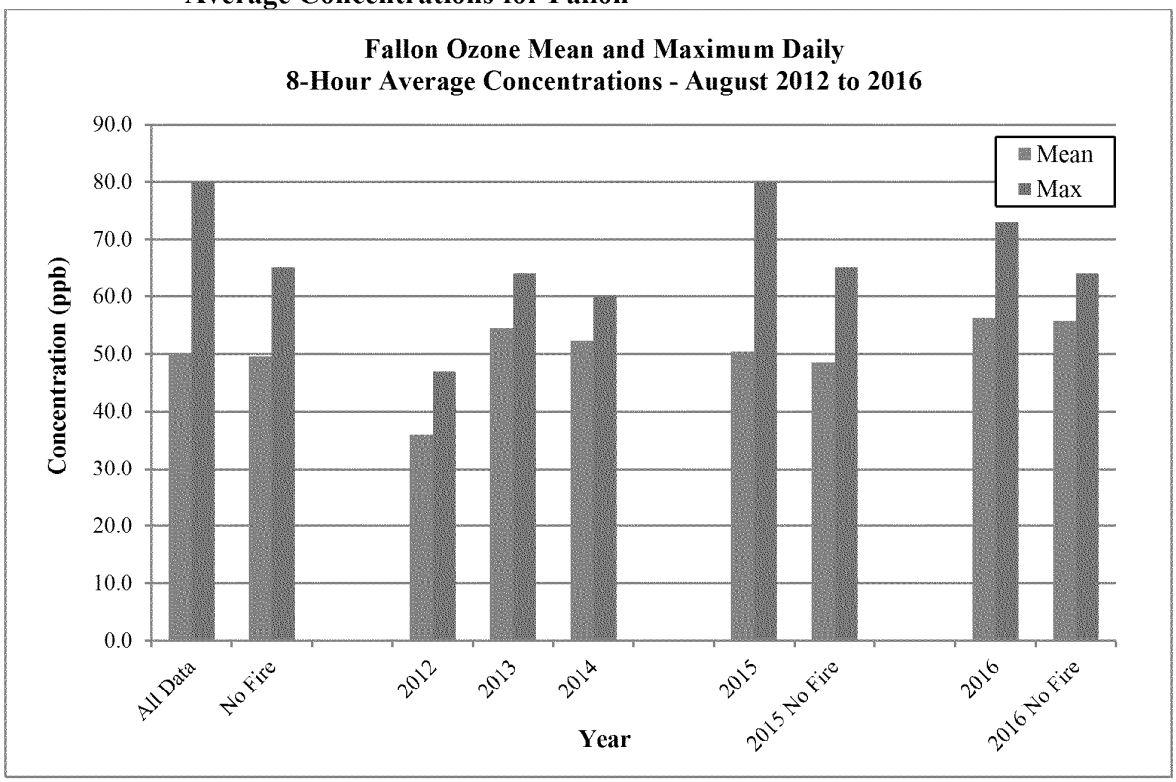



Figure 25 shows the number of August days over the five-year period 2012 through 2016 when the maximum 8-hour ozone concentration fell within established concentration bins of 10 ppb.



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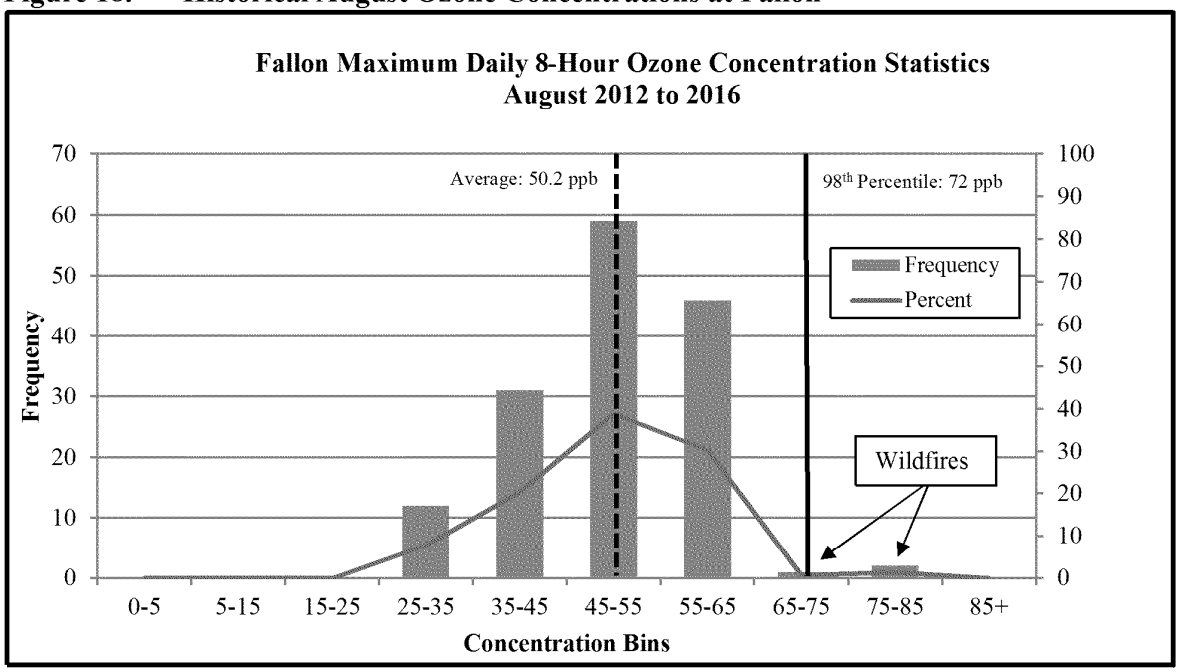
The curve on the graph represents the percentage for days that fall within each concentration bin. The concentration on August 28, 2016 is higher than the 98th percentile (Figure 18).

**Figure 18. Historical August Ozone Concentrations at Fallon**




To NDEP's knowledge, there were no other unusual localozone precursor emissions in or upwind from Fallon before or during the event days.



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## 4.0 SUMMARY

Smoke from the 2016 summer California wild fires began impacting northern Nevada on August 26, and caused an 8-hour exceedance at the Fallon ozone monitoring site on August 28, 2016. This summary documents the transport of emissions from the fires to northern Nevada. Wildfire emissions transported both at the surface and aloft affected northern and western Nevada on August 28, 2016, causing the 8-hour ozone exceedance at Fallon.

This document has demonstrated a clear causal relationship between the emissions from the 2016 California wildfires and the 8-hour exceedance at Fallon on August 28, 2016, based on the following evidence:

- Meteorological and trajectory analyses document the transport of smoke and emissions from the 2016 California wildfires, demonstrating that these emissions reached northern and western Nevada, including Fallon;

- Pollution in the plume increased ozone concentrations consistent with the science of the conceptual model for the event. Ozone levels were anomalously elevated throughout northern Nevada, including the exceedances at Fallon. This regional increase in ozone, consistent with the extent and timing of increase in $PM_{2.5}$, indicates that it is more likely that the fire emissions increased ozone due to increased precursors, rather than decreased ozone due to decreased solar insolation or increased ozone titration; and

- The concentration of 73 ppb at Fallon was well above normal historical levels.



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## 5.0 CRITERIA FOR THE DEFINITION OF AN EXCEPTIONAL EVENT

The criteria in 40 CFR §50.1(j) for an event to meet the definition of an exceptional event need to be met for the measured exceedances to qualify for exclusion. These criteria are:

- The event affects air quality;
- The event is not reasonably controllable or preventable; and
- The event is unlikely to reoccur at a particular location or [is] a natural event.

### 5.1 AFFECTS AIR QUALITY

As stated in the preamble to the EER, the event in question is considered to have affected air quality if it can be shown that there is a clear causal relationship between the monitored exceedances and the event, and that the event is associated with a measured concentration in excess of normal historical concentrations. These criteria are demonstrated in Section 3. The media releases provided in Appendix C also provide evidence that the 2016 California wildfires affected air quality in the vicinity of the Fallon monitor. Given the information presented in this demonstration, the NDEP concludes that the California wildfires in late August 2016 affected air quality at the Fallon ozone monitoring site.

### 5.2 NOT REASONABLY CONTROLLABLE OR PREVENTABLE

The EER defines a wildfire as an unplanned, unwanted wildland fire. The California wildfires were natural events occurring on wildland. NDEP BAQP is not aware of any evidence clearly demonstrating that prevention or control efforts beyond those actually taken would have been reasonable. Therefore, emissions from the California wildfires were not reasonably controllable or preventable.

### 5.3 NATURAL EVENT

Based on the evidence provided in this demonstration, the California wildfires were "Natural Events" as defined in 40 CFR 50.1(k). According to the EER, "…wildfires on wildland initiated by accident or arson are considered natural events, and on a case-by-case basis this treatment for wildfires may bear on the appropriate treatment of accidental and arson-set structural fire," (USEPA, 2016).

The California wildfires meet the definition of "wildfire" predominantly occurring on "wildland" as defined in 40 CFR 50.1(n) and (o). The California wildfires occurred on federal and state-owned lands.



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# 6.0 PROCEDURAL REQUIREMENTS

## 6.1 FLAGGING OF DATA

The NDEP BAQP has submitted the ozone data from the Fallon monitor to the US EPA AQS database and has placed the appropriate flags on the data indicating that the data was affected by an exceptional event due to wildfires (Flag RT, requesting exclusion due to wildland fires). Informational flags (IT) were also included for other NDEP BAQP ozone monitoring sites for the same time period. Such flagging ensures that the air quality data is properly represented in the overall air quality planning process.

## 6.2 PUBLIC OUTREACH DURING EVENT

An air agency requesting exclusion of air quality data affected by an exceptional event must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the agency must:

- Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
- Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
- Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events.

The public was notified of air quality being affected by ozone from the California wildfires via AQI updates, National Weather Service Smoke Text Products, and NDEP's public website. The AQI maps and Smoke Text Products are provided in Appendix C.



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### 6.3 PUBLIC COMMENT PERIOD

The NDEP BAQP has prepared this documentation to demonstrate that these exceedances were due to a wildland fire natural event, in accordance with the US EPA EER. The documentation in support of this demonstration and request for the treatment of the data associated with this exceedance as an exceptional event is posted on the NDEP website at http://ndep.nv.gov/admin/public.htm requesting review and comment by the public for a minimum of 30 days. Direct public comments to:

Sheryl Fontaine, Ambient Air Monitoring Branch
Nevada Division of Environmental Protection
Bureau of Air Quality Planning
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Email: sfontaine@ndep.nv.gov



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# APPENDIX A

# NDEP BAQP Annual Network Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

OCT 2 6 2016

Mr. Danilo Dragoni
Chief, Bureau of Air Quality Planning
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701

Dear Mr. Dragoni:

Thank you for your submission of the 2016 *Ambient Air Monitoring Network* Plan for the State of Nevada in June 2016. We have reviewed the submitted document based on the requirements set forth under 40 CFR 58. Based on the information provided in the plan, the U.S. Environmental Protection Agency (EPA) approves all portions of the network plan except those specifically identified below.

Please note that we cannot approve portions of the annual network plan for which the information in the plan is insufficient to judge whether the requirement has been met, or for which the information, as described, does not meet the requirements as specified in 40 CFR 58.10 and the associated appendices. EPA Region 9 also cannot approve portions of the plan for which the EPA Administrator has not delegated approval authority to the regional offices. Accordingly, the first enclosure (*A. Annual Monitoring Network Plan Items where EPA is Not Taking Action*) provides a listing of specific items of your agency's annual monitoring network plan where EPA is not taking action. The second enclosure (*B. Additional Items Requiring Attention*) is a listing of additional items in the plan that EPA wishes to bring to your agency's attention.

The third enclosure (*C. Annual Monitoring Network Plan Checklist*) is the checklist EPA used to review your plan for overall items that are required to be included in the annual network plan along with our assessment of whether the plan submitted by your agency addresses those requirements.

The first two enclosures highlight a subset of the more extensive list of items reviewed in the third enclosure. All comments conveyed via this letter (and enclosures) should be addressed (through corrections within the plan, additional information being included, or discussion) in next year's annual monitoring network plan.

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If you have any questions regarding this letter or the enclosed comments, please feel free to contact me at (415) 947-4134 or Anna Mebust at (415) 972-3265.

Sincerely,

Gwen Yoshimura, Acting Manager
Air Quality Analysis Office

Enclosures:

A. Annual Monitoring Network Plan Items where EPA is Not Taking Action
B. Additional Items Requiring Attention
C. Annual Monitoring Network Plan Checklist

cc (via email): Daren Winkelman, NDEP

# APPENDIX B
# NDEP BAQP 2016 Data Certification Letter

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

May 1, 2017

Ms. Alexis Strauss
Acting Regional Administrator
U.S. EPA – Region 9
75 Hawthorne Street
San Francisco, CA 94105

**RE: Submittal of the State of Nevada 2016 Data Certification Package**

Dear Ms. Strauss:

Pursuant to 40 CFR Part 58, state and local government monitoring organizations must annually certify their data. Certification for the year 2016 means that (1) the ambient concentration data and the quality assurance data from January 1, 2016 through December 31, 2016 are completely submitted to the Air Quality System (AQS) by the State of Nevada, Primary Quality Assurance Organization (PQAO) 0757, and (2) the ambient data are accurate to the best of my knowledge taking into consideration the quality assurance findings. This process has taken into account the results of periodic verification, precision and accuracy checks, and any other relevant performance assessments.

Therefore, as Chief of the Bureau of Air Quality Planning for the State of Nevada, I certify that all data from the NDEP State and Local Air Monitoring System (SLAMS) and the Special Purpose Monitor (SPM) reported to EPA Region 9, enclosed on the AMP 600 summary report, have met the data certification criteria described in 40 CFR Part 58, for the year 2016.

If you have any questions or comments, please contact Daren Winkelman of my staff, at 775-687-9342, or e: dwinkelman@ndep.nv.gov.

Sincerely,

Danilo Dragoni, Chief
Bureau of Air Quality Planning

DD/dw
Enclosure



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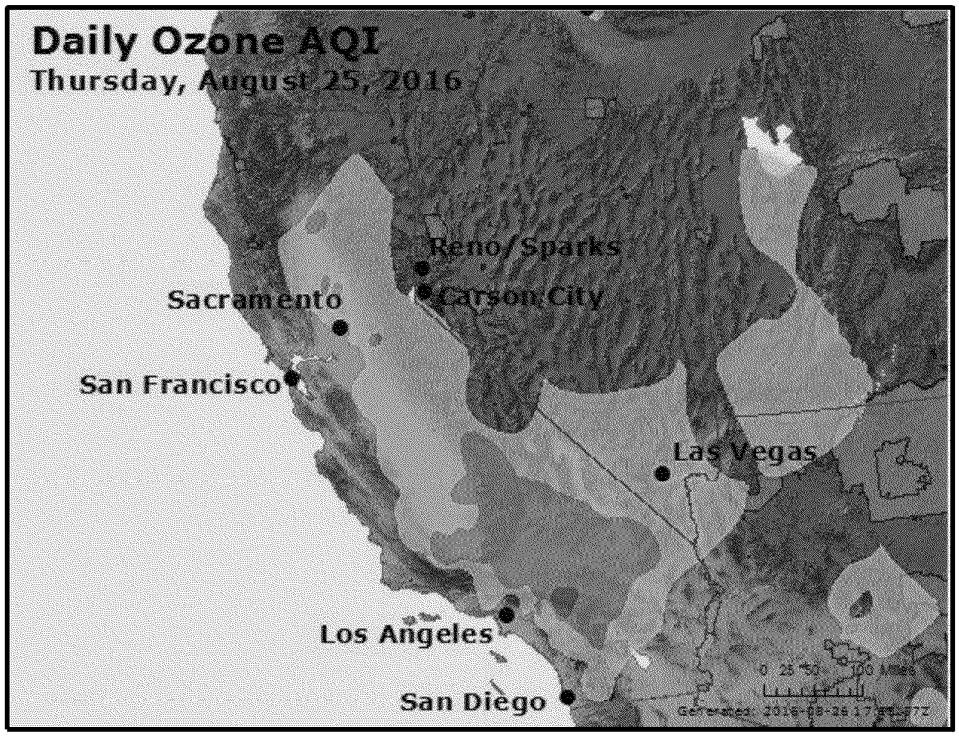
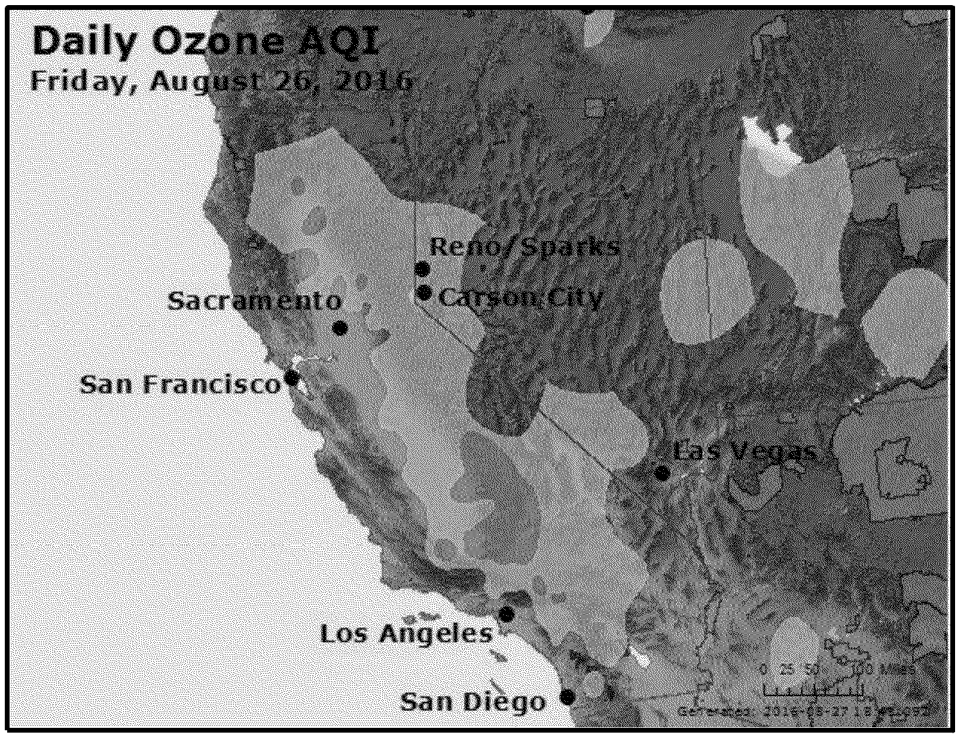
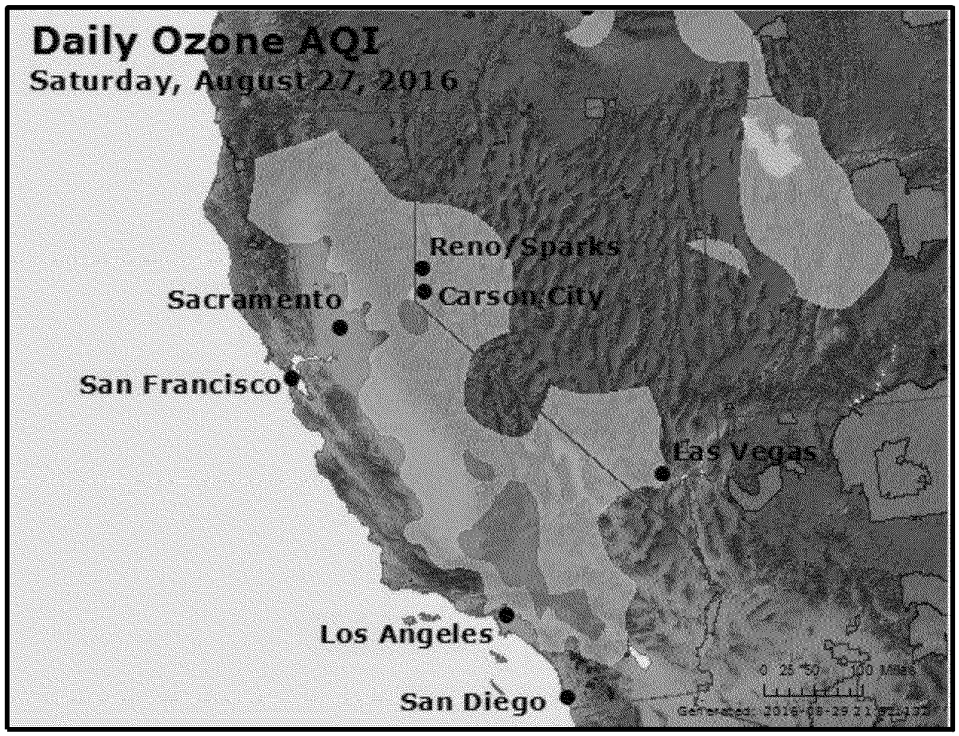
# APPENDIX C
## Sample Public Notifications



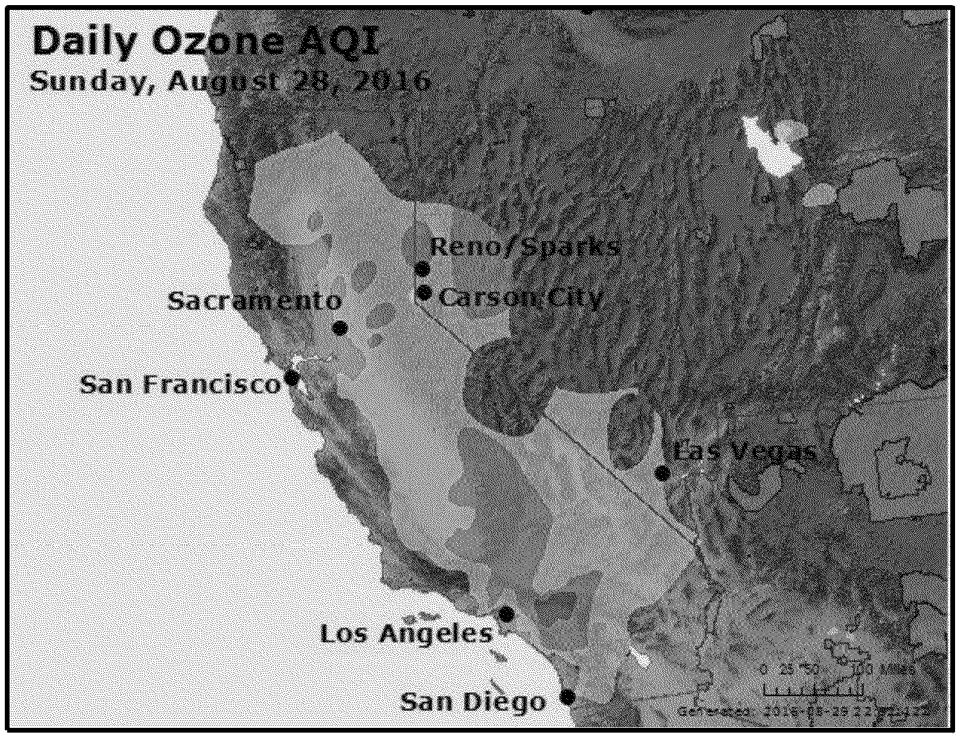
AirNow Ozone AQI Map for August 25, 2016



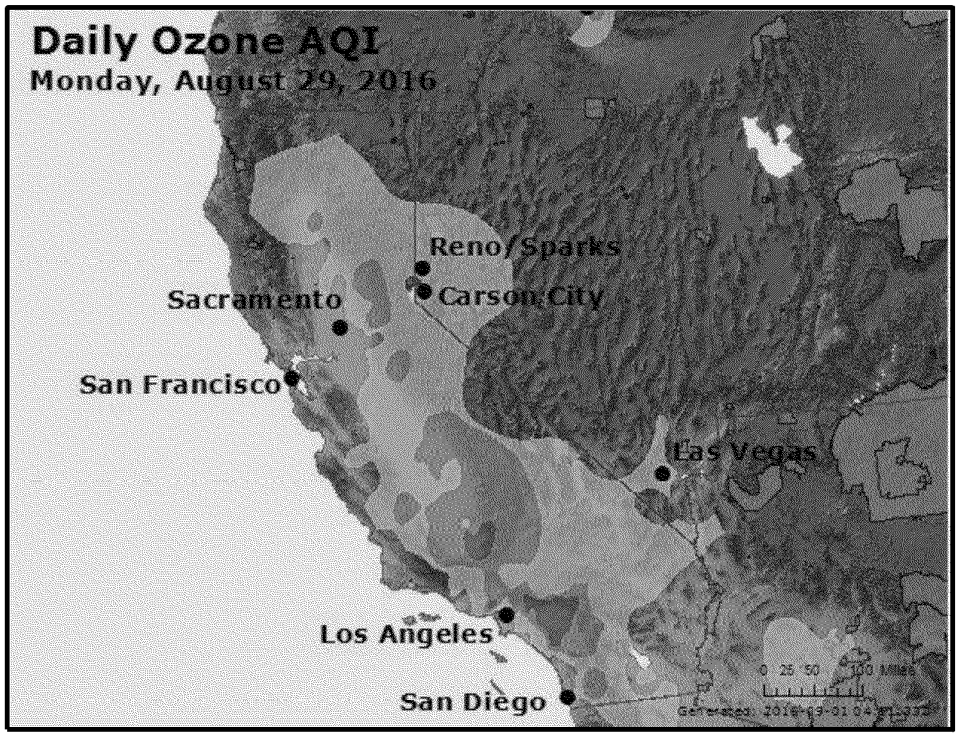
AirNow Ozone AQI Map for August 26, 2016



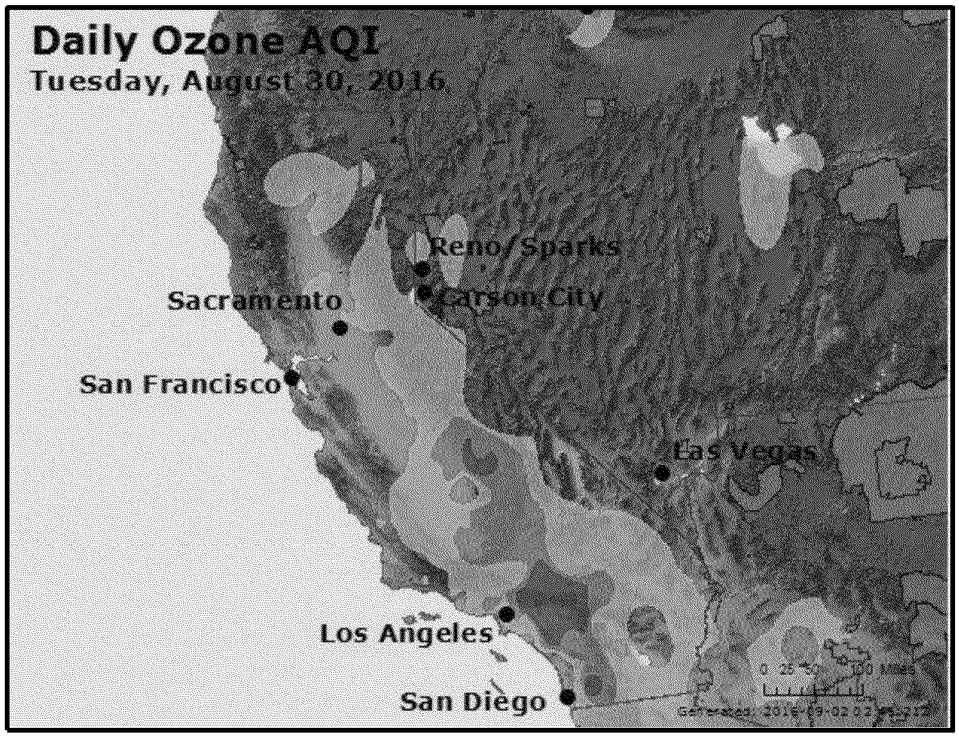
AirNow Ozone AQI Map for August 27, 2016



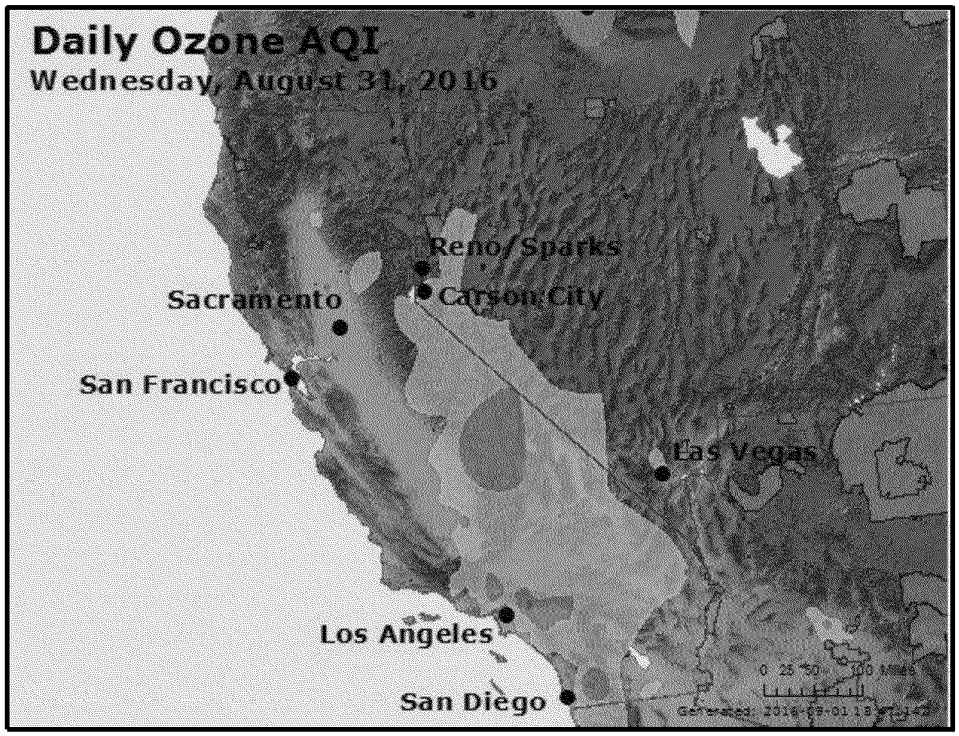
AirNow Ozone AQI Map for August 28, 2016



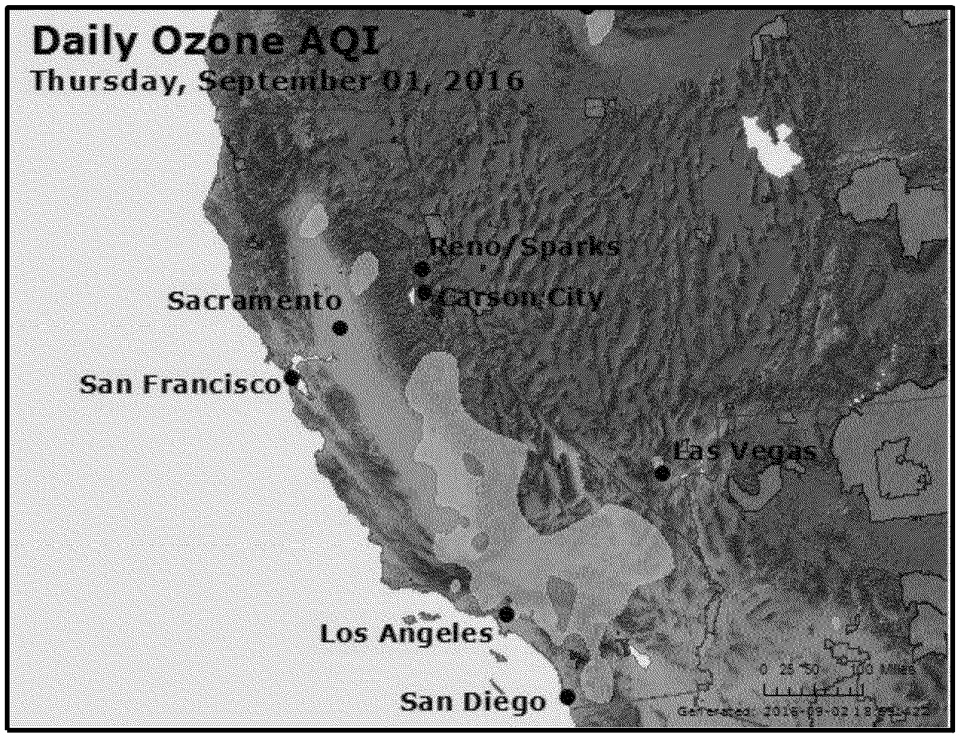
AirNow Ozone AQI Map for August 29, 2016



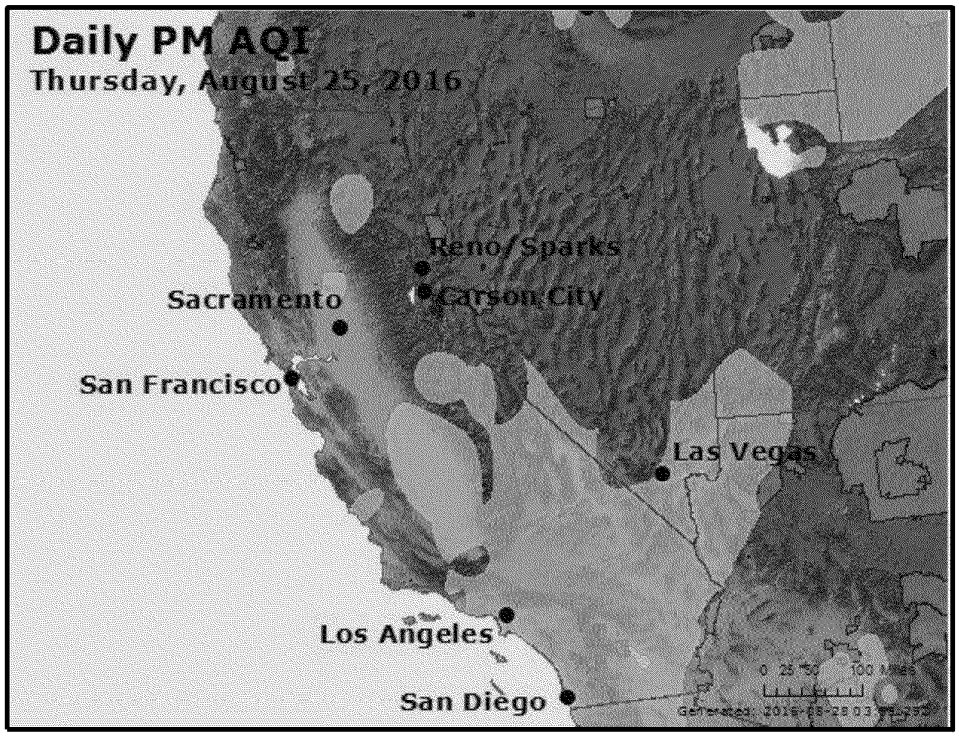
AirNow Ozone AQI Map for August 30, 2016



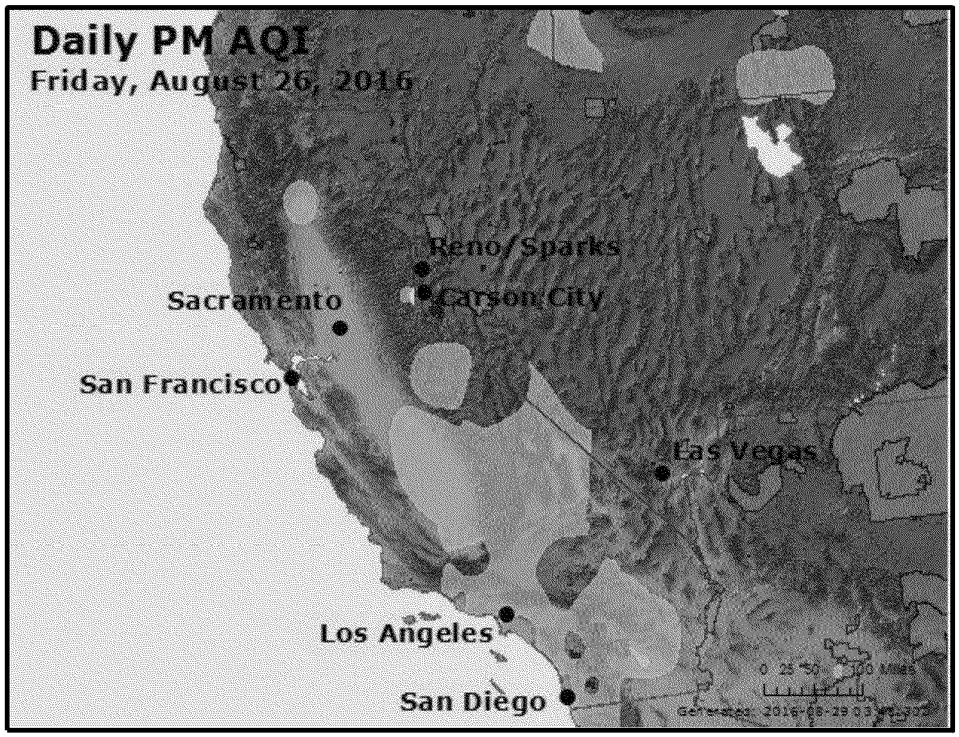
AirNow Ozone AQI Map for August 31, 2016



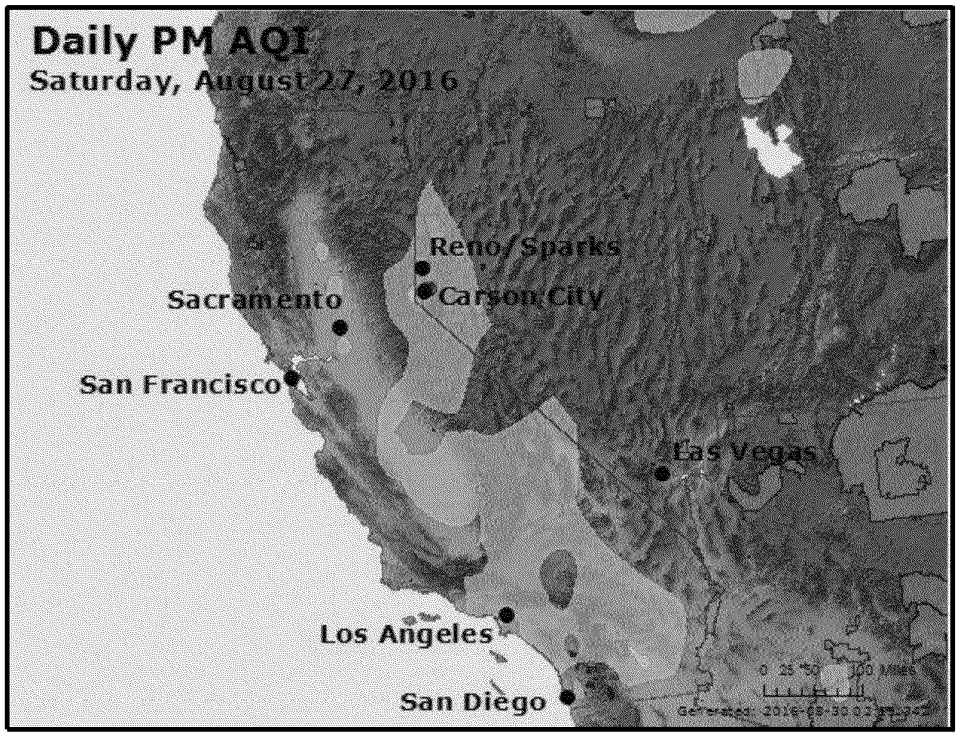
AirNow Ozone AQI Map for September 1, 2016



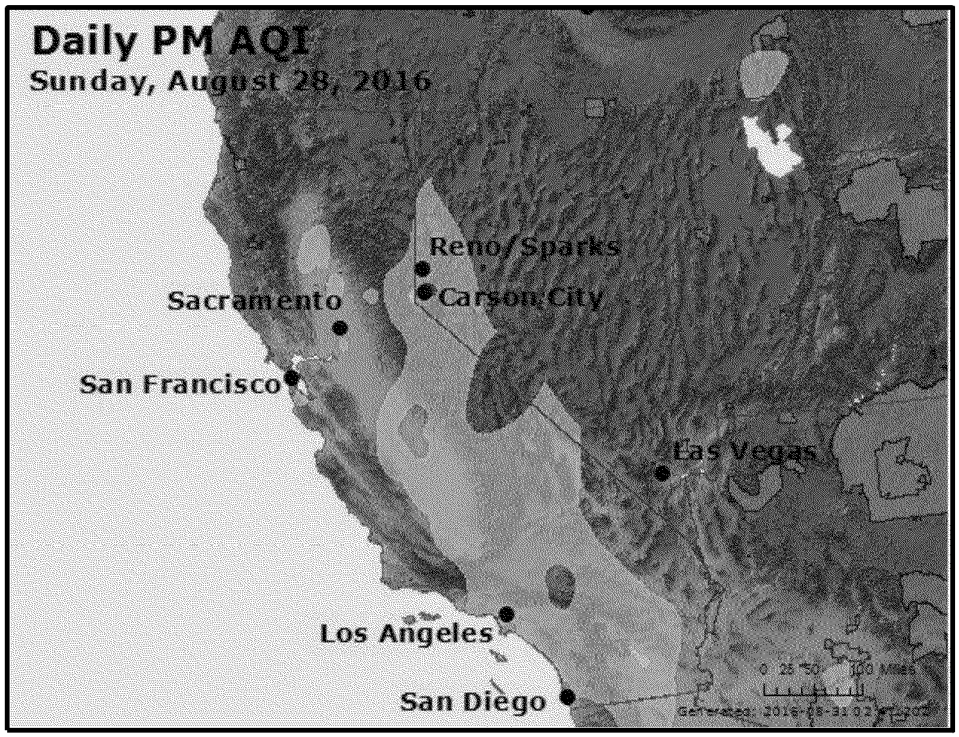

AirNow $PM_{2.5}$ AQI Map for August 25, 2016



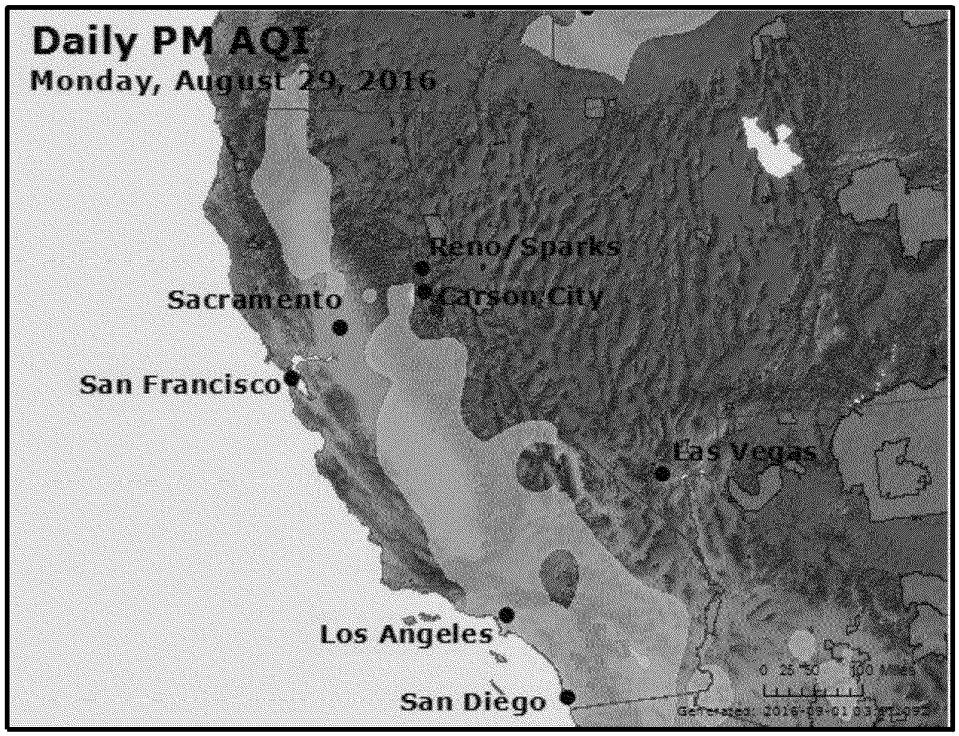

AirNow $PM_{2.5}$ AQI Map for August 26, 2016



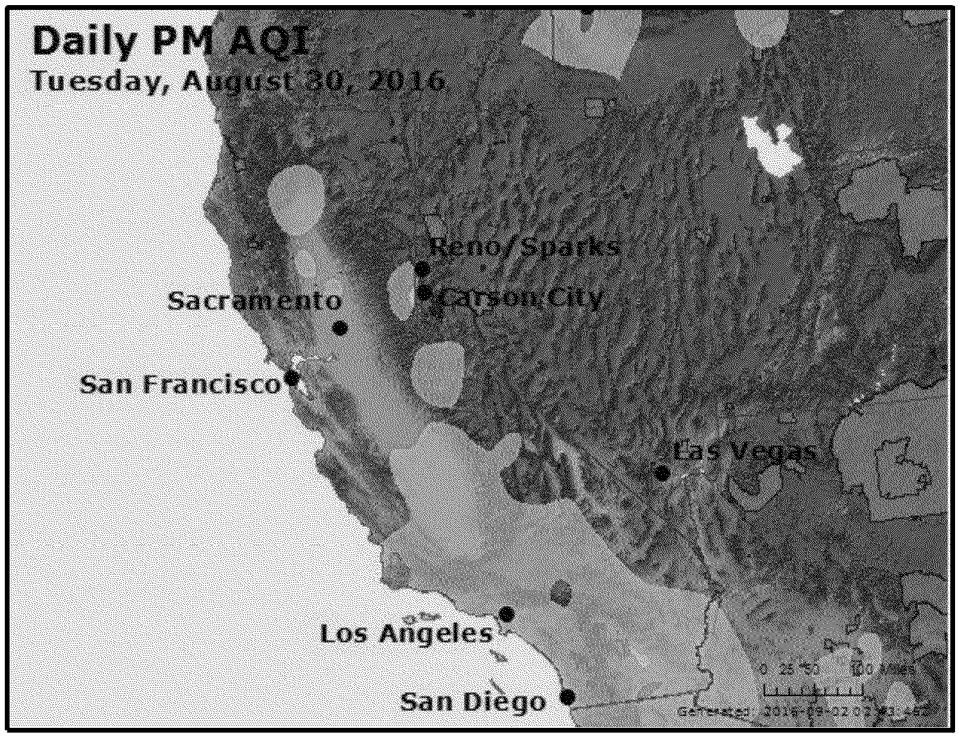

AirNow $PM_{2.5}$ AQI Map for August 27, 2016



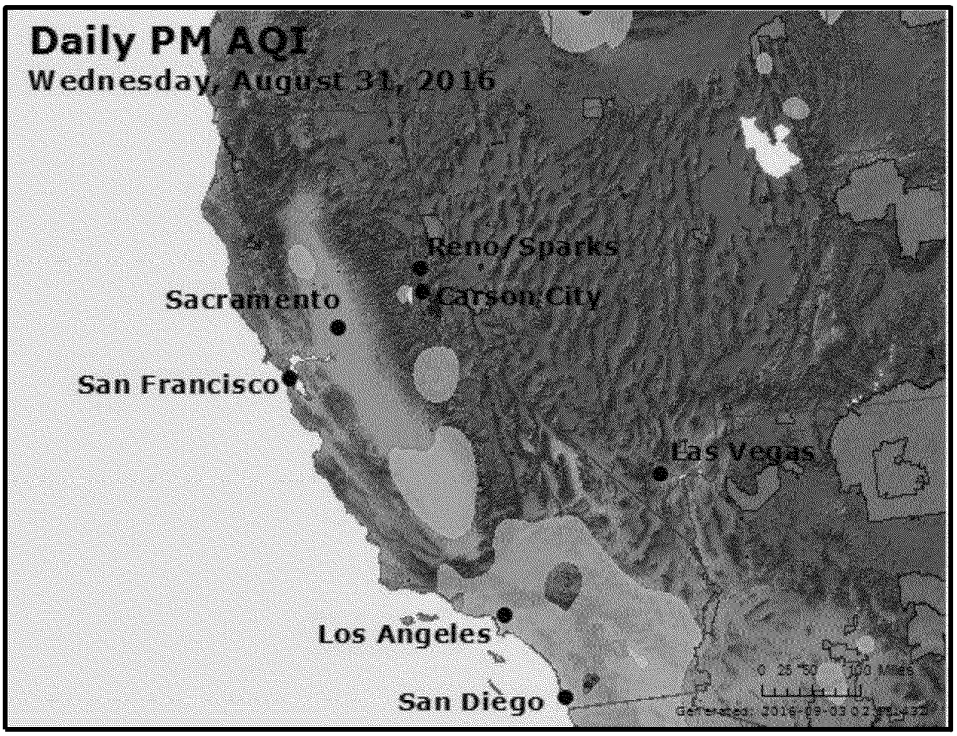

AirNow $PM_{2.5}$ AQI Map for August 28, 2016



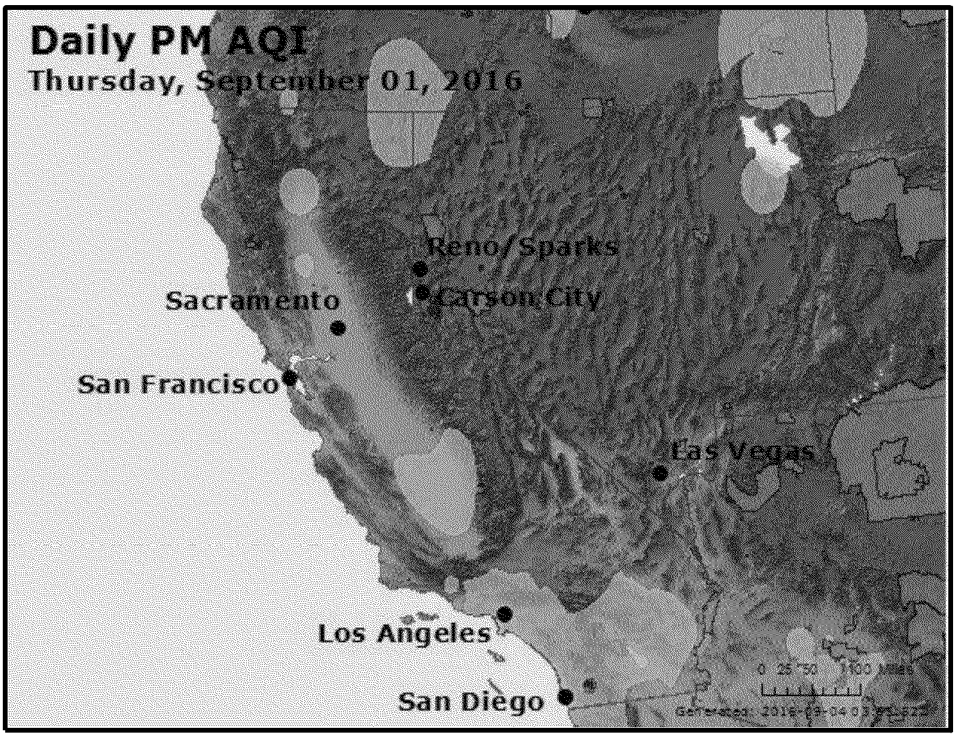

AirNow $PM_{2.5}$ AQI Map for August 29, 2016




AirNow $PM_{2.5}$ AQI Map for August 30, 2016




AirNow $PM_{2.5}$ AQI Map for August 31, 2016




AirNow $PM_{2.5}$ AQI Map for September 1, 2016

**Saturday, August 27, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1730Z August 27, 2016

SMOKE:
Western United States:
An area of light to moderate density smoke was seen from ongoing wildfires in eastern Oregon and Idaho moving eastward into northwestern Wyoming and southwestern Montana. Light density smoke was also seen across Wyoming from the wildfires.

Central Plains:
A plume of light density smoke was seen spanning from central Nebraska to extreme southern North Dakota mostly likely from wildfires from the Western United States.

Canada:
A swath of light density smoke was seen across northern Ontario moving toward James Bay. The source of the smoke is unclear but most likely resulting from the wildfires from the western United States.

DUST:
Caribbean:
African dust moving westward across the tropical Atlantic/eastern Caribbean Sea can be seen in satellite imagery stretching from the Leeward Islands to Jamaica, mostly south of Hispaniola.

DS/JW

THIS TEXT PRODUCT IS PRIMARILY INTENDED TO DESCRIBE SIGNIFICANT AREAS OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF THESE AND OTHER PLUMES WHICH ARE LESS EXTENSIVE AND STILL ATTACHED TO THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

JPEG: http://www.ospo.noaa.gov/Products/land/hms.html
GIS: http://www.firedetect.noaa.gov/viewer.htm
KML: http://www.ssd.noaa.gov/PS/FIRE/kml.html
ANY QUESTIONS OR COMMENTS REGARDING THIS PRODUCT SHOULD BE SENT TO SSDFireTeam@noaa.gov

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**Unless otherwise indicated:**

- Areas of smoke are analyzed using GOES-EAST and GOES-WEST Visible satellite imagery.

- Only a general description of areas of smoke or significant smoke plumes will be analyzed.
- A quantitative assessment of the density/amount of particulate or the vertical distribution is not included.
- Widespread cloudiness may prevent the detection of smoke even from significant fires.

**Saturday, August 27, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 0130Z August 28, 2016

SMOKE:
California:
An area of light density remnant smoke originating from fires in southern California was seen across California slowly moving east with optically thicker smoke in Central Valley banked along the Sierra Nevada mountains. Several fires are still emitting light to moderate density smoke in the southern Sierra Nevada mountains and southwestern California coast.

Pacific Northwest/Intermountain West:
Two significant light to heavy density smoke plumes were seen traveling east in east-central Oregon and west-central Idaho. Multiple light to moderate density smoke plumes were seen in-between cloud cover traveling east in the northern portions of the Intermountain West.

DUST:
Caribbean:
African dust moving westward across the tropical Atlantic/eastern Caribbean Sea can be seen in satellite imagery stretching from the Leeward Islands to Jamaica, mostly south of Hispaniola.

-Cronin

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- Widespread cloudiness may prevent the detection of smoke even from significant fires.

**Sunday, August 28, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1730Z August 28, 2016

SMOKE:
Pacific Northwest/Intermountain West:
Two remnant smoke plumes with density ranging from light to moderate were seen from eastern Oregon all the way to the Dakotas. These smokes plumes are from wildfires in eastern Oregon and Idaho.

DUST:
Caribbean:
African dust is seen moving westward across the Leeward Islands and Puerto Rico.

UNKNOWN AEROSOL:
An unknown aerosol was seen spanning from northern Texas to Missouri. The unknown aerosol could be from sulfates.

Another swatch of unknown aerosol was seen off the eastern coast of North Carolina and Virginia spanning eastward over the western Atlantic. The unknown aerosol was likely sulfates, though there may be some remnant smoke mixed in.

An unknown aerosol was seen in central Canada in western Saskatchewan and southeastern Alberta. The aerosol was likely a mixture of sulfates and remnant smoke.

- DS/JW

THIS TEXT PRODUCT IS PRIMARILY INTENDED TO DESCRIBE SIGNIFICANT AREAS OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF THESE AND OTHER PLUMES WHICH ARE LESS EXTENSIVE AND STILL ATTACHED TO THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

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- Widespread cloudiness may prevent the detection of smoke even from significant fires.

**Sunday, August 28, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1730Z August 28, 2016

SMOKE:
Area from Eastern Oregon and Idaho to the Dakotas:
Smoke of varying density was visible extending from eastern Oregon across southern Idaho and over southern and eastern Montana and much of Wyoming to the Dakotas. Some of the smoke also fanned out in a southerly direction reaching northern Utah. This smoke was attributed primarily to wildfire activity over eastern Oregon, Idaho, southwestern and western Montana, and northwestern Wyoming.

California/Southern Oregon/Western and Central Nevada:
A few widely scattered wildfires from northern to south central California were producing patches of smoke affecting portions of California into southern Oregon. A larger area of aerosol surrounding the smoke was visible covering virtually all of California, western and central Nevada, and southern Oregon though it is uncertain how much of this aerosol is composed of smoke.

JS

Earlier This Morning...
DUST:
Caribbean:
African dust is seen moving westward across the Leeward Islands and Puerto Rico.

UNKNOWN AEROSOL:
An unknown aerosol was seen spanning from northern Texas to Missouri. The unknown aerosol could be from sulfates.

Another swatch of unknown aerosol was seen off the eastern coast of North Carolina and Virginia spanning eastward over the western Atlantic. The unknown aerosol was likely sulfates, though there may be some remnant smoke mixed in.

An unknown aerosol was seen in central Canada in western Saskatchewan and southeastern Alberta. The aerosol was likely a mixture of sulfates and remnant smoke.

- DS/JW

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- Only a general description of areas of smoke or significant smoke plumes will be analyzed.
- A quantitative assessment of the density/amount of particulate or the vertical distribution is not included.
- Widespread cloudiness may prevent the detection of smoke even from significant fires.

# National Weather Service Raw Text Product

Displaying AFOS PIL: **AFDREV** Received: **2016-08-27 20:55 UTC**

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685
FXUS65 KREV 272055
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
155 PM PDT SAT AUG 27 2016

.SYNOPSIS...
Light winds and high temperatures a few degrees above average are
expected through the weekend. High pressure breaks down Monday
and Tuesday for increasing breezes, with cooler temperatures
likely by late week.

&&

.SHORT TERM...
Added haze for Reno and Tahoe through Sunday evening, otherwise
only minor tweaks to the forecast.

High pressure will bring dry and warm conditions into early next
week. Temperatures will be near to slightly (3-6 degrees) above
average with highs in the upper 80s to mid 90s for western Nevada
valleys and low to mid 80s in Sierra valleys. Afternoon zephyr
winds are expected to be average to weak through Sunday. By Monday,
the ridge of high pressure begins to slip off to the south and
east with a slightly stronger zephyr possible...although the
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increase is not expected to be enough to warrant too much fire
weather concern.

Tuesday, an upper disturbance will move over northern California
and into central and eastern Oregon. Simulations hint at some mid
level clouds over northeast CA and northwest NV Tuesday morning
and early afternoon as the disturbance, while quick-moving,
exhibits sharp forcing and moderate lapse rates. The question will
be...does the forcing hang around long enough to produce deeper
elevated convection? At this time, it looks to be mainly some
altocumulus with a few ACCAS embedded north of a Portola to
Pyramid Lake to Gerlach line.

If any showers or thunderstorms form Tuesday morning, they will
very likely be dry with swift mid-level flow and dry sub-cloud
layers. At this time, the chances are low (10%) for elevated
convection Tuesday morning. However, with "dry" lightning and
gusty outflow winds possible, the fire weather community and
outdoor events across northeast CA and northwest NV should remain
informed of the latest forecasts and discussions, especially as
Tuesday afternoon could bring gusty winds of 25-35 mph in the wake
of the upper disturbance. Snyder

.LONG TERM...Wednesday through Saturday...

The second half of next week will feature a broad upper trough
over the western U.S. This will bring periods of gusty winds and
a gradual cool down by late week...with little chance for rain
until at least next weekend. Highs for Thursday and Friday were
moderated/warmed a touch for some areas as the trough does not
look quite as deep, at least until next weekend. Snyder

&&

.AVIATION...

VFR conditions are likely through the weekend with mainly light
winds. Late afternoon and early evening winds could increase by
Sunday...but this is more likely Monday as thermal gradients
start to increase.

Some haze has leaked into far western Nevada today, at least
partially from the Mokelumne Fire on the west slopes of the
Sierra south of Lake Tahoe. With southwest to west winds aloft,
haze could hang around periodically for the next couple days
(depending on smoke production from fires)...possibly bringing
some decrease in slantwise visibility for landings at
KRNO/KCXP/KRTS/KMEV. Snyder/20

&&

.REV Watches/Warnings/Advisories...
NV...None.
CA...None.

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For more information from the National Weather Service visit...
http://weather.gov/reno
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# National Weather Service Raw Text Product

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168
FXUS65 KREV 280939
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
239 AM PDT SUN AUG 28 2016

.SYNOPSIS...
Light winds and high temperatures a few degrees above average will
continue today. High pressure breaks down Monday and Tuesday for
increasing breezes, with cooler temperatures likely by late week.


&&

.SHORT TERM...

Dry and warm conditions are expected today with only a few
afternoon cumulus developing in Mono and Mineral Counties.
Southwest flow aloft will continue to allow haze from fires in
California to move into the region.

A short wave trough is expected to move through northern
California Monday night into Tuesday which will begin to cool
temperatures a bit, slowly increase afternoon winds, and allow
some moisture into the area. It's possible areas near the Oregon
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border could see some precipitation, possibly even some high based convection, but forcing and upper level instability aren't well aligned at this point.

By Tuesday widespread gusts around 25 mph can be expected, and depending on how the trough comes through, could be a bit stronger. The combination of low humidities and gusty winds will increase fire weather concerns during the day on Tuesday before moisture begins to move into the area Tuesday night. -Zach

.LONG TERM...Wednesday through Saturday...

The medium range models are evolving toward a solution in the long term that is less aggressive than previous GFS solutions and more in line with the solution the ECMWF has been trending toward over the last 48 hours or so. Since we did not trend toward the outlier GFS solution earlier...only minor forecast changes were needed this cycle.

As stated...the models are trending toward a less amplified trough for most of the extended period as the main portion of the trough remains well north of the region in WA/OR. Thus temps were allowed to drift up a bit each day through Friday and no pops of consequence are in the forecast. Wind remains a question both Wednesday and Thursday. Timing short waves in the flow this far out is difficult at best...but there could be increased winds due to short wave activity Wednesday afternoon/evening. This could raise fire weather concerns. Winds for Thursday and Friday may be a bit lighter.

The medium range deterministic models and many of the ensemble members have a sharper short wave carving the trough farther south on Saturday. This could make Saturday the breeziest day of the extended and allow temps to fall a few degrees. But...temps should be no more than a few degrees below average. Saturday remains dry as moisture return remains cut off.

&&

.AVIATION...

VFR conditions continue into the early part of the week at least. Winds today should be fairly light through most of the day with a slightly suppressed zephyr in the late afternoon. Stronger westerly afternoon/evening winds are likely starting Monday as thermal gradients begin to strengthen.

Haze will linger around the region through early in the week...the remnants of smoke from fires in California. The haze in our region should not be so thick as to lower visibility enough to cause impacts to flight operations.

A short wave late Monday and early Tuesday could bring overnight convection with gusty surface to areas north and west of a line from Portola to Gerlach...but the likelihood of any convection is only

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about 10%.

The bigger aviation impact could be blowing dust in areas down wind
of dry lake beds starting Tuesday and continuing into Wednesday.

&&

.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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For more information from the National Weather Service visit...
http://weather.gov/reno
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# National Weather Service Raw Text Product

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884
FNUS55 KREV 271254
FWFREV

FIRE WEATHER PLANNING FORECAST
NATIONAL WEATHER SERVICE RENO NV
554 AM PDT SAT AUG 27 2016

.DISCUSSION...
DRY CONDITIONS WILL CONTINUE INTO NEXT WEEK. WINDS WILL BE LIGHT
INTO SUNDAY BEFORE SLOWLY INCREASING FOR NEXT WEEK BEGINNING ON
MONDAY. TEMPERATURES WILL BE NEAR AVERAGE...BUT HUMIDITY WILL
CONTINUE TO BE LOW WITH FAIR TO POOR OVERNIGHT RECOVERY.

NOTE:  THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS.
NOTE:  PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
       HTTP://WWW.WRH.NOAA.GOV/FIREWX/?WFO=REV

NVZ450-280045-
WESTERN NEVADA SIERRA FRONT-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER.........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........86-94.
*   MID SLOPE........80-90.
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*   24 HR TREND......2 DEGREES WARMER.
* MIN HUMIDITY.......
*   VALLEYS.........8-14%.
*   MID SLOPE........9-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING WEST AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHEAST WINDS AROUND 10 MPH SHIFTING TO THE
                     WEST IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....VARIABLE WINDS TO 10 MPH.
* VENTILATION........GOOD.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS.........42-52.
*   MID SLOPE........52-62.
*   24 HR TREND......2 DEGREES COOLER.
* MAX HUMIDITY.......
*   VALLEYS.........64-74%.
*   MID SLOPE........23-33%.
*   24 HR TREND......3-4% WETTER VALLEYS...LITTLE CHANGE MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH. GUSTS UP TO 25 MPH IN
                     THE EVENING.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH IN
                     THE EVENING.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.........86-94.
*   MID SLOPE........80-90.
* MIN HUMIDITY.......
*   VALLEYS.........8-14%.
*   MID SLOPE........9-15%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10 MPH
                     WITH GUSTS UP TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17000-18000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
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* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 43-53. SOUTHWEST WINDS AROUND 10 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.MONDAY...CLEAR. HIGHS 86-94. LOWS 42-52. SOUTHWEST WINDS 10 TO
15 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 82-92. LOWS 39-49.
SOUTHWEST WINDS 10 TO 20 MPH.
.THURSDAY...CLEAR. HIGHS 78-86. LOWS 34-44.
.FRIDAY...SUNNY. HIGHS 75-81.

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CAZ272-280045-
GREATER LAKE TAHOE AREA-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........69-77.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........13-23%.
*   MID SLOPE........15-25%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING WEST AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........EAST WINDS AROUND 10 MPH SHIFTING TO THE WEST
                     WITH GUSTS TO 25 MPH IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....VARIABLE WINDS TO 10 MPH.
* VENTILATION........GOOD.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........46-56.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........80-95%.
*   MID SLOPE........30-45%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
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*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE EVENING.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........68-76.
* MIN HUMIDITY.......
*   VALLEYS..........12-22%.
*   MID SLOPE........14-24%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10 MPH
                     WITH GUSTS UP TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 35-45. SOUTHWEST WINDS AROUND 10 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.MONDAY...CLEAR. HIGHS 72-82. LOWS 35-45. SOUTHWEST WINDS 10 TO
15 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 70-80. LOWS 33-43.
SOUTHWEST WINDS 10 TO 15 MPH.
.THURSDAY...CLEAR. HIGHS 67-75. LOWS 29-39.
.FRIDAY...SUNNY. HIGHS 64-69.

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NVZ453-280045-
WEST CENTRAL NEVADA BASIN AND RANGE-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........87-95.
*   MID SLOPE........84-94.
*   24 HR TREND......2-4 DEGREES WARMER.
* MIN HUMIDITY.......
*   VALLEYS..........7-13%.
*   MID SLOPE........9-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
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*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH. GUSTS UP TO 25
                     MPH IN THE AFTERNOON.
*   RIDGE TOP........LIGHT WINDS BECOMING WEST 10 TO 15 MPH IN THE
                     AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17000-18000 FT MSL.
* TRANSPORT WINDS....WEST AROUND 10 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........42-52.
*   MID SLOPE........51-61.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........35-45%.
*   MID SLOPE........21-31%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH. GUSTS 25 TO 30 MPH
                     IN THE EVENING.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH. GUSTS 25 TO 30 MPH IN
                     THE EVENING.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........87-97.
*   MID SLOPE........85-95.
* MIN HUMIDITY.......
*   VALLEYS..........6-12%.
*   MID SLOPE........7-13%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......18000-19000 FT MSL.
* TRANSPORT WINDS....WEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 47-57. WEST WINDS AROUND 10 MPH IN THE
EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
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.MONDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS 87-97. LOWS 47-57.
WEST WINDS 10 TO 15 MPH.
.TUESDAY...PARTLY CLOUDY. AREAS OF BLOWING DUST. HIGHS 86-96. LOWS
47-57. WEST WINDS 15 TO 20 MPH.
.WEDNESDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS 82-92. LOWS 43-53.
WEST WINDS 15 TO 20 MPH.
.THURSDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS 80-90. LOWS 41-51.
.FRIDAY...SUNNY. HIGHS 76-86.

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CAZ270-278-NVZ458-280045-
SURPRISE VALLEY CALIFORNIA-EASTERN LASSEN COUNTY-
NORTHERN WASHOE COUNTY-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........85-95.
*   MID SLOPE........79-89.
*   24 HR TREND......2 DEGREES WARMER.
* MIN HUMIDITY.......
*   VALLEYS..........7-15%.
*   MID SLOPE........10-17%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH. GUSTS 25 TO 30 MPH IN
                     THE AFTERNOON.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH. GUSTS 25 TO 30 MPH IN
                     THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15500-16500 FT MSL.
* TRANSPORT WINDS....WEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........40-50.
*   MID SLOPE........50-60.
*   24 HR TREND......3 DEGREES COOLER.
* MAX HUMIDITY.......
*   VALLEYS..........55-65%.
*   MID SLOPE........23-33%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH. GUSTS UP TO 30 MPH
                     IN THE EVENING.
*   RIDGE TOP........WEST WINDS 10 TO 20 MPH WITH GUSTS 25 TO 30 MPH.
* HAINES INDEX.......4-5.
* LAL................1.
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* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........85-95.
*   MID SLOPE........79-89.
* MIN HUMIDITY.......
*   VALLEYS..........7-15%.
*   MID SLOPE........9-17%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....WEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 40-50. SOUTHWEST WINDS 10 TO 15 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.MONDAY...CLEAR. HIGHS 85-95. LOWS 39-49. SOUTHWEST WINDS 15 TO
20 MPH.
.TUESDAY...PARTLY CLOUDY. AREAS OF BLOWING DUST. HIGHS 82-92. LOWS
38-48. SOUTHWEST WINDS 15 TO 20 MPH.
.WEDNESDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS 79-89. LOWS 35-45.
WEST WINDS 15 TO 20 MPH.
.THURSDAY...PARTLY CLOUDY. AREAS OF BLOWING DUST. HIGHS 76-86. LOWS
35-45.
.FRIDAY...PARTLY CLOUDY. HIGHS 70-80.

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CAZ271-280045-
WESTERN LASSEN/EASTERN PLUMAS/EASTERN SIERRA/EASTERN NEVADA COUNTIES-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........83-93.
*   MID SLOPE........78-86.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........9-17%.
*   MID SLOPE........12-20%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING WEST 10 TO 15 MPH
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                    WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON.
*   RIDGE TOP........LIGHT WINDS BECOMING WEST 10 TO 15 MPH WITH
                    GUSTS TO 25 MPH IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....WEST AROUND 10 MPH.
* VENTILATION........VERY GOOD.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........45-55.
*   24 HR TREND......2-4 DEGREES COOLER MID SLOPES...LITTLE CHANGE
                    VALLEYS.
* MAX HUMIDITY.......
*   VALLEYS..........70-85%.
*   MID SLOPE........39-49%.
*   24 HR TREND......8-12% WETTER VALLEYS...LITTLE CHANGE MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30 MPH
                    IN THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                    IN THE EVENING.
* HAINES INDEX.......4.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........81-91.
*   MID SLOPE........76-86.
* MIN HUMIDITY.......
*   VALLEYS..........8-18%.
*   MID SLOPE........12-18%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                    MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                    MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 35-45. SOUTHWEST WINDS 10 TO 15 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
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.MONDAY...CLEAR. HIGHS 82-92. LOWS 33-43. SOUTHWEST WINDS 10 TO
15 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 78-88. LOWS 30-40.
SOUTHWEST WINDS 15 TO 20 MPH.
.THURSDAY...PARTLY CLOUDY. HIGHS 73-83. LOWS 30-40.
.FRIDAY...PARTLY CLOUDY. HIGHS 67-77.

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CAZ273-280045-
MONO AND EASTERN ALPINE COUNTIES-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER........SUNNY THEN BECOMING PARTLY CLOUDY.
* MAX TEMPERATURE....
*   VALLEYS..........79-89.
*   MID SLOPE........73-83.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........10-18%.
*   MID SLOPE........12-20%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....VARIABLE WINDS TO 10 MPH.
* VENTILATION........GOOD.

.TONIGHT...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........33-43.
*   MID SLOPE........42-52.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........75-90%.
*   MID SLOPE........34-44%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
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* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........80-90.
*   MID SLOPE........73-83.
* MIN HUMIDITY.......
*   VALLEYS..........10-18%.
*   MID SLOPE........12-20%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS 10 TO 15 MPH WITH GUSTS TO 35 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....SOUTHEAST AROUND 10 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 35-45. SOUTHWEST WINDS AROUND 10 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.MONDAY...CLEAR. HIGHS 81-91. LOWS 35-45. SOUTHWEST WINDS 10 TO
15 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 79-89. LOWS 31-41.
SOUTHWEST WINDS 10 TO 15 MPH.
.THURSDAY...CLEAR. HIGHS 76-86. LOWS 27-37.
.FRIDAY...SUNNY. HIGHS 69-79.

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NVZ459-280045-
MINERAL AND SOUTHERN LYON COUNTIES-
554 AM PDT SAT AUG 27 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........83-93.
*   MID SLOPE........80-90.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-14%.
*   MID SLOPE........9-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHEAST AROUND 10
                     MPH IN THE AFTERNOON.
*   RIDGE TOP........LIGHT WINDS BECOMING EAST AROUND 10 MPH IN THE
                     AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......18000-19000 FT MSL.
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* TRANSPORT WINDS....VARIABLE WINDS TO 10 MPH.
* VENTILATION........GOOD.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........42-52.
*   MID SLOPE........50-60.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........55-70%.
*   MID SLOPE........26-36%.
*   24 HR TREND......2-4% WETTER MID SLOPES...LITTLE CHANGE VALLEYS.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....NORTHEAST WINDS AROUND 10 MPH WITH GUSTS UP TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........NORTHEAST WINDS AROUND 10 MPH SHIFTING TO THE
                     WEST AFTER MIDNIGHT.
* HAINES INDEX.......6.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........84-94.
*   MID SLOPE........82-90.
* MIN HUMIDITY.......
*   VALLEYS..........8-14%.
*   MID SLOPE........9-14%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING NORTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.......6.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....SOUTHEAST AROUND 10 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.SUNDAY NIGHT...CLEAR. LOWS 45-55. WEST WINDS AROUND 10 MPH IN THE
EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.MONDAY...CLEAR. HIGHS 85-95. LOWS 45-55. SOUTHWEST WINDS 10 TO
15 MPH.
.TUESDAY...PARTLY CLOUDY. HIGHS 84-94. LOWS 44-54. WEST WINDS 15 TO
20 MPH.
.WEDNESDAY...CLEAR. HIGHS 82-92. LOWS 42-52. WEST WINDS 15 TO
20 MPH.
.THURSDAY...CLEAR. HIGHS 81-91. LOWS 38-48.
.FRIDAY...SUNNY. HIGHS 77-87.
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.8 TO 14 DAY OUTLOOK FOR (SAT SEP 3 THROUGH FRI SEP 9)
BELOW NORMAL TEMPERATURES AND NEAR NORMAL PRECIPITATION.

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HTTP://WEATHER.GOV/RENO
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**Search Site with Google**

# National Weather Service Raw Text Product

Displaying AFOS PIL: **FWFREV** Received: **2016-08-27 21:30 UTC**

· Previous in Time
View All KREV Products for 27 Aug 2016
Next in Time ·
Latest Product | View As Image

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320
FNUS55 KREV 272130
FWFREV

FIRE WEATHER PLANNING FORECAST
NATIONAL WEATHER SERVICE RENO NV
230 PM PDT SAT AUG 27 2016

.DISCUSSION...

DRY CONDITIONS WILL CONTINUE INTO NEXT WEEK. WINDS WILL BE LIGHT
INTO SUNDAY BEFORE SLOWLY INCREASING FOR NEXT WEEK BEGINNING ON
MONDAY. TUESDAY COULD BE QUITE BREEZY ALONG THE SIERRA FRONT FROM
DOUGLAS COUNTY TO THE OREGON BORDER. TEMPERATURES WILL BE NEAR
AVERAGE...BUT HUMIDITY WILL CONTINUE TO BE LOW WITH FAIR TO POOR
OVERNIGHT RECOVERY.


NOTE:  THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS.
NOTE:  PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
       HTTP://WWW.WRH.NOAA.GOV/FIREWX/?WFO=REV

NVZ450-281445-
WESTERN NEVADA SIERRA FRONT-
230 PM PDT SAT AUG 27 2016

.TONIGHT...
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* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........43-53.
*   MID SLOPE........51-61.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........64-74%.
*   MID SLOPE........23-33%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH IN
                     THE EVENING.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH IN
                     THE EVENING.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........86-94.
*   MID SLOPE........80-90.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-14%.
*   MID SLOPE........9-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10 MPH
                     WITH GUSTS UP TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17000-18000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........43-53.
*   MID SLOPE........54-64.
* MAX HUMIDITY.......
*   VALLEYS..........63-73%.
*   MID SLOPE........23-33%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE EVENING.
* HAINES INDEX.......5.
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* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........86-94.
*   MID SLOPE........81-91.
* MIN HUMIDITY.......
*   VALLEYS..........8-13%.
*   MID SLOPE........8-14%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14000-15000 FT MSL.
* TRANSPORT WINDS....SOUTH 15 TO 20 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR IN THE EVENING THEN BECOMING PARTLY CLOUDY.
LOWS 44-54. WEST WINDS 10 TO 15 MPH IN THE EVENING BECOMING
DOWNSLOPE 2 TO 5 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 82-92. LOWS 39-49. WEST
WINDS 10 TO 20 MPH.
.THURSDAY...CLEAR. HIGHS 79-87. LOWS 34-44. WEST WINDS 15 TO 20 MPH.
.FRIDAY...CLEAR. HIGHS 77-83. LOWS 34-44.
.SATURDAY...PARTLY CLOUDY. HIGHS 74-80.

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CAZ272-281445-
GREATER LAKE TAHOE AREA-
230 PM PDT SAT AUG 27 2016

.TONIGHT...
* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........46-56.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........84-94%.
*   MID SLOPE........30-40%.
*   24 HR TREND......LITTLE CHANGE VALLEYS...UP TO 5% WETTER MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
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                    IN THE EVENING.
* HAINES INDEX.......4-5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........68-76.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........13-23%.
*   MID SLOPE........12-22%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10 MPH
                    WITH GUSTS UP TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 30 MPH.
* HAINES INDEX.......4-5.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........46-56.
* MAX HUMIDITY.......
*   VALLEYS..........82-92%.
*   MID SLOPE........28-38%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                    MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                    MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 35
                    MPH.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........69-77.
* MIN HUMIDITY.......
*   VALLEYS..........12-22%.
*   MID SLOPE........11-21%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
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                    MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 40
                    MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14000-15000 FT MSL.
* TRANSPORT WINDS....SOUTH 15 TO 20 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR IN THE EVENING THEN BECOMING PARTLY CLOUDY.
LOWS 36-46. WEST WINDS 10 TO 15 MPH IN THE EVENING BECOMING
DOWNSLOPE 2 TO 5 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 70-80. LOWS 33-43.
SOUTHWEST WINDS 10 TO 15 MPH.
.THURSDAY...CLEAR. HIGHS 67-77. LOWS 29-39. SOUTHWEST WINDS 10 TO
15 MPH.
.FRIDAY...CLEAR. HIGHS 66-72. LOWS 29-39.
.SATURDAY...PARTLY CLOUDY. HIGHS 63-68.

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NVZ453-281445-
WEST CENTRAL NEVADA BASIN AND RANGE-
230 PM PDT SAT AUG 27 2016

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........42-52.
*   MID SLOPE........50-60.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........36-46%.
*   MID SLOPE........21-31%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 25 MPH.
                    WINDS DROPPING TO LESS THAN 10 MPH AFTER MIDNIGHT.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH. GUSTS 25 TO 30 MPH IN
                    THE EVENING.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........87-97.
*   MID SLOPE........85-95.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
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*   VALLEYS.....6-13%.
*   MID SLOPE.....7-12%.
*   24 HR TREND.....LITTLE CHANGE.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP.....SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.....4-5.
* LAL.....1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT.....18000-19000 FT MSL.
* TRANSPORT WINDS....WEST 15 TO 20 MPH.
* VENTILATION.....EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER.....CLEAR.
* MIN TEMPERATURE....
*   VALLEYS.....44-54.
*   MID SLOPE.....52-62.
* MAX HUMIDITY.....
*   VALLEYS.....34-44%.
*   MID SLOPE.....21-31%.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP.....WEST WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH.
* HAINES INDEX.....5.
* LAL.....1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER.....SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.....87-97.
*   MID SLOPE.....85-95.
* MIN HUMIDITY.....
*   VALLEYS.....6-12%.
*   MID SLOPE.....7-12%.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP.....SOUTH WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH.
* HAINES INDEX.....5.
* LAL.....1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT.....14000-15000 FT MSL.
* TRANSPORT WINDS....SOUTH 10 TO 15 MPH.
* VENTILATION.....EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR. AREAS OF BLOWING DUST IN THE EVENING. LOWS
47-57. WEST WINDS 10 TO 15 MPH.
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.TUESDAY THROUGH THURSDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS
86-96. LOWS 41-51. WEST WINDS 15 TO 20 MPH.
.FRIDAY...CLEAR. HIGHS 78-86. LOWS 41-51.
.SATURDAY...PARTLY CLOUDY. HIGHS 76-86.

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CAZ270-278-NVZ458-281445-
SURPRISE VALLEY CALIFORNIA-EASTERN LASSEN COUNTY-
NORTHERN WASHOE COUNTY-
230 PM PDT SAT AUG 27 2016

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........42-52.
*   MID SLOPE........53-63.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........57-67%.
*   MID SLOPE........23-33%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH IN
                     THE EVENING. DECREASING TO AROUND 10 MPH AFTER MIDNIGHT.
*   RIDGE TOP........WEST WINDS 10 TO 20 MPH WITH GUSTS 25 TO 30 MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........85-95.
*   MID SLOPE........79-89.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........7-15%.
*   MID SLOPE........10-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....WEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER........CLEAR.
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* MIN TEMPERATURE....
*   VALLEYS.........43-53.
*   MID SLOPE.......53-63.
* MAX HUMIDITY.......
*   VALLEYS.........60-70%.
*   MID SLOPE.......23-33%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH. GUSTS 25 TO 30 MPH
                     IN THE EVENING.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.........85-95.
*   MID SLOPE.......79-89.
* MIN HUMIDITY.......
*   VALLEYS.........8-13%.
*   MID SLOPE.......8-13%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH 10 TO 15 MPH
                     WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14500-15500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR IN THE EVENING THEN BECOMING PARTLY CLOUDY.
AREAS OF BLOWING DUST IN THE EVENING. LOWS 44-54. SOUTHWEST WINDS
10 TO 15 MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...PARTLY CLOUDY. AREAS OF BLOWING DUST. HIGHS 82-92. LOWS
38-48. SOUTHWEST WINDS 15 TO 20 MPH.
.WEDNESDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS 79-89. LOWS 35-45.
WEST WINDS 15 TO 20 MPH.
.THURSDAY...PARTLY CLOUDY. AREAS OF BLOWING DUST. HIGHS 77-87. LOWS
35-45. WEST WINDS 15 TO 20 MPH.
.FRIDAY...PARTLY CLOUDY. HIGHS 73-83. LOWS 35-45.
.SATURDAY...MOSTLY CLOUDY. HIGHS 71-81.

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CAZ271-281445-
WESTERN LASSEN/EASTERN PLUMAS/EASTERN SIERRA/EASTERN NEVADA COUNTIES-
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230 PM PDT SAT AUG 27 2016

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........45-55.
*   24 HR TREND......2-4 DEGREES COOLER MID SLOPES...LITTLE CHANGE
                     VALLEYS.
* MAX HUMIDITY.......
*   VALLEYS..........71-81%.
*   MID SLOPE........34-44%.
*   24 HR TREND......5-10% WETTER VALLEYS...LITTLE CHANGE MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH
                     IN THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE EVENING.
* HAINES INDEX.......4.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........81-91.
*   MID SLOPE........76-86.
*   24 HR TREND......2 DEGREES COOLER.
* MIN HUMIDITY.......
*   VALLEYS..........8-18%.
*   MID SLOPE........12-18%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........46-56.
* MAX HUMIDITY.......
*   VALLEYS..........71-81%.
*   MID SLOPE........36-46%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
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                    MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                    MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                    MPH.
* HAINES INDEX.......4-5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........82-92.
*   MID SLOPE........77-85.
* MIN HUMIDITY.......
*   VALLEYS..........8-16%.
*   MID SLOPE........11-17%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                    MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
                    MPH.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......13500-14500 FT MSL.
* TRANSPORT WINDS....SOUTH 20 TO 25 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR IN THE EVENING THEN BECOMING PARTLY CLOUDY.
LOWS 36-46. SOUTHWEST WINDS 10 TO 15 MPH IN THE EVENING BECOMING
DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...PARTLY CLOUDY. HIGHS 78-88. LOWS 31-41. SOUTHWEST WINDS
15 TO 20 MPH.
.WEDNESDAY...CLEAR. HIGHS 75-85. LOWS 30-40. SOUTHWEST WINDS 15 TO
20 MPH.
.THURSDAY...PARTLY CLOUDY. HIGHS 74-84. LOWS 30-40. WEST WINDS 15 TO
20 MPH.
.FRIDAY THROUGH SATURDAY...PARTLY CLOUDY. HIGHS 69-79. LOWS 30-40.

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CAZ273-281445-
MONO AND EASTERN ALPINE COUNTIES-
230 PM PDT SAT AUG 27 2016

.TONIGHT...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING CLEAR. HAZE IN THE
                    EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........32-42.
*   MID SLOPE........42-52.
*   24 HR TREND......LITTLE CHANGE.
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* MAX HUMIDITY.......
*   VALLEYS..........84-94%.
*   MID SLOPE........32-42%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........80-90.
*   MID SLOPE........73-83.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........10-18%.
*   MID SLOPE........10-18%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS 10 TO 15 MPH WITH GUSTS TO 35 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....SOUTHEAST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........44-54.
* MAX HUMIDITY.......
*   VALLEYS..........81-91%.
*   MID SLOPE........33-43%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
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* MAX TEMPERATURE....
*   VALLEYS.....81-91.
*   MID SLOPE.....75-85.
* MIN HUMIDITY.....
*   VALLEYS.....8-16%.
*   MID SLOPE.....9-16%.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP.....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.....5.
* LAL.....1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT.....16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTH 10 TO 15 MPH.
* VENTILATION.....VERY GOOD.


.EXTENDED...
.MONDAY NIGHT...CLEAR. LOWS 37-47. SOUTHWEST WINDS AROUND 10 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY THROUGH THURSDAY...CLEAR. HIGHS 79-89. LOWS 27-37.
SOUTHWEST WINDS 10 TO 15 MPH.
.FRIDAY THROUGH SATURDAY...CLEAR. HIGHS 71-81. LOWS 27-37.

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NVZ459-281445-
MINERAL AND SOUTHERN LYON COUNTIES-
230 PM PDT SAT AUG 27 2016

.TONIGHT...
* SKY/WEATHER.....CLEAR.
* MIN TEMPERATURE....
*   VALLEYS.....41-51.
*   MID SLOPE.....50-60.
*   24 HR TREND.....LITTLE CHANGE.
* MAX HUMIDITY.....
*   VALLEYS.....54-64%.
*   MID SLOPE.....26-36%.
*   24 HR TREND.....LITTLE CHANGE.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....NORTHEAST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING. SHIFTING SOUTHWEST AROUND 10 MPH
                     AFTER MIDNIGHT.
*   RIDGE TOP.....NORTHEAST WINDS AROUND 10 MPH SHIFTING TO THE
                     WEST AFTER MIDNIGHT.
* HAINES INDEX.....6.
* LAL.....1.
* CHC WETTING RAIN...0%.

.SUNDAY...
* SKY/WEATHER.....SUNNY.
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* MAX TEMPERATURE....
*   VALLEYS.....84-94.
*   MID SLOPE.....82-90.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS.....8-14%.
*   MID SLOPE.....9-14%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING NORTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP.....SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.....6.
* LAL.............1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....SOUTHEAST 10 TO 15 MPH.
* VENTILATION.....EXCELLENT.

.SUNDAY NIGHT...
* SKY/WEATHER.....CLEAR.
* MIN TEMPERATURE....
*   VALLEYS.....43-53.
*   MID SLOPE.....51-61.
* MAX HUMIDITY.......
*   VALLEYS.....53-63%.
*   MID SLOPE.....26-36%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP.....SOUTHWEST WINDS AROUND 10 MPH.
* HAINES INDEX.....5.
* LAL.............1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER.....SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.....85-95.
*   MID SLOPE.....83-91.
* MIN HUMIDITY.......
*   VALLEYS.....8-13%.
*   MID SLOPE.....8-13%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     IN THE AFTERNOON.
*   RIDGE TOP.....SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.....5.
* LAL.............1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....SOUTH AROUND 10 MPH.
* VENTILATION.....VERY GOOD.
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.EXTENDED...
.MONDAY NIGHT...CLEAR. LOWS 46-56. WEST WINDS AROUND 10 MPH IN THE
EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY THROUGH WEDNESDAY...CLEAR. HIGHS 84-94. LOWS 42-52.
NORTHWEST WINDS 10 TO 20 MPH.
.THURSDAY...CLEAR. HIGHS 81-91. LOWS 38-48. NORTH WINDS 10 TO
15 MPH.
.FRIDAY THROUGH SATURDAY...CLEAR. HIGHS 78-88. LOWS 38-48.

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.8 TO 14 DAY OUTLOOK FOR (SUN SEP 4 THROUGH SAT SEP 10)
BELOW NORMAL TEMPERATURES AND NEAR NORMAL PRECIPITATION.

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HTTP://WEATHER.GOV/RENO
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# National Weather Service Raw Text Product

Displaying AFOS PIL: **FWFREV** Received: **2016-08-28 12:48 UTC**

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View As Image

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962
FNUS55 KREV 281248
FWFREV

FIRE WEATHER PLANNING FORECAST
NATIONAL WEATHER SERVICE RENO NV
548 AM PDT SUN AUG 28 2016

.DISCUSSION...
DRY CONDITIONS WILL CONTINUE INTO THE COMING WEEK. THE ONLY
EXCEPTION COULD BE THE POSSIBILITY OF ELEVATED THUNDERSTORMS LATE
MONDAY NIGHT OR EARLY TUESDAY MORNING NORTH OF PORTOLA. WINDS
WILL BE LIGHT TODAY BEFORE SLOWLY INCREASING DURING THE WEEK. TUESDAY
COULD BE QUITE BREEZY ALONG THE SIERRA FRONT FROM DOUGLAS COUNTY
TO THE OREGON BORDER. TEMPERATURES WILL BE NEAR AVERAGE...BUT
HUMIDITY WILL CONTINUE TO BE LOW WITH FAIR TO POOR OVERNIGHT
RECOVERY.

NOTE:  THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS.
NOTE:  PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
       HTTP://WWW.WRH.NOAA.GOV/FIREWX/?WFO=REV

NVZ450-290045-
WESTERN NEVADA SIERRA FRONT-
548 AM PDT SUN AUG 28 2016

.TODAY...
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* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........86-94.
*   MID SLOPE........80-90.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........7-13%.
*   MID SLOPE........9-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10 MPH
                     WITH GUSTS UP TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17000-18000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR. HAZE.
* MIN TEMPERATURE....
*   VALLEYS..........43-53.
*   MID SLOPE........54-64.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........60-75%.
*   MID SLOPE........23-33%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE EVENING.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........86-94.
*   MID SLOPE........81-91.
* MIN HUMIDITY.......
*   VALLEYS..........7-13%.
*   MID SLOPE........8-14%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH.
* HAINES INDEX.......5.
* LAL................1.
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* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14500-15500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR IN THE EVENING THEN BECOMING PARTLY CLOUDY.
HAZE IN THE EVENING. LOWS 44-54. WEST WINDS 10 TO 15 MPH IN THE
EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...CLEAR. HIGHS 84-92. LOWS 41-51. SOUTHWEST WINDS 15 TO
20 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. HIGHS 81-91. LOWS 35-45.
SOUTHWEST WINDS 10 TO 20 MPH.
.FRIDAY...CLEAR. HIGHS 81-87. LOWS 35-45.
.SATURDAY...PARTLY CLOUDY. HIGHS 77-83.

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CAZ272-290045-
GREATER LAKE TAHOE AREA-
548 AM PDT SUN AUG 28 2016

.TODAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........68-76.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........12-20%.
*   MID SLOPE........14-22%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10 MPH
                     WITH GUSTS UP TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR. HAZE.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........46-56.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........80-95%.
*   MID SLOPE........28-38%.
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*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........69-77.
* MIN HUMIDITY.......
*   VALLEYS..........11-20%.
*   MID SLOPE........12-21%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 40
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14000-15000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR IN THE EVENING THEN BECOMING PARTLY CLOUDY.
HAZE IN THE EVENING. LOWS 36-46. SOUTHWEST WINDS 10 TO 15 MPH IN THE
EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...CLEAR. HIGHS 70-80. LOWS 34-44. SOUTHWEST WINDS 10 TO
15 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. HIGHS 68-77. LOWS 30-40.
SOUTHWEST WINDS 10 TO 15 MPH.
.FRIDAY...CLEAR. HIGHS 67-75. LOWS 30-40.
.SATURDAY...PARTLY CLOUDY. HIGHS 65-71.

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NVZ453-290045-
WEST CENTRAL NEVADA BASIN AND RANGE-
548 AM PDT SUN AUG 28 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........87-97.
*   MID SLOPE........85-95.
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*   24 HR TREND......2 DEGREES WARMER.
* MIN HUMIDITY.......
*   VALLEYS.........6-13%.
*   MID SLOPE........7-14%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......18000-19000 FT MSL.
* TRANSPORT WINDS....WEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS.........44-54.
*   MID SLOPE........52-62.
*   24 HR TREND......2-4 DEGREES COOLER.
* MAX HUMIDITY.......
*   VALLEYS.........34-44%.
*   MID SLOPE........21-31%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.........87-97.
*   MID SLOPE........85-95.
* MIN HUMIDITY.......
*   VALLEYS.........6-12%.
*   MID SLOPE........7-13%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS AROUND 10 MPH. GUSTS UP TO 25
                     MPH IN THE MORNING.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14500-15500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.
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.EXTENDED...
.MONDAY NIGHT...CLEAR. AREAS OF BLOWING DUST IN THE EVENING. LOWS
47-57. WEST WINDS AROUND 10 MPH.
.TUESDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS 86-96. LOWS 47-57.
WEST WINDS 15 TO 20 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS
83-92. LOWS 42-52. WEST WINDS 10 TO 20 MPH.
.FRIDAY...CLEAR. HIGHS 80-88. LOWS 42-52.
.SATURDAY...PARTLY CLOUDY. HIGHS 78-86.

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CAZ270-278-NVZ458-290045-
SURPRISE VALLEY CALIFORNIA-EASTERN LASSEN COUNTY-
NORTHERN WASHOE COUNTY-
548 AM PDT SUN AUG 28 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........85-95.
*   MID SLOPE........79-89.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........7-14%.
*   MID SLOPE........10-17%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....WEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........43-53.
*   MID SLOPE........53-63.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........60-75%.
*   MID SLOPE........23-33%.
*   24 HR TREND......3-5% DRIER MID SLOPES...LITTLE CHANGE VALLEYS.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
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                    MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH. GUSTS 25 TO 30 MPH
                    IN THE EVENING.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........85-95.
*   MID SLOPE........79-89.
* MIN HUMIDITY.......
*   VALLEYS..........7-12%.
*   MID SLOPE........8-13%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                    MPH WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                    MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14500-15500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...PARTLY CLOUDY. AREAS OF BLOWING DUST IN THE EVENING.
LOWS 44-54.  SOUTHWEST WINDS 10 TO 15 MPH IN THE EVENING BECOMING
DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...CLEAR. HIGHS 82-92.  LOWS 38-48.  SOUTHWEST WINDS 15 TO
20 MPH.
.WEDNESDAY THROUGH THURSDAY...PARTLY CLOUDY. AREAS OF BLOWING DUST.
HIGHS 80-90.  LOWS 35-45.  WEST WINDS 10 TO 20 MPH.
.FRIDAY...PARTLY CLOUDY. HIGHS 76-86.  LOWS 36-46.
.SATURDAY...MOSTLY CLOUDY. HIGHS 73-83.

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CAZ271-290045-
WESTERN LASSEN/EASTERN PLUMAS/EASTERN SIERRA/EASTERN NEVADA COUNTIES-
548 AM PDT SUN AUG 28 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........81-91.
*   MID SLOPE........76-86.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-14%.
*   MID SLOPE........12-18%.
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*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........46-56.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........65-80%.
*   MID SLOPE........30-45%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......4-5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........82-92.
*   MID SLOPE........77-85.
* MIN HUMIDITY.......
*   VALLEYS..........8-15%.
*   MID SLOPE........11-18%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14000-15000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.
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.EXTENDED...
.MONDAY NIGHT...PARTLY CLOUDY. LOWS 36-46. SOUTHWEST WINDS 10 TO
15 MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...CLEAR. HIGHS 78-88. LOWS 31-41. SOUTHWEST WINDS 10 TO
15 MPH.
.WEDNESDAY...CLEAR. HIGHS 75-85. LOWS 30-40. SOUTHWEST WINDS 15 TO
20 MPH.
.THURSDAY...PARTLY CLOUDY. HIGHS 73-83. LOWS 30-40. SOUTHWEST WINDS
15 TO 20 MPH.
.FRIDAY THROUGH SATURDAY...PARTLY CLOUDY. HIGHS 72-82. LOWS 31-41.

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CAZ273-290045-
MONO AND EASTERN ALPINE COUNTIES-
548 AM PDT SUN AUG 28 2016

.TODAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........80-90.
*   MID SLOPE........73-83.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-16%.
*   MID SLOPE........10-18%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS 10 TO 15 MPH WITH GUSTS TO 35 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....SOUTHEAST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING CLEAR. HAZE.
* MIN TEMPERATURE....
*   VALLEYS..........35-45.
*   MID SLOPE........44-54.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........76-91%.
*   MID SLOPE........33-43%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
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* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........81-91.
*   MID SLOPE........75-85.
* MIN HUMIDITY.......
*   VALLEYS..........8-15%.
*   MID SLOPE........9-16%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS 25 TO
                     30 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17000-18000 FT MSL.
* TRANSPORT WINDS....SOUTH 10 TO 15 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.MONDAY NIGHT...CLEAR. HAZE IN THE EVENING. LOWS 37-47. SOUTHWEST
WINDS AROUND 10 MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...CLEAR. HIGHS 79-89. LOWS 34-44. SOUTHWEST WINDS 10 TO
15 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. HIGHS 78-88. LOWS 28-38.
SOUTHWEST WINDS 10 TO 15 MPH.
.FRIDAY THROUGH SATURDAY...CLEAR. HIGHS 76-86. LOWS 28-38.

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NVZ459-290045-
MINERAL AND SOUTHERN LYON COUNTIES-
548 AM PDT SUN AUG 28 2016

.TODAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........84-94.
*   MID SLOPE........82-90.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-14%.
*   MID SLOPE........9-15%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING NORTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS AROUND 10 MPH.
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* HAINES INDEX.......6.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......19000-20000 FT MSL.
* TRANSPORT WINDS....SOUTHEAST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.TONIGHT...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........43-53.
*   MID SLOPE........51-61.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........55-70%.
*   MID SLOPE........22-32%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS AROUND 10 MPH.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........85-95.
*   MID SLOPE........83-91.
* MIN HUMIDITY.......
*   VALLEYS..........8-13%.
*   MID SLOPE........9-14%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING EAST AROUND 10 MPH
                     WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST AROUND 10 MPH.
* VENTILATION........VERY GOOD.


.EXTENDED...
.MONDAY NIGHT...CLEAR. LOWS 46-56. NORTHWEST WINDS AROUND 10 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.TUESDAY...CLEAR. HIGHS 84-94. LOWS 44-54. WEST WINDS 15 TO 20 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. HIGHS 84-94. LOWS 39-49.
NORTHWEST WINDS 15 TO 20 MPH.
.FRIDAY THROUGH SATURDAY...CLEAR. HIGHS 80-90. LOWS 39-49.

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.8 TO 14 DAY OUTLOOK FOR (SUN SEP 4 THROUGH SAT SEP 10)
BELOW NORMAL TEMPERATURES AND NEAR NORMAL PRECIPITATION.

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HTTP://WEATHER.GOV/RENO
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# National Weather Service Raw Text Product

Displaying AFOS PIL: **FWFREV** Received: **2016-08-28 20:11 UTC**

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Latest Product | View As Image

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242
FNUS55 KREV 282011
FWFREV

FIRE WEATHER PLANNING FORECAST
NATIONAL WEATHER SERVICE RENO NV
111 PM PDT SUN AUG 28 2016

...FIRE WEATHER WATCH IN EFFECT FROM TUESDAY AFTERNOON THROUGH
TUESDAY EVENING...

.DISCUSSION...

DRY CONDITIONS WILL CONTINUE INTO THE COMING WEEK. THE ONLY
EXCEPTION COULD BE THE POSSIBILITY OF ELEVATED THUNDERSTORMS LATE
MONDAY NIGHT OR EARLY TUESDAY MORNING NORTH OF PORTOLA. WINDS WILL
BE LIGHT TODAY BEFORE SLOWLY INCREASING DURING THE WEEK. TUESDAY
AND WEDNESDAY COULD BE QUITE BREEZY ALONG THE SIERRA FRONT FROM
DOUGLAS COUNTY TO THE OREGON BORDER. TEMPERATURES WILL BE NEAR
AVERAGE...BUT HUMIDITY WILL CONTINUE TO BE LOW WITH FAIR TO POOR
OVERNIGHT RECOVERY. RECOVERIES IMPROVE LATE IN THE WEEK AS
TEMPERATURES TREND COOLER.


NOTE:  THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS.
NOTE:  PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
       HTTP://WWW.WRH.NOAA.GOV/FIREWX/?WFO=REV
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NVZ450-291545-
WESTERN NEVADA SIERRA FRONT-
111 PM PDT SUN AUG 28 2016

...FIRE WEATHER WATCH IN EFFECT FROM TUESDAY AFTERNOON THROUGH
TUESDAY EVENING...

.TONIGHT...
* SKY/WEATHER........CLEAR. HAZE.
* MIN TEMPERATURE....
*   VALLEYS..........42-52.
*   MID SLOPE........53-63.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........58-73%.
*   MID SLOPE........28-38%.
*   24 HR TREND......UP TO 5% WETTER VALLEYS...LITTLE CHANGE MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE EVENING.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........86-94.
*   MID SLOPE........81-91.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-13%.
*   MID SLOPE........8-14%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTH AROUND 10 MPH
                     WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.

.MONDAY NIGHT...
* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........44-54.
*   MID SLOPE........54-64.
* MAX HUMIDITY.......
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*   VALLEYS.....62-72%.
*   MID SLOPE.....23-33%.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP.....SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     AFTER MIDNIGHT.
* HAINES INDEX.....5.
* LAL.............1.
* CHC WETTING RAIN...0%.

.TUESDAY...
* SKY/WEATHER.....PARTLY CLOUDY THEN BECOMING SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.....84-92.
*   MID SLOPE.....79-89.
* MIN HUMIDITY.....
*   VALLEYS.....9-14%.
*   MID SLOPE.....9-14%.
* 20-FOOT WINDS.....
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 15 TO 20
                     MPH WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON. SOME
                     MIDSLOPES MAY GUST TO 35 MPH.
*   RIDGE TOP.....SOUTHWEST WINDS AROUND 10 MPH INCREASING TO 15
                     TO 20 MPH IN THE AFTERNOON. GUSTS UP TO 35
                     MPH.
* HAINES INDEX.....5-6.
* LAL.............1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT.....15500-16500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION.....EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. LOWS 41-51. WEST WINDS 15 TO 20 MPH IN THE
EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.WEDNESDAY THROUGH FRIDAY...CLEAR. HIGHS 81-91. LOWS 36-46. WEST
WINDS 15 TO 20 MPH.
.SATURDAY...PARTLY CLOUDY. HIGHS 77-83. LOWS 35-45.
.SUNDAY...SUNNY. HIGHS 78-83.

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CAZ272-291545-
GREATER LAKE TAHOE AREA-
111 PM PDT SUN AUG 28 2016

.TONIGHT...
* SKY/WEATHER.....CLEAR. HAZE.
* MIN TEMPERATURE....
*   VALLEYS.....34-44.
*   MID SLOPE.....45-55.
*   24 HR TREND.....LITTLE CHANGE.
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* MAX HUMIDITY.......
*   VALLEYS..........78-93%.
*   MID SLOPE........35-45%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS..........72-82.
*   MID SLOPE........69-77.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........12-22%.
*   MID SLOPE........11-21%.
*   24 HR TREND......2% WETTER.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 40
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 15 TO 20 MPH.
* VENTILATION........EXCELLENT.

.MONDAY NIGHT...
* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........37-47.
*   MID SLOPE........49-59.
* MAX HUMIDITY.......
*   VALLEYS..........82-92%.
*   MID SLOPE........27-37%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 40
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
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.TUESDAY...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........70-80.
*   MID SLOPE........67-75.
* MIN HUMIDITY.......
*   VALLEYS..........14-24%.
*   MID SLOPE........13-23%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS UP TO 30 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 15 TO 25 MPH WITH GUSTS TO 50
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14000-15000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 25 TO 30 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. LOWS 34-44. SOUTHWEST WINDS 10 TO 15 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. HIGHS 68-77. LOWS 32-42.
SOUTHWEST WINDS 15 TO 20 MPH.
.FRIDAY...CLEAR. HIGHS 67-75. LOWS 32-42. SOUTHWEST WINDS 10 TO
15 MPH.
.SATURDAY...PARTLY CLOUDY. HIGHS 65-71. LOWS 29-39.
.SUNDAY...SUNNY. HIGHS 66-73.

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NVZ453-291545-
WEST CENTRAL NEVADA BASIN AND RANGE-
111 PM PDT SUN AUG 28 2016

...DRY AND BREEZY CONDITIONS FOR THE VERY NORTHWESTERN PORTION OF
ZONE 453 TUESDAY AFTERNOON...

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........43-53.
*   MID SLOPE........51-61.
*   24 HR TREND......3 DEGREES COOLER.
* MAX HUMIDITY.......
*   VALLEYS..........35-45%.
*   MID SLOPE........30-40%.
*   24 HR TREND......UP TO 5% WETTER.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH WITH GUSTS TO 25 MPH.
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* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........87-97.
*   MID SLOPE........85-95.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........6-12%.
*   MID SLOPE........7-12%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS AROUND 10 MPH. GUSTS UP TO 25
                     MPH IN THE MORNING.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.MONDAY NIGHT...
* SKY/WEATHER........CLEAR. AREAS OF BLOWING DUST IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........47-57.
*   MID SLOPE........53-63.
* MAX HUMIDITY.......
*   VALLEYS..........35-45%.
*   MID SLOPE........22-32%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH. GUSTS UP TO 25 MPH IN
                     THE EVENING.
*   RIDGE TOP........WEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     AFTER MIDNIGHT.
* HAINES INDEX.......5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.TUESDAY...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING SUNNY. AREAS OF
                     BLOWING DUST IN THE AFTERNOON.
* MAX TEMPERATURE....
*   VALLEYS..........86-96.
*   MID SLOPE........83-93.
* MIN HUMIDITY.......
*   VALLEYS..........7-12%.
*   MID SLOPE........8-13%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
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                    MPH WITH GUSTS AROUND 25 MPH IN THE AFTERNOON.
                    PYRAMID LAKE AND LOCATIONS NEAR GERLACH MAY GUST
                    HAVE PERIODIC GUSTS UP TO 35 MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
                    MPH.
* HAINES INDEX.......5-6.
* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15500-16500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. AREAS OF BLOWING DUST IN THE EVENING. LOWS
46-56. WEST WINDS 10 TO 15 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS
83-92. LOWS 43-53. WEST WINDS 15 TO 20 MPH.
.FRIDAY...CLEAR. HIGHS 80-88. LOWS 41-51. WEST WINDS 10 TO 15 MPH.
.SATURDAY...PARTLY CLOUDY. HIGHS 78-86. LOWS 40-50.
.SUNDAY...SUNNY. HIGHS 78-86.

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CAZ270-278-NVZ458-291545-
SURPRISE VALLEY CALIFORNIA-EASTERN LASSEN COUNTY-
NORTHERN WASHOE COUNTY-
111 PM PDT SUN AUG 28 2016

...FIRE WEATHER WATCH IN EFFECT FROM TUESDAY AFTERNOON THROUGH
TUESDAY EVENING...

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........42-52.
*   MID SLOPE........52-62.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........35-50%.
*   MID SLOPE........27-37%.
*   24 HR TREND......3% DRIER MID SLOPES...LITTLE CHANGE VALLEYS.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                    MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                    MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH. GUSTS 25 TO 30 MPH
                    IN THE EVENING.
* HAINES INDEX.......4-5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
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* MAX TEMPERATURE....
*   VALLEYS.....85-95.
*   MID SLOPE.....79-89.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS.....8-13%.
*   MID SLOPE.....8-13%.
*   24 HR TREND......2% DRIER.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS AROUND 25 MPH IN THE AFTERNOON.
*   RIDGE TOP.....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......5.
* LAL.............1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15000-16000 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION.....EXCELLENT.

.MONDAY NIGHT...
* SKY/WEATHER.....PARTLY CLOUDY. AREAS OF BLOWING DUST IN THE
                     EVENING.
* MIN TEMPERATURE....
*   VALLEYS.....44-54.
*   MID SLOPE.....54-64.
* MAX HUMIDITY.......
*   VALLEYS.....59-69%.
*   MID SLOPE.....24-34%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS UP TO 30
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP.....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......5.
* LAL.............1.
* CHC WETTING RAIN...0%.

.TUESDAY...
* SKY/WEATHER.....PARTLY CLOUDY. AREAS OF BLOWING DUST IN THE
                     AFTERNOON.
* MAX TEMPERATURE....
*   VALLEYS.....82-92.
*   MID SLOPE.....76-86.
* MIN HUMIDITY.......
*   VALLEYS.....8-13%.
*   MID SLOPE.....9-14%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 15 TO 20
                     MPH WITH GUSTS UP TO 35 MPH IN THE AFTERNOON.
*   RIDGE TOP.....SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5-6.
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* LAL.................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15500-16500 FT MSL.
* TRANSPORT WINDS....SOUTH 25 TO 30 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. AREAS OF BLOWING DUST IN THE EVENING. LOWS
38-48. SOUTHWEST WINDS 15 TO 20 MPH BECOMING WEST AROUND 10 MPH
AFTER MIDNIGHT.
.WEDNESDAY THROUGH THURSDAY...CLEAR. AREAS OF BLOWING DUST. HIGHS
80-90. LOWS 36-46. WEST WINDS 10 TO 20 MPH.
.FRIDAY...PARTLY CLOUDY. HIGHS 76-86. LOWS 35-45. WEST WINDS 15 TO
20 MPH.
.SATURDAY THROUGH SUNDAY...PARTLY CLOUDY. HIGHS 73-83. LOWS 35-45.

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CAZ271-291545-
WESTERN LASSEN/EASTERN PLUMAS/EASTERN SIERRA/EASTERN NEVADA COUNTIES-
111 PM PDT SUN AUG 28 2016

.TONIGHT...
* SKY/WEATHER........CLEAR.
* MIN TEMPERATURE....
*   VALLEYS..........34-44.
*   MID SLOPE........45-55.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS..........68-83%.
*   MID SLOPE........35-50%.
*   24 HR TREND......2% WETTER VALLEYS...LITTLE CHANGE MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......4-5.
* LAL.................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........82-92.
*   MID SLOPE........77-85.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS..........8-16%.
*   MID SLOPE........11-17%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
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*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......14500-15500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION........EXCELLENT.

.MONDAY NIGHT...
* SKY/WEATHER........PARTLY CLOUDY.
* MIN TEMPERATURE....
*   VALLEYS..........36-46.
*   MID SLOPE........47-57.
* MAX HUMIDITY.......
*   VALLEYS..........76-86%.
*   MID SLOPE........36-46%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 25
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.TUESDAY...
* SKY/WEATHER........PARTLY CLOUDY.
* MAX TEMPERATURE....
*   VALLEYS..........78-88.
*   MID SLOPE........73-83.
* MIN HUMIDITY.......
*   VALLEYS..........10-18%.
*   MID SLOPE........12-18%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS UP TO 30 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 20 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......13500-14500 FT MSL.
* TRANSPORT WINDS....SOUTH 25 TO 30 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. LOWS 33-43. SOUTHWEST WINDS 10 TO 15 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.WEDNESDAY THROUGH THURSDAY...CLEAR. HIGHS 75-85. LOWS 32-42.
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SOUTHWEST WINDS 15 TO 20 MPH.
.FRIDAY...PARTLY CLOUDY. HIGHS 72-82. LOWS 30-40. WEST WINDS 15 TO
20 MPH.
.SATURDAY THROUGH SUNDAY...PARTLY CLOUDY. HIGHS 71-81. LOWS 29-39.

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CAZ273-291545-
MONO AND EASTERN ALPINE COUNTIES-
111 PM PDT SUN AUG 28 2016

.TONIGHT...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING CLEAR. HAZE.
* MIN TEMPERATURE....
*   VALLEYS.........34-44.
*   MID SLOPE........43-53.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS.........70-80%. 82-92% COLDEST VALLEYS
*   MID SLOPE........33-43%.
*   24 HR TREND......2% WETTER VALLEYS...LITTLE CHANGE MID SLOPES.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER........SUNNY. HAZE.
* MAX TEMPERATURE....
*   VALLEYS.........81-91.
*   MID SLOPE........75-85.
*   24 HR TREND......3 DEGREES WARMER.
* MIN HUMIDITY.......
*   VALLEYS.........8-16%.
*   MID SLOPE........9-16%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST AROUND 10
                     MPH WITH GUSTS TO 20 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS 25 TO
                     30 MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17000-18000 FT MSL.
* TRANSPORT WINDS....SOUTH 10 TO 15 MPH.
* VENTILATION........EXCELLENT.

.MONDAY NIGHT...
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* SKY/WEATHER........CLEAR. HAZE IN THE EVENING.
* MIN TEMPERATURE....
*   VALLEYS..........37-47.
*   MID SLOPE........47-57.
* MAX HUMIDITY.......
*   VALLEYS..........78-88%.
*   MID SLOPE........32-42%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH WITH GUSTS TO 35
                     MPH.
* HAINES INDEX.......5.
* LAL................1.
* CHC WETTING RAIN...0%.

.TUESDAY...
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........79-89.
*   MID SLOPE........73-83.
* MIN HUMIDITY.......
*   VALLEYS..........10-16%.
*   MID SLOPE........10-18%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS UP TO 30 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH INCREASING TO 15 TO
                     25 MPH IN THE AFTERNOON. GUSTS UP TO 45 MPH.
* HAINES INDEX.......5-6.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......17500-18500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. LOWS 34-44. SOUTHWEST WINDS 10 TO 15 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.WEDNESDAY THROUGH FRIDAY...CLEAR. HIGHS 78-88. LOWS 28-38.
SOUTHWEST WINDS 15 TO 20 MPH.
.SATURDAY THROUGH SUNDAY...CLEAR. HIGHS 72-82. LOWS 28-38.

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NVZ459-291545-
MINERAL AND SOUTHERN LYON COUNTIES-
111 PM PDT SUN AUG 28 2016

.TONIGHT...
* SKY/WEATHER........PARTLY CLOUDY THEN BECOMING CLEAR.
* MIN TEMPERATURE....
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*   VALLEYS.....42-52.
*   MID SLOPE.....50-60.
*   24 HR TREND......LITTLE CHANGE.
* MAX HUMIDITY.......
*   VALLEYS.....55-70%.
*   MID SLOPE.....30-45%.
*   24 HR TREND......2-4% WETTER MID SLOPES...LITTLE CHANGE VALLEYS.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH GUSTS TO 20 MPH IN
                     THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
*   RIDGE TOP.....SOUTHWEST WINDS AROUND 10 MPH.
* HAINES INDEX.......5.
* LAL.............1.
* CHC WETTING RAIN...0%.

.MONDAY...
* SKY/WEATHER.....SUNNY.
* MAX TEMPERATURE....
*   VALLEYS.....85-95.
*   MID SLOPE.....83-91.
*   24 HR TREND......LITTLE CHANGE.
* MIN HUMIDITY.......
*   VALLEYS.....8-13%.
*   MID SLOPE.....8-13%.
*   24 HR TREND......LITTLE CHANGE.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING NORTHWEST AROUND 10 MPH
                     IN THE AFTERNOON.
*   RIDGE TOP.....SOUTH WINDS AROUND 10 MPH.
* HAINES INDEX.......5.
* LAL.............1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......15500-16500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST AROUND 10 MPH.
* VENTILATION.....VERY GOOD.

.MONDAY NIGHT...
* SKY/WEATHER.....CLEAR.
* MIN TEMPERATURE....
*   VALLEYS.....46-56.
*   MID SLOPE.....52-62.
* MAX HUMIDITY.......
*   VALLEYS.....52-62%.
*   MID SLOPE.....25-35%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....NORTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 20
                     MPH IN THE EVENING BECOMING DOWNSLOPE 2 TO 5
                     MPH.
*   RIDGE TOP.....WEST WINDS AROUND 10 MPH.
* HAINES INDEX.......5.
* LAL.............1.
* CHC WETTING RAIN...0%.

.TUESDAY...
```

```
* SKY/WEATHER........SUNNY.
* MAX TEMPERATURE....
*   VALLEYS..........84-94.
*   MID SLOPE........82-90.
* MIN HUMIDITY.......
*   VALLEYS..........8-13%.
*   MID SLOPE........9-14%.
* 20-FOOT WINDS......
*   VALLEYS/SLOPE....UPSLOPE 4 TO 8 MPH BECOMING SOUTHWEST 10 TO 15
                     MPH WITH GUSTS AROUND 25 MPH IN THE AFTERNOON.
*   RIDGE TOP........SOUTHWEST WINDS 10 TO 15 MPH. GUSTS UP TO 25 MPH
                     IN THE AFTERNOON.
* HAINES INDEX.......5-6.
* LAL................1.
* CHC WETTING RAIN...0%.
* MIXING HEIGHT......16500-17500 FT MSL.
* TRANSPORT WINDS....SOUTHWEST 20 TO 25 MPH.
* VENTILATION........EXCELLENT.


.EXTENDED...
.TUESDAY NIGHT...CLEAR. LOWS 44-54. SOUTHWEST WINDS 10 TO 15 MPH IN
THE EVENING BECOMING DOWNSLOPE 2 TO 5 MPH.
.WEDNESDAY THROUGH FRIDAY...CLEAR. HIGHS 84-94. LOWS 39-49.
NORTHWEST WINDS 15 TO 20 MPH.
.SATURDAY...PARTLY CLOUDY. HIGHS 78-86. LOWS 38-48.
.SUNDAY...SUNNY. HIGHS 78-86.

$$


.8 TO 14 DAY OUTLOOK FOR (MON SEP 5 THROUGH SUN SEP 11)
BELOW NORMAL TEMPERATURES AND NEAR NORMAL PRECIPITATION.

=
$$

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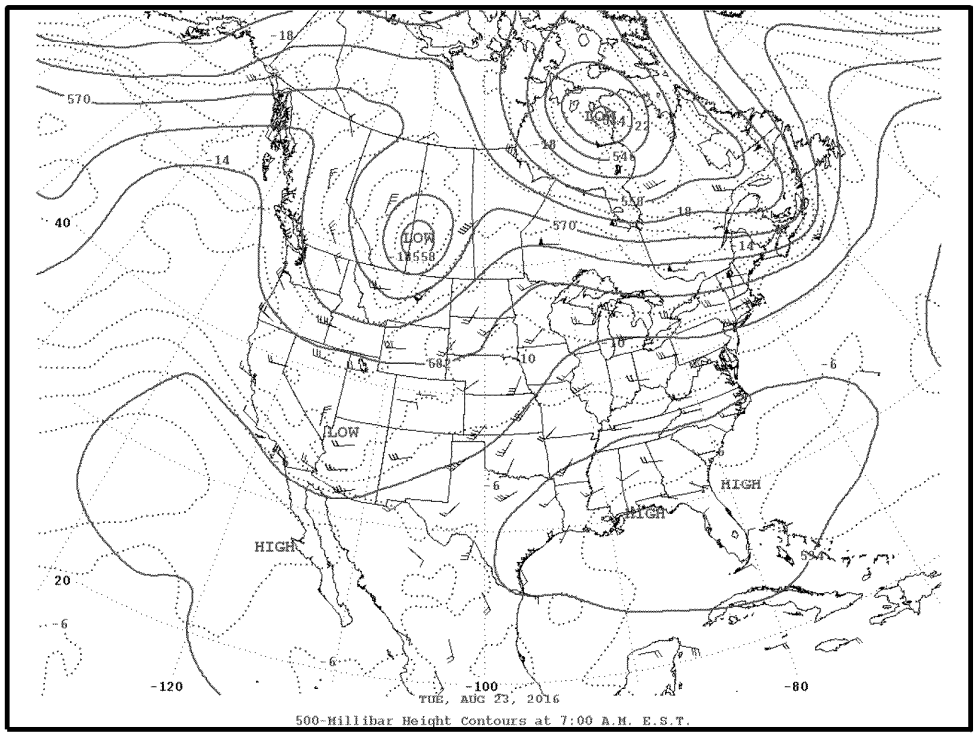
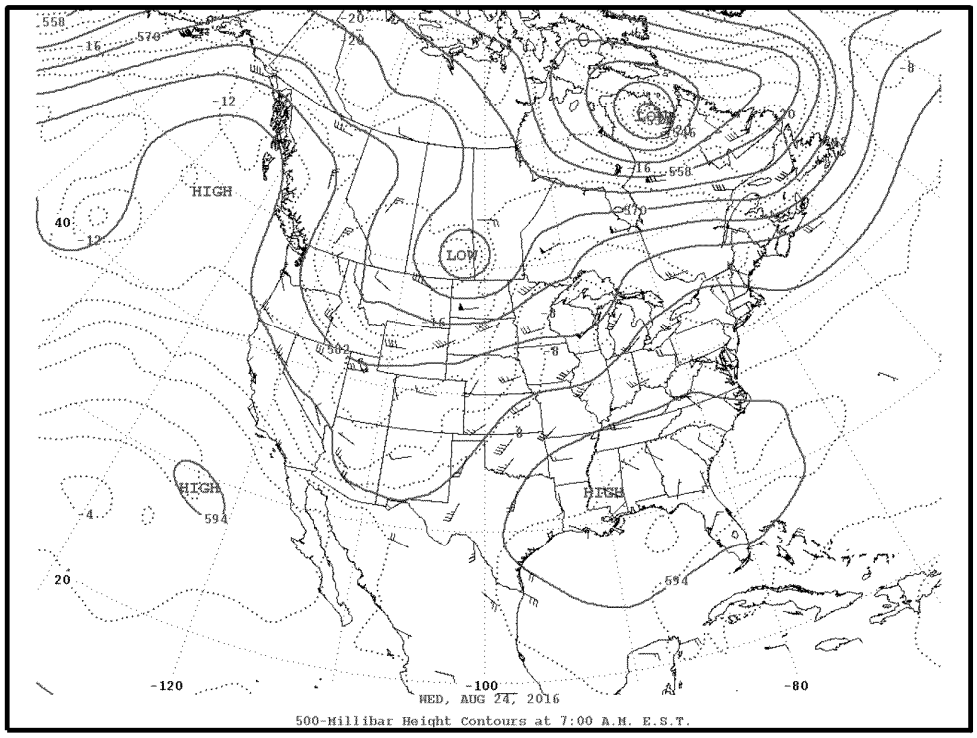
# APPENDIX D

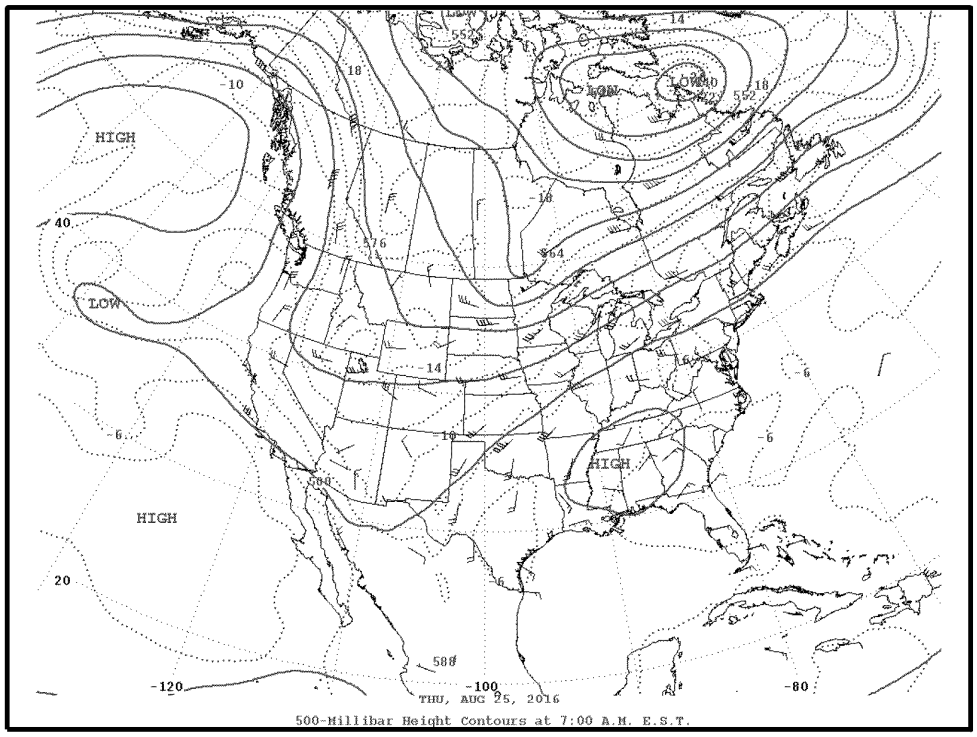
# Surface Weather Maps for the Fallon Area – June 29 through July 5, 2016



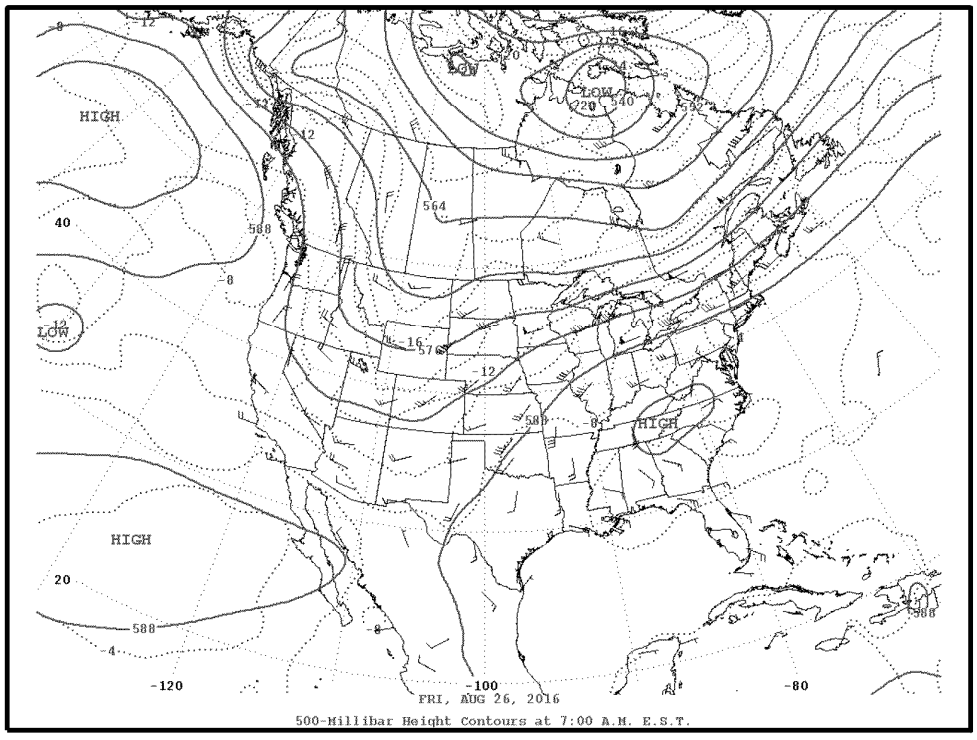

500 mb map for August 23, 2016



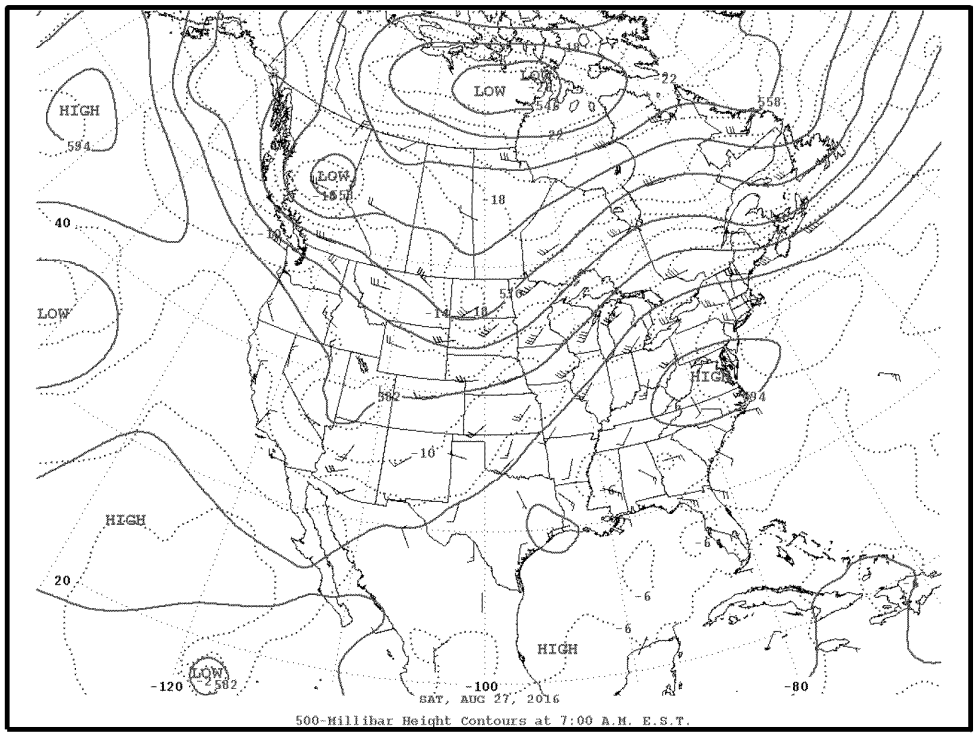

500 mb map for August 24, 2016



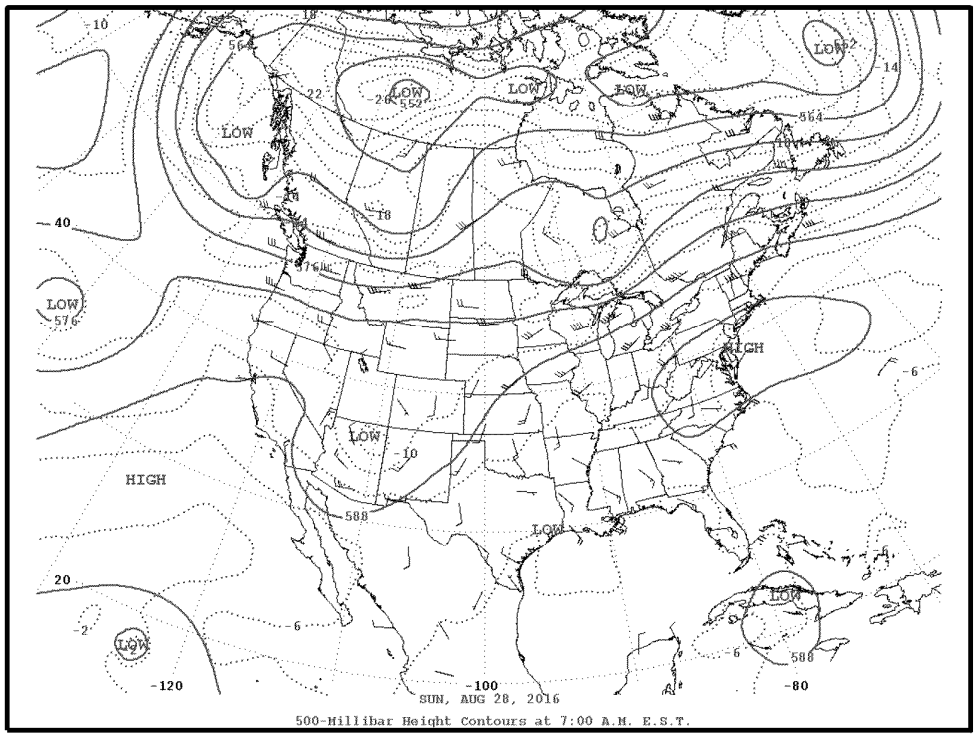

500 mb map for August 25, 2016




500 mb map for August 26, 2016




500 mb map for August 27, 2016

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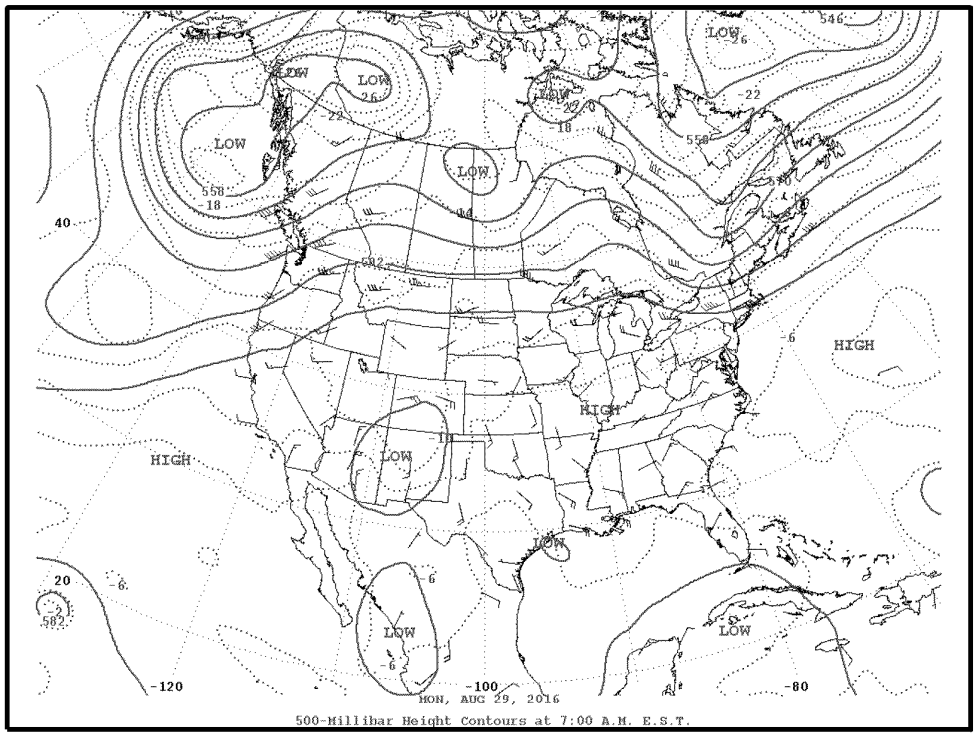


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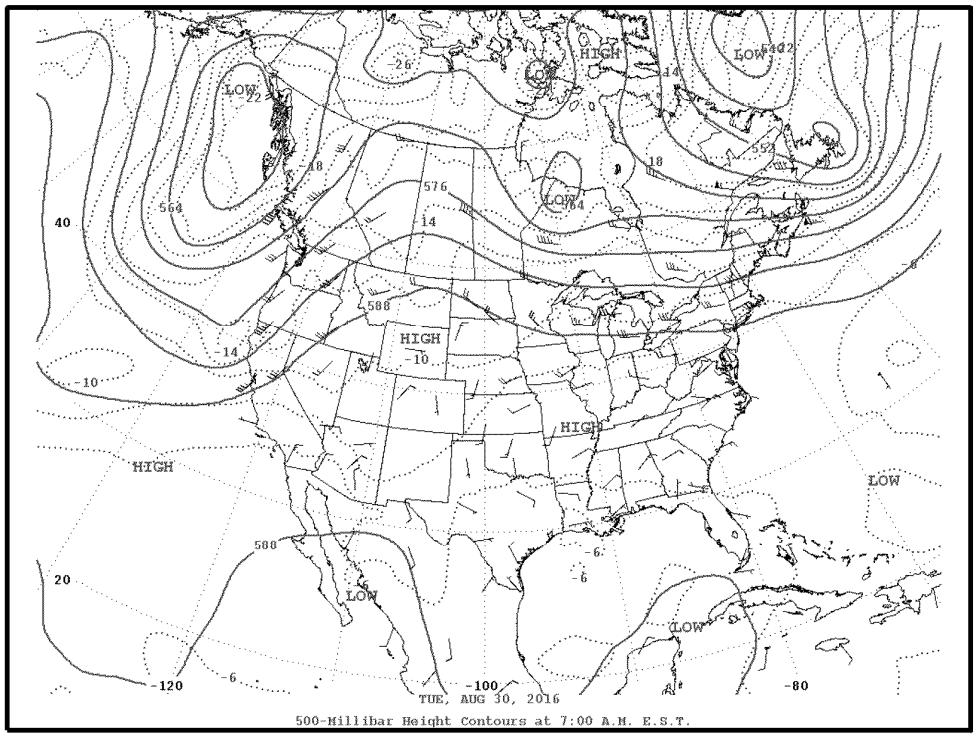
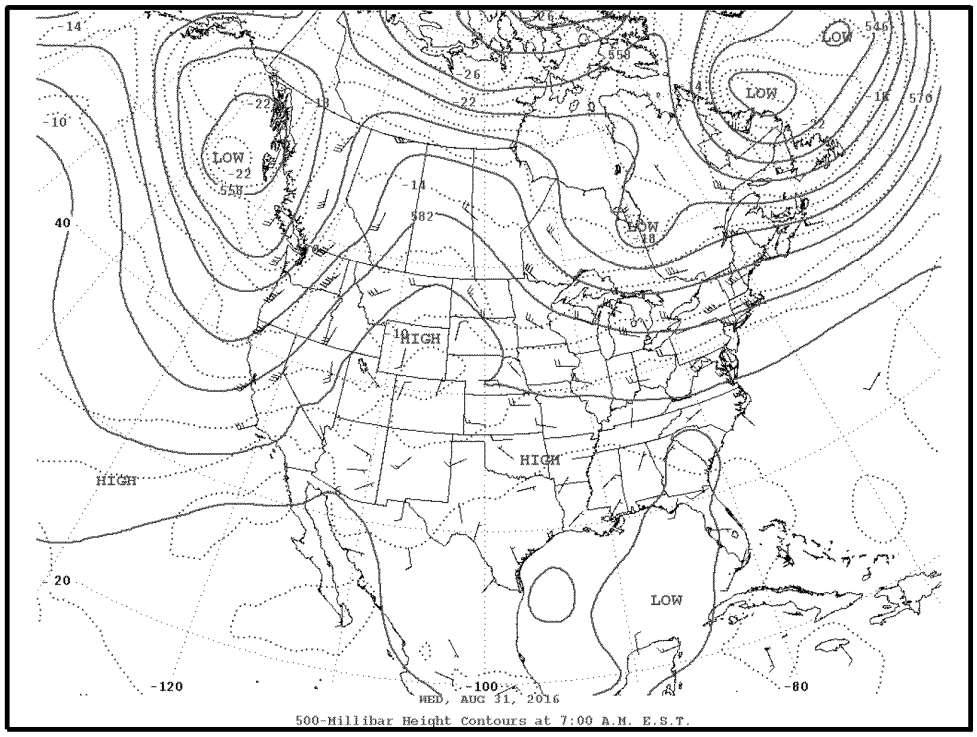



500 mb map for August 30, 2016

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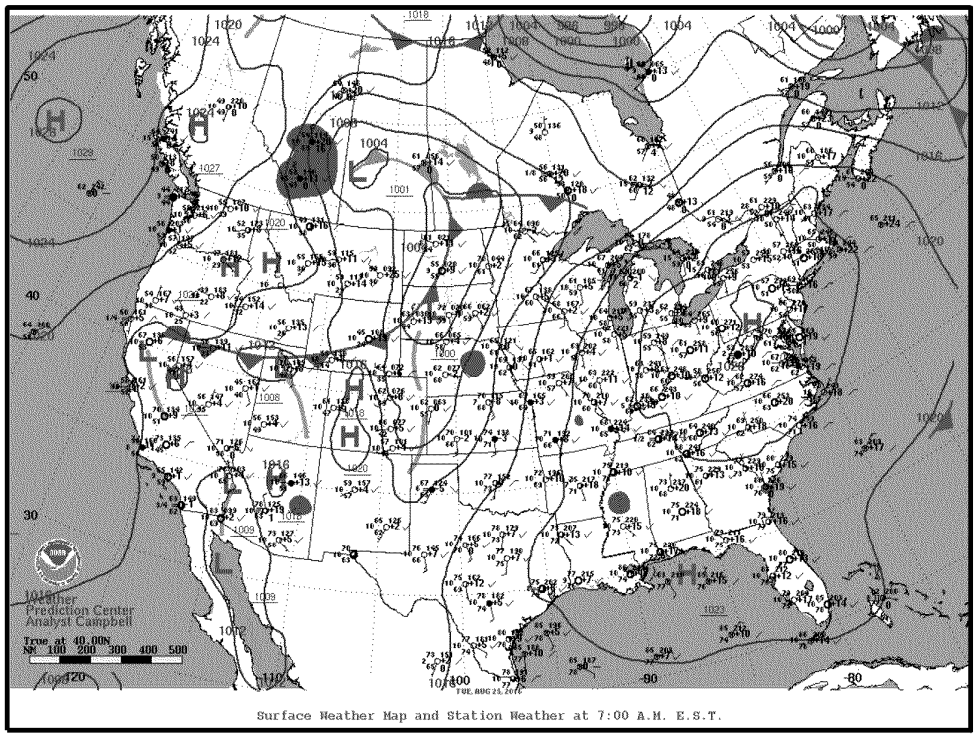
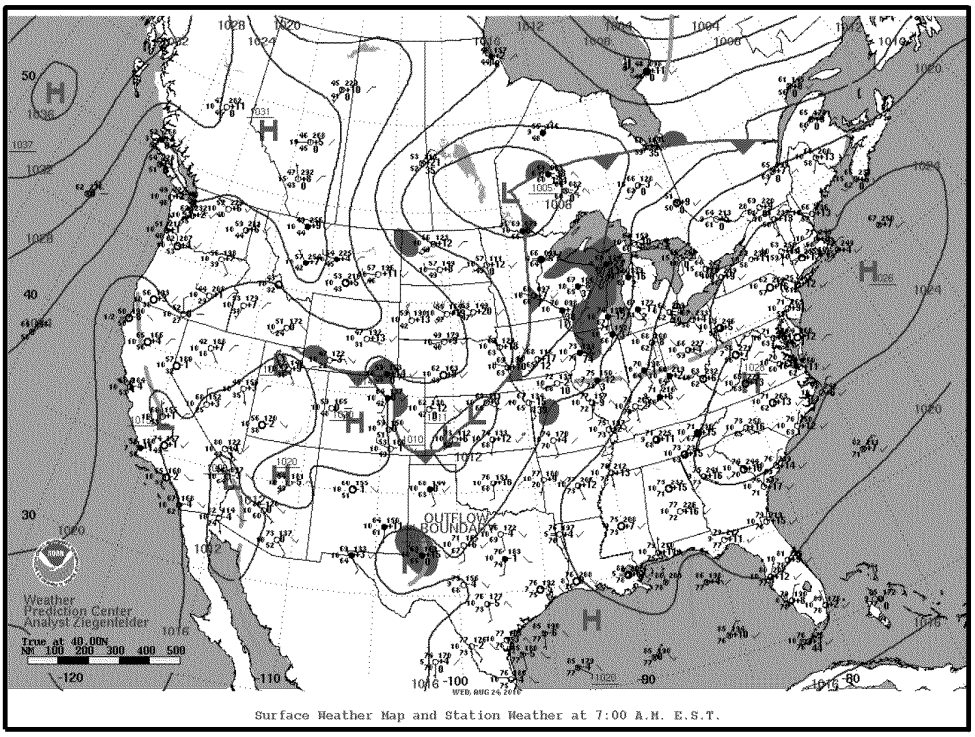
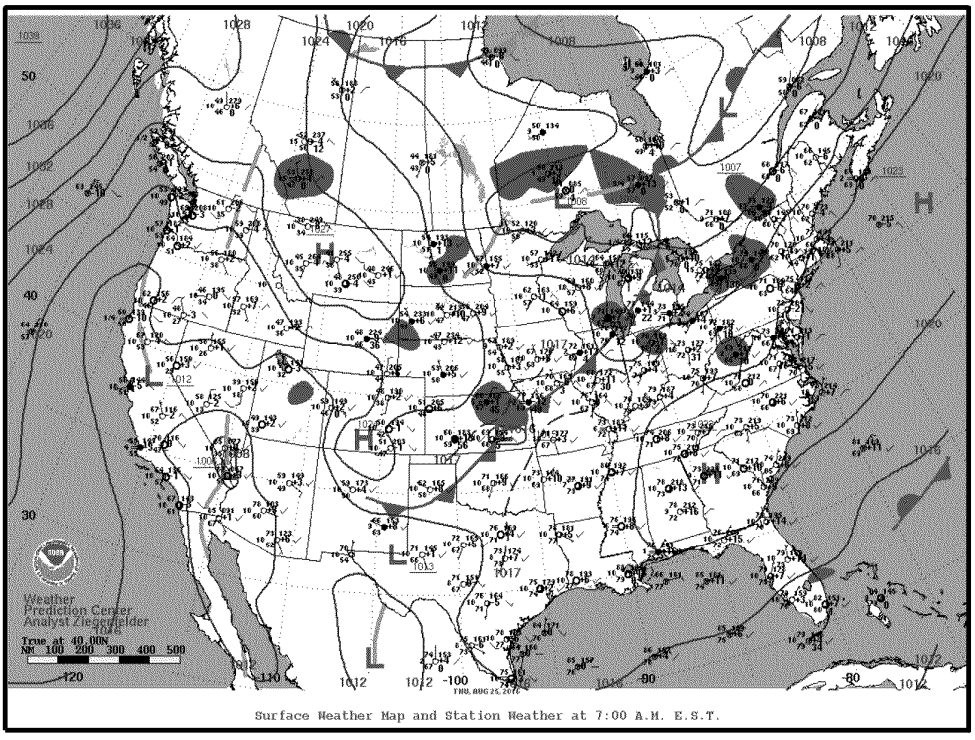


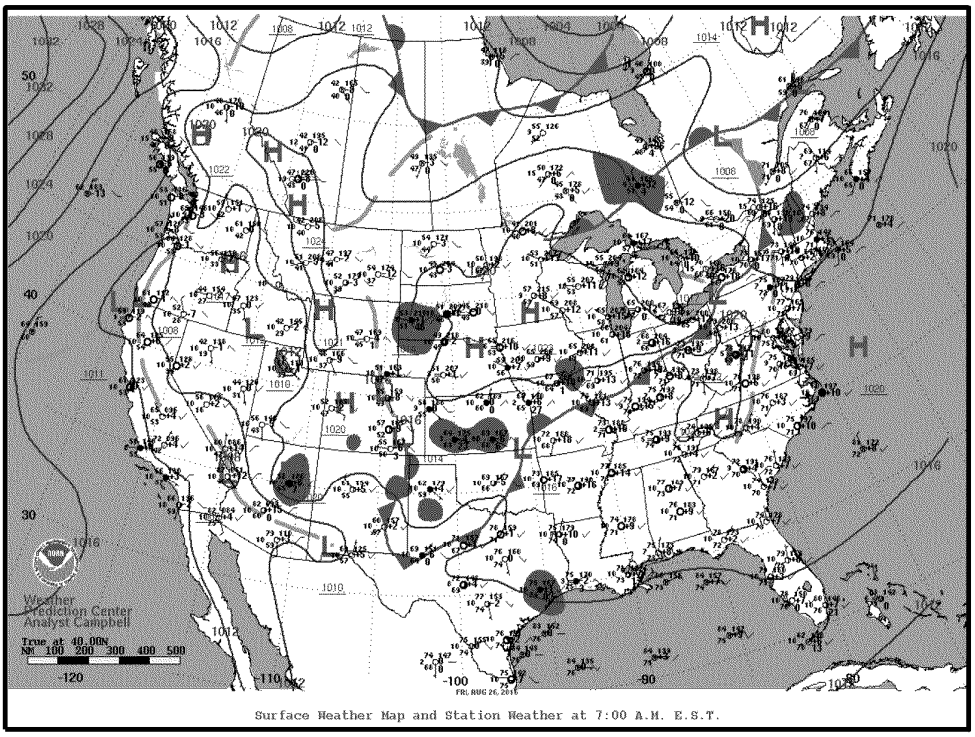

Surface map for August 23, 2016



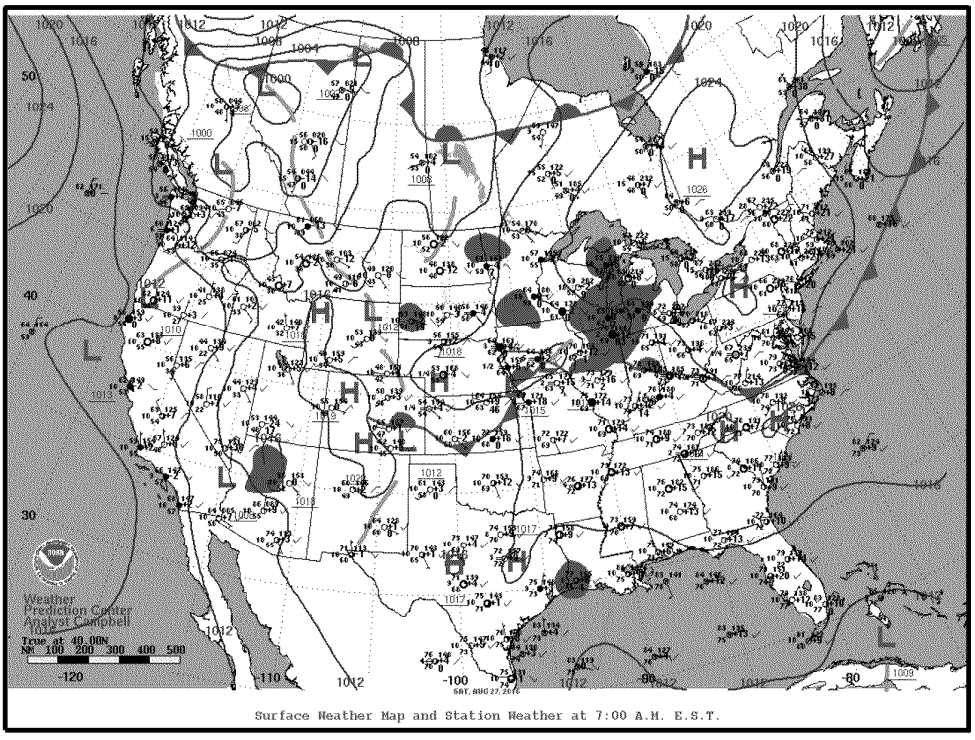

Surface map for August 24, 2016




Surface map for August 25, 2016




Surface map for August 26, 2016

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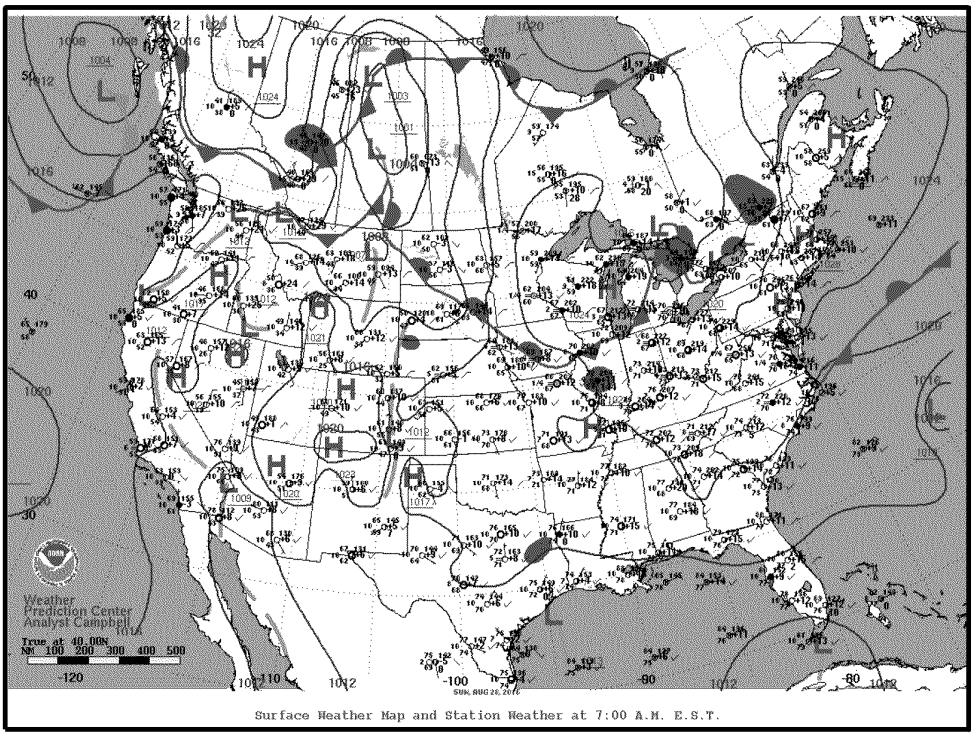
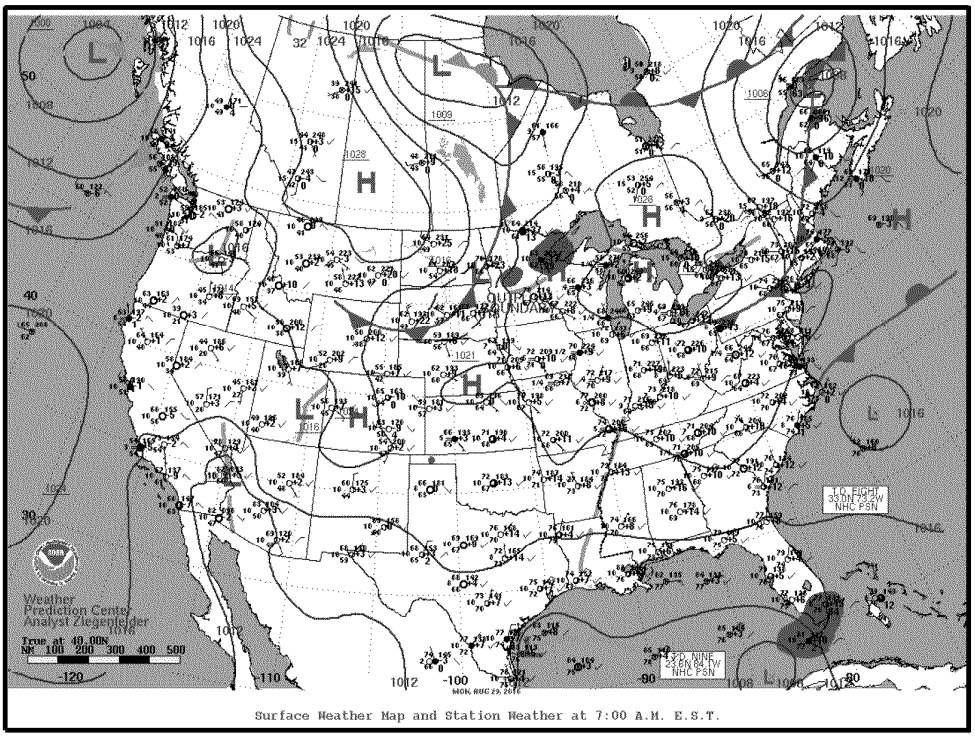



Surface map for August 28, 2016

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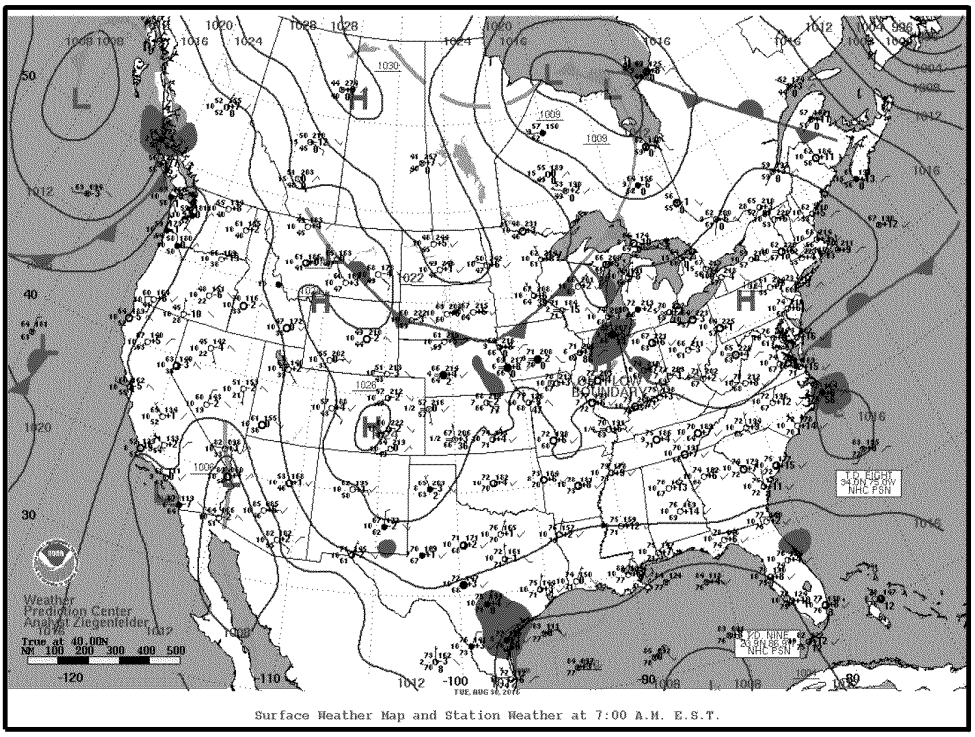
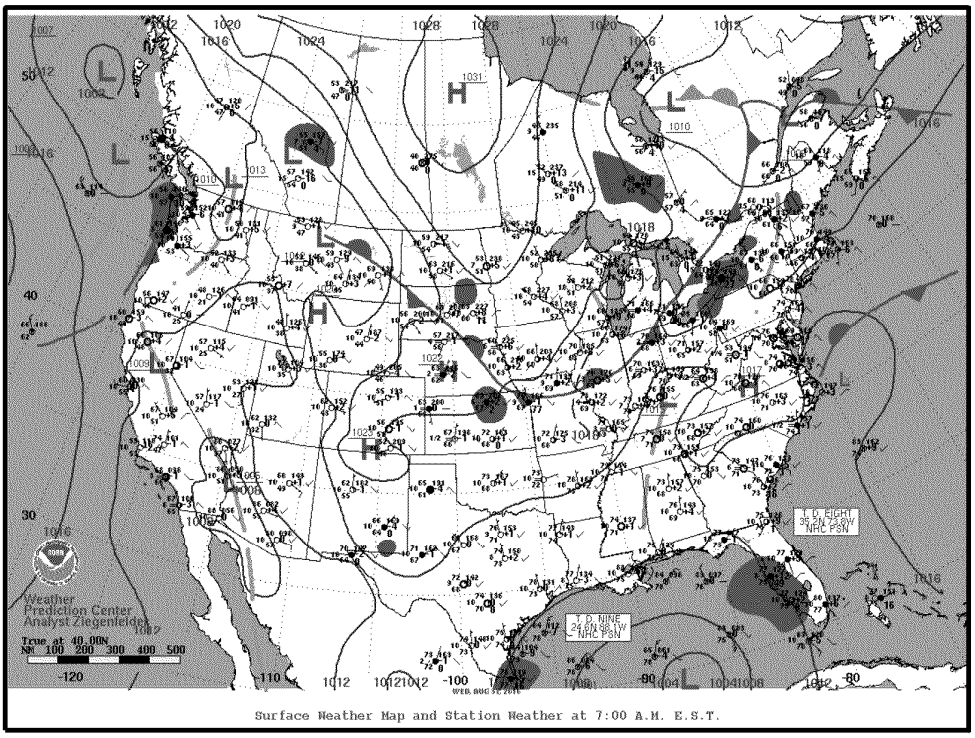



Surface map for August 30, 2016




Surface map for August 31, 2016

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

May 31, 2017

Randall Chang
United States Environmental Protection Agency, Region 9
75 Hawthorne Street
Mail code: AIR-7
San Francisco, California 94105

Re: Submittal of Exceptional Events for the State of Nevada

Dear Mr. Chang:

The State of Nevada, Department of Conservation and Natural Resources, Bureau of Air Quality Planning, requests that the EPA Region IX exclude data related to exceedances of the NAAQS for ozone that are directly due to exceptional events. Specifically, NDEP requests that ozone data be excluded for July 3 and 4, 2016 for the Fernley monitoring site due to wildfire, and for August 28, 2016 for the Fallon monitoring site due to wildfire. The enclosed documents demonstrate that there is a clear causal relationship between the measured exceedances of the ozone standard and these natural events.

Concurrent public comment/review on the enclosed documents is being solicited through our website beginning on May 31, 2017.

If you have any questions or need additional information, please contact Daren Winkelman at (775) 687-9342.

Sincerely,

Danilo Dragoni
Chief, Bureau of Air Quality Planning

DD:dw



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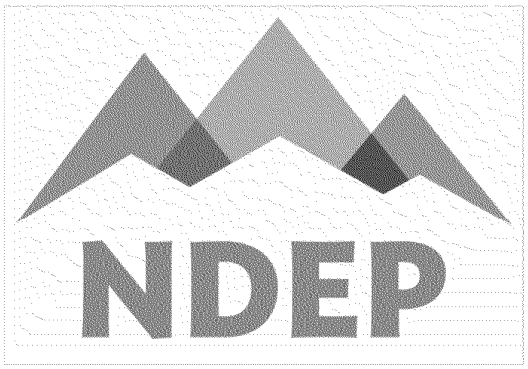
# NEVADA DIVISION OF ENVIRONMENTAL PROTECTION




# ANALYSIS OF THE TRAILHEAD WILDFIRE IN CALIFORNIA AS AN EXCEPTIONAL EVENT AND ITS CONTRIBUTION TO HIGH OZONE CONCENTRATIONS IN FERNLEY, NEVADA

FINAL Report
May 2017

Authors
Daren Winkelman
Sheryl Fontaine

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **agl** | Above ground level |
| **amsl** | Above mean sea level |
| **AQI** | Air Quality Index |
| **AQS** | Air Quality System |
| **BAQP** | Bureau of Air Quality Planning |
| **CFR** | Code of Federal Regulations |
| **CSA** | Combined Statistical Area |
| **°F** | Degrees Fahrenheit |
| **EER** | Exceptional Event Rule |
| **FEM** | Federal Equivalence Method |
| **HMS** | Hazard Mapping System |
| **HYSPLIT** | Hybrid Single Particle Lagrangian Integrated Trajectory |
| **km** | kilometers |
| **m** | Meters |
| **mph** | Miles per hour |
| **NAAQS** | National Ambient Air Quality Standards |
| **NDEP** | Nevada Division of Environmental Protection |
| **NEI** | National Emissions Inventory |
| **NO** | Nitrogen Monoxide |
| **$NO_x$** | Oxides of Nitrogen |
| **$O_3$** | Ozone |
| **ppb** | Parts per billion |
| **Preparedness Level** | PL |
| **$PM_{2.5}$** | Particulate Matter Smaller than 2.5 Micrometers |
| **$PM_{10}$** | Particulate Matter Smaller than 10 Micrometers |
| **PST** | Pacific Standard Time |
| **tpd** | Tons per day |
| **U.S.** | United States |
| **USEPA** | United States Environmental Protection Agency |
| **UTC** | Coordinated Universal Time |
| **VOCs** | Volatile Organic Compounds |



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# ANALYSIS OF THE TRAILHEAD WILDFIRE IN CALIFORNIA AS AN EXCEPTIONAL EVENT AND ITS CONTRIBUTION TO HIGH OZONE CONCENTRATIONS IN FERNLEY, NEVADA ON JULY 3 AND 4, 2016

## 1.0 INTRODUCTION

The Nevada Division of Environmental Protection (NDEP) Bureau of Air Quality Planning (BAQP) operates a network of ambient air quality monitors at a variety of locations throughout the state of Nevada. In 2016, air quality monitoring was represented by eleven ambient air quality monitoring stations (Carson City ( ozone [$O_3$], particulate matter smaller than 2.5 micrometers in diameter [$PM_{2.5}$]), Elko (particulate matter smaller than 10 micrometers [$PM_{10}$]), Fallon ($O_3$), Fernley ($O_3$), Pahrump ($PM_{10}$) and Gardnerville ($PM_{2.5}$)) under the jurisdiction of the NDEP - BAQP. The USEPA provides minimum site requirements to monitor for $O_3$ and PM based on Metropolitan Statistical Area population (40 Code of Federal Regulations [ CFR] Part 58, Appendix D). The NDEP-BAQP's air monitoring network meets or, in most cases, exceeds the minimum network requirements. Data was collected and quality assured in accordance with 40 CFR Part 58 and submitted to the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS) database. The approval letter for the 2016 NDEP-BAQP Annual Network Plan is included in Appendix A. Ambient air monitoring data is collected and data quality is assured in accordance with 40 CFR 58. The data for 201 6 was certified in May 2017. The Data Certification Letter was submitted to USEPA Region IX in May 2017 as well, and is included in Appendix B.

### 1.1 SCOPE OF REPORT

The Trailhead Fire, located west of Volcanoville , California, started June 28, 2016 and burned 5,646 acres. On June 29, 2016, smoke from the Trailhead Fire began to impact western Nevada. Wildfire smoke continued to affect western Nevada through July 4, 2016. On July 3 and 4, 2016, the NDEP monitored one exceedance of the 2015 8 -hour $O_3$ National Ambient Air Quality Standards (NAAQS) at the Fernley air quality monitoring site (AQS 32-019-0006), and one high associated value (hereafter referred to as "exceedances" in this document),due to the smoke plume impacts. The Trailhead Fire was 100 percent contained on July 18, 2016.

The NDEP is requesting exclusion of the July 3 and 4, 2016 8 -hour $O_3$ data from the Fernley air monitoring site that met or exceeded the NAAQS as an exceptional event under the US EPA's regulation for *The Treatment of Dat a Influenced by Exceptional Even ts;* (81 Federal Register 68216; USEPA, 2016), known as the Exceptional Events Rule (EER; 40 CFR Parts 50 and 51). The purpose of this report is to provide documentation in support of this request. The Trailhead Fire in California was a natural event that caused exceedances of the federal standard for one of NDEP's Federal Equivalent Method (FEM) ozone monitors on July 3 and 4 , 2016. The 8-hour



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average $O_3$ concentration reached 71 parts per billion (ppb) at the Fernley air monitoring station in Lyon County (AQS Site Code32-019-0006). This document demonstrates thatthe 8-hour ozone exceedances on July 3 and 4, 2016 at the Fernley monitoring site meet the requirements for having been influenced by an exceptional event as stipulated in the EER. Table 1 lists the 8-hour ozone concentrations at Fernley that are included in this request.

**Table 1. Eight-hour Federal Ozone Values at the Fernley Monitoring Site**

| Monitoring Site | AQS Number | Maximum Daily 8-hour Average $O_3$ Concentration (ppb) | Date | Date of Maximum |
|---|---|---|---|---|
| Fernley | 32-019-0006 | 71 | 07/03/2016 | 07/03/2016 |
| | | 70 | 07/04/2016 | |

The elevated ozone concentrations observed on July 3 and 4 , 2016 occurred as a result of the emissions from the Trailhead Fire in California. The NDEP-BAQP has submitted the 1-hour $O_3$ data from the affected monitors on those days to the US EPA AQS database and has placed the appropriate AQS flags throughout the data to indicate that the data was affected by an exceptional event due to wildfire. Informational flags (IT) were also included for other ozone NDEP-BAQP monitoring sites for the same time period. This flagging indicates that the ambient air quality data was influenced by the wildfire emissions, and ensures that the data is properly represented in the regulatory process.

### 1.2 EXCEPTIONAL EVENT DEFINITION AND DEMONSTRATION CRITERIA

The EER defines an exceptional event in 40 CFR Part 50 as an event that 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 is a natural event.

The following analysis will address this definition and provide documentation to establish that the 2016 Trailhead Fire meets the criteria for classification as an exceptional event as set forth in 40 CFR Part 50. Specifically, this document provides evidence that the wildfire affected air quality by demonstrating that:

1. there was a clear causal relationship between the 8-hour $O_3$ concentrations at Fernley and the event;
2. the $O_3$ concentrations during the event were significantly higher than normal historical concentrations, and;
3. the 8-hour $O_3$ concentrations at Fernley would not have exceeded the standard without the emissions contributed by the Trailhead Fire.

In addition, documentation is provided dem onstrating that the Trailhead Fire was a natural event whose emissions were not reasonably controllable or preventable. Finally, information regarding reasonable and appropriate actions taken to protect public health is included in Appendix C.



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In addition to the EER, this document follows the guidance recently issued by the US EPA regarding the treatment of $O_3$ concentration data affected by wildfire (*Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*; USEPA, 2015). Specifically, the elevated $O_3$ 8-hour average concentrations at the Fernley air monitoring site on July 3 and 4, 2016 were significantly higher (by more than 15 ppb) than the average concentration for this site during the month of July (2010 through 2016). The measured maximum 8-hour averages for these two days were also significantly higher (by more than 15 ppb) than non-event related concentrations during the month of July at the Fernley site.



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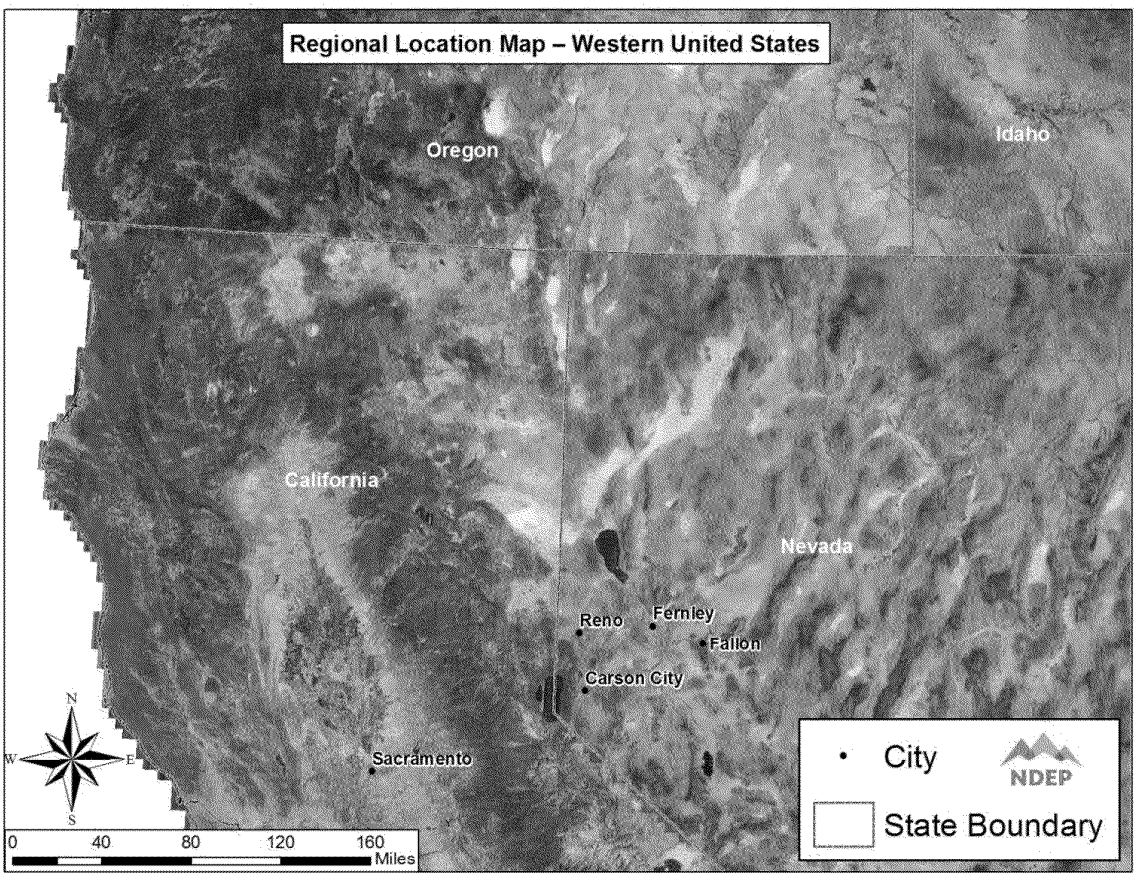
## 2.0 SETTING AND BASIC CONCEPTUAL MODEL

### 2.1 REGIONAL DESCRIPTION

Fernley is part of Lyon County, Nevada, and is approximately 30 miles east of Reno, Nevada. Fernley is in the southeastern part of Dodge Flat and the western portion of the Fortymile Desert, along the Interstate-80 corridor. Air masses commonly flow from west to east through the Truckee River Canyon, which topographically connects the Reno-Sparks area to Fernley. The Fernley area is bordered by the Truckee Range to the northeast, the Virginia Range to the south and southwest, and the Pah Rah Range to the northwest. Pyramid Lake, the terminus of the Truckee River , lies approximately 20 miles to the northwest (Figure 1).

**Figure 1. Regional Location Map**




Fernley lies within the Basin and Range Physiographic Province, a region of internal drainage characterized by north- to northeast-trending mountain ranges separated by lower elevation valleys (Figure 2). The elevation in Fernley is approximately 4,100 feet above mean sea level (amsl), and the surrounding mountains exceed 7,500 feet amsl.



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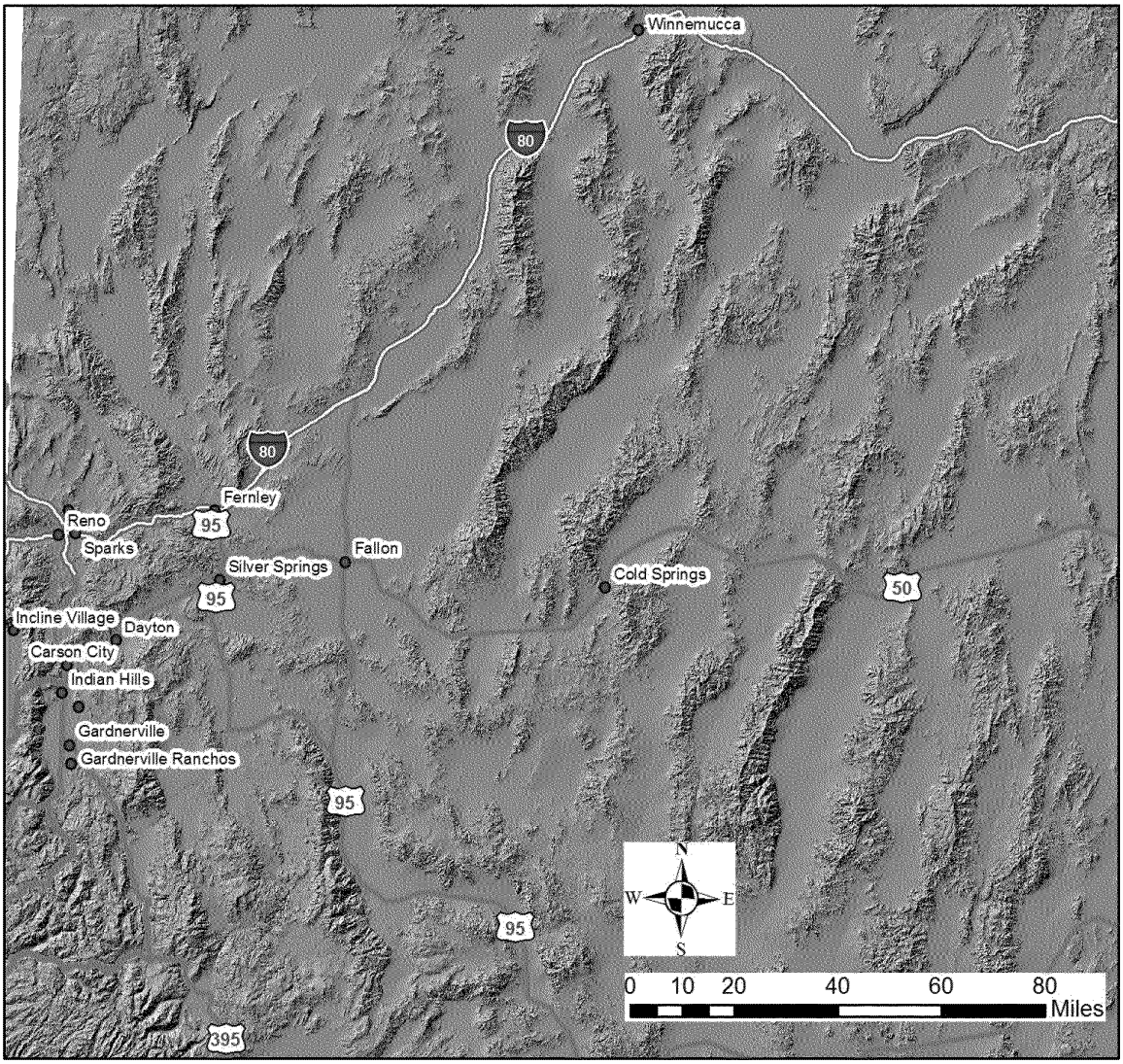
**Figure 2. Shaded Relief Map of West-Central Nevada**




## 2.2 CLIMATE AND WEATHER

Due to the rain shadow effect of the Sierra Nevada and other large mountain ranges to the west and southwest, moisture associated with Pacific storms rarely reaches the Fernley area. As a result, Fernley has an arid climate (an average of approximately six inches of precipitation per year), typical of the Great Basin region. Most of the precipitation in the area occurs in the winter months (between December and May). The average daily maximum temperature is approximately 94 degrees Fahrenheit (°F) in July and approximately 44 °F in January. Average daily minimum temperatures vary from 57 °F in July to 19 °F in January.

Weather conditions during the summer months of July, August, and September are typically dominated by a large, upper-level, synoptic-scale high pressure system over the western United



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States (U.S.). For northern Nevada, this usually results in very warm temperatures and light to moderate west winds, generally out of the west. These winds are strongest during the afternoon hours and generally decrease overnight. When the upper-level high pressure system is located over the four-corners area (Arizona, New Mexico, Colorado, and Utah), south to southeast winds transport subtropical moisture into the southwestern deserts, resulting in afternoon and evening thunderstorms. This moisture sometimes extends as far north as northern Nevada. The accompanying monsoonal storms are accompanied by strong, gusty winds, rain, and sometimes hail. The winds associated with these storms often create blowing dust conditions with reduced visibility.

Section 3 provides a more detailed discussion of the specific meteorological conditions on each of the event days included in this request as part of the clear causal connection between the Trailhead Fire and the elevated ozone concentrations. Section 3 also provides information to demonstrate that the 8-hour ozone concentrations at Fernley on each of these days would not have exceeded the federal standard without the impacts of the wildfire emissions.

### 2.3 DEMOGRAPHICS

Fernley is part of the Reno-Carson City-Fernley Combined Statistical Area (CSA). This CSA includes all of Lyon and Washoe counties as well. Lyon County covers approximately 2,000 square miles and has a population of approximately 53,100. The City of Fernley has a population of approximately 19,400 (USCB, 2016).

### 2.4 POLLUTANT SEASONALITY

Periods of high pressure and stagnant air masses, which are conducive to pollutant build up, occur during both the winter and summer seasons in northern Nevada. Particulate matter generated in winter months and the presence of ozone in the summer result in a seasonal pollutant pattern, with the highest particulate matter concentrations usually occurring during the winter months (except during wildfires) and the highest ozone concentrations observed during the summer months.

The ozone season in western Nevada therefore occurs from April through October. In general, the synoptic (large-scale) weather conditions leading to elevated ozone concentrations are slow moving, high pressure weather systems, which cause the air to subside, or sink. As the air sinks, it warms, forming a subsidence temperature inversion several hundred meters (m) above the surface that stabilizes and dries the atmosphere. This process limits vertical mixing of the boundary layer and traps pollutants below the height of the inversion. This process also limits cloud production, thereby increasing ozone photochemistry. In addition, calm surface winds are conducive to high ozone concentrations because these conditions prevent the dispersion of pollutants.



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Figure 3 shows the typical summer diurnal pattern of ozone concentrations in western Nevada; the highest concentrations occur in the early to mid-afternoon, during the time of highest solar radiation. The 95$^{th}$, 50$^{th}$, and 5$^{th}$ percentiles of hourly ozone concentrations at the Fernley site are shown for all days of June, July, and August from 2012 through 2016, excluding July 3 and 4, 2016 (Figure 3).



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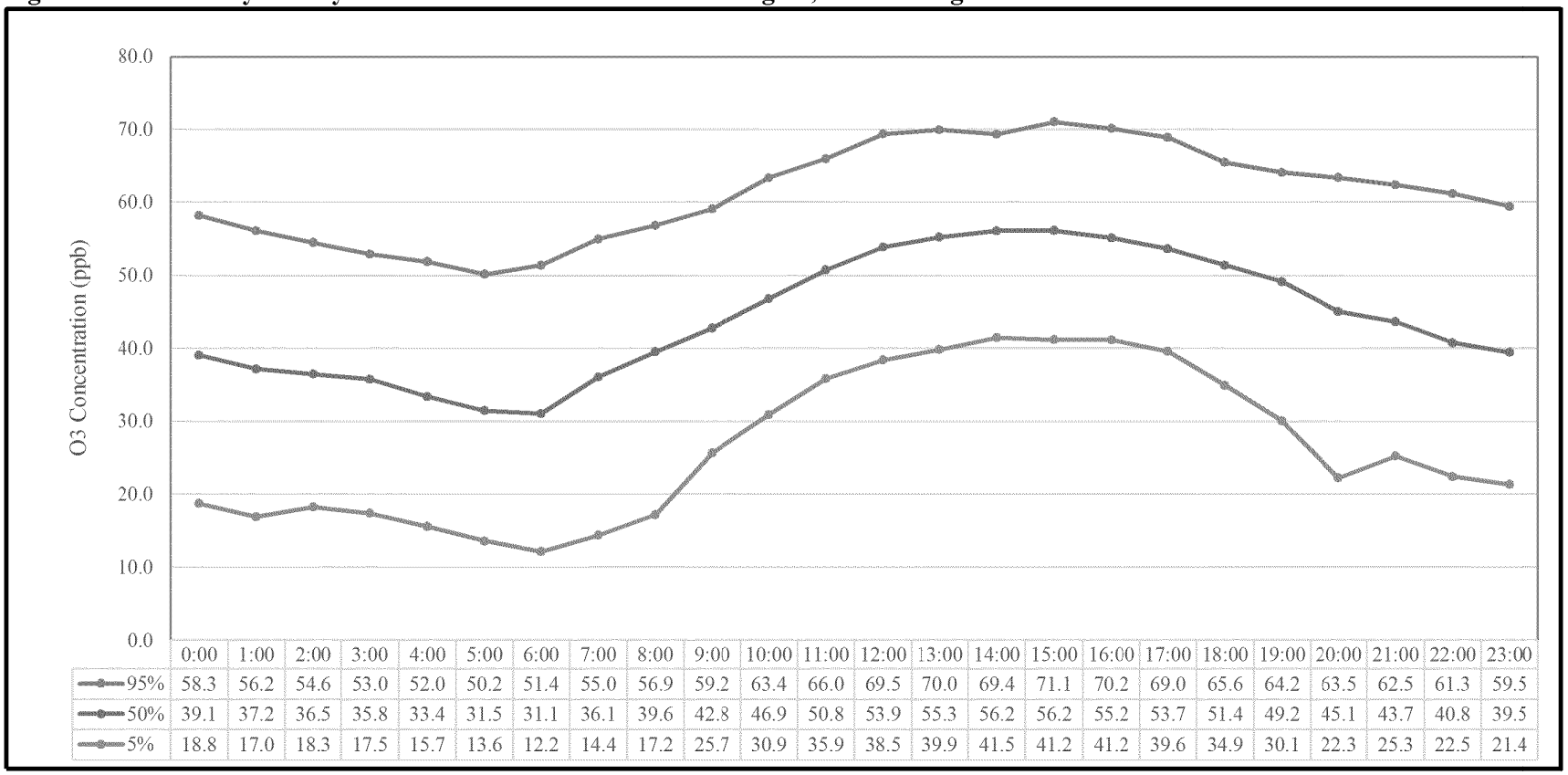
**Figure 3. Fernley Hourly Ozone Concentrations for June-August, 2012 through 2016.**




| | 0:00 | 1:00 | 2:00 | 3:00 | 4:00 | 5:00 | 6:00 | 7:00 | 8:00 | 9:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 17:00 | 18:00 | 19:00 | 20:00 | 21:00 | 22:00 | 23:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95% | 58.3 | 56.2 | 54.6 | 53.0 | 52.0 | 50.2 | 51.4 | 55.0 | 56.9 | 59.2 | 63.4 | 66.0 | 69.5 | 70.0 | 69.4 | 71.1 | 70.2 | 69.0 | 65.6 | 64.2 | 63.5 | 62.5 | 61.3 | 59.5 |
| 50% | 39.1 | 37.2 | 36.5 | 35.8 | 33.4 | 31.5 | 31.1 | 36.1 | 39.6 | 42.8 | 46.9 | 50.8 | 53.9 | 55.3 | 56.2 | 56.2 | 55.2 | 53.7 | 51.4 | 49.2 | 45.1 | 43.7 | 40.8 | 39.5 |
| 5% | 18.8 | 17.0 | 18.3 | 17.5 | 15.7 | 13.6 | 12.2 | 14.4 | 17.2 | 25.7 | 30.9 | 35.9 | 38.5 | 39.9 | 41.5 | 41.2 | 41.2 | 39.6 | 34.9 | 30.1 | 22.3 | 25.3 | 22.5 | 21.4 |

## 2.5 CHARACTERISTICS OF NON-EVENT OZONE FORMATION

The anthropogenic emissions contributing to ozone formation include volatile organic compounds (VOCs) and oxides of nitrogen ($NO_x$). The main sources of these emissions are mobile sources (cars, trucks, locomotives, off-road equipment) along with stationary and area sources (industrial processes, consumer products, and pesticides ). Mobile source emissions dominate the anthropogenic emissions in Lyon County, accounting for the majority of the total $NO_x$ inventory.

VOC and $NO_x$ emissions in Lyon County over the last decade have remained below 15 tons per day (tpd). In 2014 (the most recent National Emissions Inventory (NEI) for which VOC and $NO_x$ values are available), VOC and $NO_x$ precursor emissions for Lyon County were estimated at 2.3 and 3.5 tpd, respectively. Based on 2014 NEI data, VOC and $NO_x$ emissions have decreased over the past decade despite increases in population, vehicle activity, and economic development.

## 2.6 CHARACTERISTICS OF WILDFIRE-RELATED OZONE FORMATION

Wildfires generate both $NO_x$ and VOC, with different burning stages generating different types of emissions. Biogenic VOCs are generated by vegetation throughout the burning cycle. $NO_x$ is generated primarily during the hot, flaming stage of the fire, while small reactive hydrocarbons, such as ethane and acetylene, are generated during the smoldering phase (Finlayson-Pitts and Pitts, 2000; Jaffe et al., 2008).

Very near fires, ozone concentrations can potentially be suppressed, despite the increase in ozone precursors generated by the wildfires. Bytnerowicz et al. (2010), Finlayson-Pitts and Pitts (2000), and Sandberg et al. (2002) provide several explanations why ozone can potentially be low at fire sites: 1) thick smoke can prevent sufficient UV light from reaching the surface, thereby inhibiting photochemical reactions, and 2) the wildfire plume typically contains high nitrogen monoxide (NO) concentrations, which can titrate ozone concentrations. Downwind of the fire (or at the top of the plume; Sith et al., 1981, quoted in Sandberg et al., 2002), away from fresh NO sources and with reduced aerosol optical depth, considerable amounts of ozone can be generated. The plume does not need to be very far downwind of fire emissions to generate ozone. Sith et al. (1981) found ozone beginning 10 kilometers (km) downwind of wildfires, in plumes less than one -hour old (quoted in Sandberg et al., 2002). Ozone and ozone precursors can also be transported quite far from a wildfire site (Finlayson-Pitts and Pitts, 2000 and Jaffe et al., 2008). Therefore, similar to the impacts of anthropogenic emissions in urban airsheds, the highest ozone concentrations due to wildfires are often found downwind of the area of greatest precursor emissions.

The impact of wildfires on ozone concentrations at both the local and regional level has been extensively evaluated in recent years. Field observations of ozone formation in smoke plumes from fires date back nearly 25 years when aircraft measurements detected elevated ozone at the edge of forest fire smoke plumes far downwind. More recently, aircraft flights through smoke plumes have demonstrated increased ozone concentrations of 15 to 30 ppb in California (Bush,



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2008), while ozonesonde measurements in Texas found enhanced ozone aloft ranging from 25 to 100 ppb attributable to long -range transport of smoke plumes from Canada and Alaska (Morris, 2006).

In addition, air quality modeling has shown increased levels of ozone from a number of large fires. McKeen (2002) found that Canadian fires in 1995 enhanced ozone concentrations by 10 to30 ppb throughout a large region of the central and eastern United States. Lamb (2007) found similar results simulating the impacts of fires in the Pacific Northwest in 2006, with increases of over 30 ppb. Junquera (2005) further found that within 10 km of a fire, ozone concentrations could be enhanced by up to 60 ppb. Finally, in one of the most recent studies, Pfister (2008) simulated the large 2007 fires in both northern and southern California and found ozone increases of approximately 15 ppb in many locations, concludingthat "Our findings demonstrate a clear impact of wildfires on surface ozone nearby and potentially fardownwind from the fire location, and show that intense wildfire periods frequently can cause ozone levels to exceed current health standards."



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## 3.0 CLEAR CAUSAL RELATIONSHIP

This section demonstrates a clear causal relationship between the Trailhead Fire and the 8-hour ozone exceedances that occurred at the Fernley monitor on July 3 and 4, 2016. Specifically, this section provides evidence that: 1) the wildfire occurred, 2) the smoke plume from the wildfire reached the Fernley monitor, and 3) that the pollutants within the smoke plume increased ozone concentrations at the Fernley monitor.

This comprehensive weight of evidence includes: documentation of the extensive nature of the fire; a meteorological analysis; satellite imagery; $PM_{2.5}$ air quality data from upwind monitoring locations in Washoe County; ozone air quality data; ozone chemistry leading to elevated 8-hour ozone concentrations; forward and backward trajectories showing that emissions from the wildfire was transported to the Fernley monitoring location; and finally a discussion of how the 8-hour ozone concentrations exceed the normal non-event related concentrations for the Fernley ozone monitor.

### 3.1 DESCRIPTION OF THE EVENT

Wildfire activity typically begins to increase through the United States in late spring. Temperatures during the winter months leading into the 2016 wildfire season were generally above normal for the much of the United States, including northern California. Most of the Pacific Northwest, northern California, and parts of the Great Basin received normal to slightly above normal precipitation, generally as rain instead of the more-typical snow; however, severe to exceptional drought conditions continued to worsen across much of California, Nevada, and southern Oregon. The warm trend continued into the spring across most of the nation, with above normal temperatures stretching from the Pacific Northwest and northern California, east through the central states. The summer of 2016 was the warmest in California on record. As a result, drought conditions continued to worsen in the west, where severe to exceptional drought continued across much of California, Nevada, and Oregon (NICC, 2016). The North American Drought Monitor for June 2016 showed severe to exceptional drought over the far west (Figure 4).



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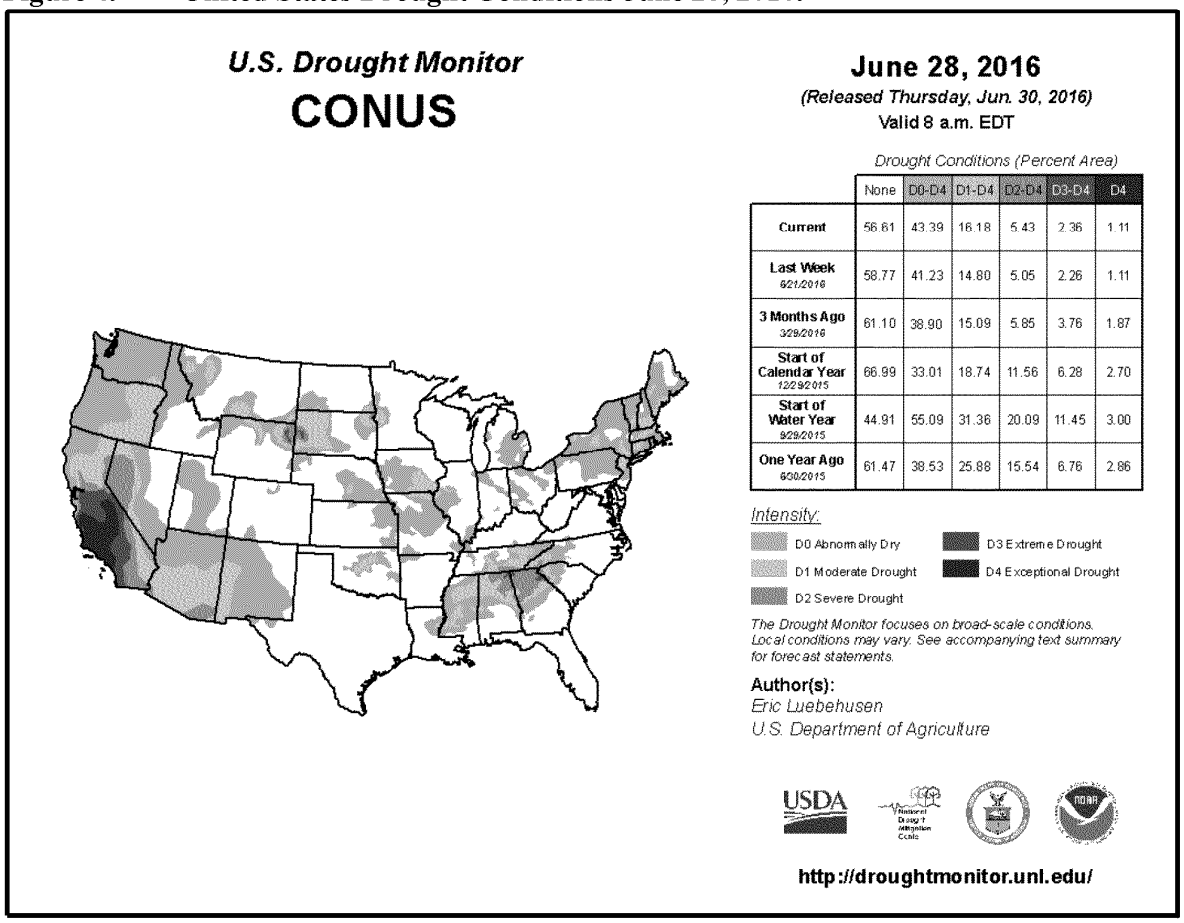
**Figure 4. United States Drought Conditions June 28, 2016.**




Although conditions were present to support significant fire activity throughout the summer fire season, for the most part these conditions fell wit hin the normal range and fire activity was generally normal, potentially due to the significant decrease in lightning strikes as compared to recent years (Rolinski, 2017).

Although most of the fire activity in the United States was below normal in 2016, numerous fires in California contributed to smoke being transported to Nevada. There were approximately 242 significant fires in the Pacific Northwest ; 68 of those fires were in California. The national Preparedness Level (PL) was elevated to PL 2 on June 7, 2016 then was raised to PL 3 on July 26 where it remained for three and a half weeks. On August 20 it was raised further to PL 4 where it remained for two weeks. On September 3 the PL dropped to 3 and quickly dropped to PL 2 three days later. On September 30 the PL was lowered to 1 where it remained for threst of the calendar year (NICC, 2016). By the end of the 2016 fire season, due to large wildland fires, a total of 560,815 acres were burned in California. Figure 5 shows the locations of large wildfires during the 2016 fire season.



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**Figure 5. Large Wildfires in the United States – 2016.**

The Trailhead Fire started on June 28, 2016 in the Middle Fork American River Canyon in central California. Although the cause of the fire remains under investigation, there was no lightning in the area at the time. Smoke from the Trailhead Fire impacted areas in northern California and western Nevada. Figure 6 provides a map of the location of the Trailhead Fire origin as well as the Fernley, Nevada monitoring site. Table 2 shows the number of acres burned by the Trailhead Fire on July 2, 3, and 4, 2016.



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**Figure 6. Location Map of the Trailhead Fire Start Location and the Fern ley, Nevada Monitoring Site.**

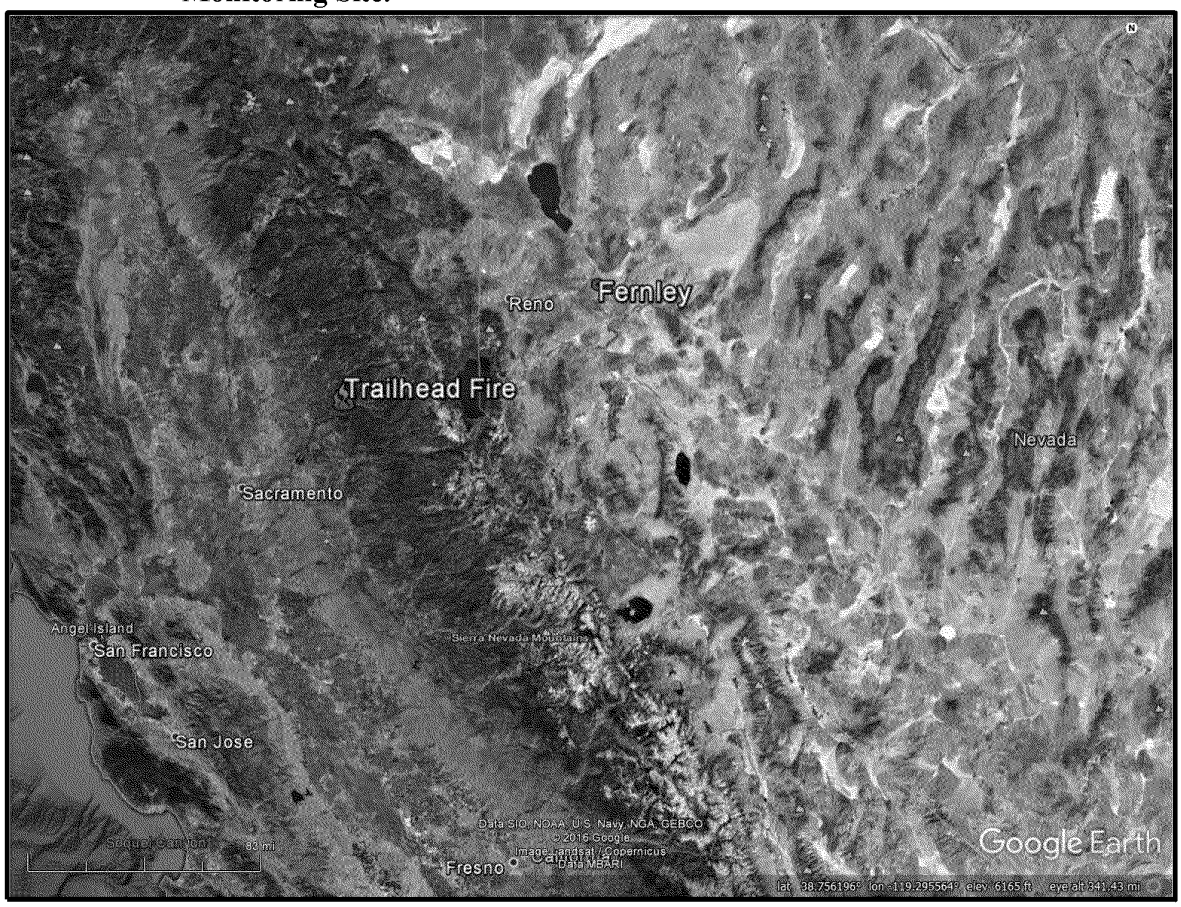


**Table 2. Acres Burned for the Trailhead Fire from July 2 through 4, 2016.**

| NAME | FIRE START | | TOTAL ACRES BURNED BY DATE | | |
|---|---|---|---|---|---|
| | LATITUDE | LONGITUDE | 7/2/2016 | 7/3/2016 | 7/4/2016 |
| Trailhead Fire | 38.969 | -120.854 | 836 | +1,657 | +400 |

USDA, 2016; http://www.predictiveservices.nifc.gov/intelligence/intelligence.htm
Numbers after the '+' indicate an increase in acreage burned from the previous day.

Air quality in northern Nevada was moderate to poor from July 2 through 5, 2016 due to smoke from the Trailhead Fire. AirNow Air Quality Index (AQI) maps showing air quality from June 28 through July 5, 2016 are included in Appendix C. Many air quality monitors in northern Nevada recorded elevated ozone concentrations during this time, along with increased concentrations of particulate matter. Figures 7 and 8 provide satellite images illustrating the extent of the smoke impacts on July 3 and 4, 2016.



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**Figure 7. Satellite Imagery of Smoke Plume – July 3, 2016.**

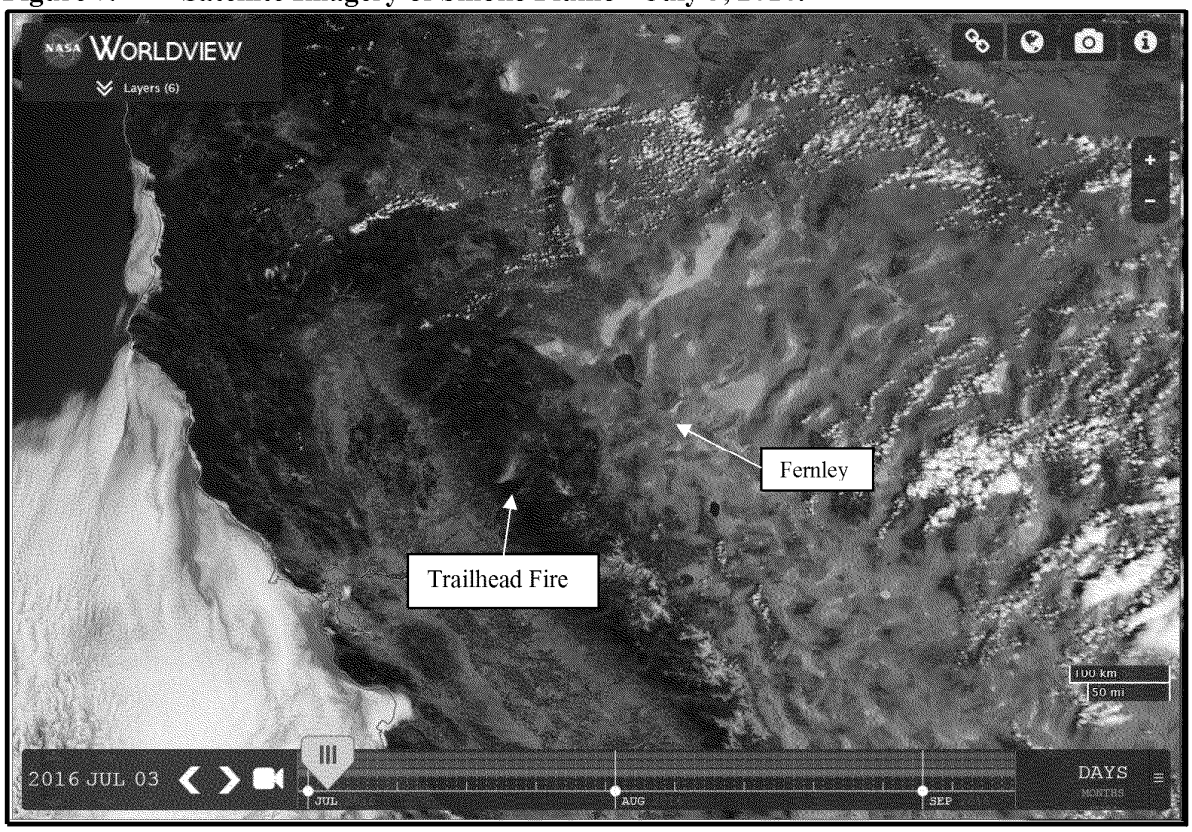




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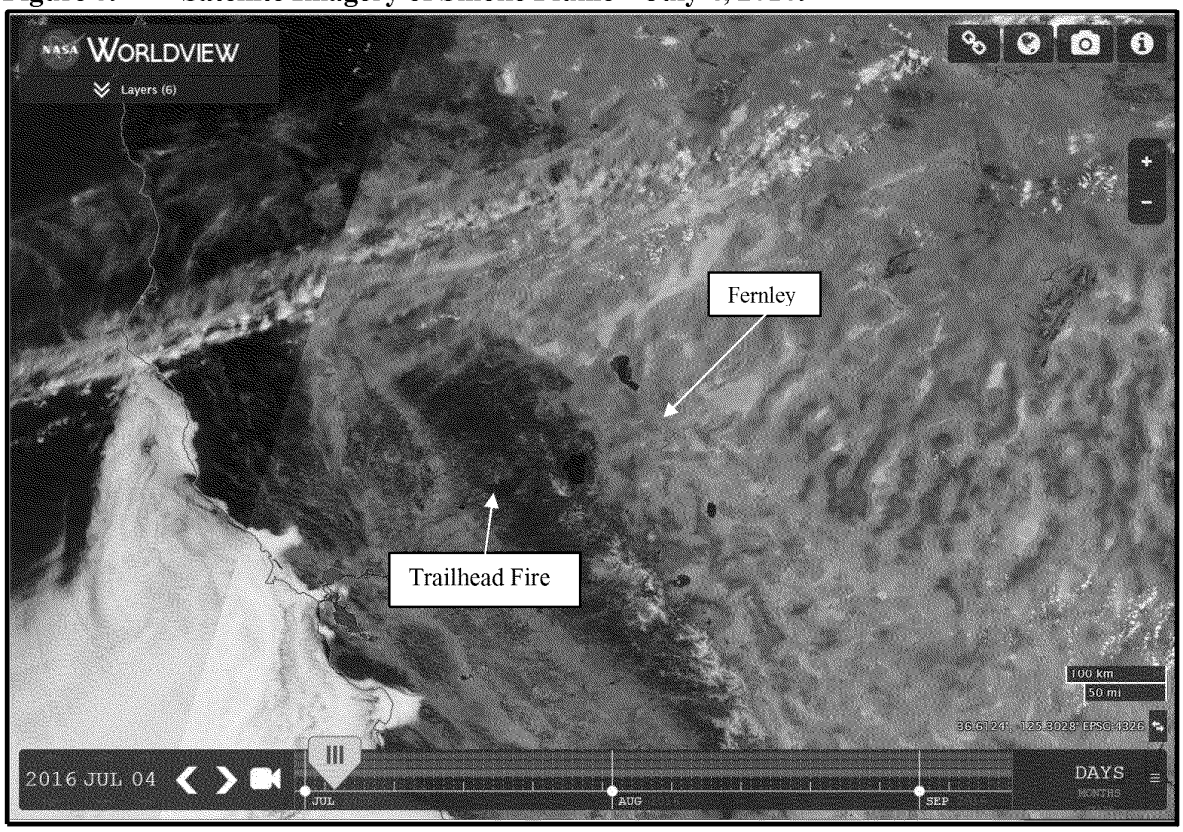
**Figure 8. Satellite Imagery of Smoke Plume – July 4, 2016.**




### 3.2 METEOROLOGICAL CONDITIONS AND TRANSPORT PATTERNS

Substantial amounts of NOx and VOCs were generated from the Trailhead Fire, causing the 8-hour ozone exceedances at Fernley on July 3 and 4, 2016. Due to the buoyancy of fire plumes, these precursors were mixed throughout the boundary layer, making them available for long-range transport.

Figures 9 through 14 show the 500 millibar heights and winds for the period June 29, 2016 through July 5, 2016. During the period from June 29 through July 4, 2016, when smoke from the Trailhead Fire moved into northwestern Nevada, a high pressure system located over the four corners region was beginning to move south and east. Upper level winds were out of the south on June 29, 2016. As the high moved south and east, an upper level low moved into the Pacific Northwest, causing upper level winds in northern Nevada to shift from the south to the southwest from June 30 through July 4, 2016. These southwest upper level winds transported smoke and associated ozone precursors from the Trailhead Fire into northern Nevada. By July 5, 2016, with the continued approach of a low pressure system into the Pacific Northwest, upper level winds became more westerly, resulting in smoke from the Trailhead Fire being directed away from northern Nevada (Figures 9 through 14).



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**Figure 9. Upper-Level Pressure and Winds – June 29, 2016**

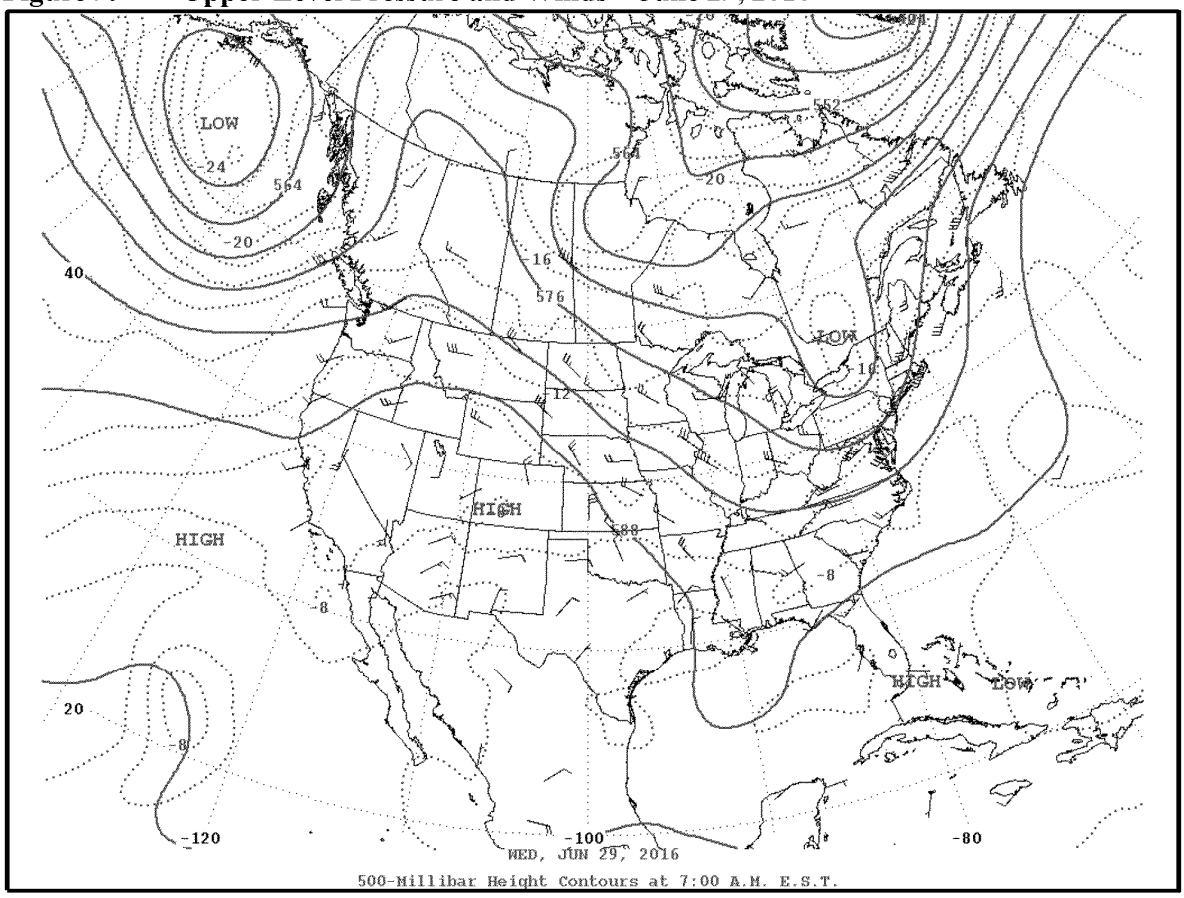




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**Figure 10. Upper-Level Pressure and Winds – June 30, 2016**

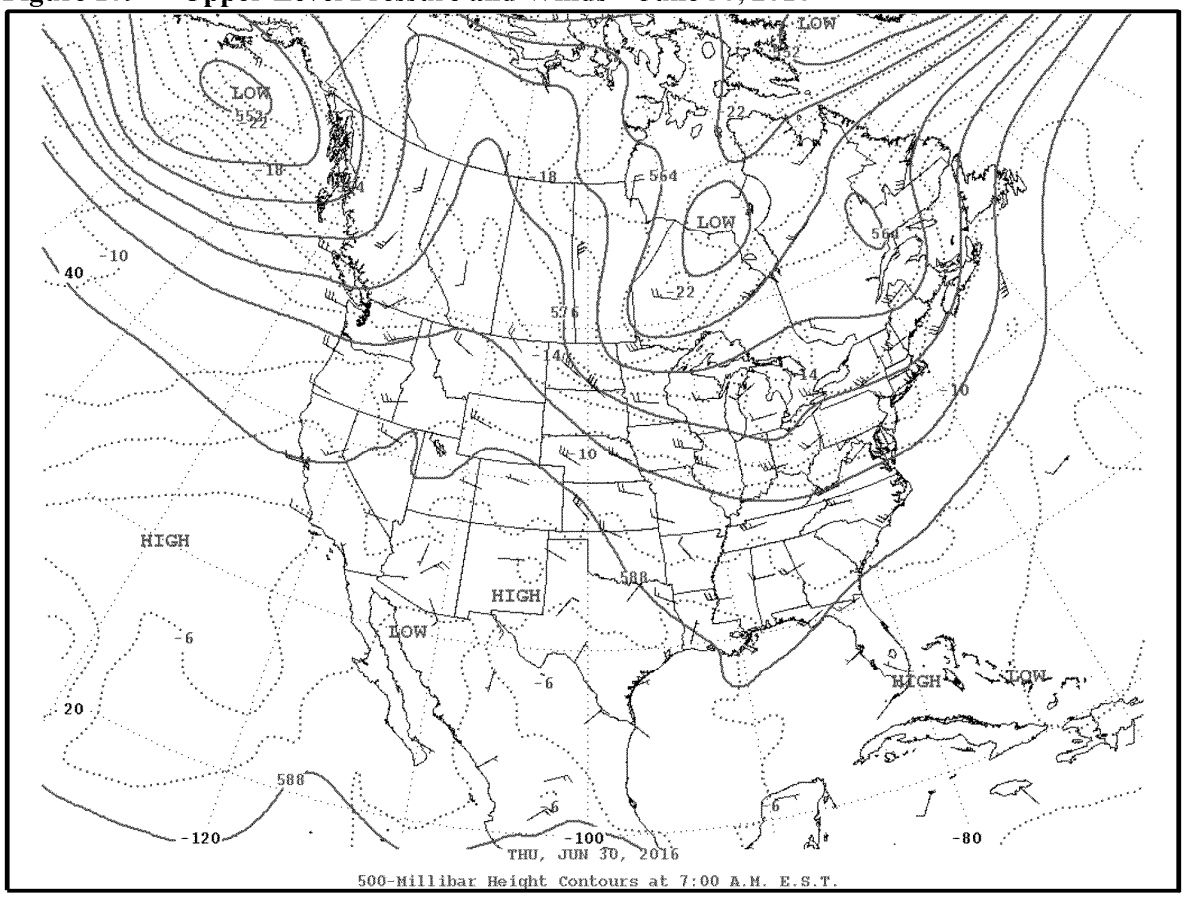




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**Figure 11. Upper-Level Pressure and Winds – July 1, 2016**

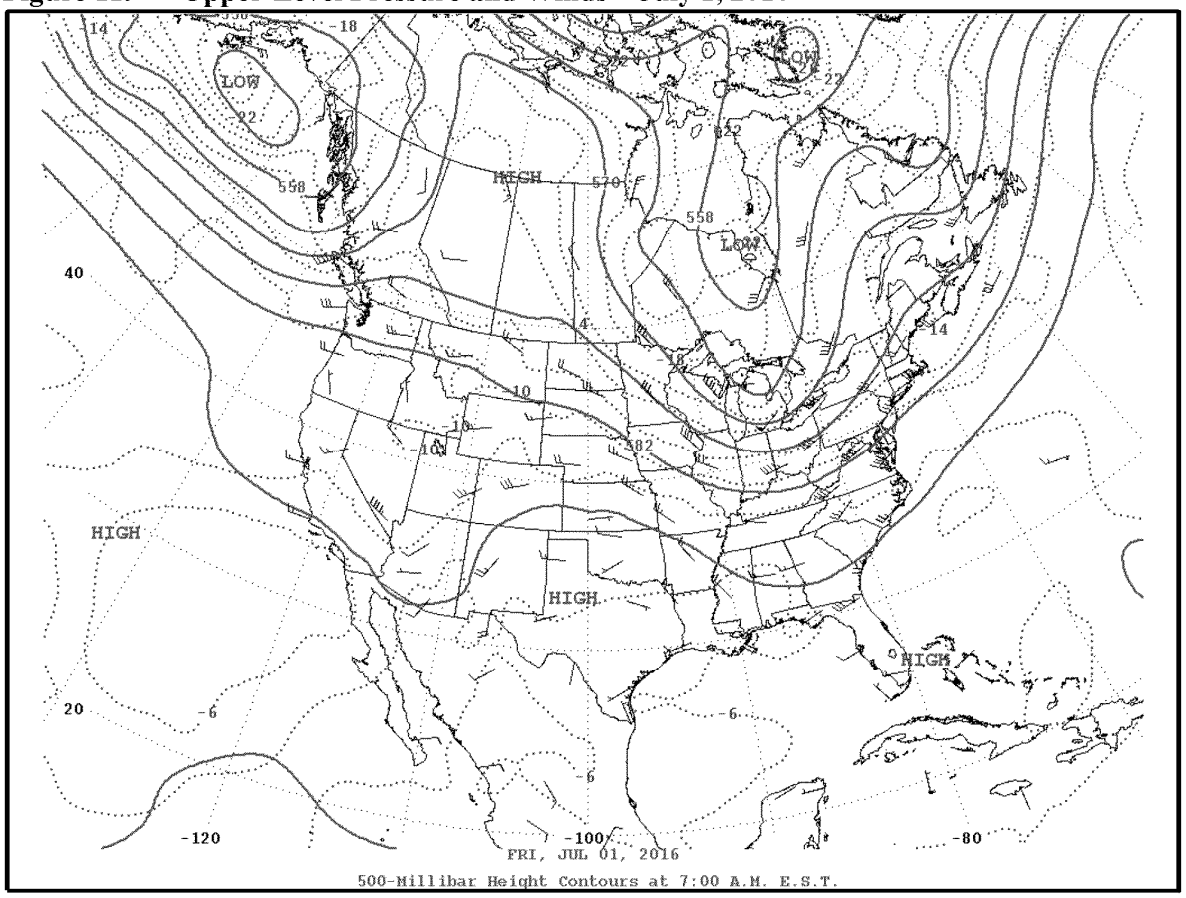




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**Figure 12. Upper-Level Pressure and Winds – July 2, 2016**

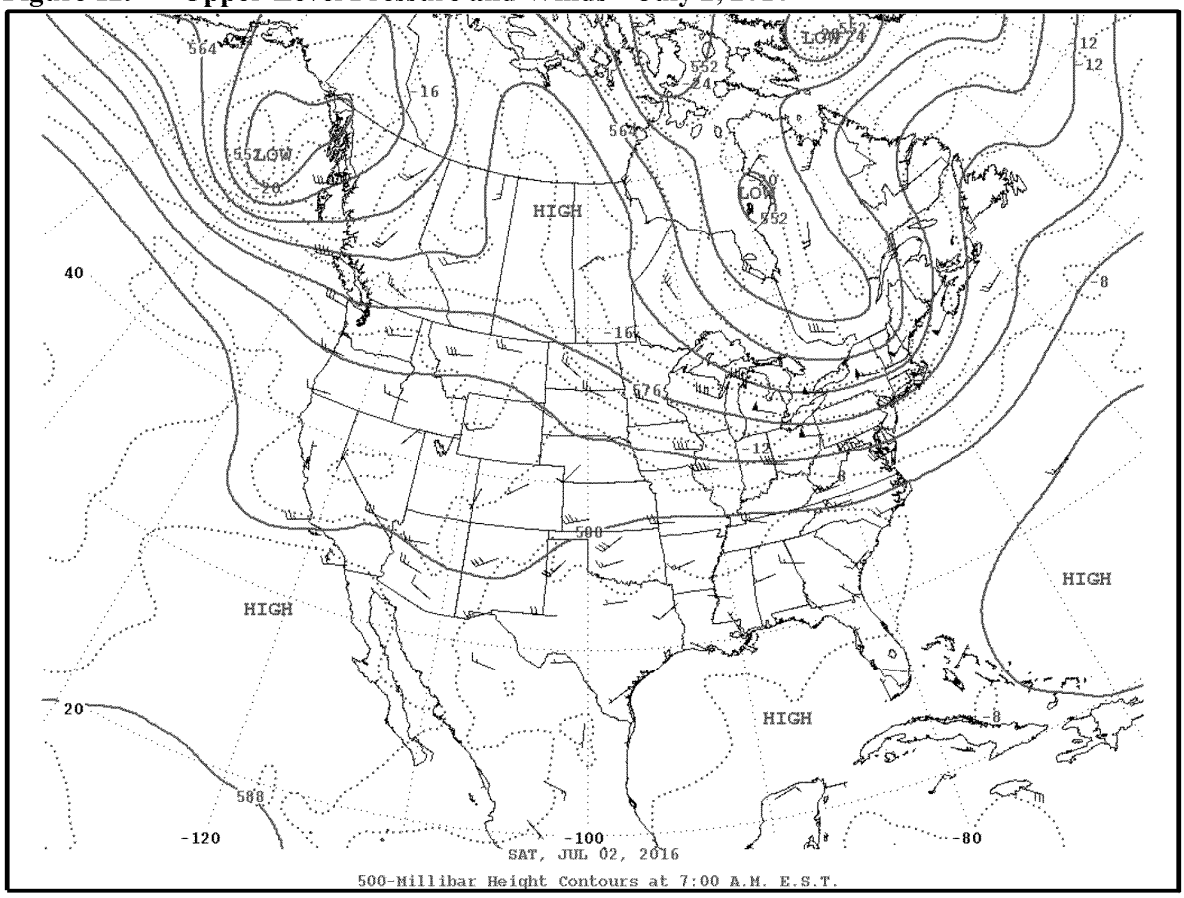




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**Figure 13. Upper-Level Pressure and Winds – July 3, 2016**

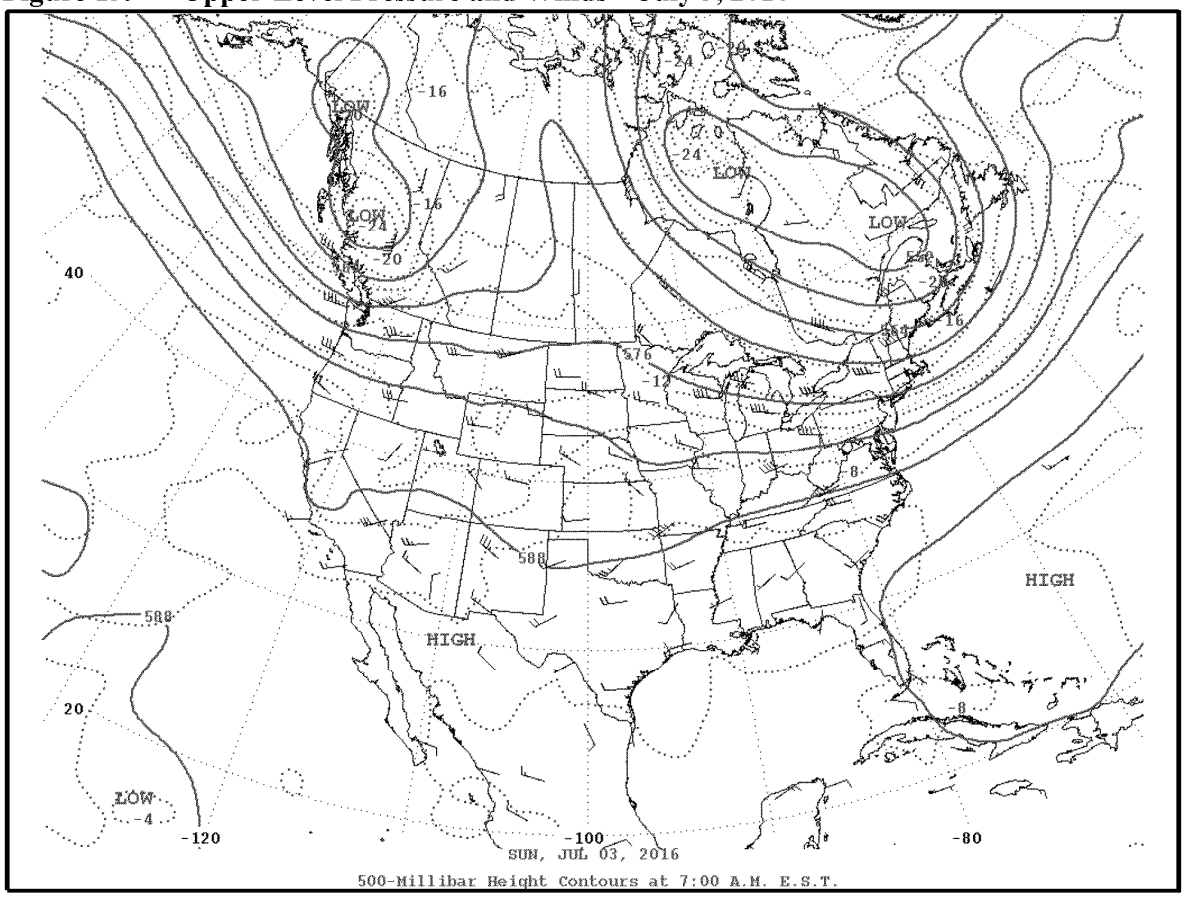




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**Figure 14. Upper-Level Pressure and Winds – July 4, 2016**

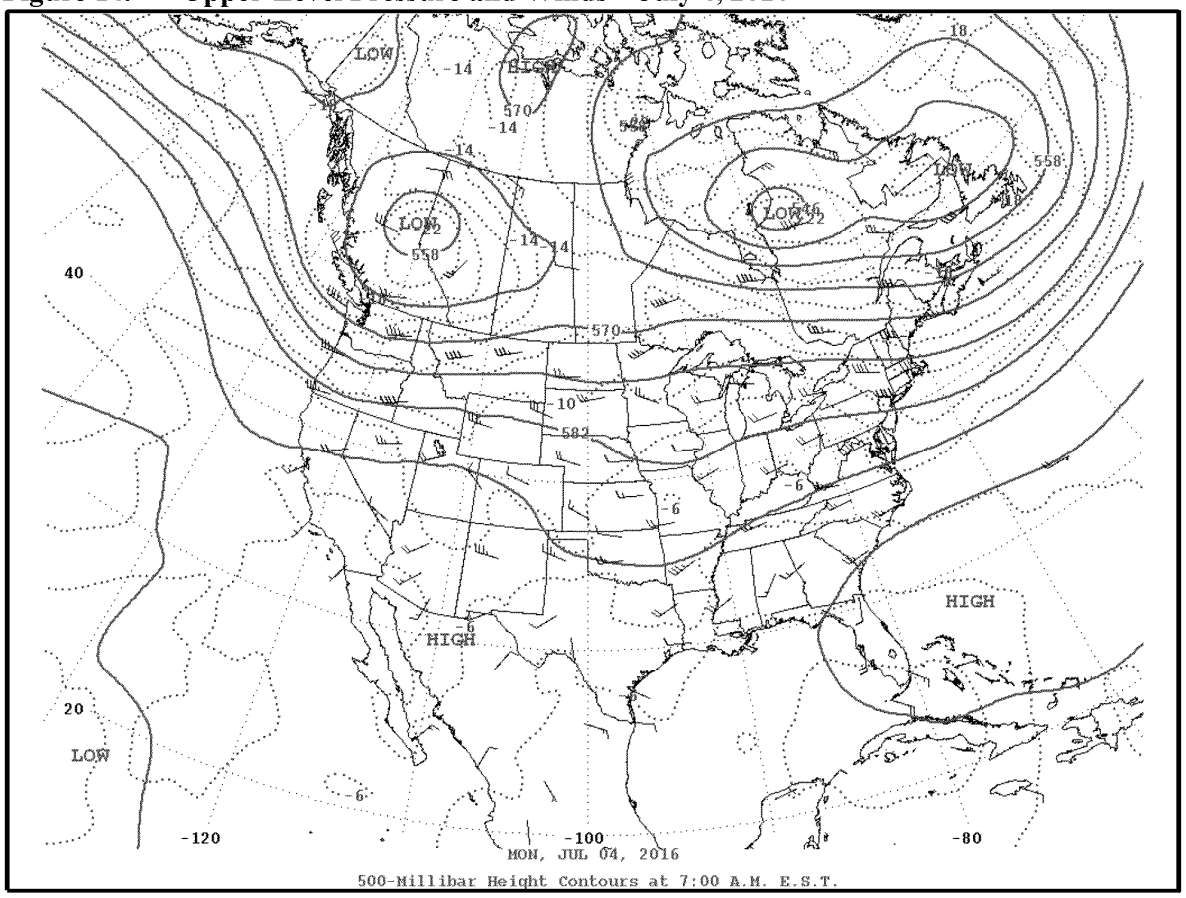




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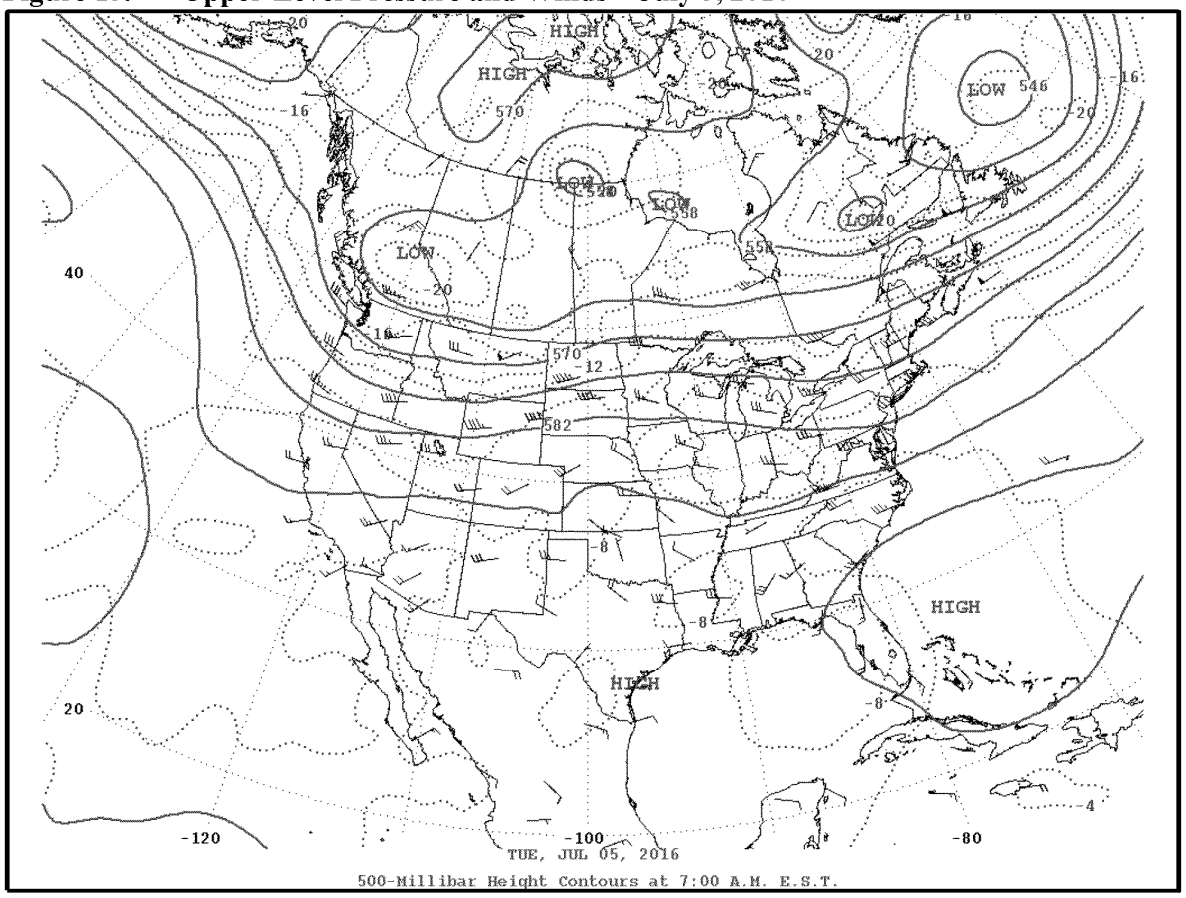
**Figure 15. Upper-Level Pressure and Winds – July 5, 2016**




Temperature and surface wind data was analyzed from June 26 through July 11, 2016. Because there are no topographic barriers between them, the weather conditions in Reno, Nevada are considered representative of those in Fernley. Summer surface winds in Reno, Nevada generally range from the northwest to southwest; Figure 16 shows wind speeds and directions for all days in June, July, and August from 2012 through 2016. For the two-week period before and after the event days, as well as on the event days themselves, surface winds were typical of summer winds in the area (Figures 17 and 18). Both upper level and surface winds transported wildfire precursor emissions to the Fernley area.

Table 3 shows the temperatures and wind speeds for the Reno-Tahoe International airport for the two weeks before and after the exceedances. Wind speeds in northern Nevada for early July average between 7 and 8 miles per hour (mph). Winds throughout the two-week period before and after the event days were generally light, but increased slightly on July 3 and 4.



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**Figure 16. Wind Rose for Desert Research Institute (Reno, Nevada) , June 1 through August 31, 2012 through 2016**

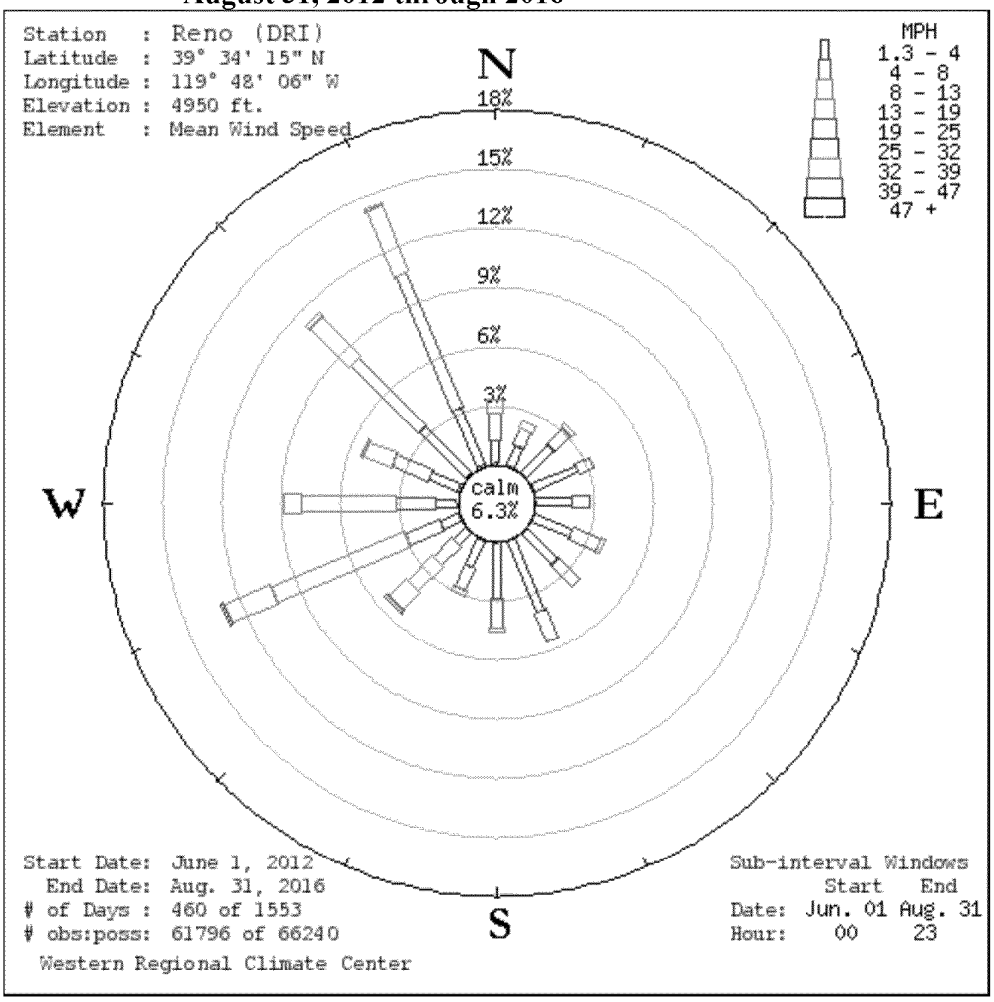




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**Figure 17. Wind Rose for Desert Research Institute (Reno, Nevada) , June 26, 2016 through July 11, 2016**

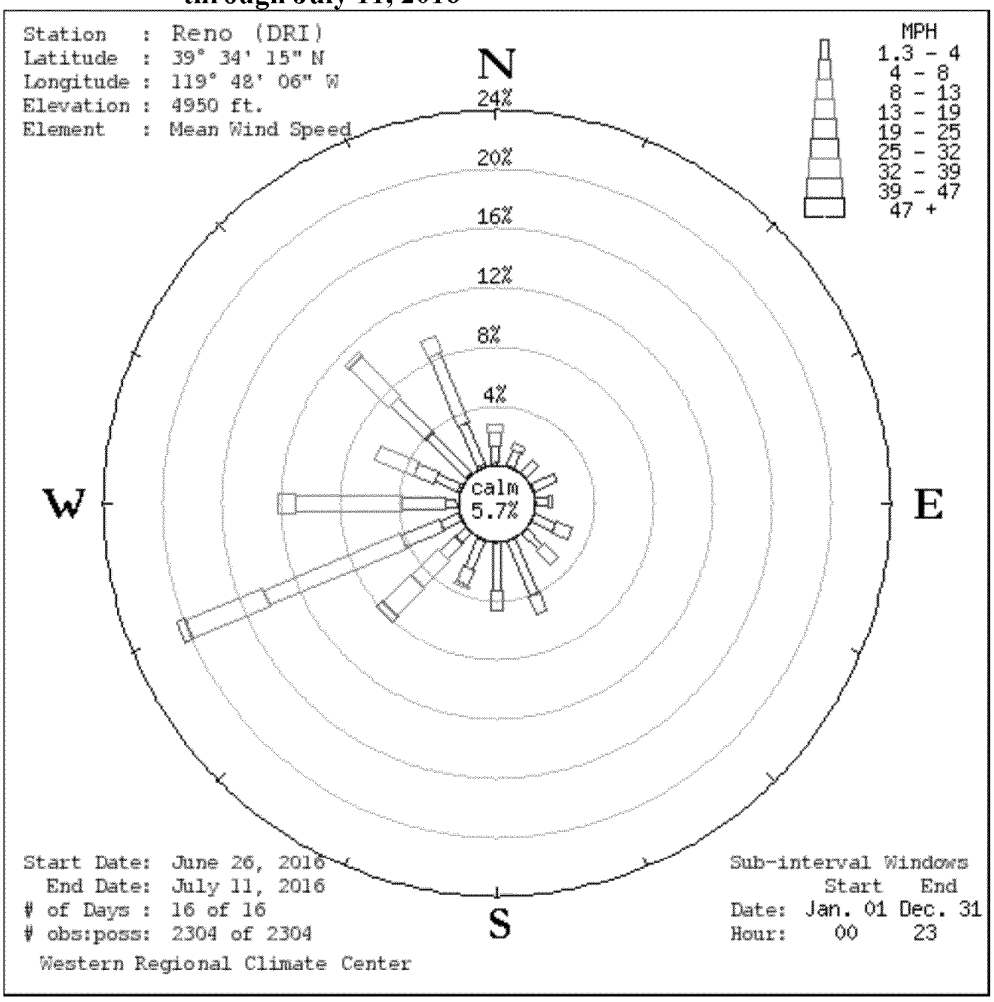




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**Figure 18. Wind Rose for Desert Research Institute (Reno, Nevada), July 3-4, 2016**

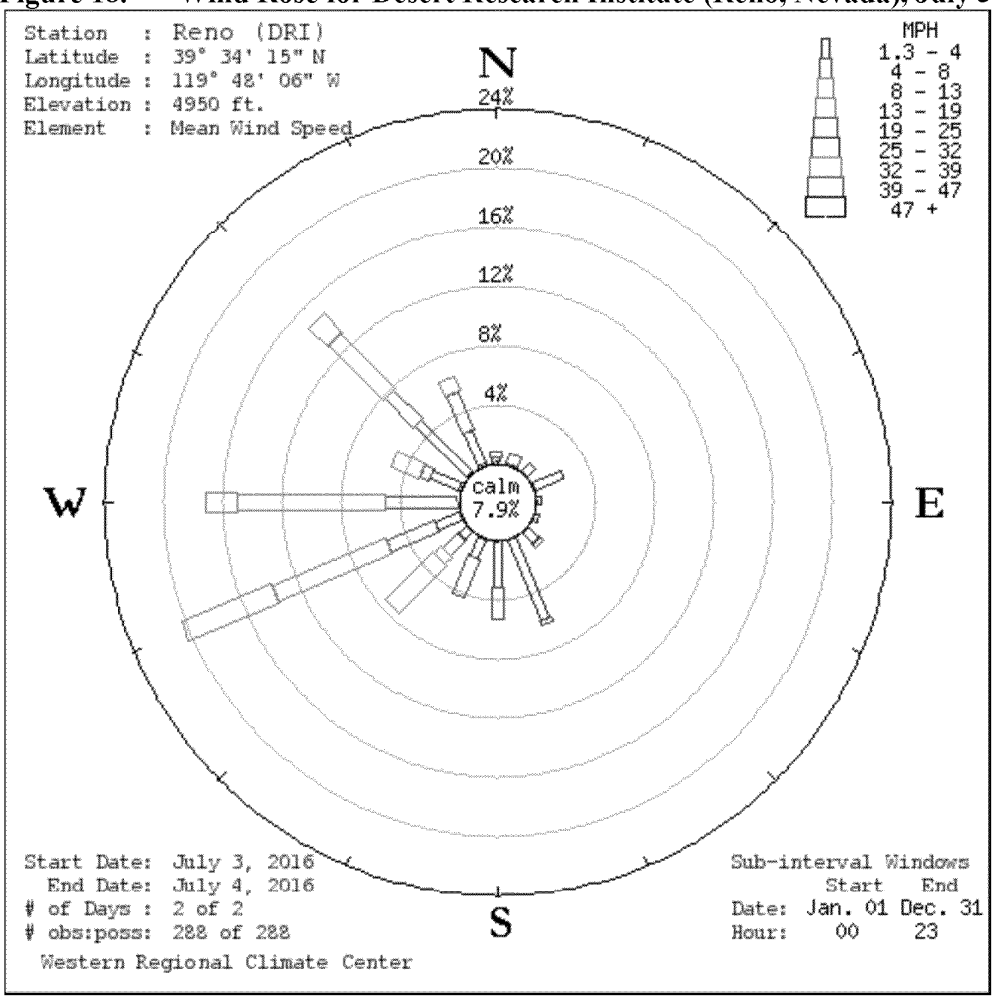




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**Table 3. Historical and Event-Related Temperature Data for Reno-Tahoe Airport**

| | Non-event | | | | | | | Trailhead Fire | | Non-event | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 06/26 | 06/27 | 06/28 | 06/29 | 06/30 | 07/01 | 07/02 | 07/03 | 07/04 | 07/05 | 07/06 | 07/07 | 07/08 | 07/09 | 07/10 | 07/11 |
| Ozone | | | | | | | | | | | | | | | | |
| 8-hour Maximum Concentration (ppb) | 56 | 55 | 55 | 61 | 53 | 61 | 66 | 71 | 70 | 68 | 66 | 57 | 49 | 25 | 47 | 41 |
| Maximum Temperature | | | | | | | | | | | | | | | | |
| Observed (°F) | 98 | 100 | 101 | 100 | 100 | 99 | 97 | 95 | 93 | 91 | 90 | 91 | 88 | 86 | 80 | 86 |
| Historical Average (°F) | 87 | 88 | 88 | 88 | 89 | 89 | 89 | 90 | 90 | 90 | 91 | 91 | 91 | 91 | 92 | 92 |
| Wind Speed | | | | | | | | | | | | | | | | |
| Observed (mph) | 7.6 | 5.6 | 6.4 | 8.0 | 7.5 | 7.5 | 7.3 | 7.9 | 10.4 | 10.1 | 9.2 | 6.9 | 8.7 | 15.0 | 11.9 | 5.9 |

In general, higher temperatures are associated with higher surface ozone concentrations (Jacob and Winner, 2009). Temperatures in Reno, Nevada were generally higher than historical averages for the approximate two-week period surrounding the event days. However, ozone concentrations at the Fernley site were within the range of historical concentrations except on the two event days, when they were significantly higher. This suggests that the elevated ozone concentrations were caused by smoke from the Trailhead Fire as opposed to high temperatures. Surface winds also increased slightly on the event days, supporting the interpretation that smoke from the fire was transported to the Fernley site and caused the elevated ozone concentrations.

In the desert portions of northern Nevada, visibilities are typically very good. Strong low-level inversions in the winter months result in pooling of cold air at the surface, and can lead to an accumulation of locally generated pollution being trapped under the inversion, causing a decrease in visibility. This phenomenon only occurs during the cold months of the year. Reductions in visibility in the summer occur under three conditions: 1) heavy rain from thunderstorms; 2) blowing dust from thunderstorm downdrafts; and 3) smoke from wildfires. Visibility at the Reno-Tahoe International Airport was reduced to eight miles on the afternoons of July 2 and 3, 2016. There were no thunderstorms in northern Nevada on July 2, 3, and 4, 2016; therefore, the observed decrease in visibility cannot be attributed to windblown dust or rain, but was due to smoke from the Trailhead Fire.

To further demonstrate that smoke from the Trailhead Fire impacted the Fernley ozone monitoring site, trajectory analyses were created using the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT; Stein, 2015; Rolph, 2016) tool in the AirNow Tech online platform. HYSPLIT trajectories were generated for July 3 and 4, 2016; both forward (from the fire forward 24 hours) and backward (from the site back 24 hours) trajectories were analyzed. The Trailhead Fire origin is approximately 150 km away from the Fernley ozone monitor. The emissions from the fire therefore traveled a considerable distance, including passing over significant topographic features. Because of this distance, as well as the heat of the plume, the smoke plume dispersed upward into the atmosphere. To account for this vertical motion, and the fact that the HYSPLIT models do not account for turbulence or vertical mixing within the troposphere, trajectories were generated at 100 m, 700 m, and 1,500 m above ground level (agl). These heights are representative of the base, middle, and top of the typical daytime planetary boundary layer, and are consistent with the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (USEPA, 2015). HYSPLIT trajectories are shown in Figures 19a through 20b, for July 3 and 4, 2016, respectively. According to the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations,* the starting heights of trajectories should be between 100 and 1,500 m agl to avoid terrain interference and to stay within the mixed layer of the atmosphere (USEPA, 2015). Forward trajectories were initiated from the Trailhead Fire origin at 1800 Coordinated Universal Time



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(UTC; 1000 Pacific Standard Time (PST)) on July 2, 2016 and at 2200 UTC (1400 PST) on July 3, 2016, and were run forward for 24 hours. Backward trajectories were initiated from the Fernley ozone monitoring site beginning at 1800 UTC (1000 PST) July 3, 2016 and 2200 UTC (1400 PST) also for 24 hours. These times correspond to the hour of the maximum daily 8-hour average at the Fernley site on the two event days. Forward trajectories from the fire origin show that the air mass above the fire traveled to and over the Fernley monitoring site. B ackward trajectories from the Fernley monitoring site show that the air mass above the Fernley site during the exceedances traveled to Fernley from the area of the Trailhead Fire smoke plume.

Figures 19a through 20b also show Hazard Mapping System (HMS) smoke plumes for July 3 and 4, 2016. The smoke plume from the Trailhead Fire was clearly transported to and impacted the Fernley monitoring site. The HYSPLIT trajectories also intersect with the smoke plume from the Trailhead Fire, providing more evidence that the plume impacted the site.



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**Figure 19a. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8 -Hour Ozone Concentrations, and Forward HYSPLIT Trajectories – July 2, 2016 (24 hours)**

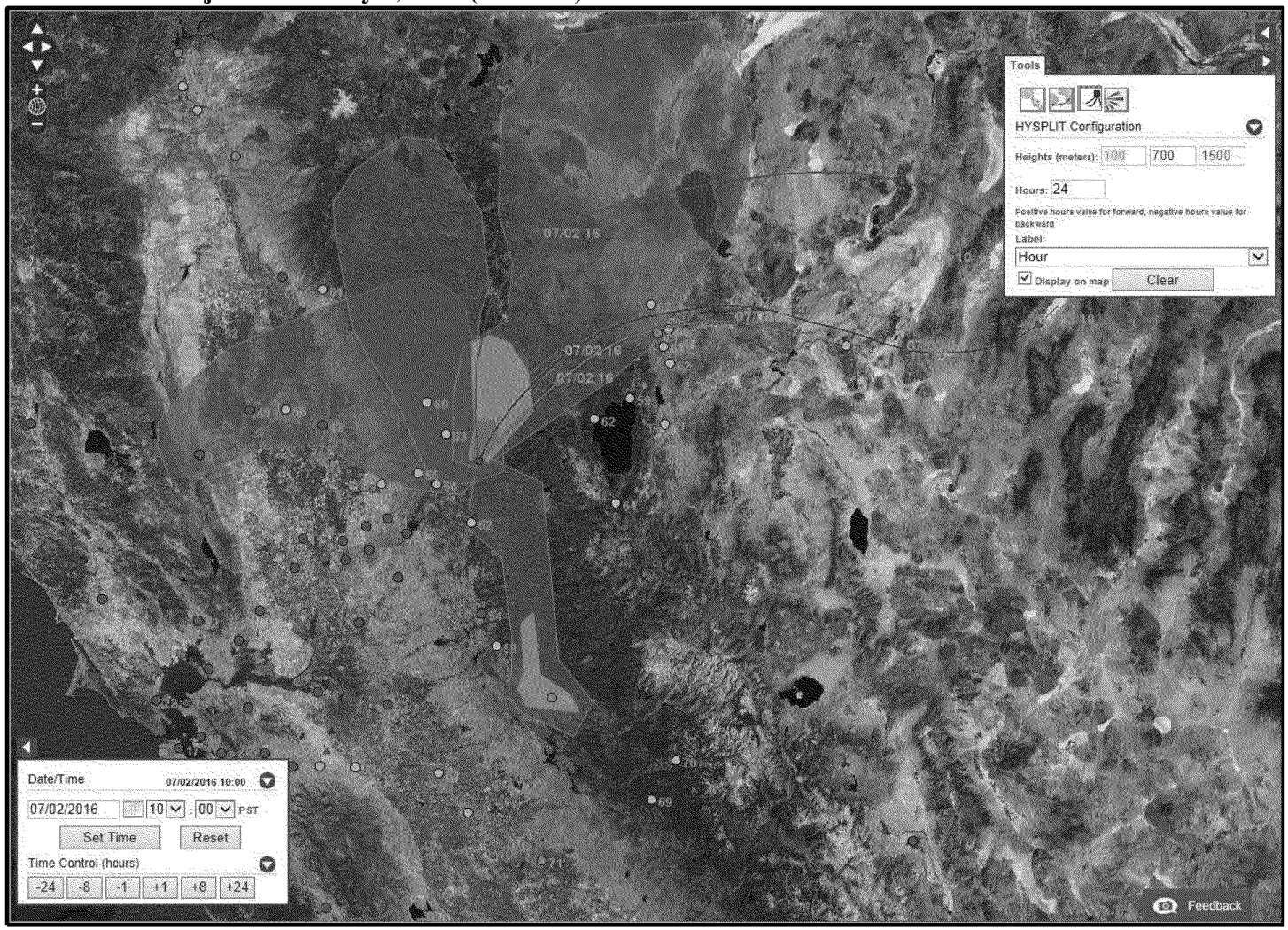

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**Figure 19b. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8 -Hour Ozone Concentrations, and Backward HYSPLIT Trajectories – July 3, 2016**

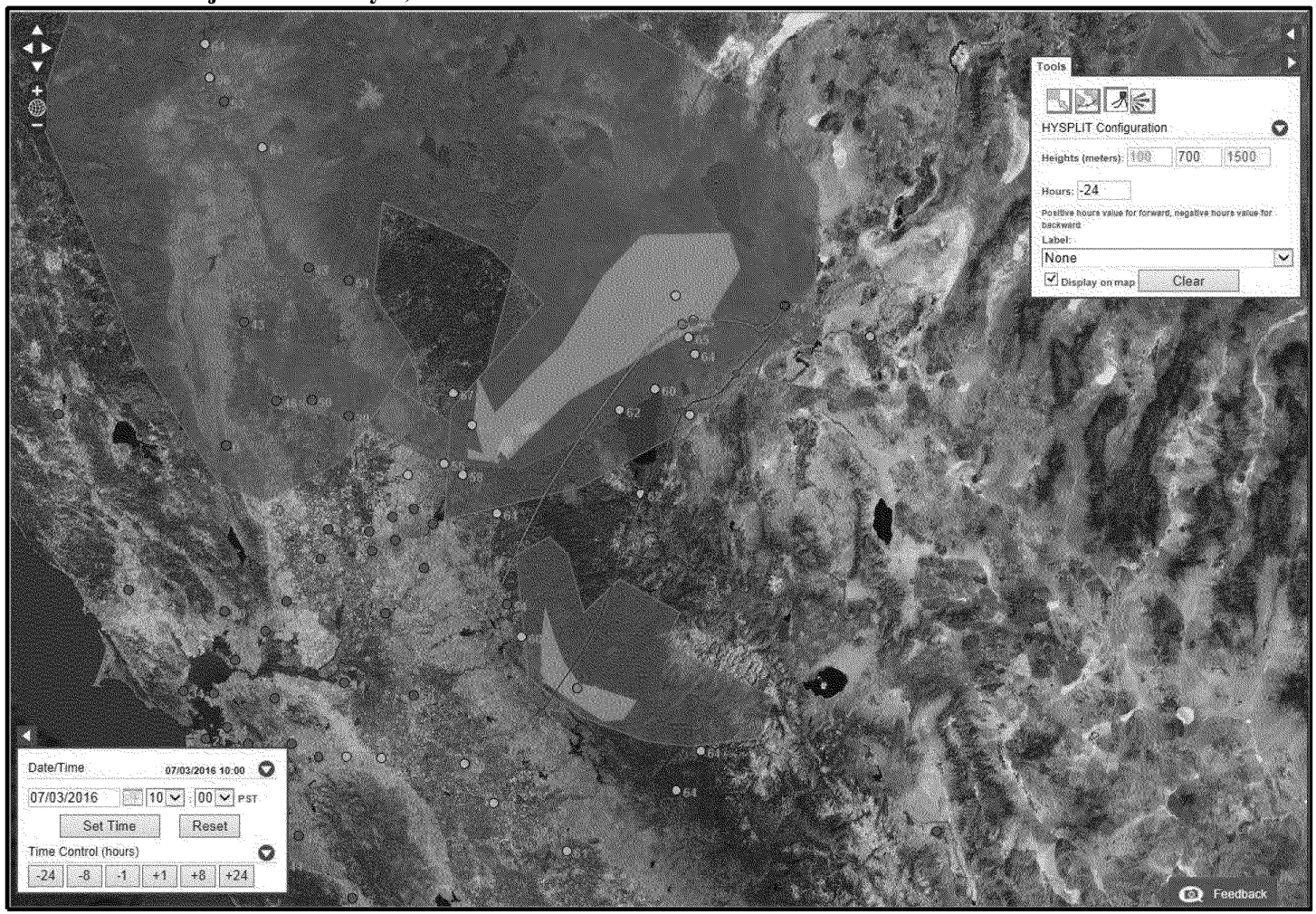

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**Figure 20a. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8-Hour Ozone Concentrations, and Forward HYSPLIT Trajectories – July 3, 2016 (24 hours_**

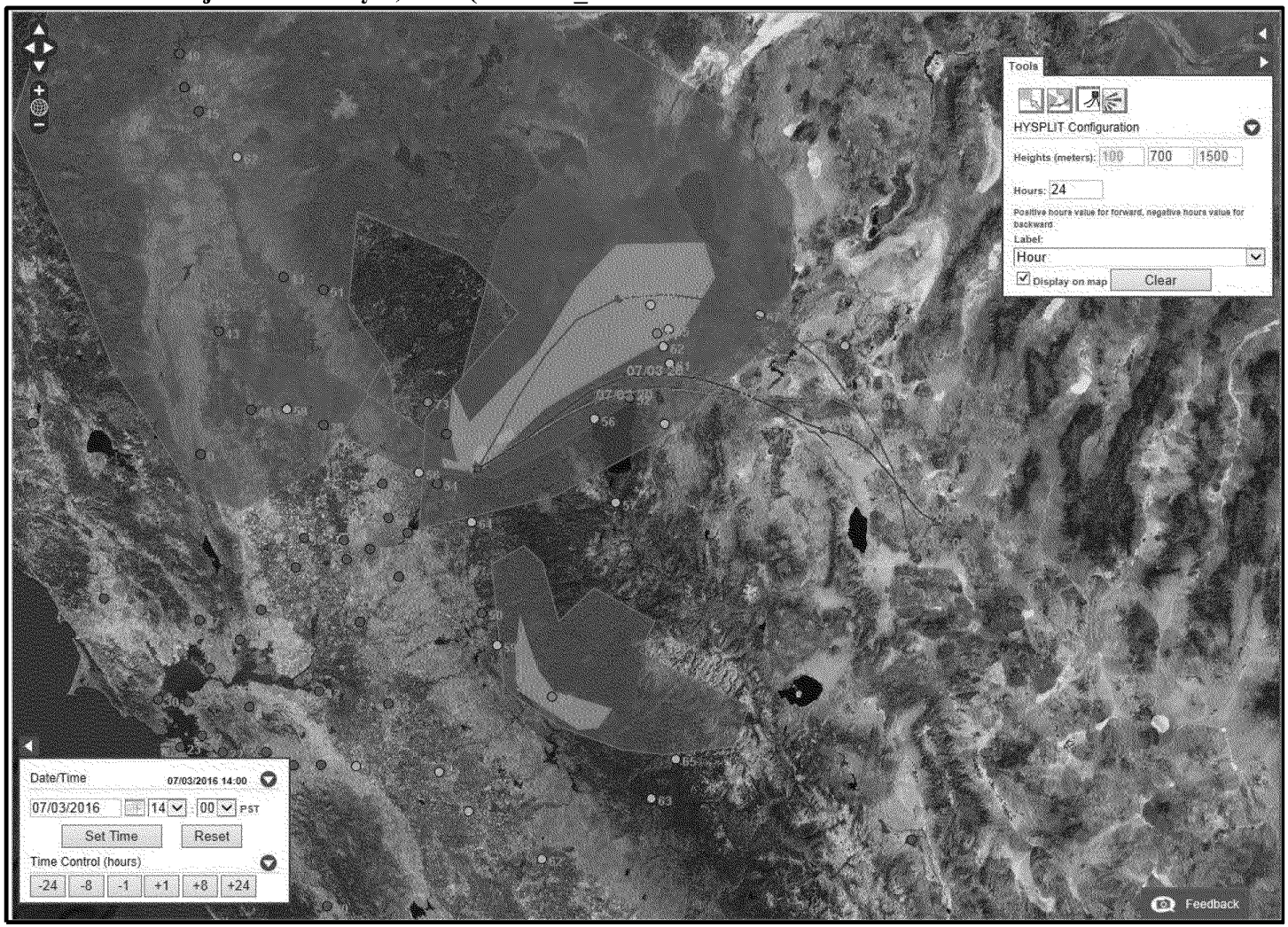

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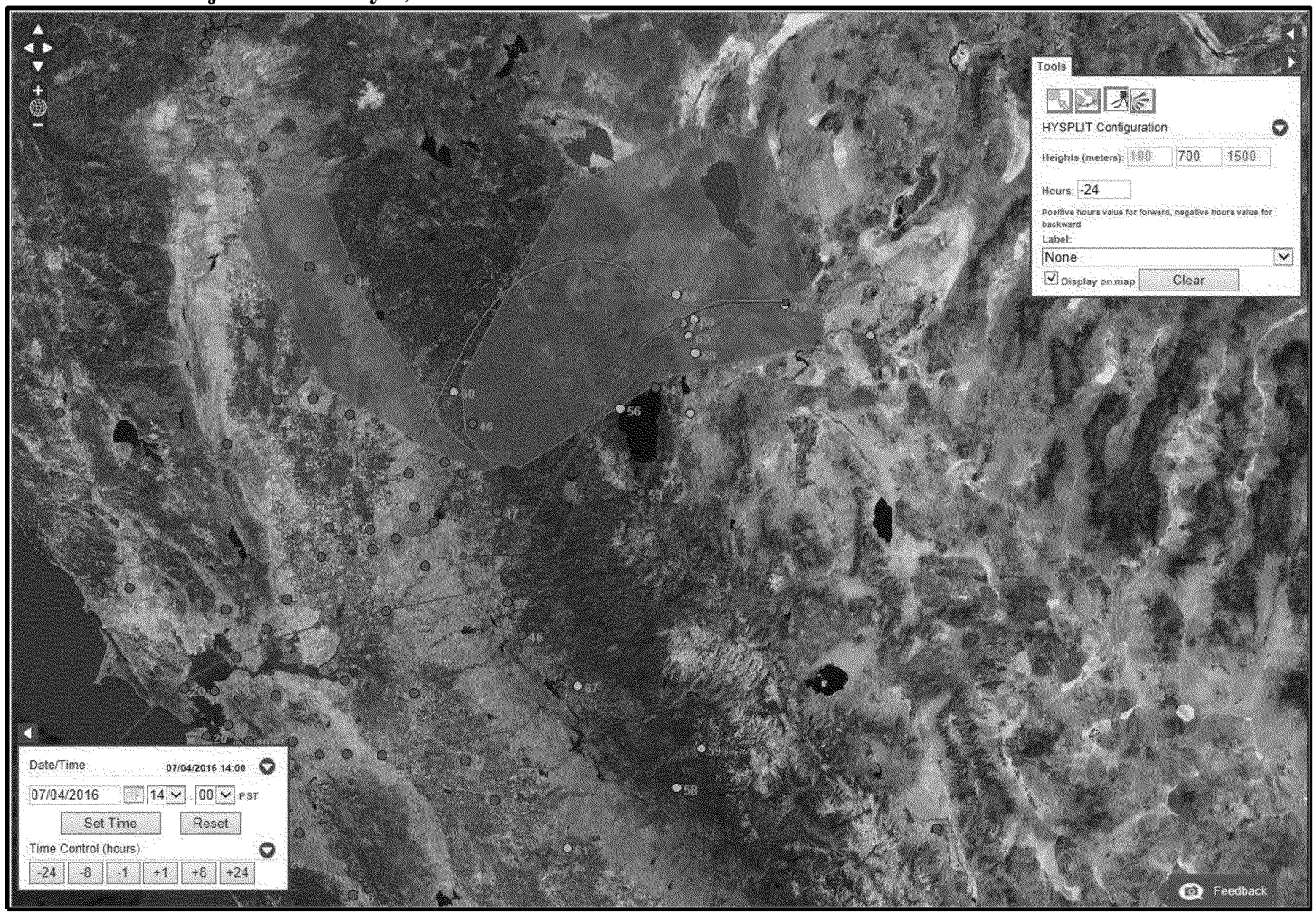
**Figure 20b. AirNow Tech Image of Active Fires, HMS Smoke Plumes, 8-Hour Ozone Concentrations, and Backward HYSPLIT Trajectories – July 4, 2016**



### 3.3 $PM_{2.5}$ Concentrations and Speciation

$PM_{2.5}$ is directly emitted during combustion. Elevated concentrations of $PM_{2.5}$ were measured at air monitors in Washoe County from June 29, 2016 through July 4, 2016, providing additional evidence that emissions from the Trailhead Fire reached ground level monitors in northern Nevada. Speciation data from the Washoe County $PM_{2.5}$ samples show elevated levels of organic and elemental carbon, also indicative of wildfire smoke (WCAQMD, 2017).

### 3.4 Ozone Chemistry and Concentrations

On July 3 and 4, 2016, the NDEP monitored exceedances of the 2015 8-hour $O_3$ NAAQS, with concentrations reaching 71 ppb. Wildfire smoke and $O_3$ precursors from the Trailhead Fire were transported east into Nevada on upper level winds. Ozone concentrations were elevated across Nevada, including the $O_3$ exceedances at the Fernley monitoring site. Ozone exceedances were also recorded at air monitoring sites in Reno, Nevada, within the Washoe County Air Quality Monitoring District. Table 4 lists $O_3$ concentrations across the NDEP-BAQP ambient air monitoring network for the seven days before and after the event, highlighting the exceedances at the Fernley site. Figure 21 shows the hourly ozone concentrations measured by ozone monitors within the NDEP-BAQP monitoring network for the same time period.

In addition to elevated ozone concentrations, $PM_{2.5}$ and NOx concentrations measured in Reno, Nevada (approximately 30 miles west) were elevated on July 2, 3, and 4, 2016 (WCAQMD, 2017). This supports the interpretation that the increase in wildfire smoke increased NOx concentrations, which subsequently increased $O_3$ levels. The elevated ozone and ozone precursor concentrations throughout western Nevada demonstrate that the wildfire smoke impacts were regional and were consistent with dispersion from the Trailhead Fire, more than 100 km away.

Although, as discussed earlier, NO from fires can result in ozone titration very close to the source of a fire, Fernley is sufficiently far enough downwind (150 km) that a reduction in ozone concentrations due to this phenomena was unlikely. In addition, while the increased smoke from the fire may have reduced the amount of solar insolation, thereby potentially reducing photochemical activity, this was offset by the substantially increased levels of ozone precursors generated by the fire, resulting in a net ozone enhancement.



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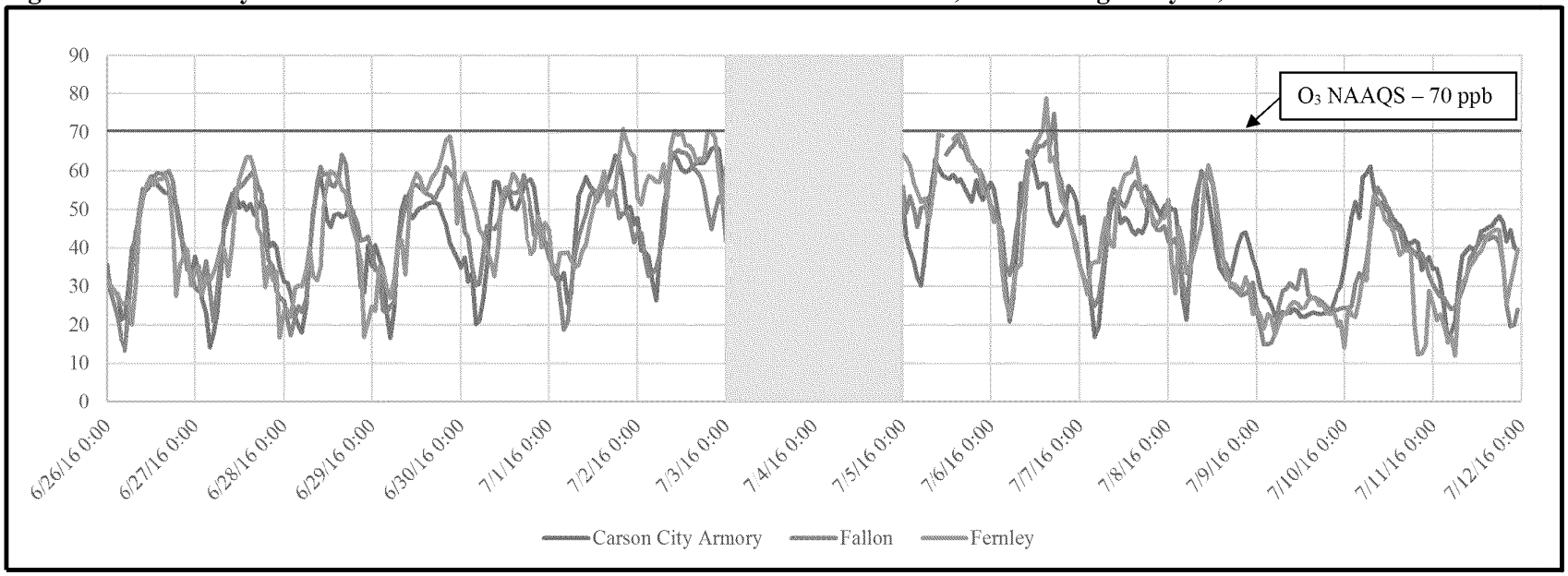
**Table 4. Maximum Daily 8-hour Ozone Concentrations (in ppb) Across the Monitoring Network for June 26, 2016 through July 11, 2016.**

| | Non-event | | | | | | | Trailhead Fire | | Non-event | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | 06/26 | 06/27 | 06/28 | 06/29 | 06/30 | 07/01 | 07/02 | 07/03 | 07/04 | 07/05 | 07/06 | 07/07 | 07/08 | 07/09 | 07/10 | 07/11 |
| Carson City | 55 | 51 | 50 | 50 | 53 | 58 | 63 | 62 | 62 | 58 | 58 | 50 | 48 | 46 | 51 | 45 |
| Fallon | 58 | 56 | 59 | 56 | 54 | 53 | 62 | 67 | 66 | 65 | 66 | 54 | 53 | 30 | 49 | 41 |
| Fernley | 56 | 55 | 55 | 61 | 53 | 61 | 66 | 71 | 70 | 68 | 66 | 57 | 49 | 25 | 47 | 41 |

**Figure 21. Hourly Ozone Concentrations for Network Monitors from June 26, 2016 through July 11, 2016.**



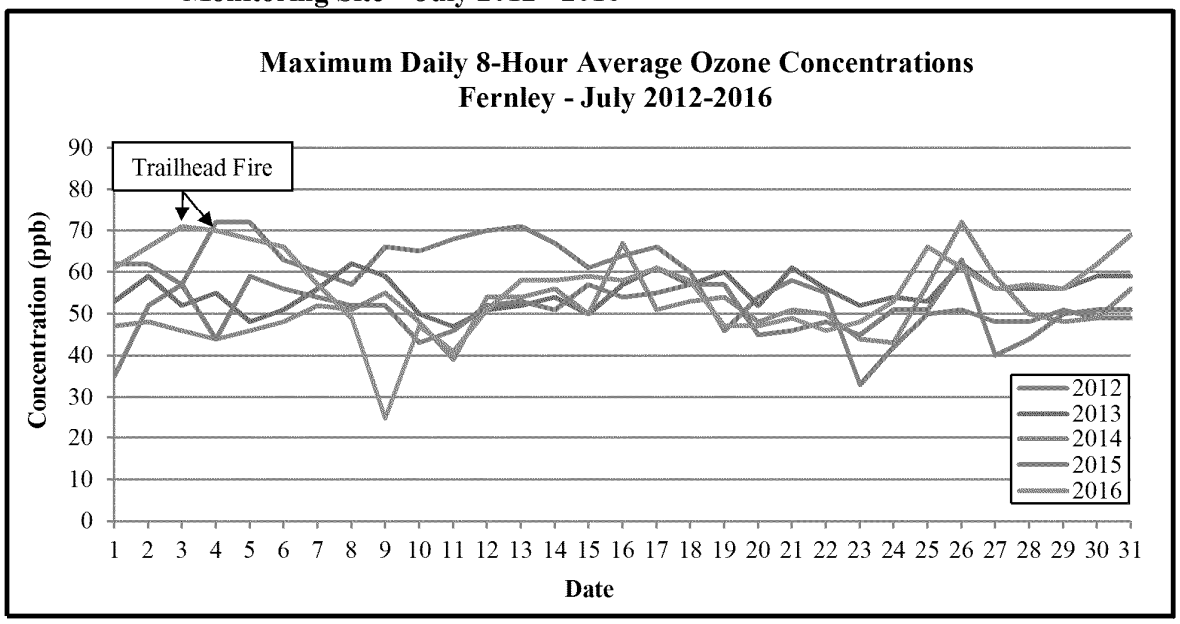
The increased precursor emissions from the fire throughout the western U.S. resulted in substantial amounts of ozone formation, leading to the 8-hour ozone exceedances at Fernley on July 3 and 4, 2016. Section 2.6 summarizes the key mechanisms by which emissions from wildfires can increase ozone, as well as past research that documents increases in ozone formation downwind of wildfires.

The daily maximum 8-hour ozone concentrations at the Fernley site on July 3 and 4, 2016, were more than 15 ppb higher than the average and median maximum daily 8-hour ozone concentrations historically measured during the month of July at the Fernley site (2012 through 2016). The measured concentrations were approximately two standard deviations higher than the mean ozone concentrations at the site for the month of July (Table 5). In addition to the exceedances at Fernley, ozone was elevated throughout much of northern Nevada; air quality monitors in Washoe County also recorded exceedances of the 8-hour ozone standard.

### 3.5 BEYOND HISTORICAL AND BACKGROUND CONCENTRATIONS

Ozone concentrations in western Nevada are historically at their highest in the afternoon during the summer months. The measured 8-hour ozone concentrations at the Fernley monitoring site on July 3 and 4, 2016 were significantly higher than the average and median concentrations for the month of July, as well as for similar non-event day concentrations. Figure 22 shows a time-series plot of 8-hour ozone concentrations at the Fernley site for all July days from 2012 through 2016.

**Figure 22. Maximum Daily 8-Hour Average Ozone Concentrations at the Fernley Ozone Monitoring Site – July 2012 - 2016**



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On both two event days, the one -hour ozone concentrations were above the 95 $^{th}$ percentile for summer ozone concentrations (June through August, 2012 through 2016, excluding July 3 and 4, 2016) for several hours on both days (Figures 23 and 24).



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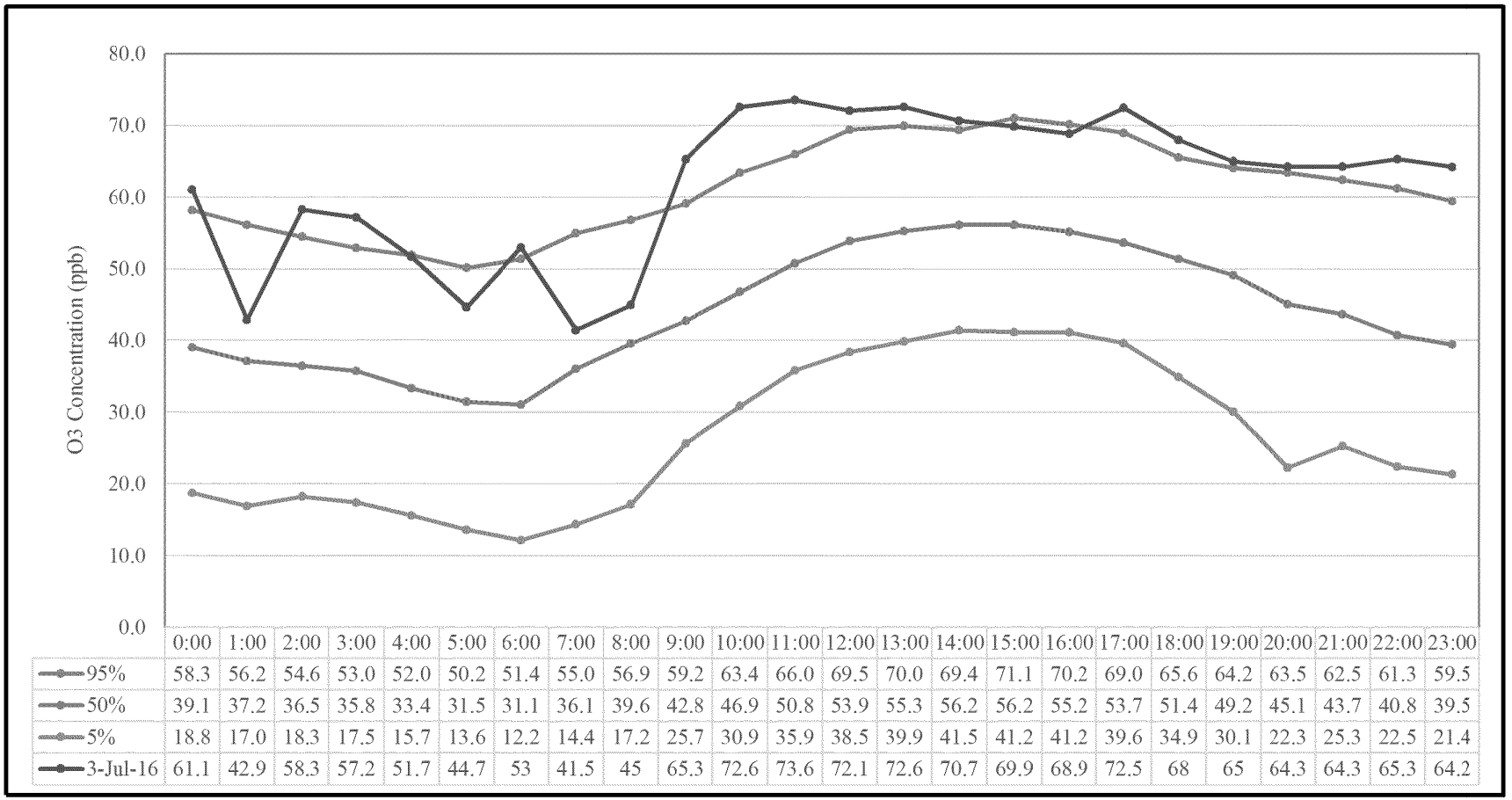
**Figure 23. Fernley Hourly Ozone Concentrations for June-August, 2012 through 2016, with July 3, 2016.**




| | 0:00 | 1:00 | 2:00 | 3:00 | 4:00 | 5:00 | 6:00 | 7:00 | 8:00 | 9:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 17:00 | 18:00 | 19:00 | 20:00 | 21:00 | 22:00 | 23:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95% | 58.3 | 56.2 | 54.6 | 53.0 | 52.0 | 50.2 | 51.4 | 55.0 | 56.9 | 59.2 | 63.4 | 66.0 | 69.5 | 70.0 | 69.4 | 71.1 | 70.2 | 69.0 | 65.6 | 64.2 | 63.5 | 62.5 | 61.3 | 59.5 |
| 50% | 39.1 | 37.2 | 36.5 | 35.8 | 33.4 | 31.5 | 31.1 | 36.1 | 39.6 | 42.8 | 46.9 | 50.8 | 53.9 | 55.3 | 56.2 | 56.2 | 55.2 | 53.7 | 51.4 | 49.2 | 45.1 | 43.7 | 40.8 | 39.5 |
| 5% | 18.8 | 17.0 | 18.3 | 17.5 | 15.7 | 13.6 | 12.2 | 14.4 | 17.2 | 25.7 | 30.9 | 35.9 | 38.5 | 39.9 | 41.5 | 41.2 | 41.2 | 39.6 | 34.9 | 30.1 | 22.3 | 25.3 | 22.5 | 21.4 |
| 3-Jul-16 | 61.1 | 42.9 | 58.3 | 57.2 | 51.7 | 44.7 | 53 | 41.5 | 45 | 65.3 | 72.6 | 73.6 | 72.1 | 72.6 | 70.7 | 69.9 | 68.9 | 72.5 | 68 | 65 | 64.3 | 64.3 | 65.3 | 64.2 |

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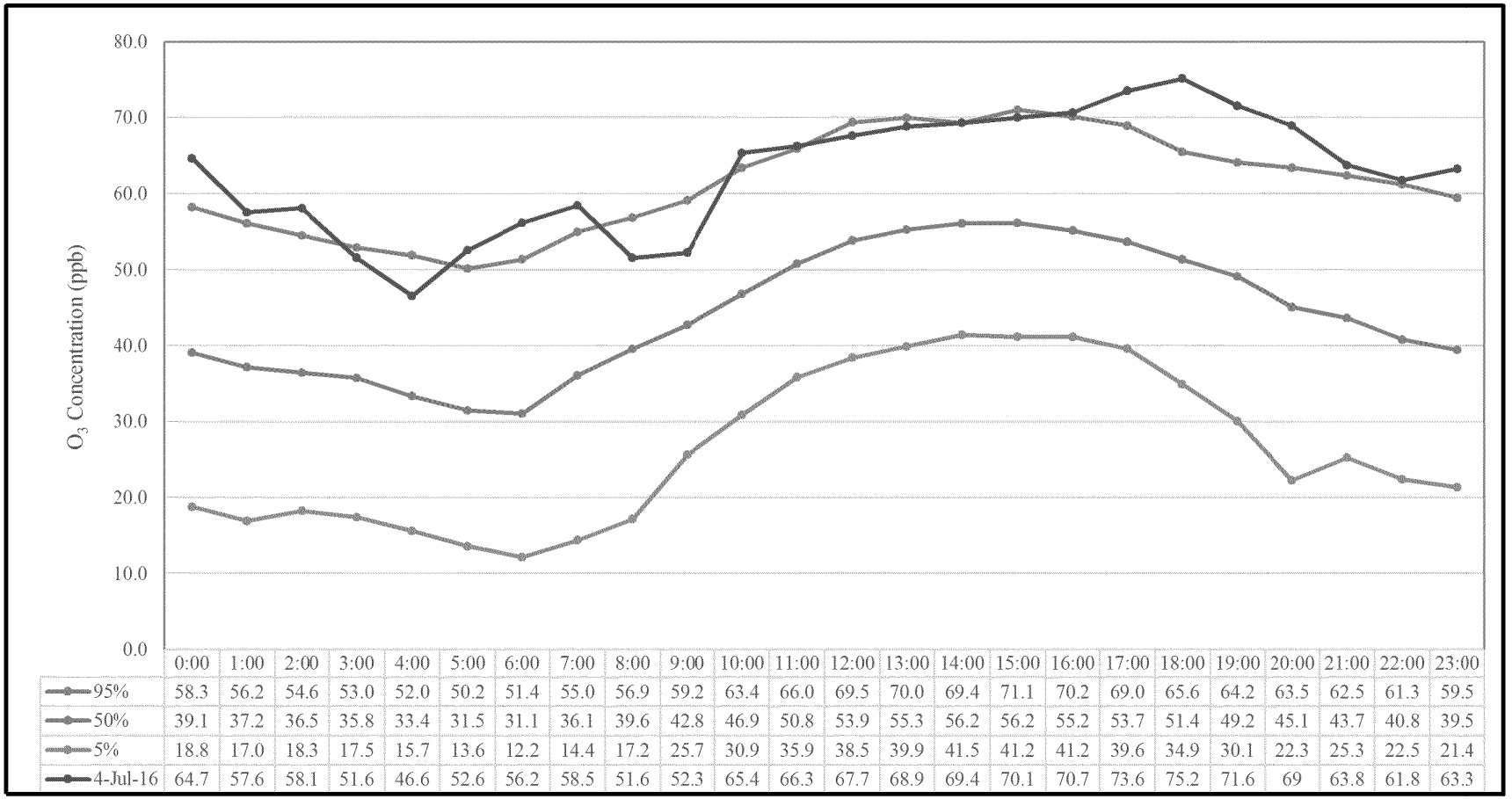
**Figure 24. Fernley Hourly Ozone Concentrations for June-August, 2012 through 2016, with July 4, 2016.**




| | 0:00 | 1:00 | 2:00 | 3:00 | 4:00 | 5:00 | 6:00 | 7:00 | 8:00 | 9:00 | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 17:00 | 18:00 | 19:00 | 20:00 | 21:00 | 22:00 | 23:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95% | 58.3 | 56.2 | 54.6 | 53.0 | 52.0 | 50.2 | 51.4 | 55.0 | 56.9 | 59.2 | 63.4 | 66.0 | 69.5 | 70.0 | 69.4 | 71.1 | 70.2 | 69.0 | 65.6 | 64.2 | 63.5 | 62.5 | 61.3 | 59.5 |
| 50% | 39.1 | 37.2 | 36.5 | 35.8 | 33.4 | 31.5 | 31.1 | 36.1 | 39.6 | 42.8 | 46.9 | 50.8 | 53.9 | 55.3 | 56.2 | 56.2 | 55.2 | 53.7 | 51.4 | 49.2 | 45.1 | 43.7 | 40.8 | 39.5 |
| 5% | 18.8 | 17.0 | 18.3 | 17.5 | 15.7 | 13.6 | 12.2 | 14.4 | 17.2 | 25.7 | 30.9 | 35.9 | 38.5 | 39.9 | 41.5 | 41.2 | 41.2 | 39.6 | 34.9 | 30.1 | 22.3 | 25.3 | 22.5 | 21.4 |
| 4-Jul-16 | 64.7 | 57.6 | 58.1 | 51.6 | 46.6 | 52.6 | 56.2 | 58.5 | 51.6 | 52.3 | 65.4 | 66.3 | 67.7 | 68.9 | 69.4 | 70.1 | 70.7 | 73.6 | 75.2 | 71.6 | 69 | 63.8 | 61.8 | 63.3 |

Historical data from the Fernley site show that the average ozone concentration for July from 2012 through 2016, (excluding July 3 and 4, 2016) is 54.0 ppb. This data is summarized in Table 5 and shown graphically in Figure 25.

**Table 5. July Maximum Daily 8-Hour Average Ozone Statistics for Fernley**

| | 2012-2016 | | 2012 | 2013 | 2014 | 2015 | 2016 | |
|---|---|---|---|---|---|---|---|---|
| | All Data | No Fire | | | | | All Data | No Fire |
| **Mean** | 54.3 | 54.0 | 56.8 | 55.2 | 51.3 | 51.9 | 56.2 | 55.0 |
| **Median** | 54 | 54 | 57 | 56 | 50 | 52 | 58 | 58 |
| **Std. Dev.** | 8.0 | 7.8 | 10.4 | 4.1 | 6.6 | 5.9 | 9.8 | 9.4 |
| **Max.** | 72 | 72. | 72 | 62 | 72 | 63 | 71 | 69 |

Concentrations are in ppb.

**Figure 25. Historical Data – July Ozone FEM Mean and Maximum Daily 8 -Hour Average Concentrations for Fernley**

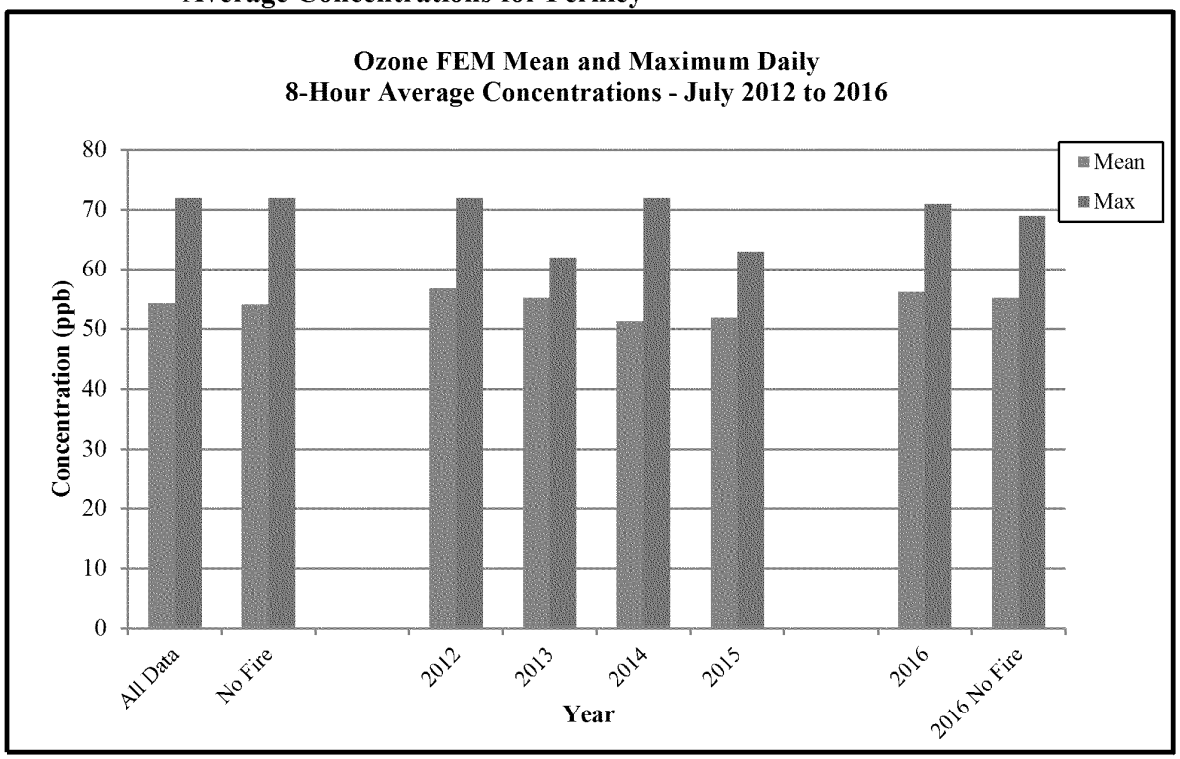



Figure 16 shows the number of July days over the five-year period 2012 through 2016 when the maximum 8-hour ozone concentration fell within established concentration bins of 10 ppb. The curve on the graph represents the percentage for days that fall within each concentration bin. Both wildfire event days (July 3 and 4, 2016) exceed the 95$^{th}$ percentile (Figure 26).



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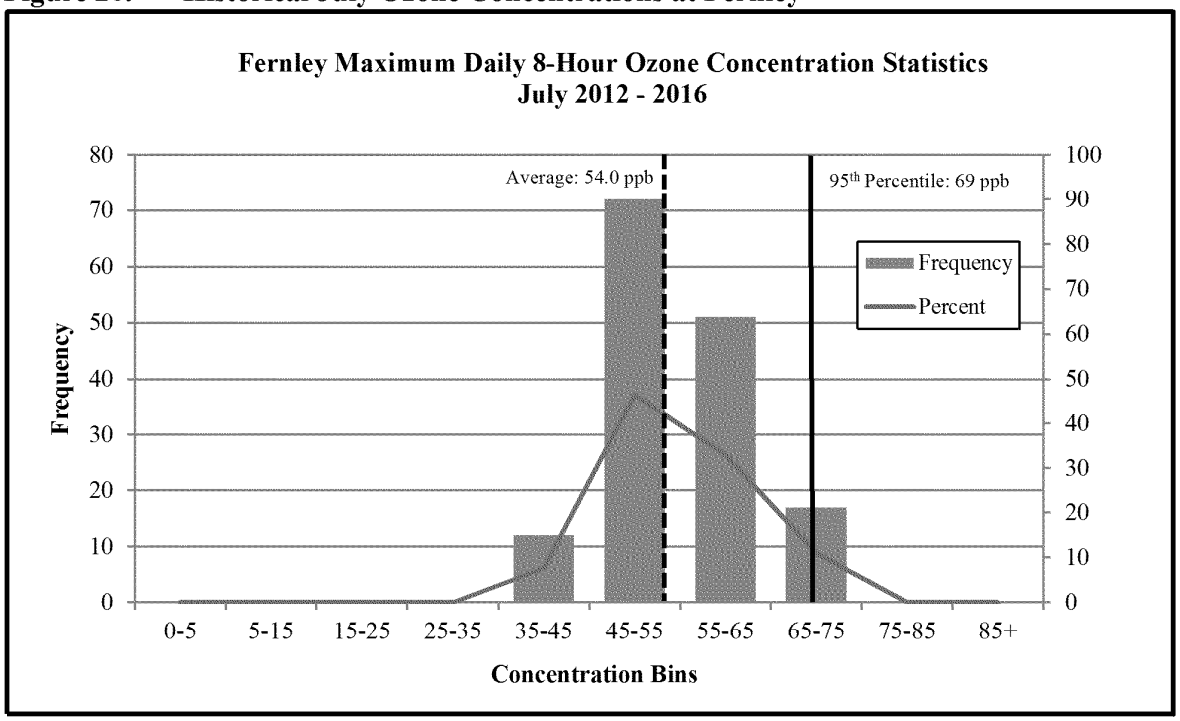
**Figure 26. Historical July Ozone Concentrations at Fernley**




To NDEP's knowledge, there were no other unusual localozone precursor emissions in or upwind from Fernley before or during the event days.



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## 4.0 SUMMARY

The Trailhead Fire started on June 28, 2016 and smoke from the fire began impacting northern Nevada on June 29. Smoke from the fire caused the 8-hour exceedances at the Fernley ozone monitoring site on July 3 and 4, 2016. This summary documents the transport of emissions from the fire to northern Nevada. Wildfire emissions transported both at the surface and aloft affected northern and western Nevada on July 3 and 4, 2016, causing the 8-hour ozone exceedances at Fernley.

This document has demonstrated a clear causal relationship between the emissions from the Trailhead Fire and the 8-hour exceedances at Fernley on July 3 and 4, 2016based on the following evidence:

- Meteorological and trajectory analyses document the transport of smoke and emissions from the Trailhead Fire, demonstrating that these emissions reached northern and western Nevada, including Fernley;

- Satellite images show evidence of smokereaching Fernley. Airport observations document smoke and limited visibility, indicating that the smoke mixed down to the surface;

- Evidence of broad surface level impacts of the Trailhead Fire is further demonstrated by increased $PM_{2.5}$ concentrations in Washoe County, upwind of the Fernley site;

- Pollution in the plume increased ozone concentrations consistent with the science of the conceptual model for the event. Ozone levels were anomalously elevated throughout northern Nevada, including the exceedances at Fernley. This regional increase in ozone, consistent with the extent and timing of increase in $PM_{2.5}$, indicates that it is more likely that the fire emissions increased ozone due to increased precursors, rather than decreased ozone due to decreased solar insolation or increased ozone titration; and

- The concentrations of 71 and 70 ppb at Fernley are well above normal historical levels.



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## 5.0 CRITERIA FOR THE DEFINITION OF AN EXCEPTIONAL EVENT

The criteria in 40 CFR §50.1(j) for an event to meet the definition of an exceptional event need to be met for the measured exceedances to qualify for exclusion. These criteria are:

- The event affects air quality;
- The event is not reasonably controllable or preventable; and
- The event is unlikely to reoccur at a particular location or [is] a natural event.

### 5.1 AFFECTS AIR QUALITY

As stated in the preamble to the EER, the event in question is considered to have affected air quality if it can be shown that there is a clear causal relationship between the monitored exceedances and the event, and that the event is associated with a measured concentration in excess of normal historical concentrations. These criteria are demonstrated in Section 3. The media releases provided in Appendix C also provide evidence that the Trailhead Fire affected air quality in the vicinity of the Fernley monitor. Given the information presented in this demonstration, the NDEP concludes that the Trailhead Fire in early July 2016 affected air quality at the Fernley ozone monitoring site.

### 5.2 NOT REASONABLY CONTROLLABLE OR PREVENTABLE

The EER defines a wildfire as an unplanned, unwanted wildland fire. The Trailhead Fire was a natural event occurring on wildland in California. NDEP BAQP is not aware of any evidence clearly demonstrating that prevention or control efforts beyond those actually taken would have been reasonable. Therefore, emissions from the Trailhead Fire were not reasonably controllable or preventable.

### 5.3 NATURAL EVENT

Based on the evidence provided in this demonstration, the Trailhead Fire is a "Natural Event" as defined in 40 CFR 50.1(k). Although the cause of the fire is still under investigation, "…wildfires on wildland initiated by accident or arson are considered natural events, and on a case-by-case basis this treatment for wildfires may bear on the appropriate treatment of accidental and arson-set structural fire," (USEPA, 2016).

The Trailhead Fire meets the definition of "wildfire" predominantly occurring on "wildland" as defined in 40 CFR 50.1(n) and (o). The Trailhead Fire occurred on federal and state-owned lands.



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# 6.0 PROCEDURAL REQUIREMENTS

## 6.1 FLAGGING OF DATA

The NDEP BAQP has submitted the ozone data from the Fernley monitor to the US EPA AQS database and has placed the appropriate flags on the data indicating that the data was affected by exceptional events due to wildfires (Flag RT, requesting exclusion due to wildland fires). Informational flags (IT) were also included for other NDEP BAQP ozone monitoring sites for the same time period. Such flagging ensures that the air quality data is properly represented in the overall air quality planning process.

## 6.2 PUBLIC OUTREACH DURING EVENT

An air agency requesting exclusion of air quality data affected by an exceptional event must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the agency must:

- Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
- Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
- Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events.

The public was notified of air quality being affected by ozone from the Trailhead Fire via AQI updates, National Weather Service Smoke Text Products, and NDEP's public website. The AQI maps and Smoke Text Products are provided in Appendix C.



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### 6.3 PUBLIC COMMENT PERIOD

The NDEP BAQP has prepared this documentation to demonstrate that these exceedances were due to a wildland fire natural event, in accordance with the US EPA EER. The documentation in support of this demonstration and request for the treatment of the data associated with these exceedances as exceptional events was posted on the NDEP website at http://ndep.nv.gov/admin/public.htm requesting review and comment by the public for a minimum of 30 days. Public comments were directed to:

Sheryl Fontaine, Ambient Air Monitoring Branch
Nevada Division of Environmental Protection
Bureau of Air Quality Planning
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Email: sfontaine@ndep.nv.gov



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## 7.0 REFERENCES


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# APPENDIX A

# NDEP BAQP Annual Network Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

OCT 26 2016

Mr. Danilo Dragoni
Chief, Bureau of Air Quality Planning
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701

Dear Mr. Dragoni:

Thank you for your submission of the 2016 *Ambient Air Monitoring Network* Plan for the State of Nevada in June 2016. We have reviewed the submitted document based on the requirements set forth under 40 CFR 58. Based on the information provided in the plan, the U.S. Environmental Protection Agency (EPA) approves all portions of the network plan except those specifically identified below.

Please note that we cannot approve portions of the annual network plan for which the information in the plan is insufficient to judge whether the requirement has been met, or for which the information, as described, does not meet the requirements as specified in 40 CFR 58.10 and the associated appendices. EPA Region 9 also cannot approve portions of the plan for which the EPA Administrator has not delegated approval authority to the regional offices. Accordingly, the first enclosure (*A. Annual Monitoring Network Plan Items where EPA is Not Taking Action*) provides a listing of specific items of your agency's annual monitoring network plan where EPA is not taking action. The second enclosure (*B. Additional Items Requiring Attention*) is a listing of additional items in the plan that EPA wishes to bring to your agency's attention.

The third enclosure (*C. Annual Monitoring Network Plan Checklist*) is the checklist EPA used to review your plan for overall items that are required to be included in the annual network plan along with our assessment of whether the plan submitted by your agency addresses those requirements.

The first two enclosures highlight a subset of the more extensive list of items reviewed in the third enclosure. All comments conveyed via this letter (and enclosures) should be addressed (through corrections within the plan, additional information being included, or discussion) in next year's annual monitoring network plan.

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If you have any questions regarding this letter or the enclosed comments, please feel free to contact me at (415) 947-4134 or Anna Mebust at (415) 972-3265.

Sincerely,

Gwen Yoshimura, Acting Manager
Air Quality Analysis Office

Enclosures:

A. Annual Monitoring Network Plan Items where EPA is Not Taking Action
B. Additional Items Requiring Attention
C. Annual Monitoring Network Plan Checklist

cc (via email): Daren Winkelman, NDEP

# APPENDIX B
# NDEP BAQP 2016 Data Certification Letter

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

May 1, 2017

Ms. Alexis Strauss
Acting Regional Administrator
U.S. EPA – Region 9
75 Hawthorne Street
San Francisco, CA 94105

**RE: Submittal of the State of Nevada 2016 Data Certification Package**

Dear Ms. Strauss:

Pursuant to 40 CFR Part 58, state and local government monitoring organizations must annually certify their data. Certification for the year 2016 means that (1) the ambient concentration data and the quality assurance data from January 1, 2016 through December 31, 2016 are completely submitted to the Air Quality System (AQS) by the State of Nevada, Primary Quality Assurance Organization (PQAO) 0757, and (2) the ambient data are accurate to the best of my knowledge taking into consideration the quality assurance findings. This process has taken into account the results of periodic verification, precision and accuracy checks, and any other relevant performance assessments.

Therefore, as Chief of the Bureau of Air Quality Planning for the State of Nevada, I certify that all data from the NDEP State and Local Air Monitoring System (SLAMS) and the Special Purpose Monitor (SPM) reported to EPA Region 9, enclosed on the AMP 600 summary report, have met the data certification criteria described in 40 CFR Part 58, for the year 2016.

If you have any questions or comments, please contact Daren Winkelman of my staff, at 775-687-9342, or e: dwinkelman@ndep.nv.gov.

Sincerely,

Danilo Dragoni, Chief
Bureau of Air Quality Planning

DD/dw
Enclosure



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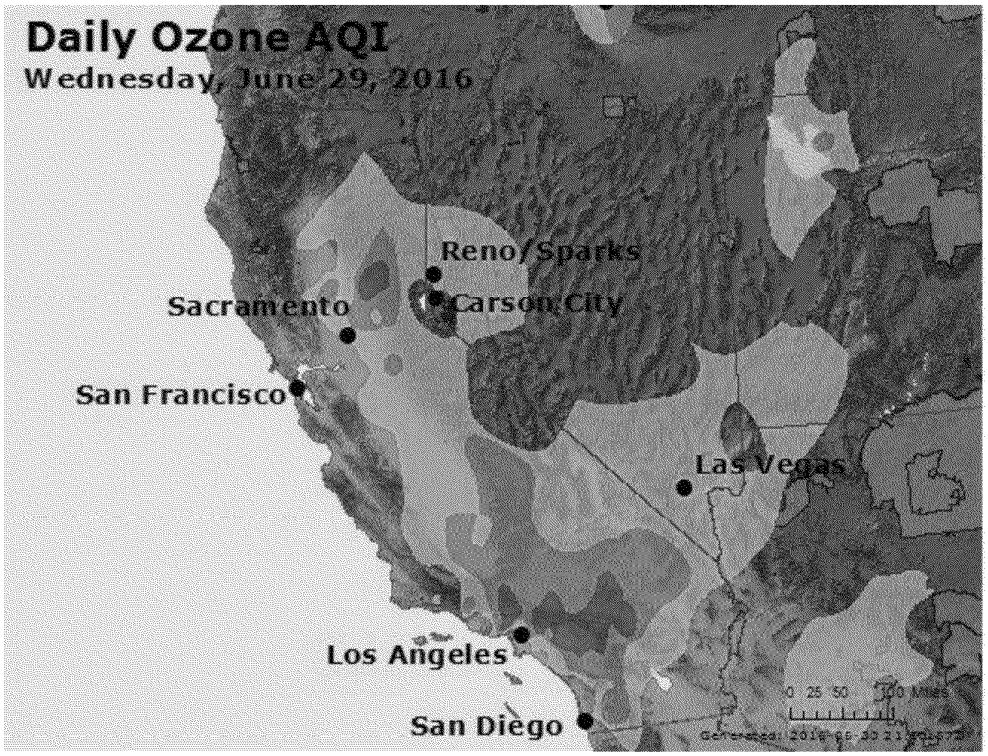
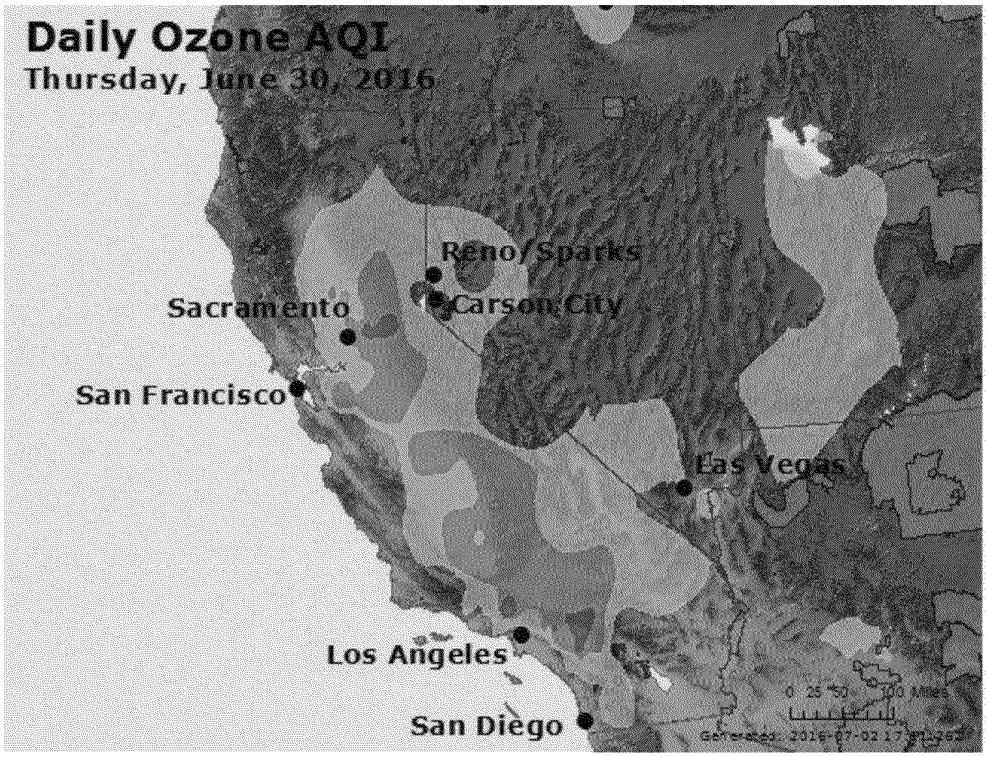
# APPENDIX C
# Sample Public Notifications



AirNow Ozone AQI from June 29, 2016.



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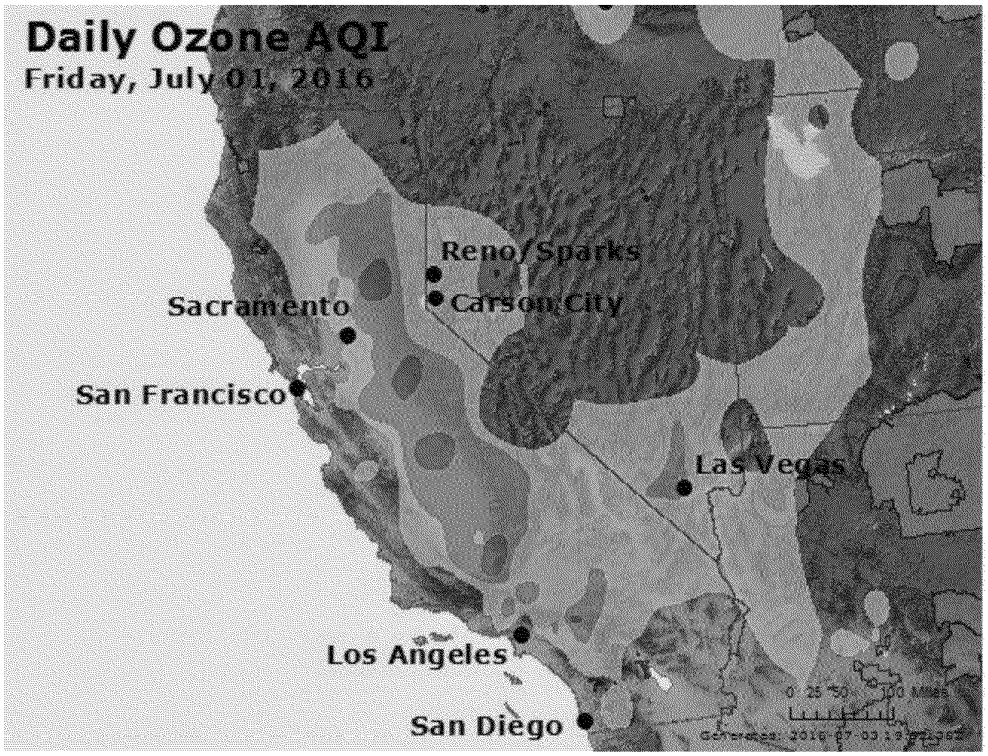
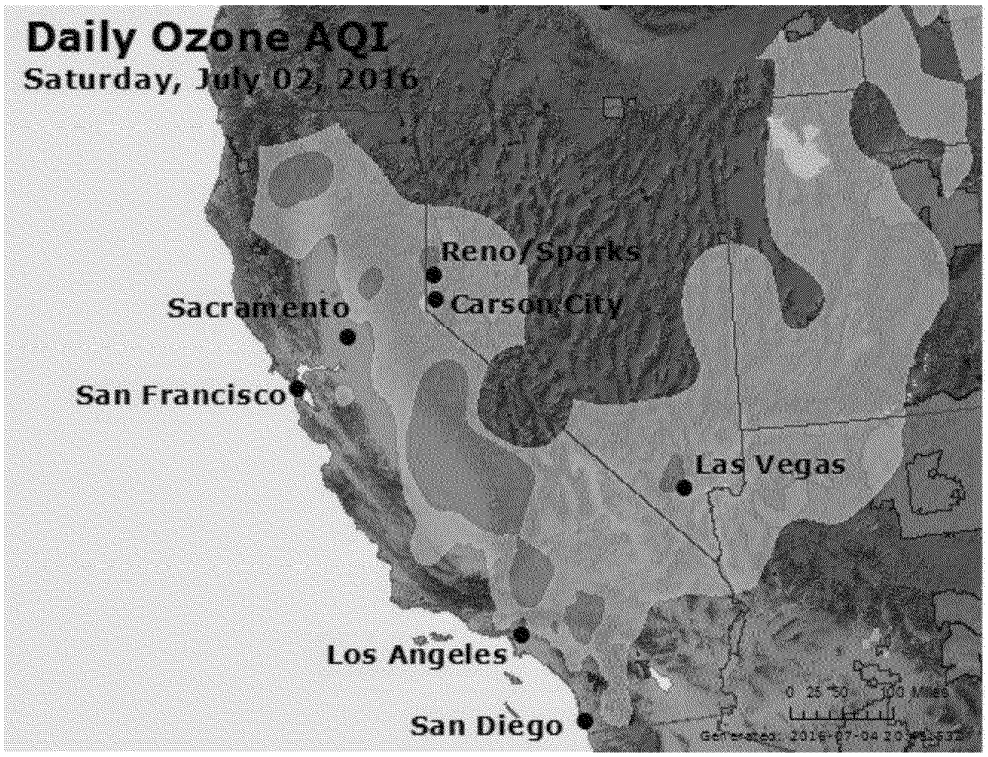
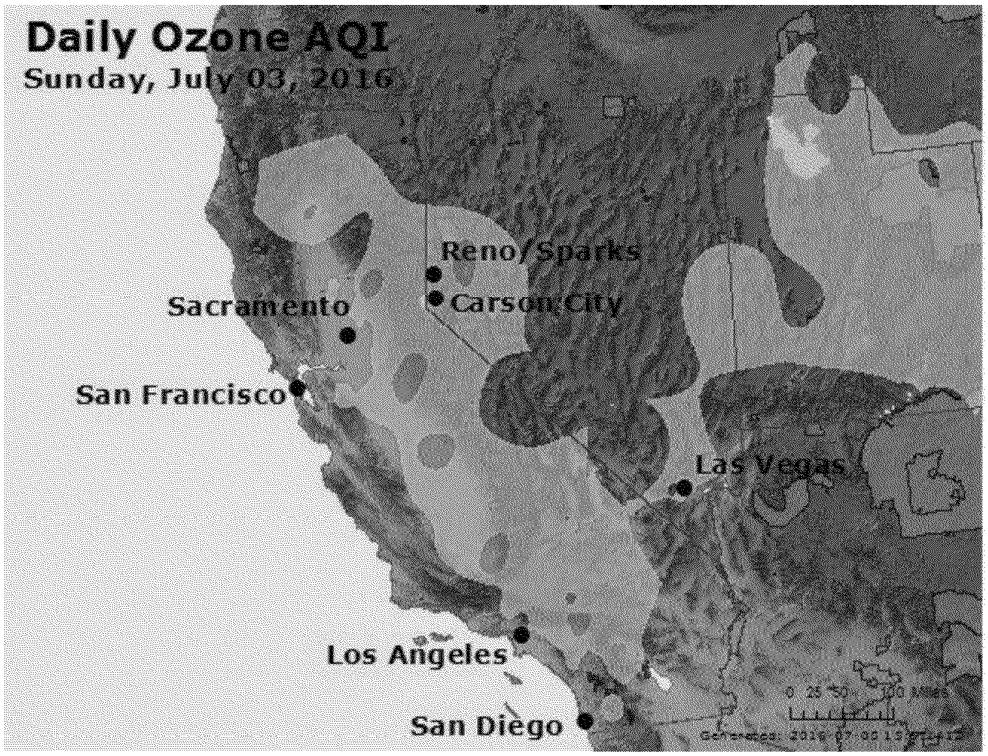


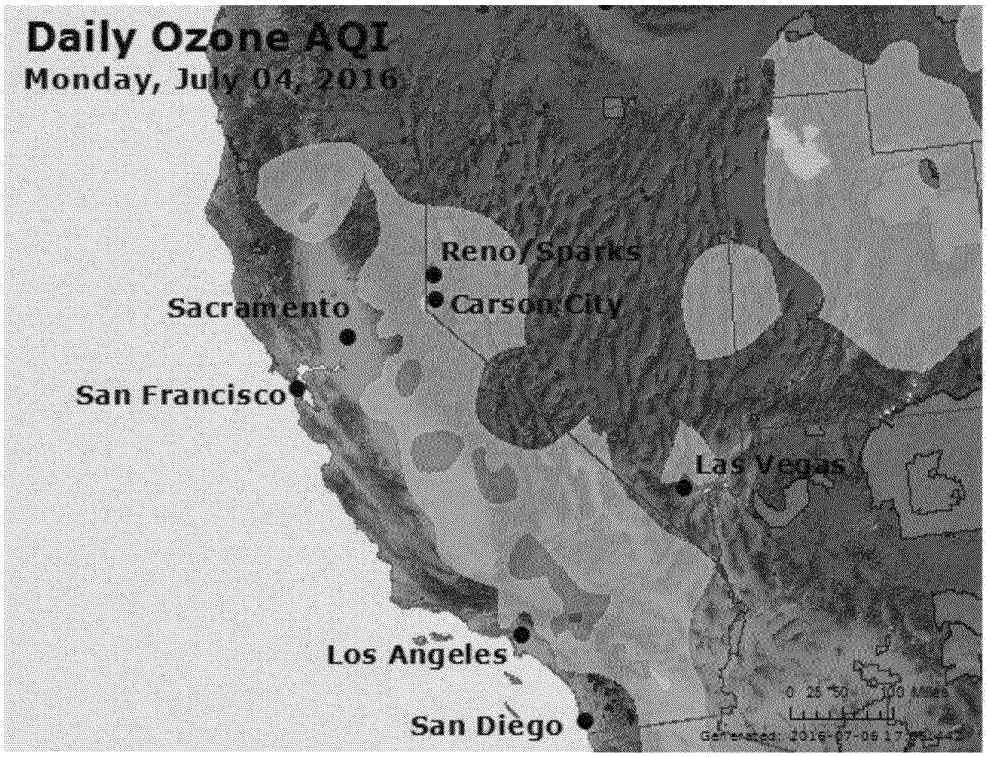
AirNow Ozone AQI from July 1, 2016.



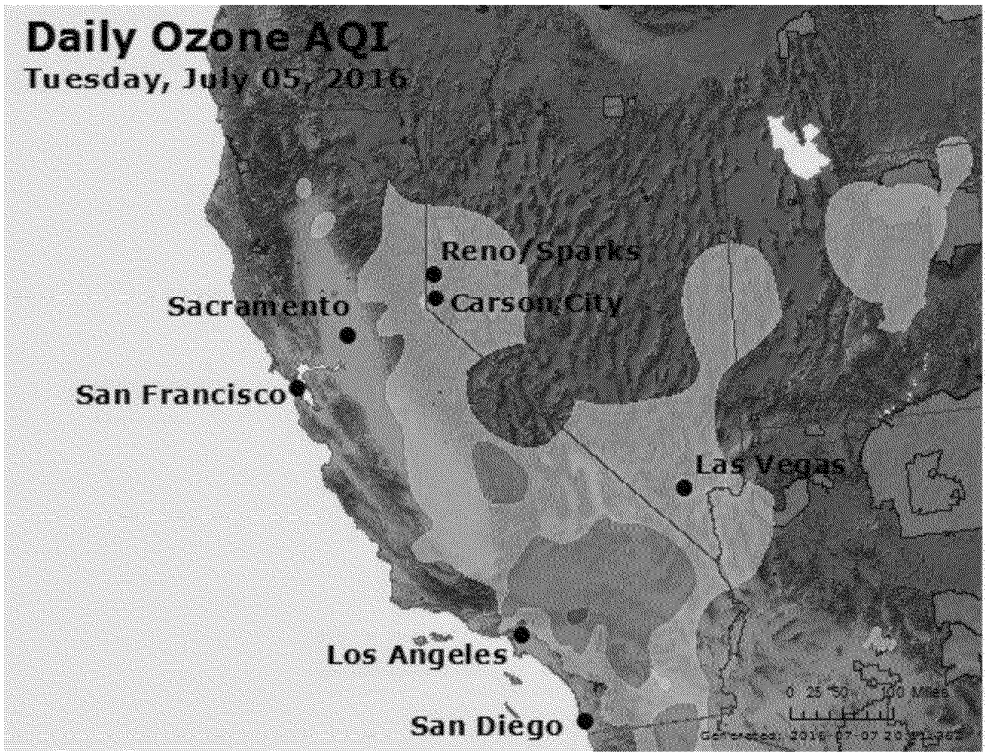
AirNow Ozone AQI from July 2, 2016.



AirNow Ozone AQI from July 3, 2016.



AirNow Ozone AQI from July 4, 2016.



AirNow Ozone AQI from July 5, 2016.

**Saturday, July 02 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 0200Z July 3, 2016

SMOKE:
Southern Canada to Northwestern Canada and Alaska:
A large area of light remnant smoke from fires over the Northwest Territories, northern Saskatchewan and northern Alberta extends from portions of southern Ontario northern Michigan and extends northwest to portions of northwest Canada and eastern Alaska. An area of moderate density smoke was seen over the Northwest Territories. Multiple light to heavy density smoke plumes were seen moving north in northeast Alberta, northern Saskatchewan and southeast of Great Slave Lake in the Northwest Territories. Another group of wildfires in northeast Manitoba were seen emitting light to moderate density smoke to the south.

California:
An area of light to moderate density smoke was seen fanning out to the north and west from the wildfire named Pine in Ventura county. Another wildfire in the Sierra foothills named Trailhead was emitting a light to heavy density smoke plume to the northeast.

DUST:
Gulf of Mexico/Texas/Lower Mississippi River Valley/Southeast US:
An area of Saharan dust was seen spanning from the western portions of the Gulf of Mexico north into eastern Texas, and eastern Oklahoma. This area of dust possibly mixed with remnant smoke and sulfates in the Lower Mississippi River Valley and the Southeast US. Cloud cover obscured the extent of this aerosol to the north.

-Cronin

THIS TEXT PRODUCT IS PRIMARILY INTENDED TO DESCRIBE SIGNIFICANT AREAS OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF THESE AND OTHER PLUMES WHICH ARE LESS EXTENSIVE AND STILL ATTACHED TO THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

JPEG: http://www.ospo.noaa.gov/Products/land/hms.html
GIS: http://www.firedetect.noaa.gov/viewer.htm
KML: http://www.ssd.noaa.gov/PS/FIRE/kml.html
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**Unless otherwise indicated:**

- Areas of smoke are analyzed using GOES-EAST and GOES-WEST Visible satellite imagery.

- Only a general description of areas of smoke or significant smoke plumes will be analyzed.
- A quantitative assessment of the density/amount of particulate or the vertical distribution is not included.
- Widespread cloudiness may prevent the detection of smoke even from significant fires.

**Sunday, July 3, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1730Z July 3, 2016

SMOKE:
Beaufort Sea/Northwestern to South Central Canada/Great Lakes Region:
An extensive area of light remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and north Manitoba extends southeastward from the Beaufort Sea to southern Ontario and the northern Great Lakes. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity.

Alaska:
A patch of thin remnant smoke is analyzed over northern Alaska, with nearby fires the likely cause. Off the western and southwestern coasts of the state, additional aerosol is observed that is thought to be remnant smoke from wildfires in Siberia that is now drifting east.

Western US:
Areas of thin to moderately dense smoke are seen over parts of northern California, Nevada, northwest Utah, and southeast Idaho. This smoke is largely from the Trailhead fire in California and the Hot Pot fire in northern Nevada.

DUST:
Gulf of Mexico/Texas Coast/Lower Mississippi River Valley/Southeast US:
An area of Saharan dust was seen over western and central portions of the Gulf of Mexico north to the Texas coast. Some of this dust possibly mixed with remnant smoke and sulfates also appears over parts of the Lower Mississippi River Valley and the Southeast US eventually disappearing beneath cloud cove just off the coast of North Carolina.

Eastern Caribbean/Bahamas/South Florida:
A large area of optically thick Saharan dust can be seen pushing westward across the Caribbean Sea from the Leeward Islands to just east of Jamaica. Other smaller separate areas of Saharan dust can also be seen crossing the Bahamas and far southern Florida/northwest Cuba

UNKNOWN AEROSOL:
New England/Canadian Maritimes:
A faint aerosol is seen along/off the coast of New England stretching from eastern Massachusetts east-northeast across the southern tip of Nova Scotia and then northeast along the coast as it wraps into a surface low over western Newfoundland. The composition and origin of this aerosol is not known.

Sheffler

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THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

JPEG: http://www.ospo.noaa.gov/Products/land/hms.html
GIS: http://www.firedetect.noaa.gov/viewer.htm
KML: http://www.ssd.noaa.gov/PS/FIRE/kml.html
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- Widespread cloudiness may prevent the detection of smoke even from significant fires.

**Sunday, July 3, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 0100Z July 4, 2016

SMOKE:
Northwestern to South Central Canada/Great Lakes Region:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends southeastward from northwest Nunavut to southern Ontario and the northern Great Lakes. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity. Numerous wildfires were seen in between cloud cover emitting light to heavy density smoke to the north in northern Saskatchewan and southeast of Great Slave Lake in the Northwest Territories. Wildfires in northern Manitoba were producing light to moderate density smoke to the west.

California/Nevada:
Areas of thin to moderately dense remnant smoke were seen over parts of northern and southern California, and Nevada. This smoke is largely from the Trailhead fire in California, the fire named Pine in Ventura County California and the Hot Pot fire in northern Nevada. The Pine fire was fanning light to moderate density to the southwest and northwest while the Trailhead fire in the Sierra foothills continues to emit a light to moderate density smoke plume to the northeast into western Nevada. The Hot Pot brush fire in west-central Elko county Nevada was seen spreading quickly to the east-northeast in shortwave IR imagery. A light to heavy density smoke plume was emanating to the east-northeast from this brush fire although clouds obscured the full extent of this smoke to the east.

DUST:
Eastern Caribbean/Bahamas/South Florida:
A large area of optically thick Saharan dust can be seen pushing westward across the Caribbean Sea from the Leeward Islands to just east of Jamaica. Other smaller separate areas of Saharan dust can also be seen crossing the Bahamas and far southern Florida/northwest Cuba although clouds began to obscure the extent of this dust in the afternoon and evening.

-Cronin

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- Widespread cloudiness may prevent the detection of smoke even from significant fires.

**Saturday, July 4, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1815Z July 4, 2016

SMOKE:
Northwestern to South Central Canada:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends southeastward from northwest Nunavut to southeast Ontario/southwest Quebec. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity.

North Utah/Northwest Colorado/South Wyoming:
An area of moderately dense to dense smoke has moved from northern Utah eastward today crossing southern Wyoming and northwest Colorado. This remnant smoke is primarily from the Hot Pot brush fire in west-central Elko county Nevada. However, two smoke producing fires in the Sierra Nevada yesterday may have also contributed to this area of smoke.

North Dakota/Northwest Minnesota/Southern Manitoba:
An area of thin remnant smoke observed over eastern North Dakota, northwest Minnesota, and southern Manitoba is likely from the brush fire in Nevada.

Alaska:
Remnant smoke is seen from the northern coast of the Alaska stretching northeast across the Arctic waters and ice. In addition a small patch of thin smoke is observed off the west coast of Alaska between areas of cloud cover. All of this smoke is primarily believed to be from Siberian wildfires.

DUST:
Eastern Caribbean/Bahamas/South Florida/Southeast Gulf of Mexico/Western Atlantic:
An expansive area of optically thick Saharan dust can be seen pushing westward across almost the entire Caribbean Sea from the Leeward Islands to just east of the Yucatan Peninsula. The dust extends north across Hispanola and eastern Cuba over much of the Bahamas and into part of the western Atlantic. Saharan dust can also be seen spreading west across southern Florida and the southeastern Gulf of Mexico.

Western and Northern Gulf of Mexico/Southern Plains/Lower Mississippi River Valley/Southeast US:
A broad area of aerosol that is believed to be mostly African dust is present across the western and northern portions of the Gulf of Mexico extending inland across central Texas/far southern Oklahoma, the Lower Mississippi River Valley, and much of the Southeast US disappearing beneath cloud cover over North Carolina. Other aerosols including a small amount of remnant smoke may be mixed with the elevated dust. Remnant smoke coming from Mexican oil rigs in the Bay of Campeche could be seen over the western Gulf as well.

Central Nunavut:
A swath of aerosol thought to be elevated dust is seen moving west along

the northwestern shore of Hudson Bay becoming mixed with the extensive area of remnant smoke over northwest Canada. The origin of the dust is not known.

UNKNOWN AEROSOL:
Northeast US/Canadian Maritimes:
A faint aerosol is seen moving off the coast of the Northeastern US states and across Nova Scotia, Newfoundland, and the Gulf of St. Lawrence. While the composition of the aerosol can not be fully determined, it seems plausible that this could be remnant smoke from the wildfires in Canada, possibly mixed with other unknown aerosols.

Great Lakes Region:
An area of aerosol is observed moving northward across far northeast Iowa, southeast Minnesota, Wisconsin, Lake Michigan, Michigan, and Lake Superior towards southern Ontario. There is a possibility that this aerosol is dust although it is uncertain if this is the case given the wide array of aerosols and sources across the United States today.

Sheffler

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**Sunday, July 4, 2016**

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 0200Z July 5, 2016

SMOKE:
Northwestern to South Central Canada:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends southeastward from northwest Nunavut to southeast Ontario/southwest Quebec. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity. Numerous wildfires were seen in between cloud cover emitting light to heavy density smoke to the west-northwest in northern Saskatchewan and southeastern portions of the Northwest Territories. Wildfires in northern Manitoba were producing light to moderate density smoke to the west and west-southwest.

Nebraska/Kansas/Northeast Colorado/Southern Wyoming:
An area of light to moderate density remnant smoke has moved from northern Utah eastward today crossing southern Wyoming, northeast Colorado into western Nebraska and north-central Kansas. This remnant smoke is primarily from the Hot Pot brush fire in west-central Elko county Nevada. However, two smoke producing fires in the Sierra Nevada yesterday may have also contributed to this area of smoke. The western extent of this area of smoke was obscured by clouds.

California:
The fire named Pine in southern California was fanning light to moderate density smoke to the southwest and north while the Trailhead fire in the Sierra foothills continues to emit a light to moderate density smoke plume to the northeast into western Nevada.

DUST:
Eastern Caribbean/Bahamas/South Florida/Southeast Gulf of Mexico/Western Atlantic:
An expansive area of optically thick Saharan dust can be seen pushing westward across almost the entire Caribbean Sea from the Leeward Islands to the Yucatan Peninsula. The dust extends north across Hispanola and eastern Cuba over much of the Bahamas and into part of the western Atlantic.

Western and Northern Gulf of Mexico/Southern Plains/Lower Mississippi River Valley/Southeast US:
A broad area of aerosol that is believed to be mostly diffuse Saharan dust is present across the western and northern portions of the Gulf of Mexico extending inland across central Texas/far southern Oklahoma, the Lower Mississippi River Valley, and much of the Southeast US disappearing beneath cloud cover over North Carolina. Other aerosols including a small amount of remnant smoke may be mixed with the elevated dust. Remnant smoke coming from Mexican oil rigs in the Bay of Campeche could be seen over the western Gulf as well.

Nevada:
A small area of blowing dust/sand originating from the Carson sink was seen in west-central Nevada moving east-southeast from the source region.

UNKNOWN AEROSOL:
Northeast US/Canadian Maritimes:
A faint aerosol is seen moving off the coast of the Northeastern US states and across Nova Scotia, Newfoundland, and the Gulf of St. Lawrence. While the composition of the aerosol can not be fully determined, it seems plausible that this could be remnant smoke from the wildfires in Canada, possibly mixed with other unknown aerosols.

-Sheffler/Cronin

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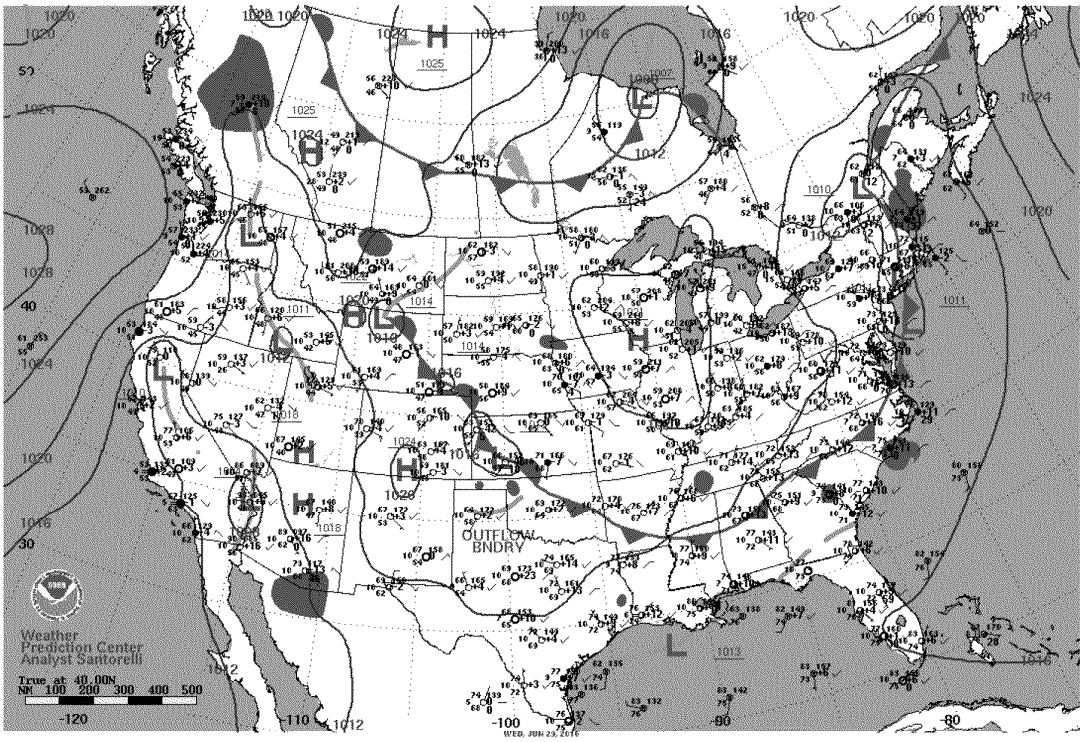
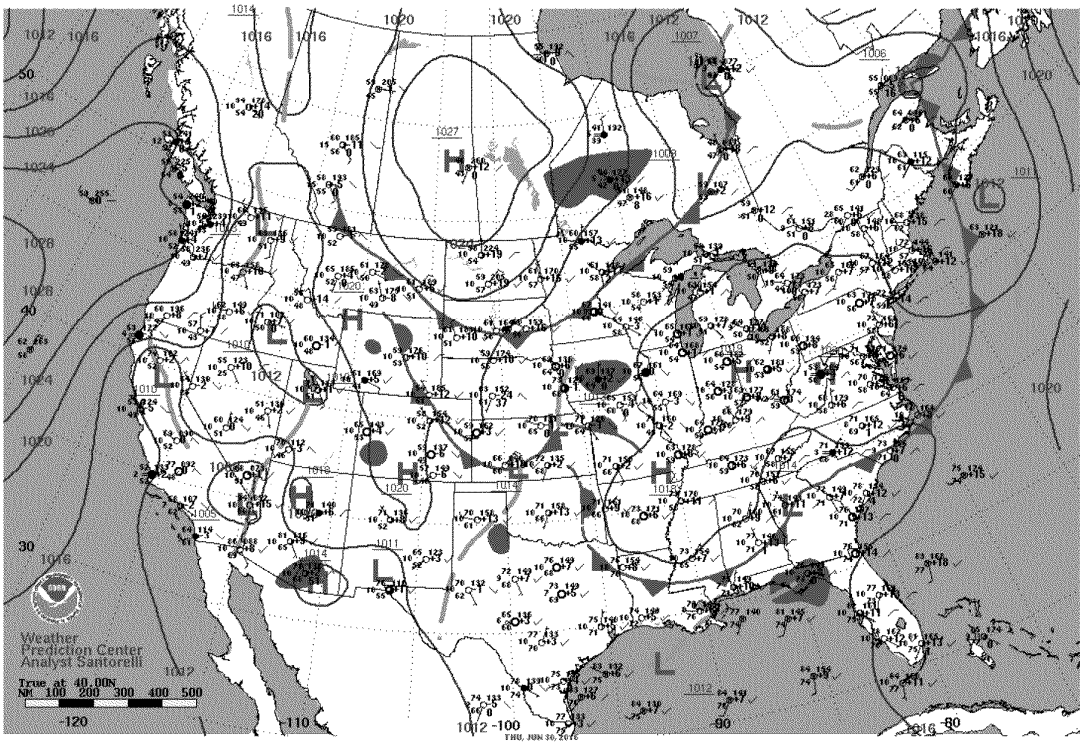
# APPENDIX D

# Surface Weather Maps for the Fernley Area – June 29 through July 5, 2016



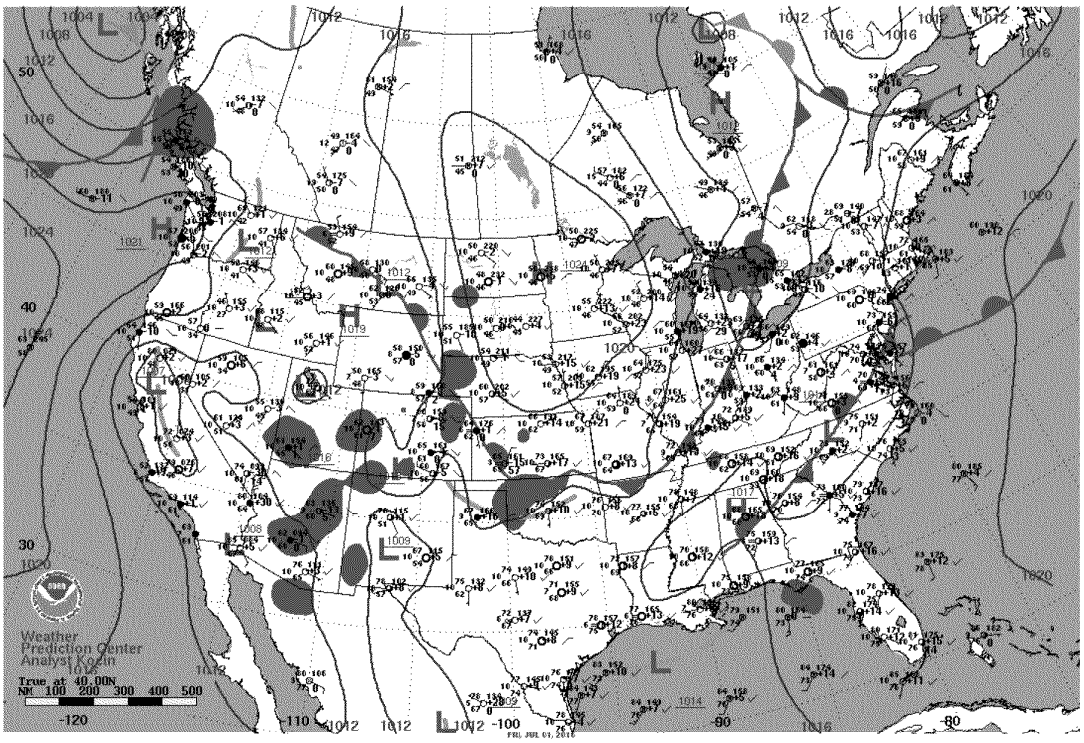

Surface Weather Map and Station Weather at 7:00 A.M. E.S.T.

Surface Weather Map – June 29, 2016

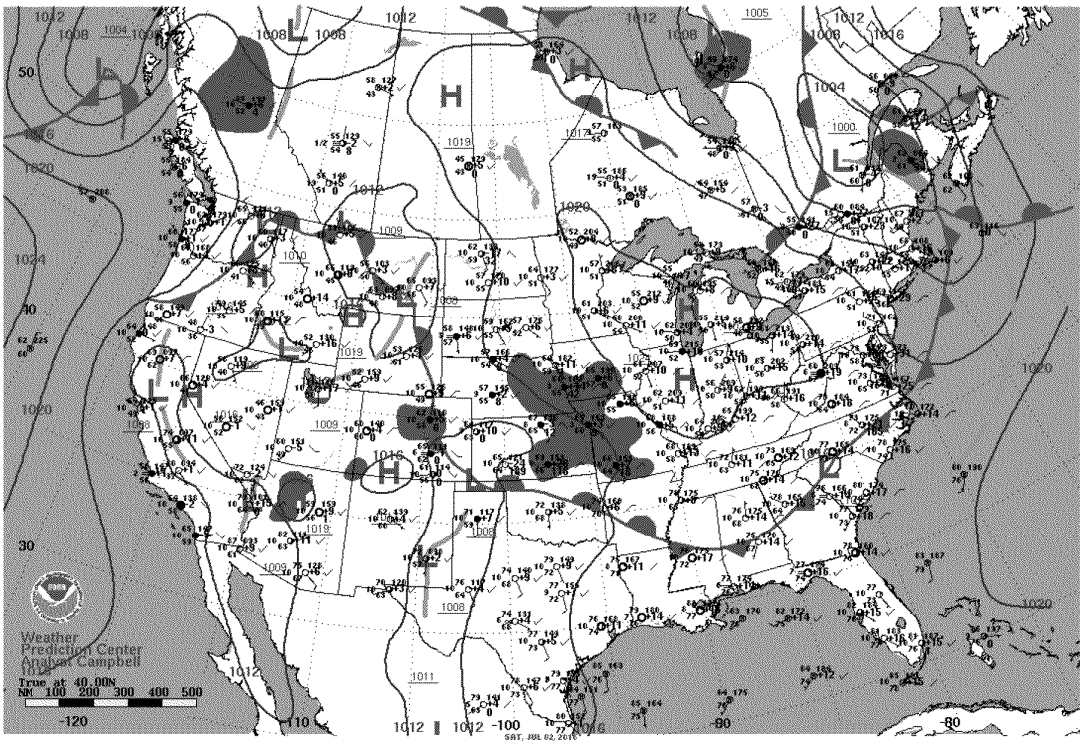



Surface Weather Map and Station Weather at 7:00 A.M. E.S.T.

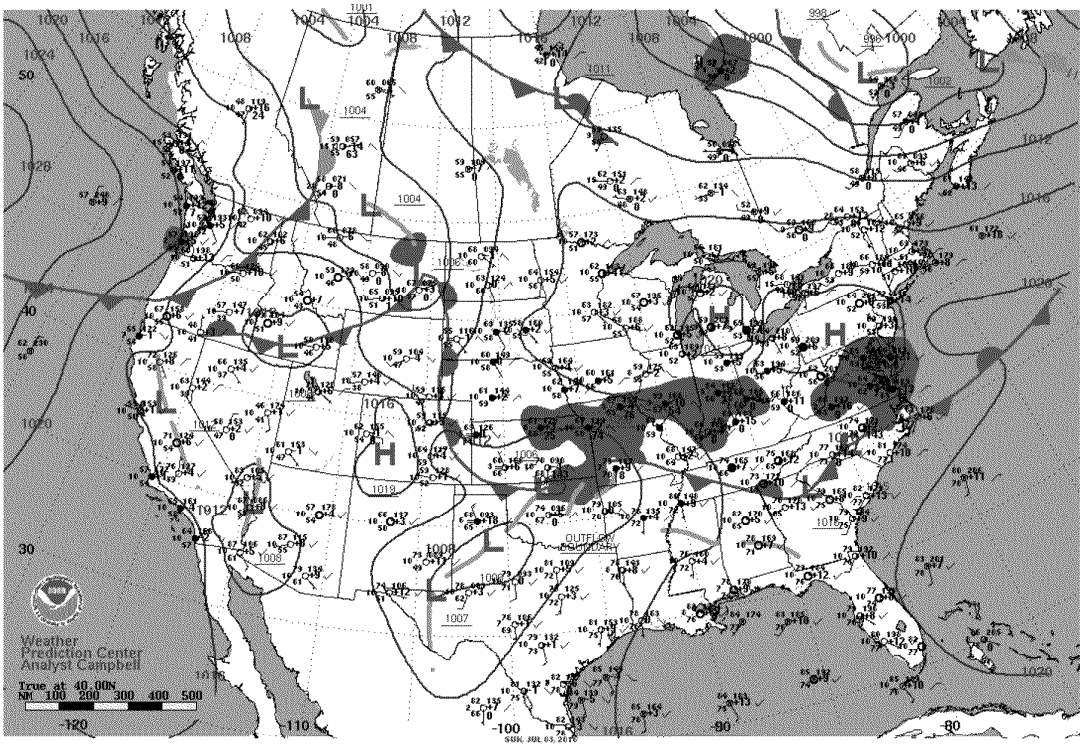
Surface Weather Map – June 30, 2016




Surface Weather Map – July 1, 2016

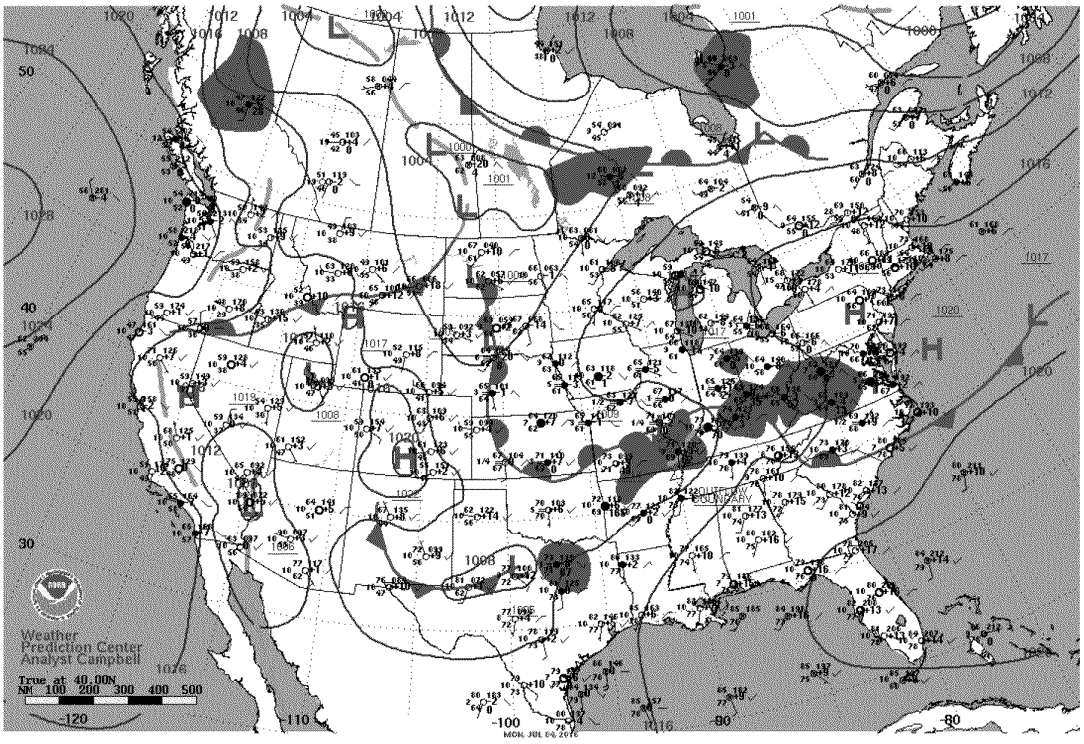



Surface Weather Map – July 2, 2016



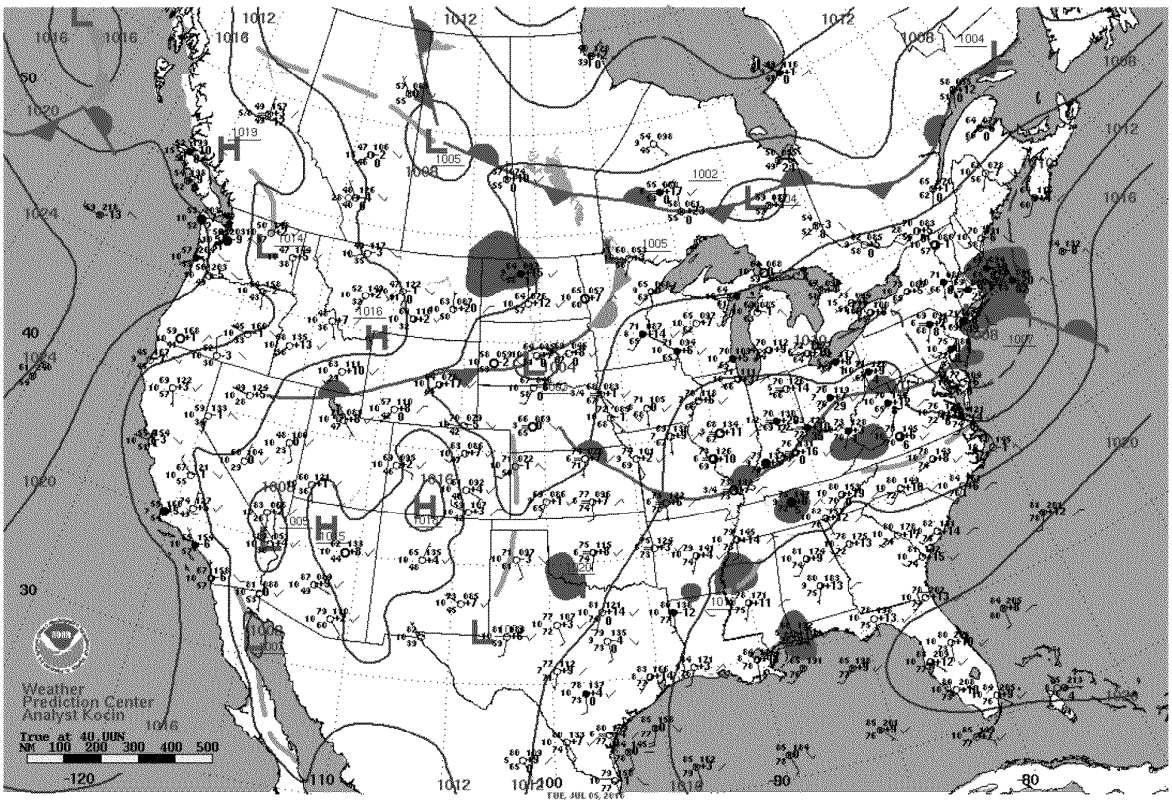

Surface Weather Map and Station Weather at 7:00 A.M. E.S.T.

Surface Weather Map – July 3, 2016




Surface Weather Map and Station Weather at 7:00 A.M. E.S.T.

Surface Weather Map – July 4, 2016




Surface Weather Map and Station Weather at 7:00 A.M. E.S.T.

Surface Weather Map – July 5, 2016

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administrator

November 29, 2016

Meredith Kurpius
United States Environmental Protection Agency, Region 9
75 Hawthorne Street
Mail code: AIR-7
San Francisco, California 94105

Re: Submittal of Exceptional Events for the State of Nevada

Dear Ms. Kurpius:

The State of Nevada, Department of Conservation and Natural Resources, Bureau of Air Quality Planning, requests that the EPA Region IX exclude data related to two exceedances of the NAAQS for ozone that are directly due to exceptional events. Specifically, NDEP requests that ozone data be excluded for August 20 and 21, 2015 for the Fallon monitoring site due to wildfire, and for June 8, 2015 for the Great Basin National Park Clean Air Status and Trends Network monitoring site due to stratospheric intrusion. The enclosed documents demonstrate that there is a clear causal relationship between the measured exceedances of the ozone standard and these natural events.

Public comment on the enclosed documents was solicited by routine methods of public notice including, but not limited to, local government websites, physical postings, and use of the State's internet website. No comments were received for the Fallon demonstration during the 30-day public comment period. The stratospheric intrusion demonstration is in concurrent public review.

If you have any questions or need additional information, please contact Daren Winkelman at (775) 687-9342.

Sincerely,

Danko Dragoni
Chief, Bureau of Air Quality Planning

DD:dw



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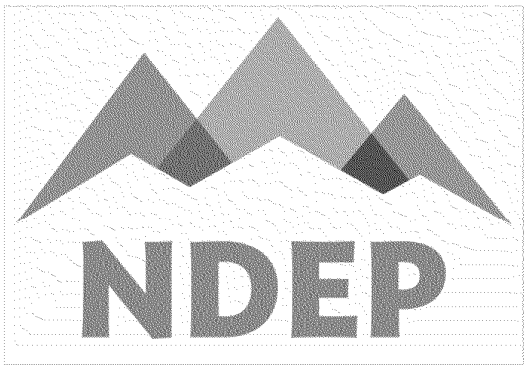
# NEVADA DIVISION OF ENVIRONMENTAL PROTECTION




# ANALYSIS OF A STRATOSPHERIC INTRUSION AS AN EXCEPTIONAL EVENT AND ITS CONTRIBUTION TO HIGH OZONE CONCENTRATIONS AT GREAT BASIN NATIONAL PARK, NEVADA

FINAL Report
November 2016

Authors
Daren Winkelman
Sheryl Fontaine

ED_001361_00016472

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **1-PVU** | One potential vorticity unit |
| **° F** | degrees Fahrenheit |
| **° N** | degrees North |
| **° W** | degrees West |
| **agl** | above ground level |
| **AIRS** | Atmospheric Infrared Sounder |
| **amsl** | above mean sea level |
| **AQI** | Air Quality Index |
| **AQS** | Air Quality System |
| **ARS** | Air Resource Specialists |
| **BAQP** | Bureau of Air Quality Planning |
| **BLM-WSO** | Bureau of Land Management Wyoming State Office |
| **CASTNET** | Clean Air Status and Trends Network |
| **CFR** | Code of Federal Regulations |
| **CO** | carbon monoxide |
| **EER** | Exceptional Event Rule |
| **EPA** | United States Environmental Protection Agency |
| **GBNP** | Great Basin National Park |
| **GOES** | Geostationary Operational Environmental Satellite |
| **FRM** | Federal Reference Method |
| **HYSPLIT** | Hybrid Single Particle Lagrangian Integrated Trajectory |
| **IPV** | Isentropic Potential Vorticity |
| **km** | kilometer |
| **m** | meters |
| **mb** | millibars |
| **NAAQS** | National Ambient Air Quality Standards |
| **NAM** | North American Mesoscale |
| **NDEP** | Nevada Division of Environmental Protection |
| **$NO_2$** | nitrogen dioxide |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **$NO_x$** | oxides of nitrogen |
| **NPS** | National Park Service |
| **$O_3$** | ozone |
| **ppb** | parts per billion |
| **PST** | Pacific Standard Time |
| **RAOB** | Radiosonde Observations |
| **RAQMS** | Realtime Air Quality Monitoring System |
| **RH** | relative humidity |
| **SI** | Stratospheric Intrusion |
| **U.S.** | United States |
| **UTC** | Coordinated Universal Time |
| **VOCs** | volatile organic compounds |



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# ANALYSIS OF STRATOSPHERIC INTRUSION AS AN EXCEPTIONAL EVENT AND ITS CONTRIBUTION TO HIGH OZONE CONCENTRATIONS AT THE GREAT BASIN NATIONAL PARK CASTNET SITE ON JUNE 8, 2015

## 1.0 INTRODUCTION

The Nevada Division of Environmental Protection (NDEP) Bureau of Air Quality Planning (BAQP) operates a network of ambient air quality monitors at a variety of locations throughout the state of Nevada. In addition to this regulatory network, the NDEP is r esponsible for the quality and integrity of the ozone data collected at the National Park Service air monitoring site at Great Basin National Park (GBNP), which is part of the Clean Air Status and Trends Network (CASTNET) (Figure 1). CASTNET is a long -term monitoring network designed to measure acidic pollutants and ambient ozone concentrations in rural areas. CASTNET is managed collaboratively by the United States Environmental Protection Agency (EPA) – Clean Air Markets Division, the National Park Servic e – Air Resources Division (NPS), and the Bureau of Land Management – Wyoming State Office (BLM -WSO). In addition to EPA, NPS, and BLM - WSO, numerous other participants provide network support including tribes, other federal agencies, States, private land owners, and universities. The EPA contractor, Amec Foster Wheeler, operates the EPA -sponsored sites while the NPS and BLM -WSO contractor, Air Resource Specialists, Inc. (ARS), operates the remaining sites.

The GBNP CASTNET site collects ambient ozone data, reported as an hourly average , using a continuous analyzer. This site meets the siting criteria specified within 40 Code of Federal Regulations (CFR) Part 58 Appendices D and E. Additional information regarding detailed siting criteria, monitoring o bjectives, site types, and other relevant parameters for each monitoring site per the requirements of 40 CFR Part 58.10(b) may be found in the 2016 CASTNET Annual Network Plan.

The NDEP BAQP's ambient air monitoring network meets the minimum monitoring requirements for all criteria pollutants pursuant to 40 CFR 58, Appendix D. The NDEP BAQP's monitoring network is reviewed annually pursuant to 40 CFR 58.10 to ensure that the network meets the monitoring objectives defined in 40 CFR 58, Appendix D. The ap proval letter for the NDEP BAQP Annual Network Plan is included in Appendix A. Ambient air monitoring data is collected and data quality is assured in accordance with 40 CFR 58. This data is submitted to the EPA's Air Quality System (AQS). The data for 2015 was certified in April 201 5. The Data Certification Letter was submitted to EPA Region IX in April 2015 as well. The Data Certification Letter is included in Appendix B.



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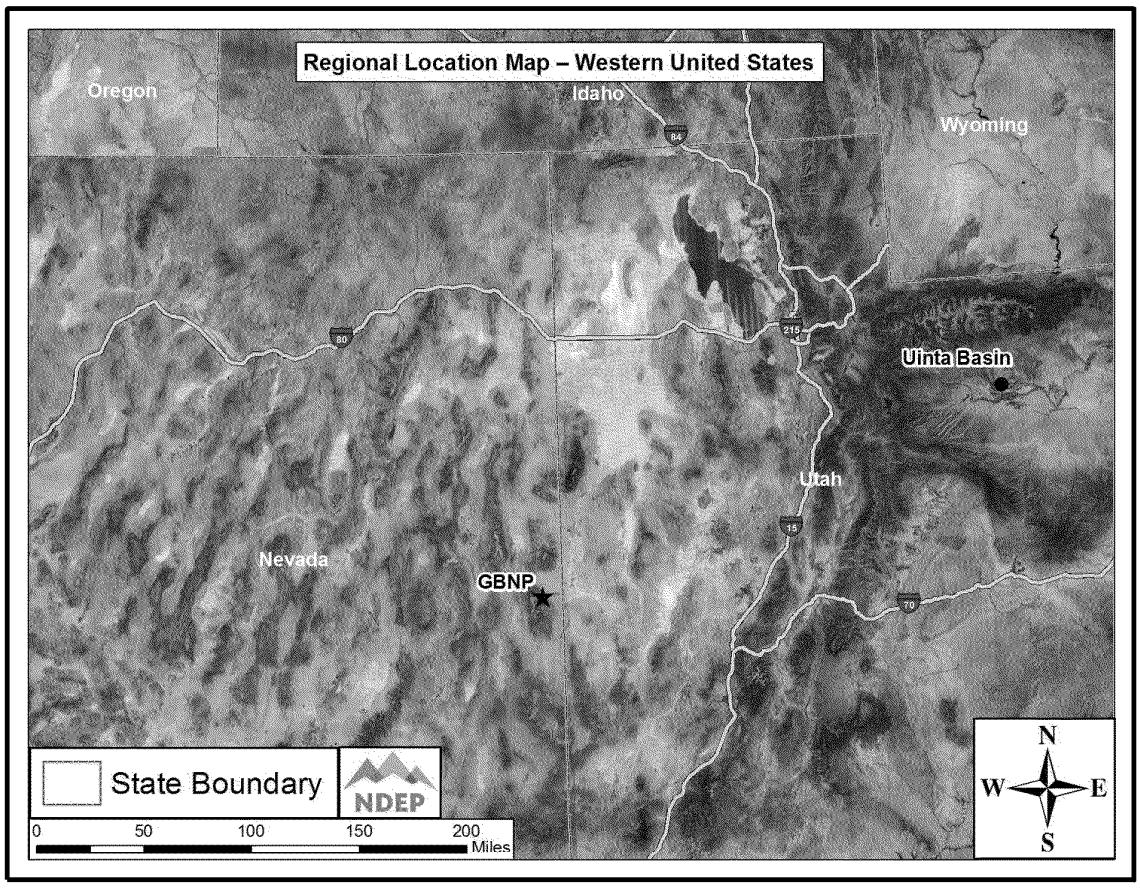
**Figure 1. Regional Location Map Showing Great Basin National Park CASTNET S ite in Nevada and the Uinta Basin in Utah.**




## 1.1 PURPOSE

On June 8, 2015 , a stratospheric intrusion (SI) caused exceedances of the 70 parts per billion (ppb) of ozone ($O_3$) 8-hour National Ambient Air Quality Standard (NAAQS) at the GBNP CASTNET ozone monitoring location in eastern Nevada.

The NDEP is requesting exclusion of the $O_3$ data from the Great Basin CASTNET air monitoring site that exceeded the NAAQS as an exceptional event under the EPA 's regulation for *The Treatment of Data Influenced by Exceptional Events;* (81 FR 68216; U.S. EPA, 2015a , known as the Exceptional Even ts Rule (EER; 40 CFR Part s 50 and 51).. The purpose of this report is to provide documentation in support of this request. The SI was a natural event that caused an exceedance of the federal standard for the Federal Equivalence Method $O_3$ monitor at Great Basin National Park on June 8, 2015. The 8-hour average concentration was 72 ppb on June 8, 2015 at the Great Basin monitoring site (AQS Site Code 32-033-0101). This document demonstrates that the 8 -hour ozone exceedance on June 8, 2015 at the Great Basin CASTNET monitoring site meets the requirements for having been influenced by an exceptional event as



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stipulated in the EER. Table 1 lists the 8 -hour ozone conc entration at Great Basin that is included in this request.

**Table 1. Eight-hour Federal Ozone Exceedance Value at the Great Basin National Park CASTNET Monitoring Site**

| Monitoring Site | AQS Number | Date of Exceedance | Maximum Daily 8-hour Average $O_3$ Concentration (ppb) |
|---|---|---|---|
| Great Basin CASTNET | 32-033-0101 | 06/08/2015 | 72 |

The elevated ozone concentrations observed on June 8 2015 occurred as a result of an SI event. ARS has submitted the hourly ozone data from the affected monitor on those days to the EPA AQS database on behalf of the NPS. At the request of NDEP, ARS has also associated the appropriate AQS flags with the data to indicate that the data was affected by an exceptional event due to stratospheric intrusion . This flagging indicates that the ambient air quality data was influenced by the SI and ensures that the data is properly represented in the regulatory process.

### 1.2 EXCEPTIONAL EVENT DEFINITION AND DEMONSTRATION CRITERIA

The EER defines an exceptional event in 40 CFR Part 50 as an event that 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 is a natural event.

The following analysis will address this defin ition and provide documentation to establish that the 2015 SI event met the criteria as set forth in 40 CFR Part 50. Specifically, this document provides evidence that the SI affected air quality by demonstrating that:

1. there was a clear causal relations hip between the 8-hour ozone concentrations at Great Basin and the event;
2. the ozone concentrations during the event were above normal historical concentrations, and;
3. the 8-hour ozone concentrations at Great Basin would not have exceeded the standard without the emissions contributed by the stratospheric intrusion.

In addition, documentation is provided demonstrating that the SI was a natural event that was not reasonably controllable or preventable. This analysis includes monitoring data, meteorol ogical data, and historical data. Finally, information regarding reasonable and appropriate actions taken to protect public health is included as Appendix C. The NDEP BAQP concludes that without the influence of the stratospheric intrusion, the measured concentrations at the Great Basin monitoring site would not have exceeded the NAAQS.



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## 2.0 BACKGROUND

### 2.1 GROUND-LEVEL OZONE FORMATION

Ozone is a gas composed of three oxygen atoms. It is not usually emitted directly into the air, but at ground level is created by a chemical reaction between oxides of nitrogen ($NO_x$) [including nitrogen dioxide ($NO_2$)] and volatile organic compounds (VOCs) in the presence of sunlight. Ozone has the same chemical structure whether it occurs miles above the earth or at ground level and can be "good" or "bad," depending on its location in the atmosphere. Specifically, $NO_2$ decomposes as a result of exposure to ultraviolet light from the sun to produce nitric oxide and an oxygen atom, which then combines with molecular oxygen to produce ozone. Calm winds allow $O_3$ precursors ($NO_x$ and VOCs) to accumulate in order to produce $O_3$. Unlike ozone of stratospheric origin, ground-based ozone typically forms during the daylight hours under stagnant weather conditions (over several days in some cases) and usually dissipates a few hours after sunset.

### 2.2 ATMOSPHERIC STRUCTURE

The troposphere is the layer of air adjacent to the earth's surface that contains our weather (i.e. wind, rain, snow, thunderstorms, etc.). The troposphere also contains variable amounts of water vapor and carbon monoxide (CO), extends to a height of roughly 11 kilometers (km; 6.8 miles) above mean sea level (amsl), and varies in depth from the earth's polar regions to the equator. Directly above the troposphere, the stratosphere exists with the tropopause separating the stratosphere from the troposphere. The tropopause is "...usually characterized by an abrupt change of lapse rate" (American Meteorological Society, 2010).

The stratosphere is the "...region of the atmosphere extending from the top of the troposphere [the tropopause], at heights of roughly 10-17 km...[and] is characterized by constant or increasing temperatures with increasing height and marked vertical stability" (American Meteorological Society, 2010).

### 2.3 COMPOSITION OF STRATOSPHERIC AIR

"While the major constituents of the stratosphere are molecular nitrogen and oxygen, just as in the troposphere, the stratosphere contains a number of minor chemical species that result from photochemical reactions in the intense ultraviolet radiation environment. Chief among these is ozone..." (American Meteorological Society, 2010). While the troposphere contains variable amounts of $O_3$, CO, and water vapor, the stratosphere lacks CO and water vapor (Pan, et al. 2004; Newell, et al. 1999; Stoller, et al. 1999). Figure 2 shows the typical concentration of ozone as a function of altitude, extending from the earth's surface through the stratosphere.



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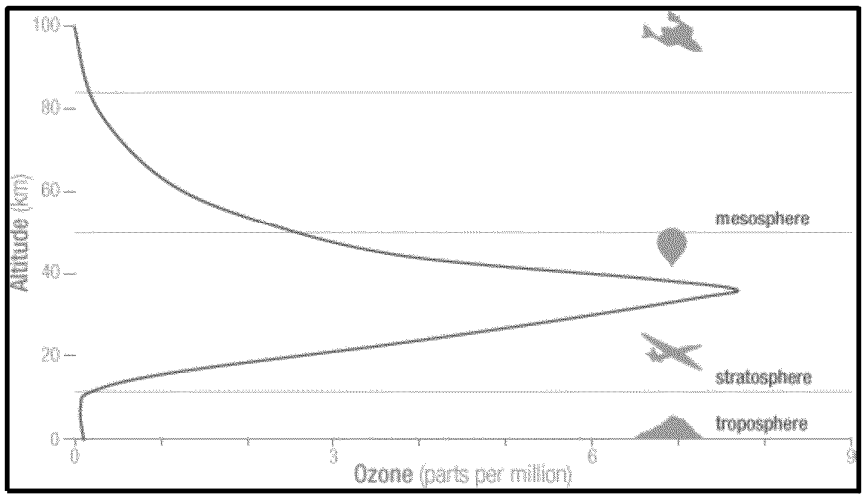
**Figure 2 Vertical Profile of Ozone**




http://ozonewatch.gsfc.nasa.gov/facts/SH.html

## 2.4 STRATOSPHERIC INTRUSIONS, TROPOSPHERIC FOLDING, AND IDENTIFYING STRATOSPHERIC AIR

Weather producing systems (i.e. tropospheric storm systems, upper level disturbances or upper level storm systems) contain atmospheric spin or vorticity, which induces vertical motion: either upward or downward. From late winter to late spring in the northern hemisphere, vertical motion associated with upper level disturbances aids in causing the tropopause to "fold" or descend into the troposphere where our weather occurs (Danielsen, 1968). Because of tropopause folding, an intrusion of stratospheric air containing high concentrations of ozone penetrates into the troposphere (Reed, 1955) releasing ozone-rich air from the stratosphere to the troposphere. As a result, the SI creates the potential for ground level ozone monitors over the higher terrain of the western United States to experience elevated ozone readings.

SIs are a tangible phenomenon. One study analyzed over 105,000 aircraft soundings, and discovered that just over 50 percent of the soundings contained regions of high ozone and low water vapor content occurring below the tropopause (Newell, et al., 1999). The presence of areas of high ozone concentrations and low water vapor located below the tropopause are signatures of an SI.

While the concentrations of $O_3$, CO, and relative humidity (RH) aid the identification of air of stratospheric origin, isentropic potential vorticity (IPV) can be used as well. IPV is a proxy for atmospheric spin and is a conservative property with values of up to two orders of magnitude greater for stratospheric air than that of tropospheric air (Shapiro, 1980). Therefore, IPV can serve as an indication of stratospheric air. One unit of IPV (1-PVU) typically represents the tropopause (Shapiro, 1980), and the value of IPV increases with increasing altitude through the tropopause and stratosphere. However, within the last decade a study by Pan revealed that using



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only IPV to define the tropopause is problematic. In fact, the thermal tropopause height "...spans a broad range of..." IPV values and varies latitudinally and seasonally (Pan , 2004). IPV is very useful in the identification of stratospheric air, and is best when used in conjunction with other parameters.

In summary, the stratosphere contains high concentrations of ozone compared to the troposphere. At times, from late winter through late spring in the northern hemisphere, tropospheric storm systems act synergistically with tropopause folds to inject str atospheric ozone into the troposphere via an SI. Compared to tropospheric air, stratospheric air is typically much drier, has higher values of IPV and contains lower amounts of CO.

Data from research aircraft have determined that tropopause folds (SIs) contain ample $O_3$, dry air, and low concentrations of CO. Mathematical calculations based on the aircraft data also verify that IPV values for SIs are greater than 1-PVU.



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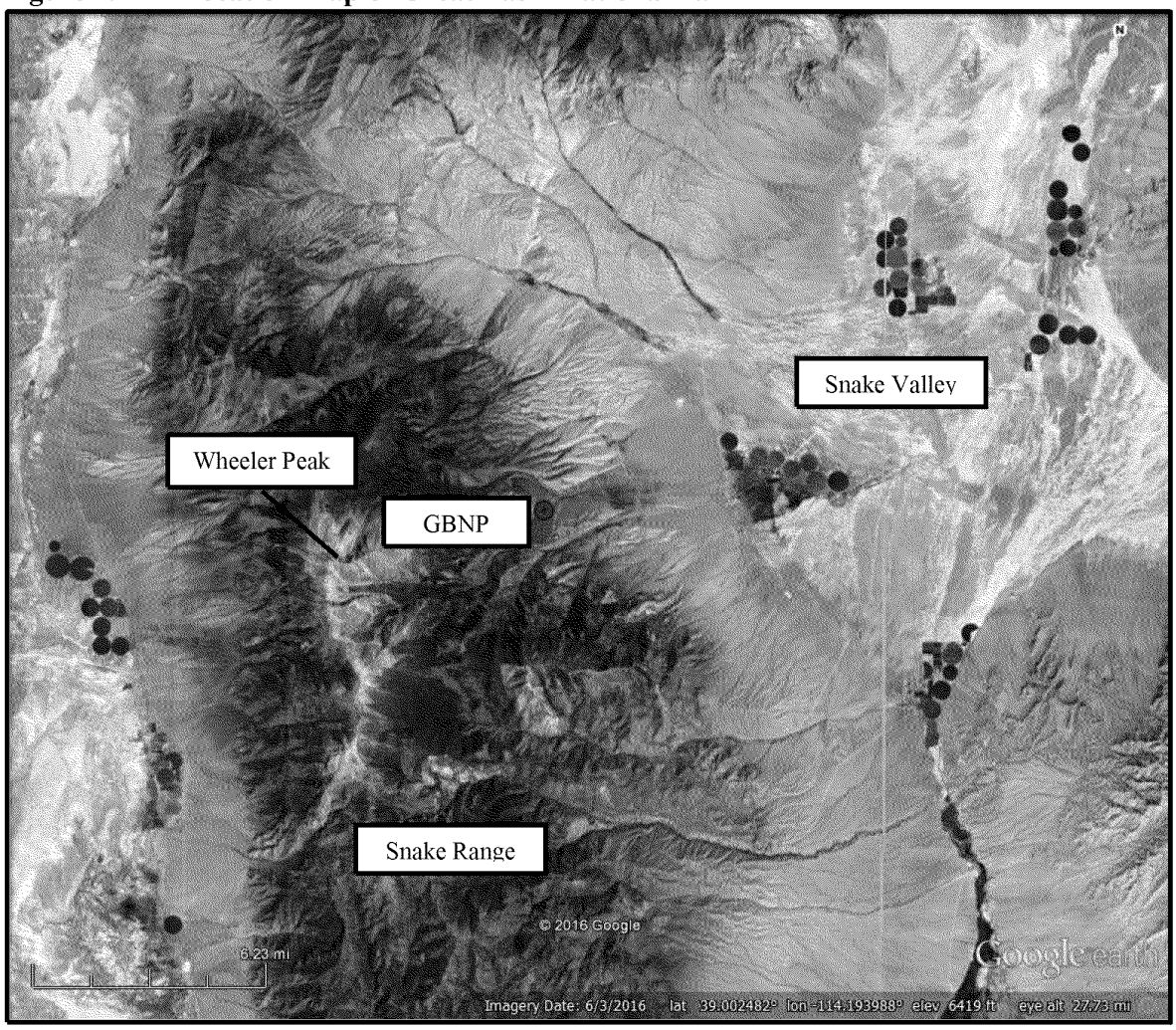
## 3.0 PHYSIOGRAPHIC SETTING AND CONCEPTUAL MODEL

Great Basin National Park is located in White Pine County in eastern Nevada, near the border between Nevada and Utah. The monitoring site is at approximately 6,770 feet amsl, on the eastern slopes of the Snake Range. Wheeler Peak, at just over 13,000 feet amsl, is approximately five miles west of the site. Snake Valley lies to the east, with a minimum elevation of 4 ,850 feet amsl (Figurc 3).

**Figure 3. Location Map of Great Basin National Park**




Great Basin National Park is in the high desert, with typical warm summers and cold winters. The average high temperatures range from 86 degrees Fahrenheit (°F) in July to 41 °F in January. Average low temperatures range from 57 °F in July to 18 °F in Ja nuary. The average annual precipitation at the park is approximately 13 inches, spread relatively evenly throughout the year. Summer thunderstorms are not uncommon in July and August, and occasionally occur



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in May and June as well. Typical of the wester n United States, the ozone season at Great Basin National Park is April through October, with the highest concentrations usually observed in May and June.



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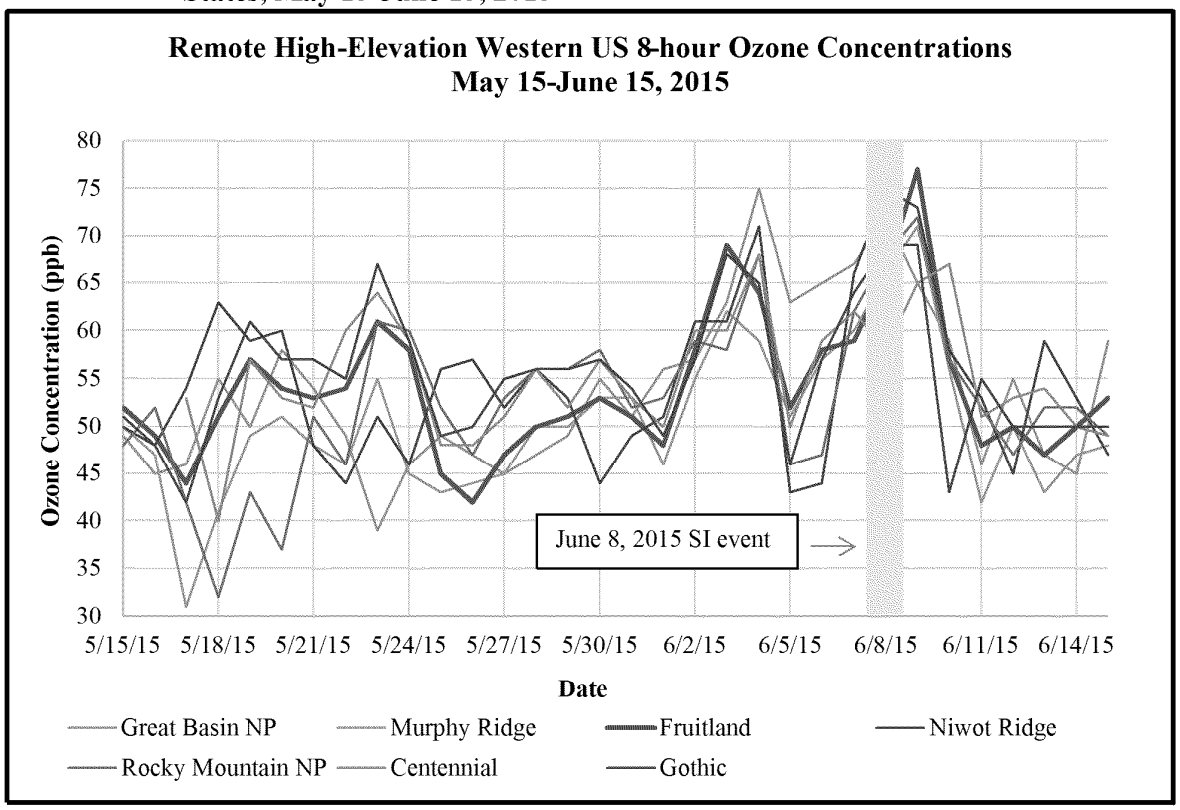
## 4.0 CLEAR CAUSAL RELATIONSHIP

### 4.1 OVERVIEW OF THE EVENT

In early June 2015, relatively high levels of ozone were observed at remote, rural high elevation ozone monitors in eastern Nevada, Utah, and Colorado due to an SI event (Figure 4). Ozone concentrations at these sites were relatively low (less than 60 ppb) during the last week of May through June 1. The Great Basin National Park monitor recorded 8-hour ozone greater than 60 ppb each day from June 3 through 9, 2015. Other high elevation monitors were generally above 60 ppb on June 3 and 4, and on June 7, 8, and 9 (Figure 4). On June 8, 2015 the Great Basin National Park CASTNET monitor in eastern Nevada recorded an 8-hour average ozone concentration of 72 ppb, exceeding the federal ozone NAAQS. Four ozone monitoring sites managed by the Ute Indian Tribe of the Uinta and Ouray Reservation also exceeded the federal ozone NAAQS on June 8 and 9, 2015. These four sites are located in the Uinta Basin in northeastern Utah.

**Figure 4. Ozone Concentrations at Remote High-Elevation Sites in the Western United States, May 15-June 15, 2015**




(Ute Tribe, 2016)

The EPA June 8, 2015 daily peak ozone air quality index (AQI) map illustrates the effects of the SI over eastern Nevada and Utah (Figure 5). Eastern Nevada and central Utah were either in the



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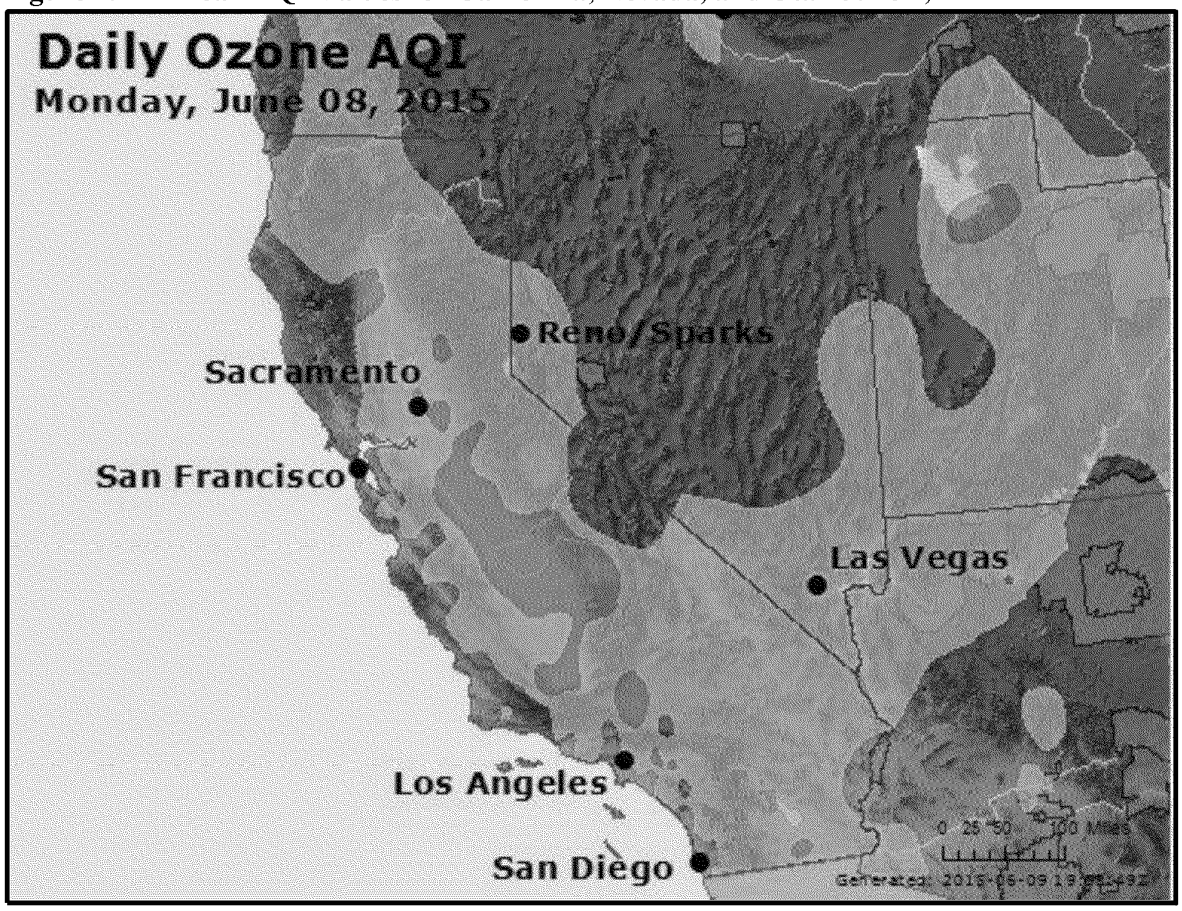
"moderate" category (yellow) or "unhealthy for sensitive groups" category (orange). AQI values for June 1 through June 10, 2015 are provided in Appendix C.

**Figure 5. Peak AQI Values for California, Nevada, and Utah June 8, 2015**




Source: https://www.airnow.gov

Accumulation of surface -based ozone precursors did not occur because meteorological conditions were not supportive of precursor bui ldup prior to elevated ozone readings. In addition, due to the rural location of GBNP, there are no local sources of ozone precursors.

For the month of June from 20 11 to 2015, ground-level, 8-hour average ozone concentrations at the GBNP CASTNET ozone monitor ranged from 52-64 ppb (25-75% interquartile range) with a median of 59 ppb. When an SI occurs, 8-hour average values (derived from the 1-hour average) can exceed 80 ppb on a time scale of a few hours to a few days (Mohnen and Reiter , 1977). While not exceeding 80 ppb, 8-hour average ozone concentrations greater than 70 ppb occurred for four consecutive hours at the GBNP ozone monitoring site on June 8 , 2015 . At 2200 coordinated universal time ( UTC) on June 8, 2015, the GBNP ozone monitor rec orded a 1-hour



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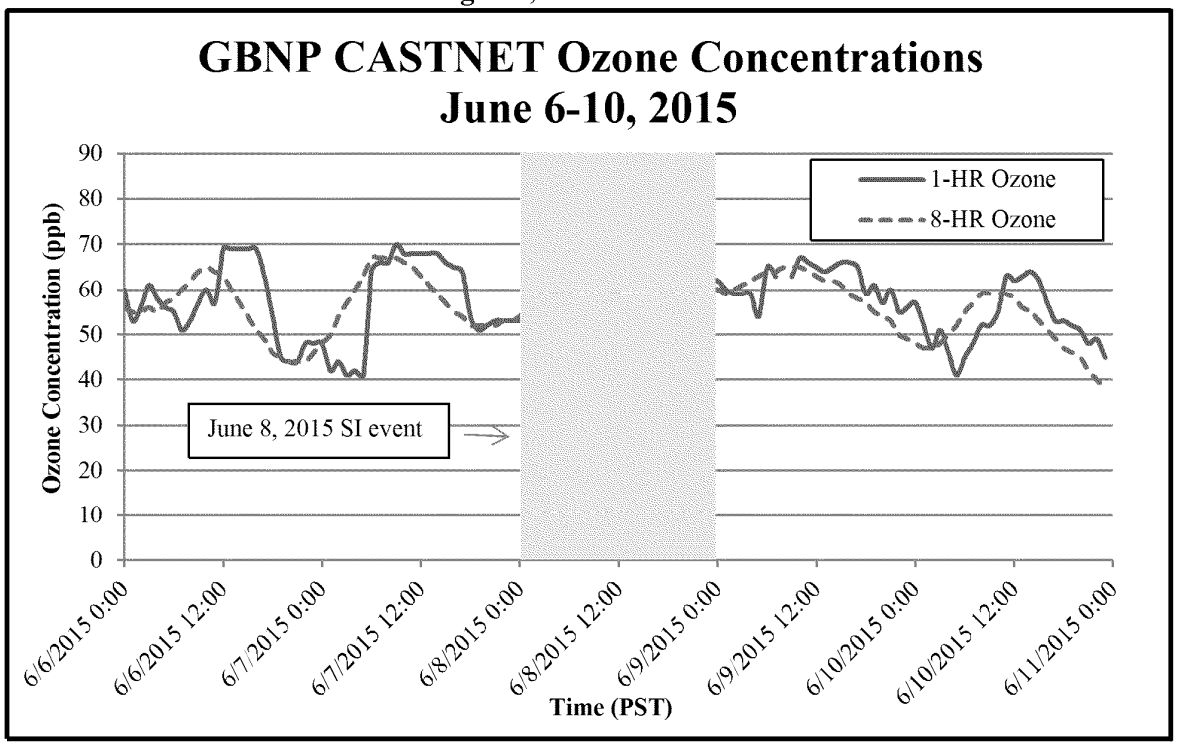
average ozone value of 78 ppb resulting in a daily maximum rolling 8 -hour average of 72 ppb (Figure 6).

**Figure 6. One-hour and 8 -hour Ozone Concentrations for the GBNP CASTNET Monitor June 6 through 10, 2015.**




### 4.2 DATA QA/QC AND EQUIPMENT

Quality Assurance/Quality Control procedures for the GBNP CASTNET ozone monitoring site were followed in accordance with 40 CFR Part 58, Appendix A, Section 3.2 *Measurement Quality Checks of Automated Methods* and the *Quality Assurance Project Plan*.

During second quarter of 2015, ARS conducted an independent performance audit of the ozone analyzers at GBNP (Appendix D). All tests met NDEP specified data quality objectives, which are consistent with QA Handbook Vol II, Section 3.0, Revision No: 1.

### 4.3 STATISTICAL ANALYSIS AND COMPARISON TO HISTORICAL DATA

The distribution of daily maximum 8 -hour ozone values for the GBNP ozone monitor for the month of June from 2011-2015 is shown in Figure 7. The June 8, 2015 GBNP daily maximum 8-hour ozone concentrations (in red) are greater than the $90^{th}$ percentile concentration value when compared to all June data from GBNP between 2011 and 2015 . The daily maximum 8 -hour ozone data for GBNP on June 8 , 2015 are considerably higher than the rest of the data. There are only eight 8 -hour values larger than those recorded on June 8 , 2015. The NDEP is



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currently investigating those exceedances, but given the very remote location of the site, stratospheric intrusion or long-range transport are likely the causes.

**Figure 7. Histogram of June GBNP Ozone Data 2011 through 2015**

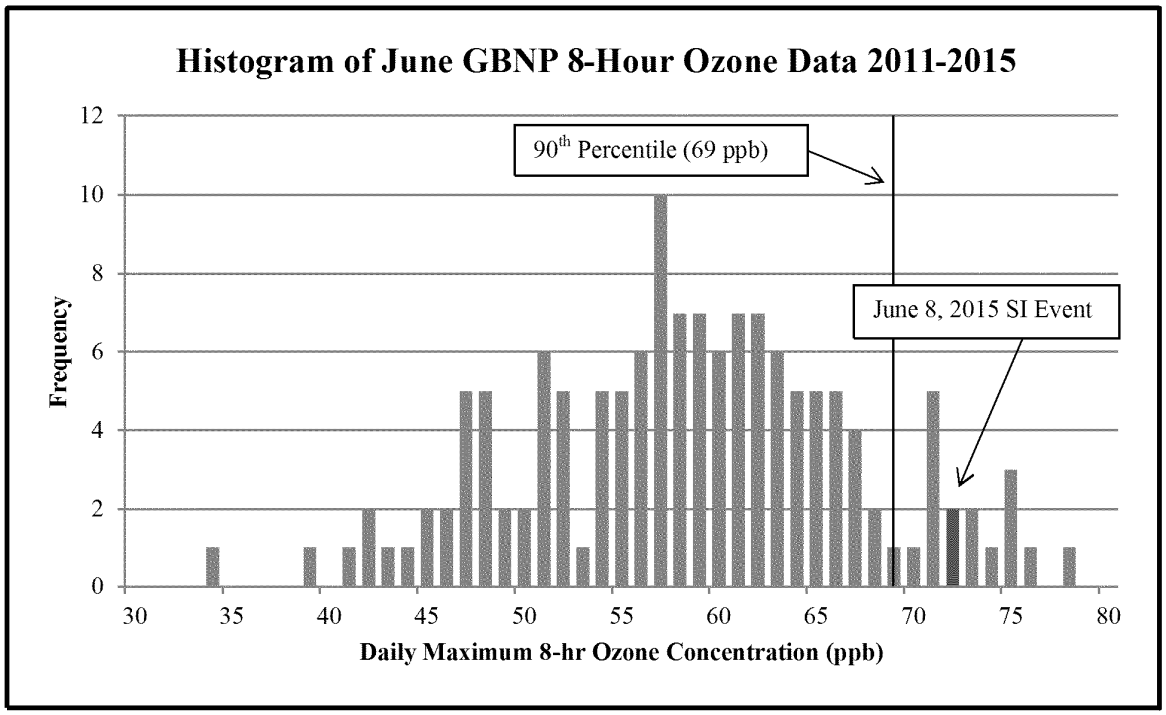




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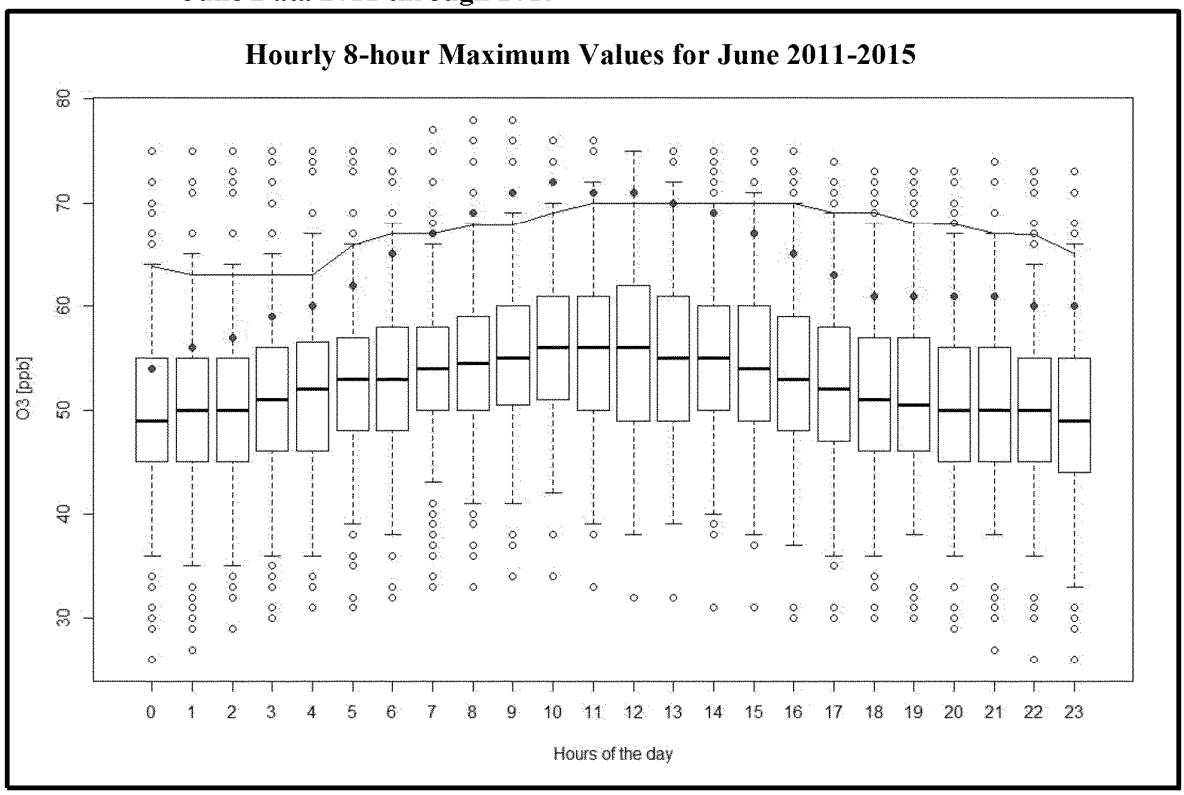
Figure 8 shows the distribution of the hourly 8-hour-averages for $O_3$ concentrations for each hour of the day in June, as measured from 2011 to 2015. Each box plot describes the interquartile range of the hourly distribution (i.e. 25 $^{th}$ to 75 $^{th}$ percentile). Whiskers extend to one time the interquartile range from each direction. Data points above and below the whiskers are plotted individually (empty circles) and are considered outliers. The solid black line describes the 95 $^{th}$ percentile for each ho ur of the day. Red filled circles are the values for June 8, 2015. Hours from 8am to 12pm (averages from 8am to 4pm and from 12pm to 8pm, respectively) on June 8, 2015 were all above the 95% percentile. Hours from 7am to 10am were outliers in each hourl y distribution.

**Figure 8. Box and Whisker Plot of 8 -Hour Ozone Concentrations at GBNP for All June Data 2011 through 2015**



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## 4.4 EVIDENCE OF A STRATOSPHERIC INTRUSION

### 4.4.1 Meteorology

On June 3 and 4, 2015 a strong upper level trough formed over the Pacific Coast (Figure 9). A surface low over southern Nevada and the Mojave Desert coincided with the upper level low. Between June 3 and June 9, the north end of the trough moved east across the United States (U.S.)-Canada border, while the low pressure at the southern end of the trough remained roughly stationary over southern California and Nevada. By June 7 and 8, the system consisted of an upper level trough over the upper Midwest U.S. with an associated elongated trough extending from the upper Midwest southwest to California (Figure 10). Surface level winds and pressure reflected the upper level trough in the Midwest U.S., but surface conditions west of the Rocky Mountains did not reflect the elongated trough found in the upper atmosphere.



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**Figure 9.** **Meteorological Plots for 1200 UTC June 4, 2015**. 850 mb Height, Wind Direction, and Temperature (left) and 300 mb Wind Speed, Height, and Wind Direction (right).

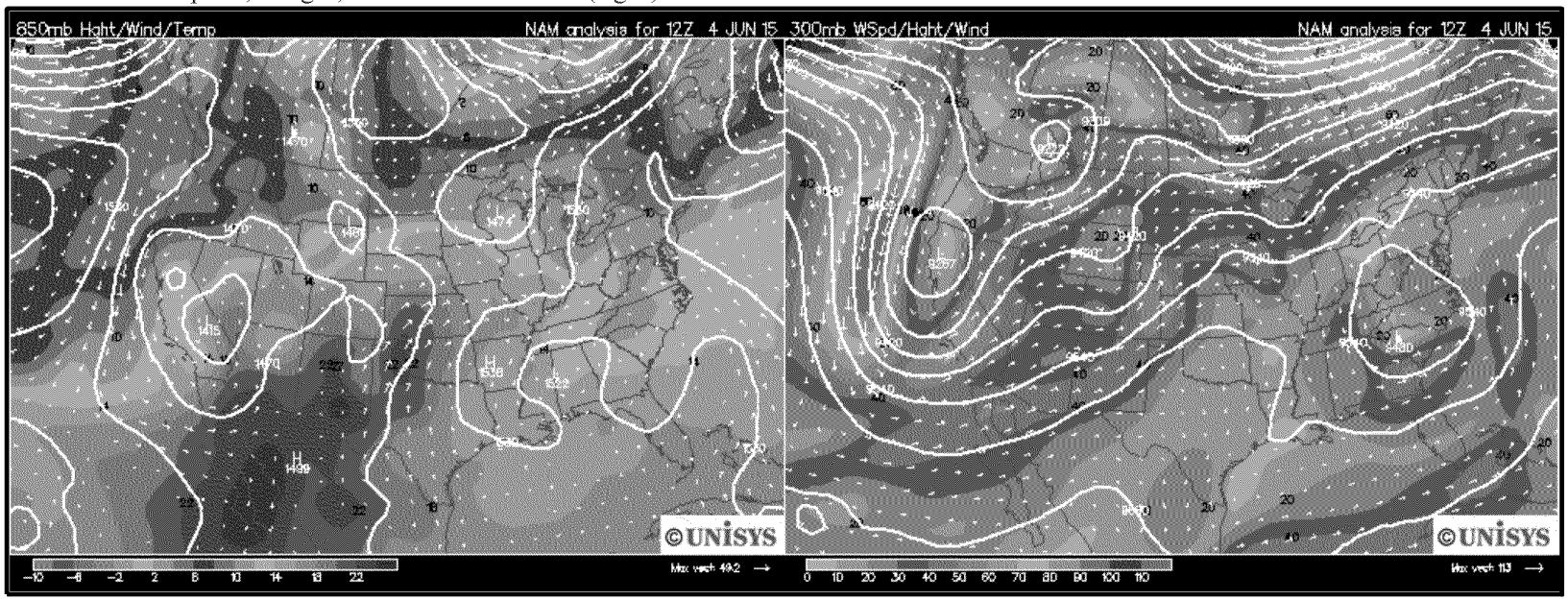

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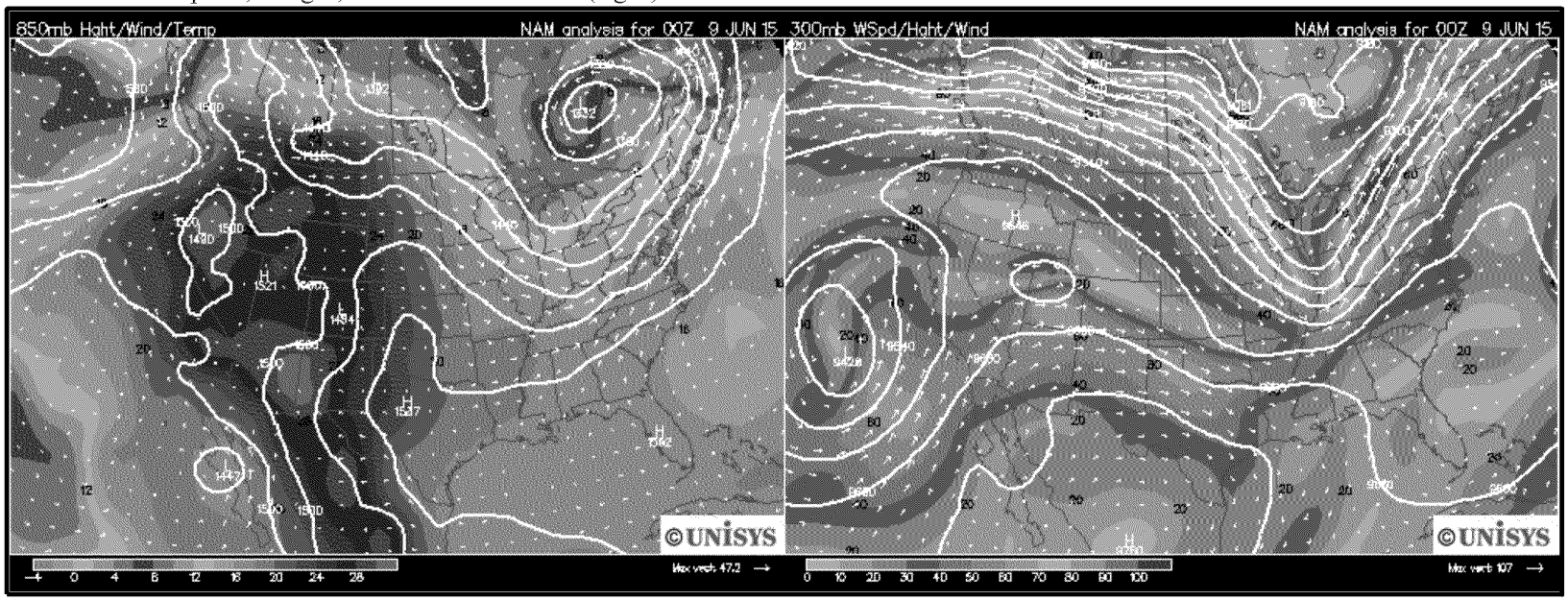
**Figure 10.** **Meteorological Plots for 0000 UTC June 9, 2015**. 850 mb Height, Wind Direction, and Temperature (left) and 300 mb Wind Speed, Height, and Wind Direction (right).



Surface winds between June 7 and June 9, 2015 were light and primarily from the southwest (Figure 11). High temperatures were increasing throughout the period, ranging from the upper 60s on June 7 to the upper 70s on June 9 (Figure 12).

**Figure 11. Wind Rose for GBNP from June 7 through June 9, 2015**

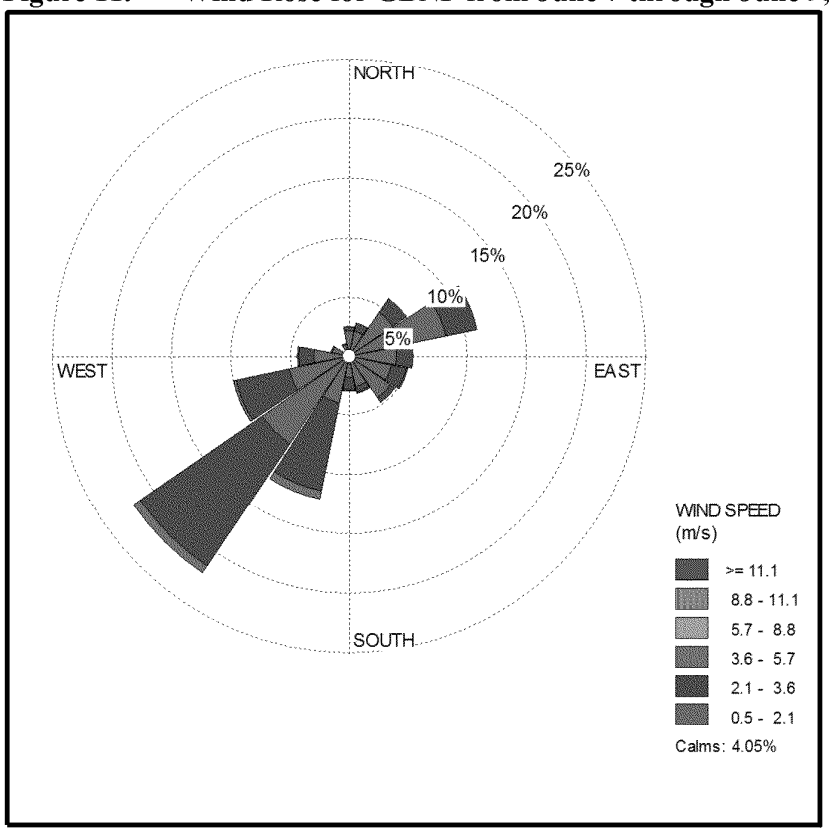





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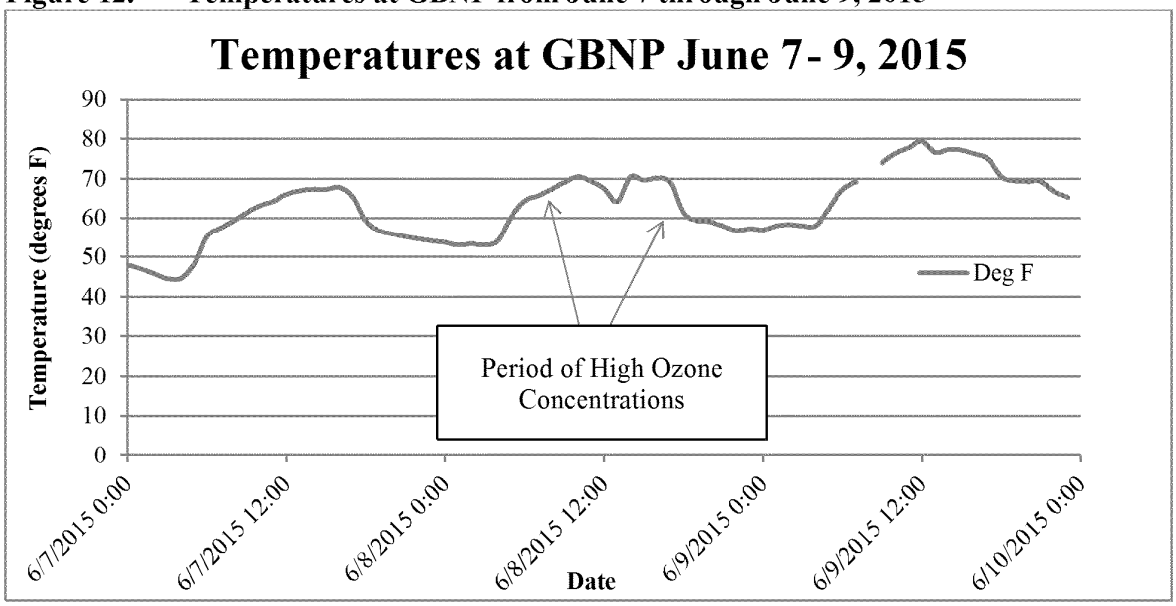
**Figure 12. Temperatures at GBNP from June 7 through June 9, 2015**



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### 4.4.2 GOES Total Column Ozone Data

Total column ozone can also be used as evidence of a SI. Enhanced total column ozone is commonly observed in regions of folds in the tropopause, which bring stratospheric air (including ozone) down into the upper troposphere. National Oceanic and Atmospheric Administration ( NOAA) Geostationary Operational Environmental Satellite (GOES) ozon e sounder images from 1300 June 4, 2015 show an area of enhanced total column ozone along the western edge of the upper level trough over the U.S. Pacific coast (Figure 13). Dark and light green areas on the sounding images correspond to regions of increa sed total column ozone (in Dobson units). The sounding image from 0000 June 9, 2015 shows that the area of enhanced total column ozone has decreased but is still present over east -central Nevada (in the vicinity of GBNP) and central Utah (Figure 14).



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**Figure 13. GOES Total Column Ozone, 1300 UTC June 4, 2015**

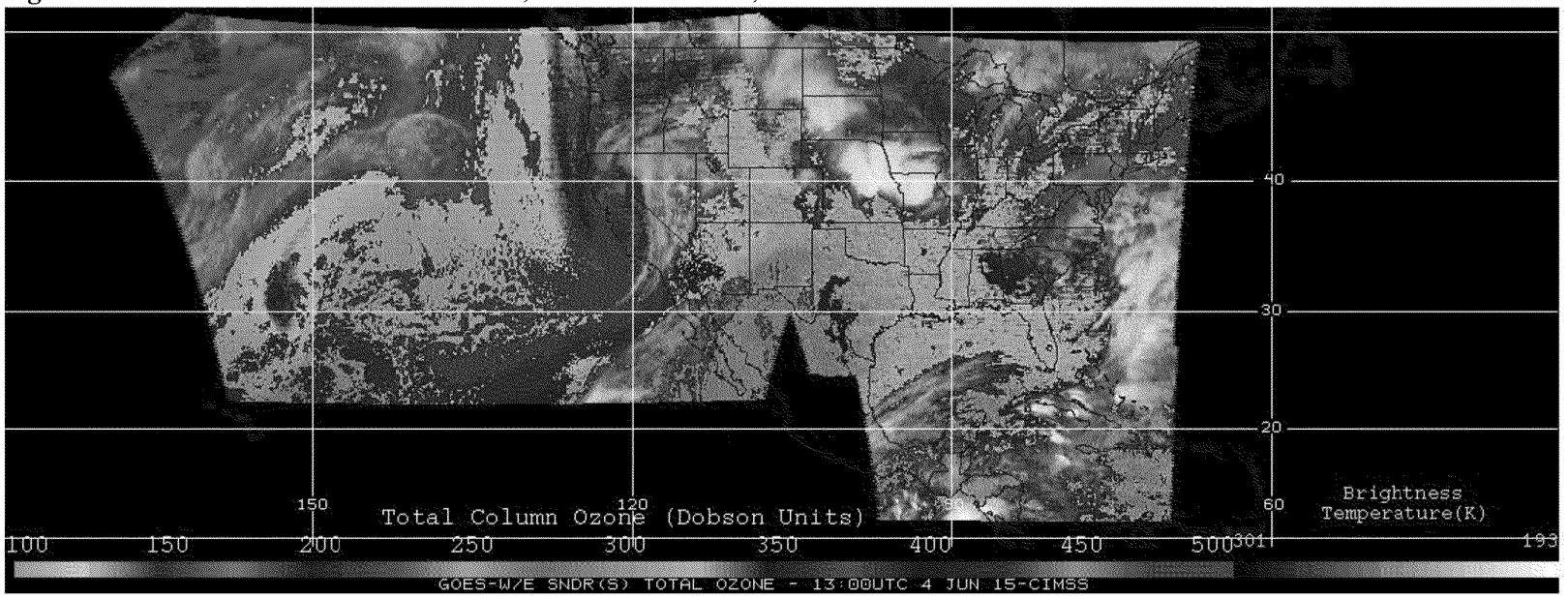

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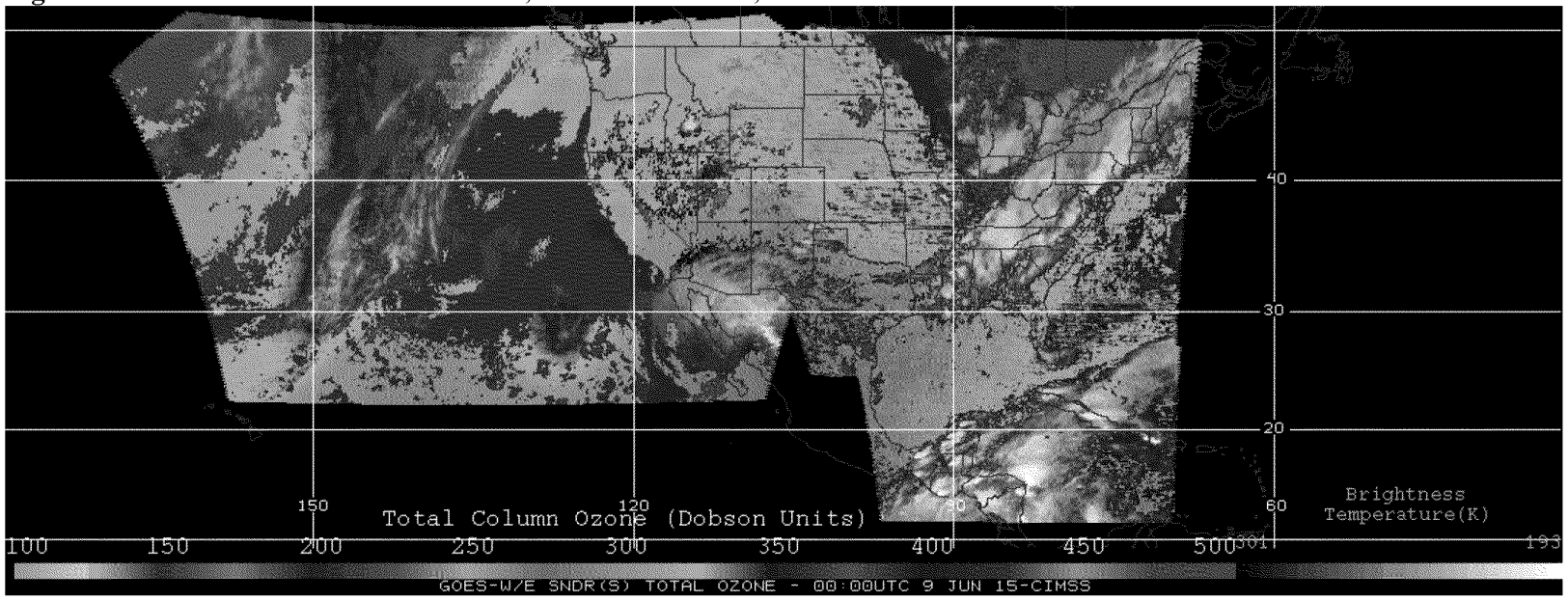
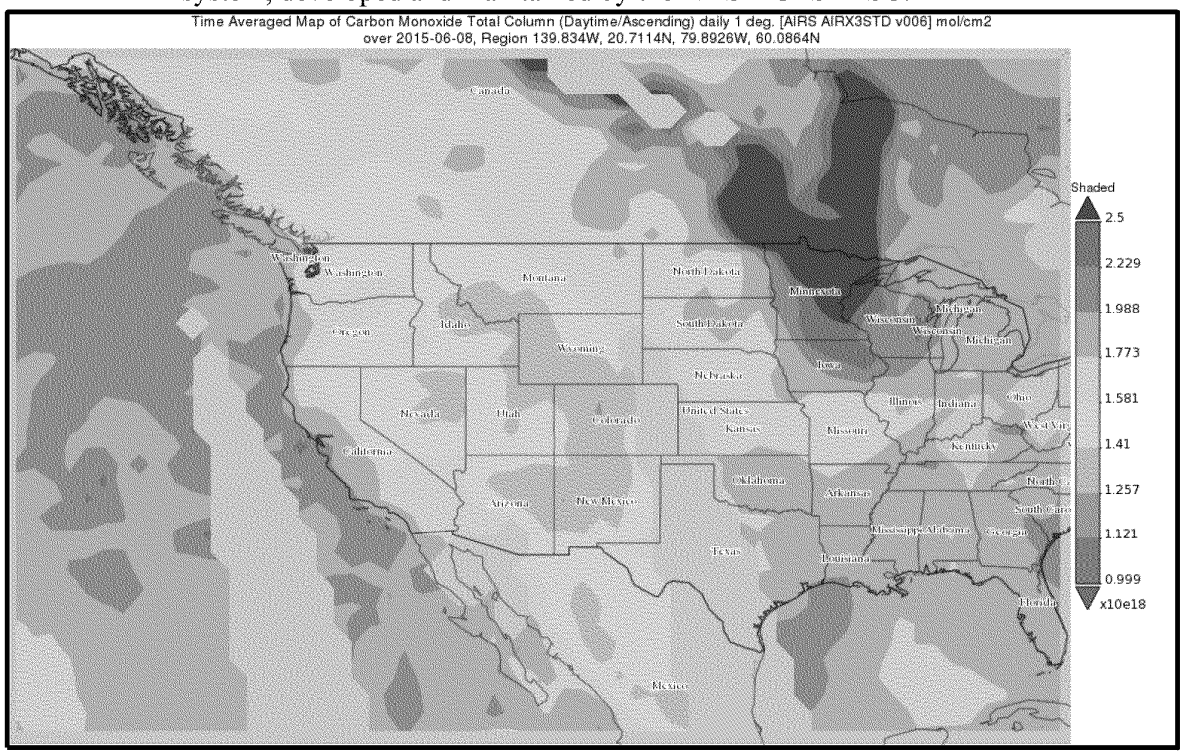
**Figure 14. GOES Total Column Ozone, 0000 UTC June 9, 2015**



### 4.4.3 AIRS Satellite Measurements of Carbon Monoxide

Stratospheric air contains very little CO (Pan, et al., 2004; Newell, et al., 1999; Stoller, et al., 1999). Atmospheric Infrared Sounder (AIRS) satellite measurements of total column CO show lower CO concentrations over eastern Nevada on June 8, 2015 (Figure 15). The relatively low concentration of CO over eastern Nevada provides additional evidence in support of an SI event affecting eastern Nevada.

**Figure 15. AIRS Satellite -derived Total Column Carbon Monoxide on June 8, 2015 (ascending pass).** This figure was produced with the Giovanni online data system, developed and maintained by the NASA GES DISC.




Source: http://giovanni.gsfc.nasa.gov/giovanni/

### 4.4.4 Isentropic Potential Vorticity

IPV is an indicator of atmospheric spin, and can be used to help identify a SI event. Values of IPV are typically 1 - to 1.5 -PVU in the troposphere. IPV values greater than 1.5 -PVU are commonly interpreted to be an indication of stratospheric air. IPV values were calculated for the 500 millibar (mb) height at 1800 UTC on June 8, 2015, using North American Mesoscale (NAM) Forecast System 12-kilometer data. A map of the IPV values is shown in Figure 16. A vertical cross -section of IPV values was also generated along a north -south transect passing through GBNP (Figure 17). The transect is at approximately 114W longitude, and is shown on Figure 16. The potential vorticity values above GBNP at the time of the elevated ozone concentrations were well above values expected for the troposphere. The vertical cross -section



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also shows elevated IPV values in the vicinity of GBNP coincident with the period of high ozone concentrations.

Both images suggest that stratosp heric air was folded down into the troposphere over eastern Nevada and western Utah on June 8, 2015. High IPV values were present at the 500 mb height, and occurred at altitudes as low as 4,000 m amsl. This is approximately the middle of the planetary bo undary layer, which is generally accepted to be the mixing layer during the day. This suggests that the stratospheric air above GBNP on June 8, 2015 was able to mix down to the surface, resulting in elevated ozone concentrations at the site.

**Figure 16. IPV Values at 500 mb Over Portions of the Western U.S. at 1800 UTC June 8, 2015**

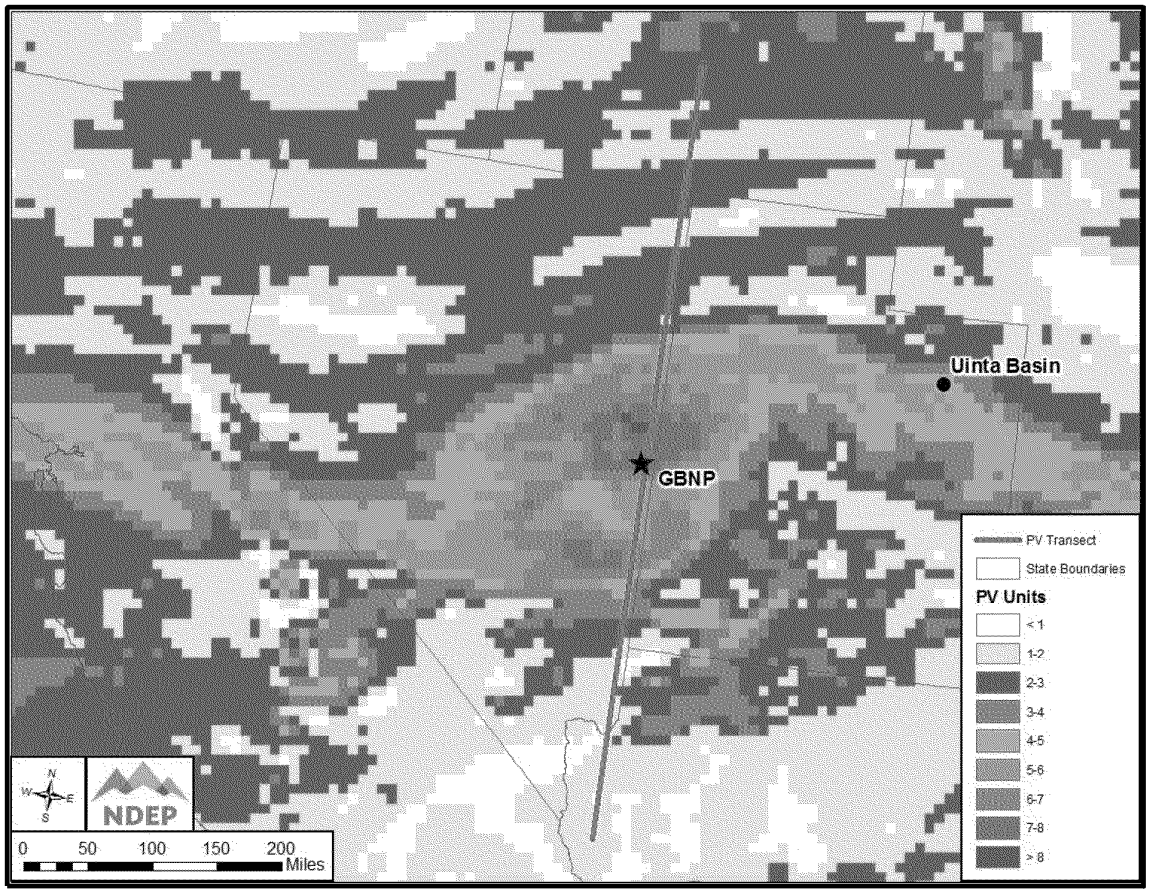




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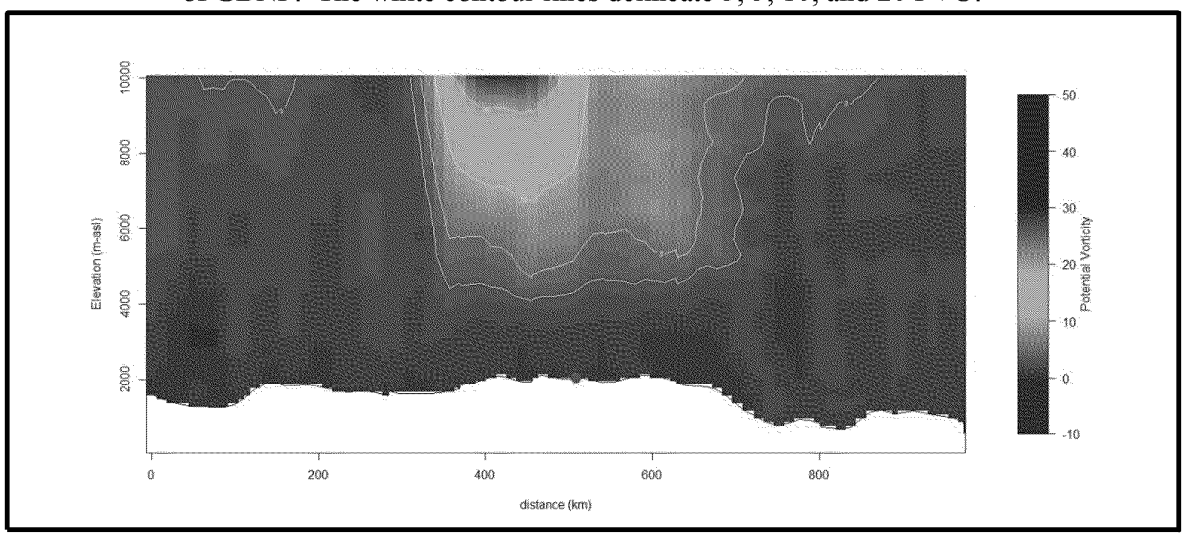
**Figure 17. IPV Values Along a North -South Transect at Approximately 114W Longitude at 1800 UTC on June 8, 2015** The red dot is the approximate location of GBNP. The white contour lines delineate 3, 5, 10, and 20 PVU.




4.4.5 Back-Trajectory Analysis

While cross-section analysis confirms an SI having occurred over eastern Nevada, a trajectory analysis is warranted to examine the pat h of the ozone-rich air. As shown in Figure 17, the SI descended to at least 4,000 m a msl over eastern Nevada . A back -trajectory analysis was performed using the GBNP monitoring site as a start/endpoint for air parcel trajectories.

Backward trajectories were produced using the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) program with archived NAM 12 -km data from June 8, 2015. Instead of analyzing one trajectory, the option of using HYSPLIT in ensemble mode was chosen to provide a more realistic likelihood of the pathway of the stratospheric air. Figure 18 shows an ensemble of backward trajectories starting at 700 meters (m) above ground level ( agl) over the GBNP site for 2300 UTC June 8, 2015 for 24 hours. A starting point of 700 m agl was chosen to represent the middle of the planetary boundary layer. Backward trajectories were also generated with starting elevations of 100, 250, and 1,500 m agl for 24 and 72 hours . These trajectories are included in Appendix E. The backward trajectories in Figure 18 show that the air above GBNP on June 8, 2015 came from a variety of heights, ranging from near ground level to more than 2,000 m agl (4,000 m amsl), providing cvidcncc that air from thc stratosphcrc mixcd down to thc surface.



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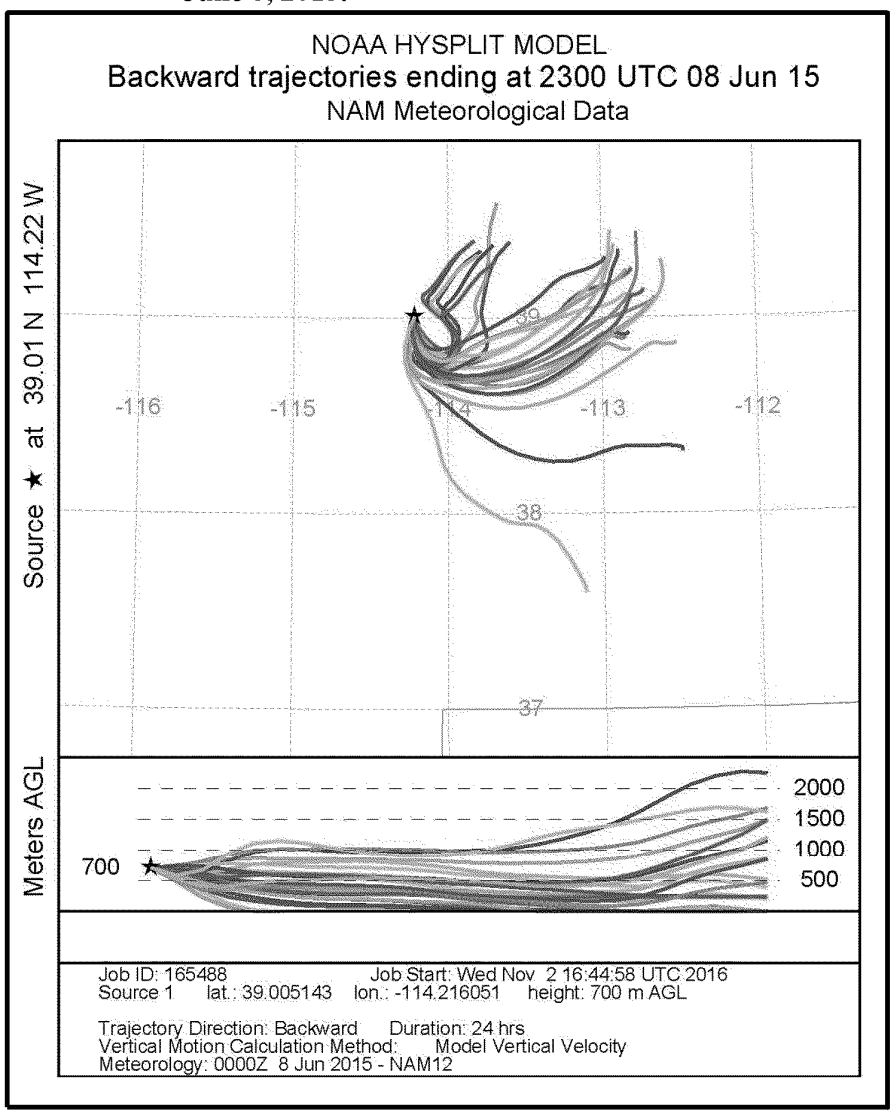
**Figure 18. Backward Trajectories Starting at 700 m agl Above GBNP at 2300 UTC June 8, 2015.**



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4.4.6 Upper Air RAOBs

A lowering of the tropopause or the existence of a dry air layer is another indication of stratospheric air. The June 8, 2015 radiosonde observations (RAOB) from Elko Nevada, Las Vegas, Nevada, and Salt Lake City, Utah , were analyzed for the presence of SI air. The 0000 UTC June 9, 2015 RAOBs for Salt Lake City, Elko, and Las Vegas all show a dry air layer from 600 to 450 mb (Figures 19-21). The soundings also show that the atmosphere was well -mixed (as shown by the dry a diabatic lapse rate) vertically up to the ozone -laden, dry air layer providing another piece of evidence that supports air from an SI having vertically mixed to the earth's surface.

**Figure 19. Radiosonde Observation for Salt Lake City, Utah at 0000 UTC June 9, 2015**

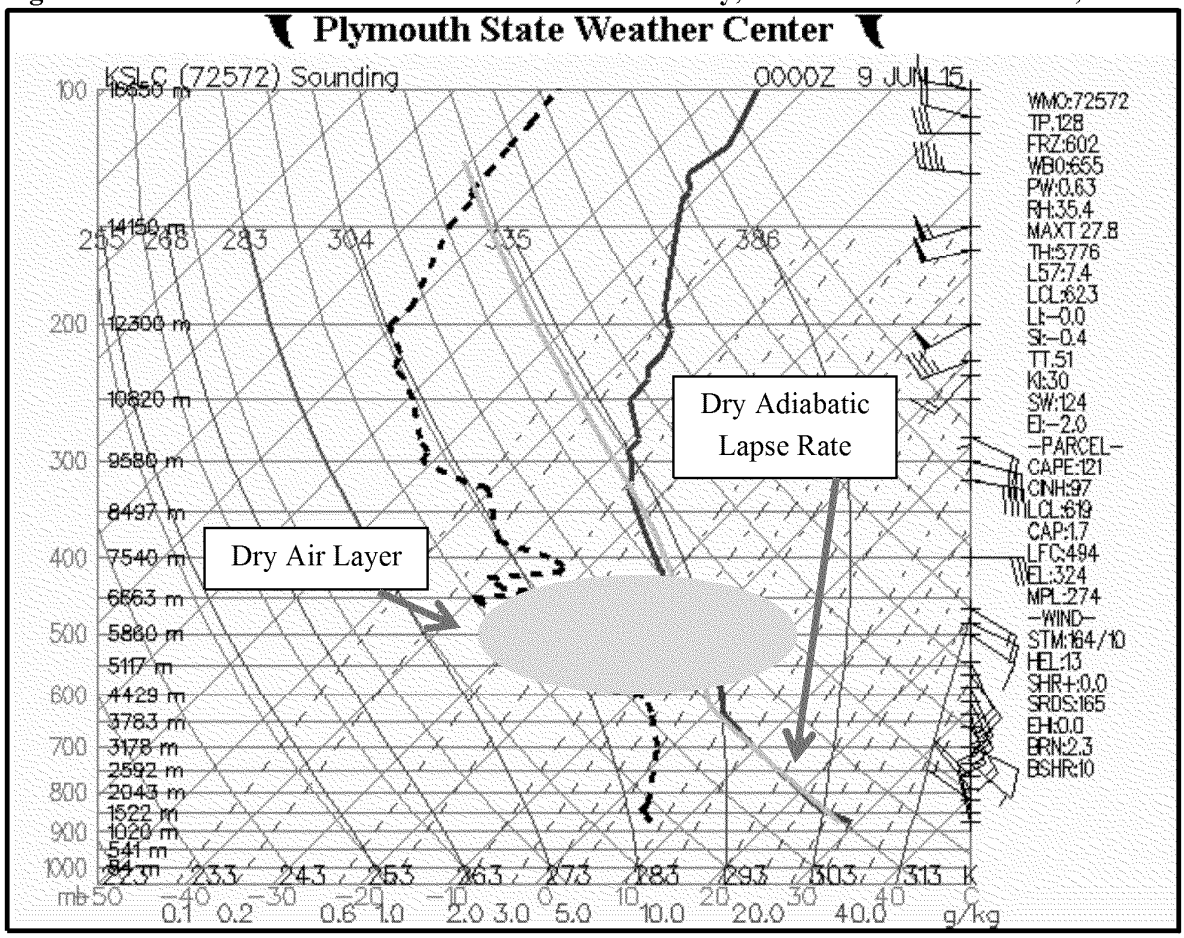




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**Figure 20. Radiosonde Observation for Las Vegas, Nevada at 0000 UTC June 9, 2015**

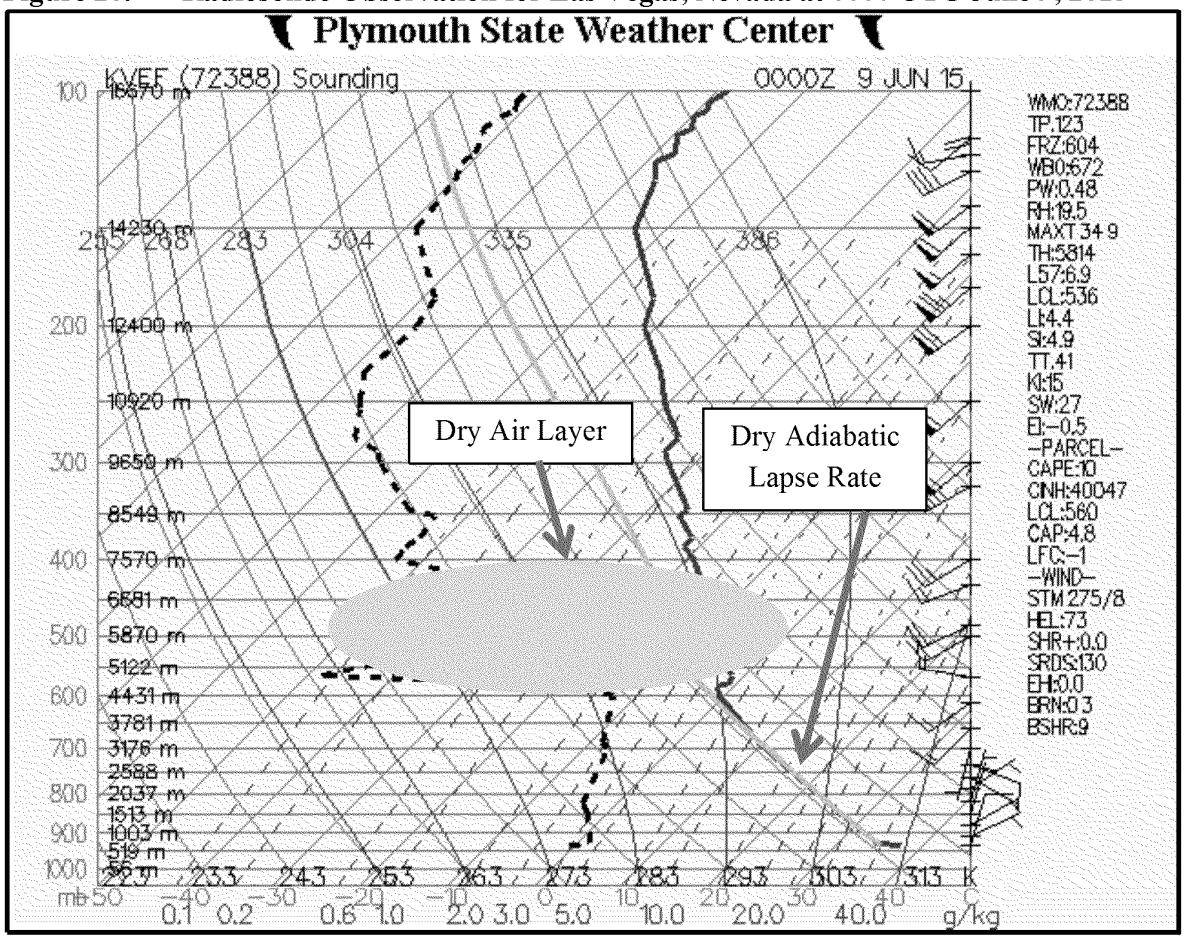




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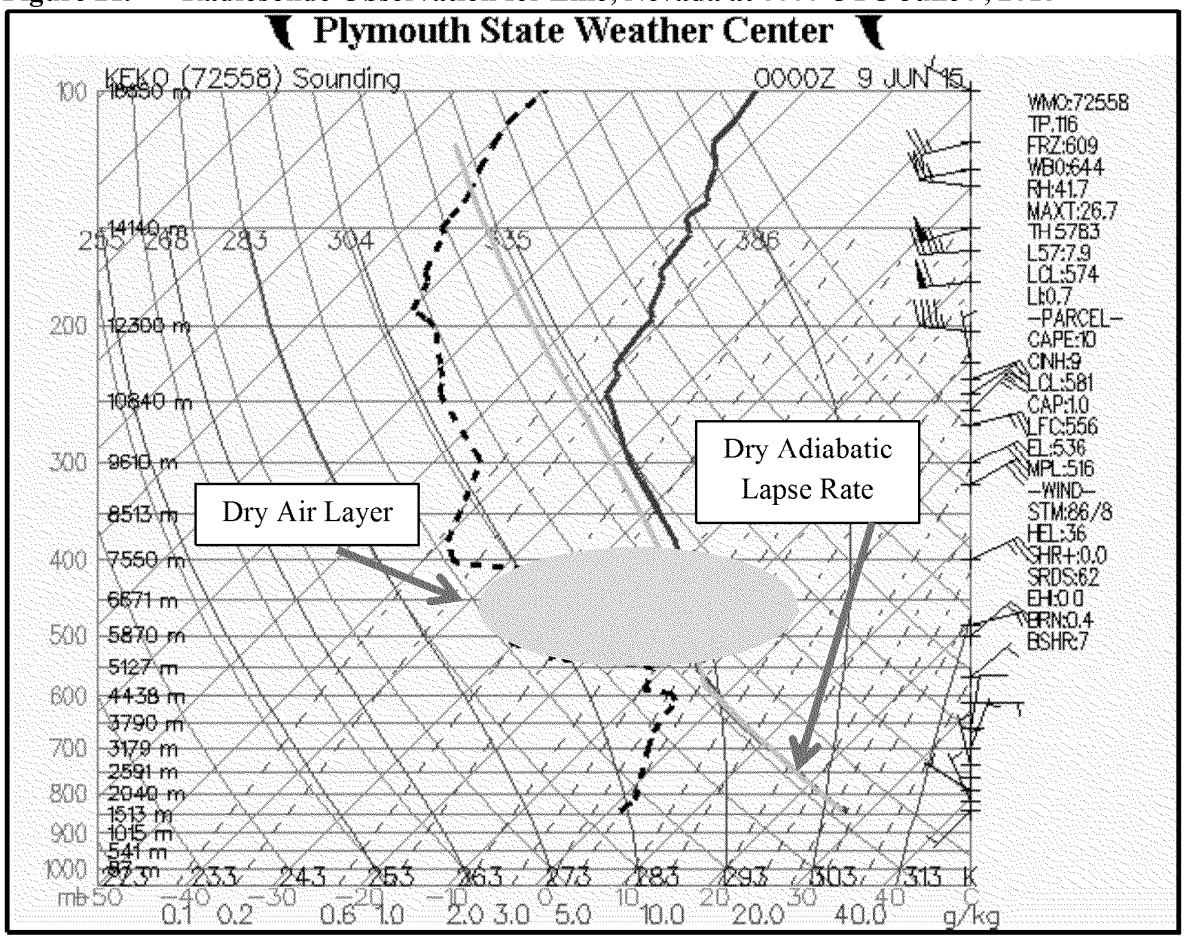
**Figure 21. Radiosonde Observation for Elko, Nevada at 0000 UTC June 9, 2015**



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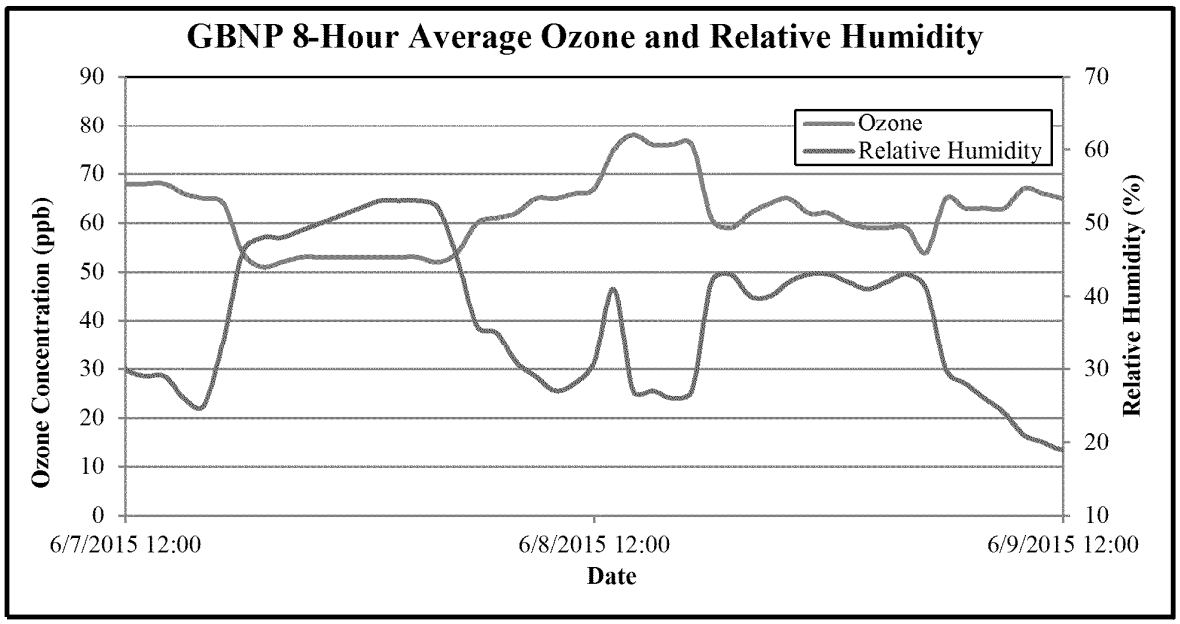
4.4.7 Surface-Based Data

Figure 22 shows the June 7-9, 2015 1-hour average ozone and hourly RH data for the GBNP monitor. The data show a decrease in RH that coincided with an increase in 8-hour average ozone values. Air of stratospheric origin is dry as depicted by very low RH values. An increase in ozone concentration and a decrease in RH at GBNP is further evidence of an SI event having occurred on June 8, 2015.

**Figure 22. Eight-Hour Ozone and One-Hour Relative Humidity Data for June 7-9, 2015 at the GBNP CASTNET Site**



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### 4.4.8 Tropopause Heights

The University of Utah Horel Research Group archives tropopause height as given in NAM forecast runs by NOAA and the National Weather Service . Figures 23 and 24 show the tropopause height over the southwestern U.S. at 0000 and 1200 UTC June 6, and 0000 and 1200 June 9, 2015, respectively. The tropopause height maps show an area with the tropopause at or below 450 mb (dark blue and black areas, approximately 21,000 feet altitude) associated with the upper level low over southern California (Figures 9 and 23 ). The area of lowered tropopause moves eastward and northward over time as the upper level low stretches into an elongated trough. By June 9, 2015 the area of lowered tropopause stretches across northern Nevada and Utah, including GBNP (Figure 25).



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**Figure 23. NAM Forecast Tropopause Heights for June 6, 2015** . NAM forecast from 0000 UTC on June 6, 2015, valid for 0000 UTC June 6, 2015 (left) and 1200 June 6, 2015 (right).

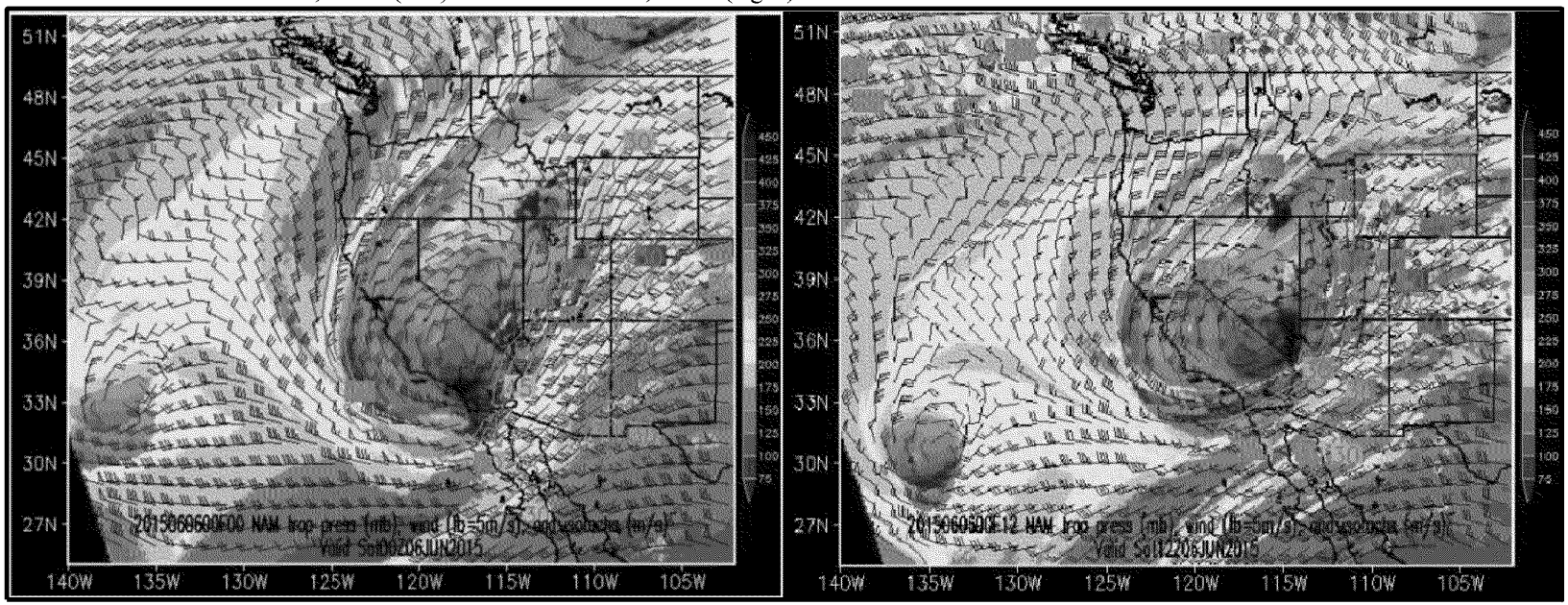

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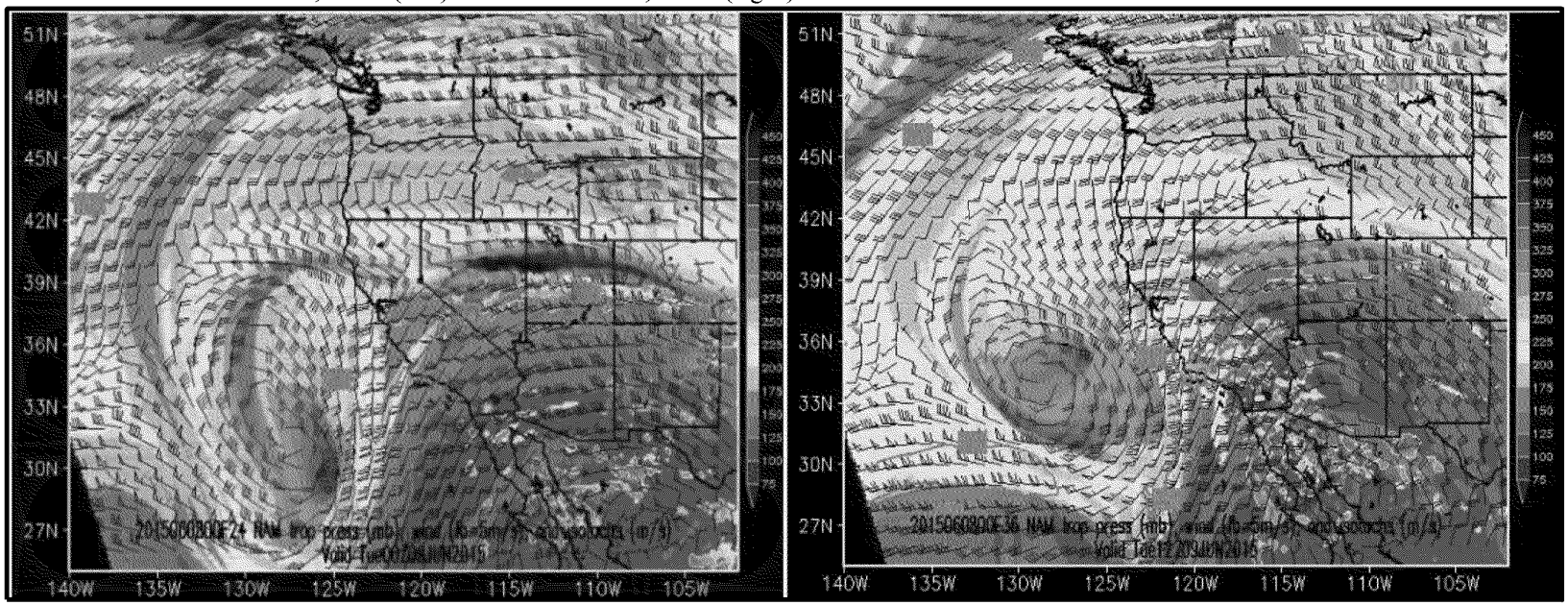
**Figure 2 4. NAM Foreca st Tropopause Heights for June 9 , 2015**. NAM forecast from 0000 UTC on June 8, 2015, valid for 0000 UTC June 9, 2015 (left) and 1200 June 9, 2015 (right).



### 4.4.9 NOAA Realtime Air Quality Modeling System

Images of the vertical distribution of ozone, carbon monoxide, and net ozone production were developed using the NOAA Realtime Air Quality Modeling System (RAQMS) and have been provided by Dr. Brad Pierce. Figures 25 through 27 show RAQMS ozone concentration maps at 5, 3, and 1 km agl at 0000 June 9, 2015. The white dashed line on Figure 25 is the location of the cross-sections shown in Figures 28 and 29 . The white star on Figures 25, 28, and 29 is the approximatc location of GBNP.

The dashed line at approximately 114 degrees west longitude shows the transect used to generate the RAQMS vertical profile of ozone shown in Figure 28. The transect shows the region of lowered tropopause height from Figure 24, with stratospheric ozone of 80 ppb or higher down to 5 km amsl.

**Figure 25. RAQMS Ozone Concentration at 5 km agl at 0000 UTC June 9, 2015.**

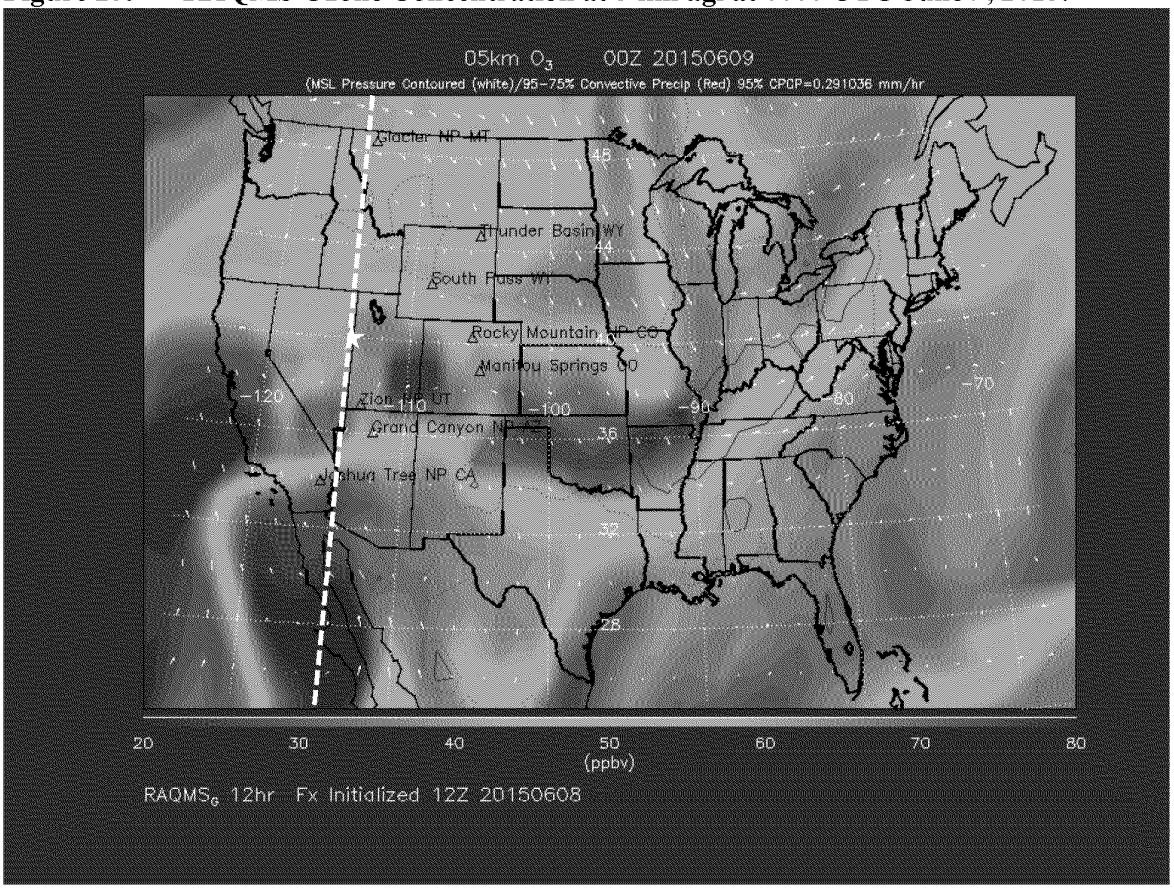





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**Figure 26. RAQMS Ozone Concentration at 3 km agl at 0000 UTC June 9, 2015**

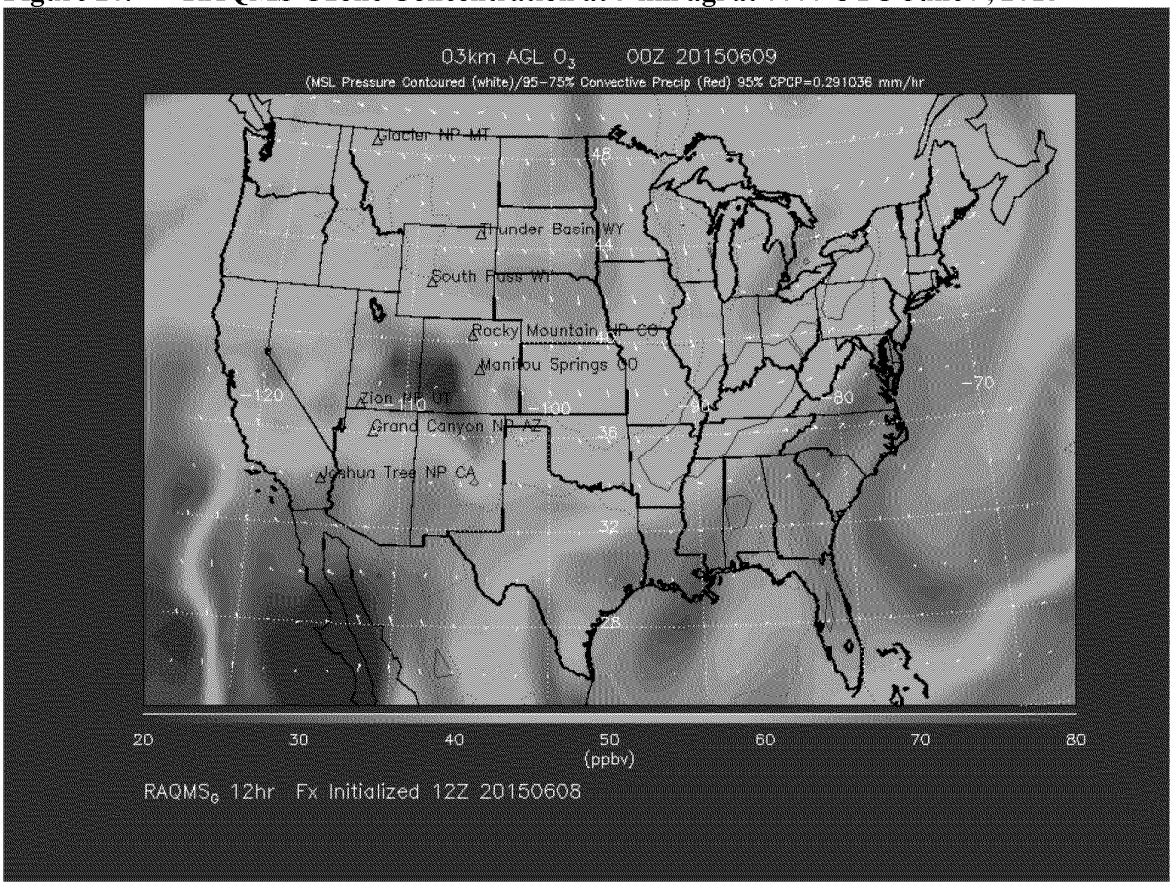




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**Figure 27. RAQMS Ozone Concentration at 1 km agl at 0000 UTC June 9, 2015**

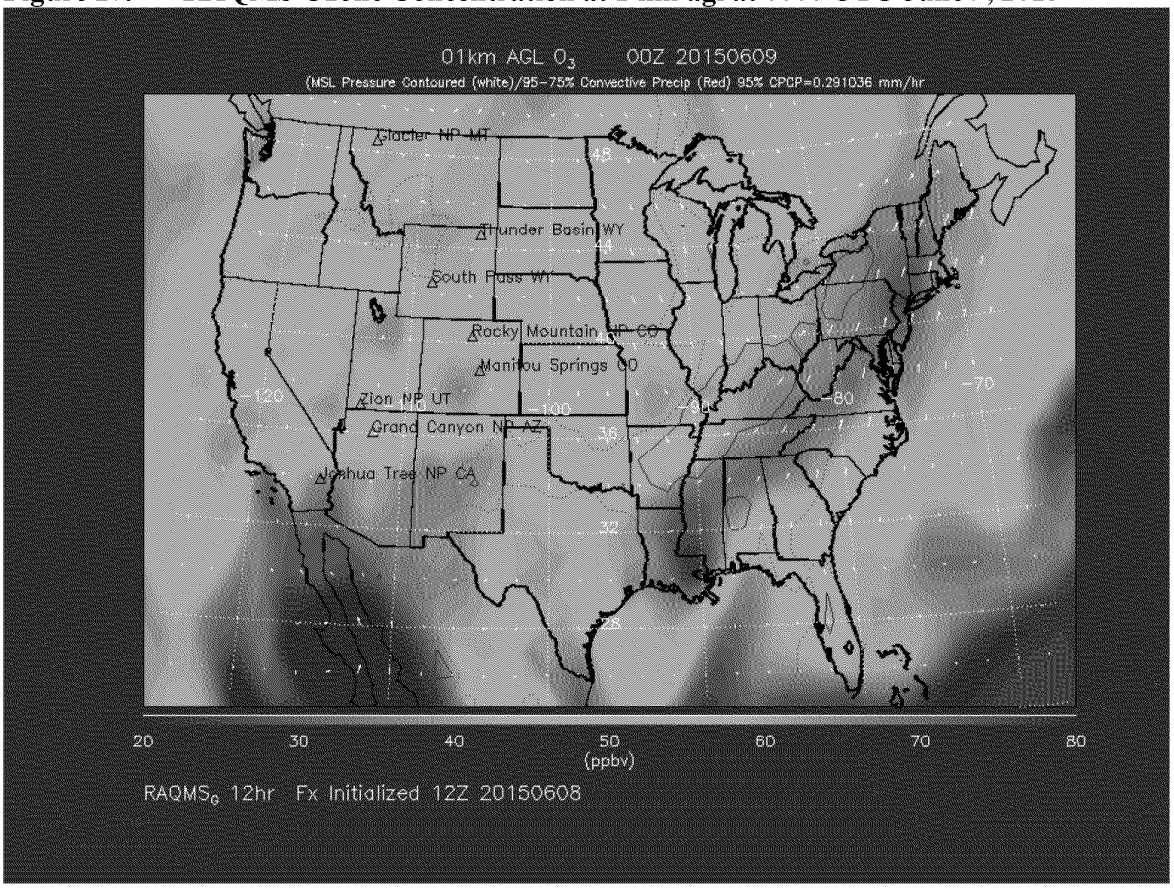


**Figure 28. RAQMS Ozone Vertical Profile 0000 UTC June 9, 2016 at 114 Degrees West.**

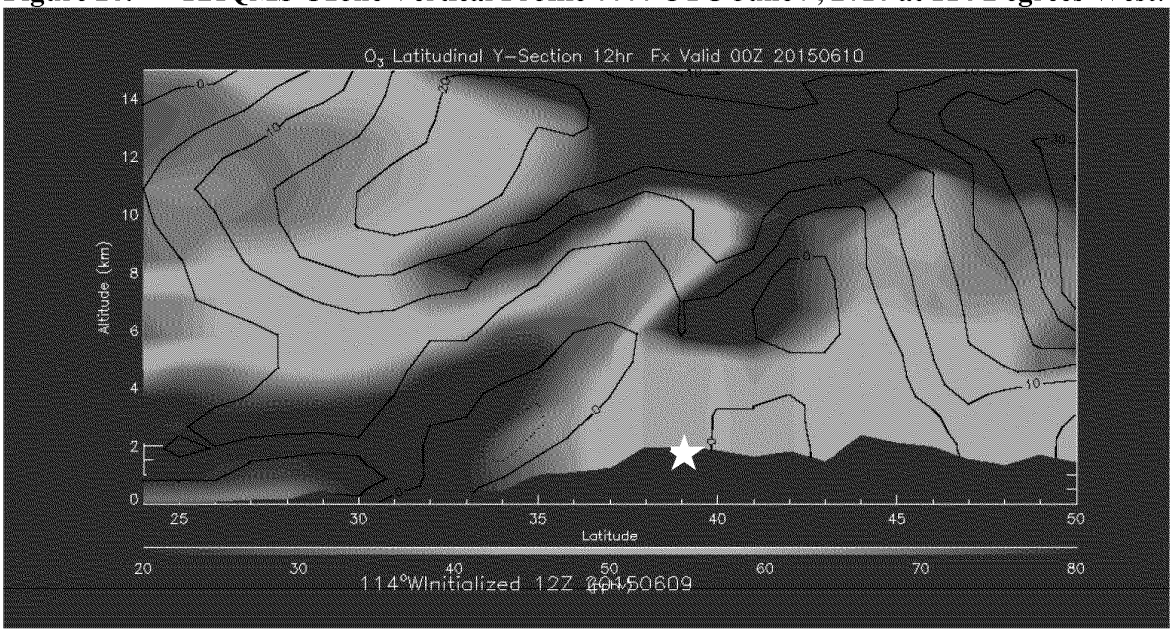




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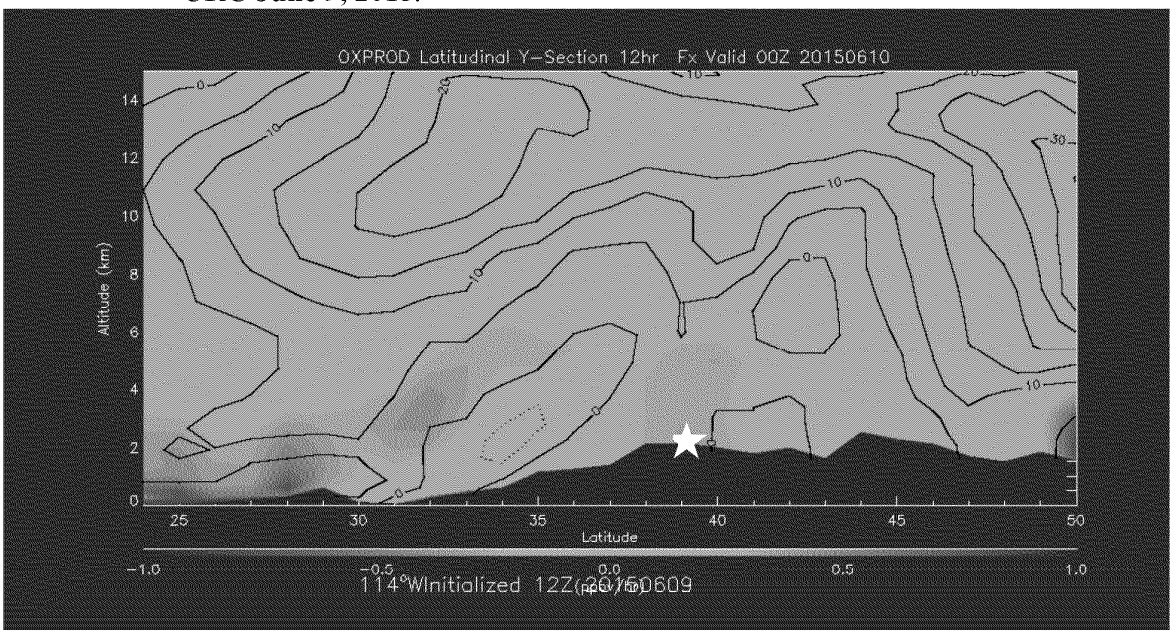
Figure 29 shows RAQMS estimates of local oxidant production rates. Elevated oxidant production due to local photochemistry is seen for Calgary, Alberta (5 1 °N, 11 4 °W), and a minimum in local photochemical oxidant production is shown for GBNP (39 °N, 114 °W). The RAQMS result suggests that local photochemistry played little or no role in the elevated ozone at GBNP on June 8, 2015.

**Figure 29. RAQMS Predicted Local Photochemical Oxidant Production Rates for 0000 URC June 9, 2015**.



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## 5.0 SUMMARY AND CONCLUSIONS

During the interval from late winter to late spring in the northern hemisphere, weather producing systems (i.e. tropospheric storm systems, upper level disturbances or upper level storm systems) aid in causing the tropopause to "fold" or descend into the t roposphere where our weather occurs. Tropopause folding permits ozone -rich air from the stratosphere to enter the troposphere, also called a stratospheric intrusion (SI), creating the potential for ground level ozone monitors over the higher terrain of the western U.S. to experience elevated readings.

During the period from June 4 through 8, 2015, an upper atmospheric disturbance associated with an SI moved over the western U.S. injecting ozone -rich air into the troposphere. The ozone-laden air then moved over eastern Nevada, generating elevated ozone readings resulting in an 8-hour ozone standard exceedance of 72 ppb at the GBNP ozone monitor ing site. Ozone monitors managed by the Ute Tribe in central Utah also measured elevated 1-hour average ozone values during the SI event (Figure 4).

Statistical analyses performed on the GBNP data show that the June 8, 2015 ozone data was statistically higher than values recorded during June of each year from 2011 through 2015.

This document clearly show s that an upper atmospheric disturbance and its attendant SI carried ozone-rich air from the stratosphere over eastern Nevada down to the area around the GBNP ozone monitor on June 8, 2015. Due to the disturbance, atmospheric conditions were conductive for a tropopause fold and vertical mixing over the GBNP area as evidenced by meteorological data, ozone and CO data, backward trajectories, upper air soundings, and IPV values. As a result, 1-hour average ozone values at the GBNP ozone monitor increased on June 8, 2015.

The event meets the definition of a stratospheric intrusion as outlined in the preamble to "Treatment of Data Influenced by Exceptional Events" 40 CFR Parts 50 and 51 section IV(D)(5)(e). Specifically, air originated in the stratosphere and was transported directly to the earth's surface via an upper level disturbance causing the GBNP June 8, 2015 exceptional event. This event meets the specific criterion established in 40 CFR 50.14 (3)(iii) as described below.

Based on the evidence, including the comparisons and analyses provided in Section 4 of this demonstration, the NDEP has established that a clear causal relationship exists between the stratospheric intrusion event on June 8, 2015 in eastern Nevada, and the monitored ozone exceedance on that day. The clear causal relationship evidence also demonstrates that the event affected air quality at the monitor, and that the event is associated with a measured concentration in excess of normal historical concentrations for this site, including background.



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### 5.1 AFFECTS AIR QUALITY

Figure 4 sh ows that rural, remote high elevation ozone monitors in the western United States observed elevated ozone levels on June 3 and 4 and on June 7, 8 and 9, 2015. Figure 5 show s maps of measured ozone in the region on June 8, 2015 , showing the geographic extent of the elevated ozone. Section 4 provided evidence that the elevated ozone observed was caused in part by stratospheric ozone affecting surface air quality.

### 5.2 NATURAL EVENT

The Exceptional Events Rule states a '[n] atural event means an event and its resulting emissions, which may recur at the same location , in which human activity plays little or no direct causal role'. The analysis shows that ozone transported via a stratospheric ozone intrusion caused the identified exceedance discussed in Section 4 of this demonstration. The NDEP concludes that the event identified should be considered a natural, stratospheric ozone intrusion event.

### 5.3 NOT REASONABLY CONTROLLABLE OR PREVENTABLE

The Exceptional Events Rule Preamble and the 40 CFR 50 .14 specifically list stratospheric intrusion of ozone as a natural event that could affect ground level ozone concentrations. The analysis shows that ozone transported via a stratospheric ozone intrusion caused the identified exceedance discussed in Section 4 of this demonstration. The NDEP concludes that the event in question was a stratospheric ozone intrusion event and thereby an unpreventable and uncontrollable natural event, and therefore not reasonably controllable or preventable.

In summary, the NDEP concludes that an SI occurred on June 8, 2015 resulting in an exceptional event. This exceptional event has passed the three criterion tests under 40 CF R 50.14 (6). Consequently, the NDEP is requesting for EPA concurrence that the event was exceptional and for the exclusion from the AQS database of the GBNP CASTNET 1-hour average ozone data for the following times:



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## 6.0 PROCEDURAL REQUIREMENTS

### 6.1 FLAGGING OF DATA

At the request of the NPS, ARS has submitted the ozone data from the GBNP CASTNET ozone monitor to the U.S. EPA AQS database . At the request of NDEP, ARS has placed the appropriate flags on the data indicating that the data was affected by exceptional events due to wild fires (Flag RT, requesting exclusion due to wildland fires). Such flagging ensures that the air quality data is properly represented in the overall air quality planning process.

### 6.2 PUBLIC OUTREACH DURING EVENT

A state requesting exclusion of air quality data affected by an exceptional event must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the state must:

- provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
- provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
- provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events.

The public was not ified of air quality being affected by ozone via Air Quality Index (AQI) updates on the AirNow website (Appendix C).

### 6.3 PUBLIC COMMENT PERIOD

The NDEP BAQP has prepared this documentation to demonstrate that these exceedances were due to wildland fire natural events, in accordance with the U.S. EPA Exceptional Event Rule. The documentation in support of this demonstration and request for the treatment of th e data associated with these exceedances as exceptional events was posted on the NDEP website at http://ndep.nv.gov/admin/public.htm requesting review and comment by the public for a minimum of 30 days. Public comments were directed to:

Sheryl Fontaine, Ambient Air Monitoring Branch
Nevada Division of Environmental Protection
Bureau of Air Quality Planning
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Email: sfontaine@ndep.nv.gov



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## 7.0 REFERENCES


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# APPENDIX A
# NDEP BAQP Annual Network Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

OCT 2 8 2015

Mr. Phillip Shoopman
Chief, Bureau of Air Quality Planning
Nevada Division of Environmental Protection
901 south Stewart Street, Suite 4001
Carson City, Nevada 89701

Dear Mr. Shoopman:

Thank you for your submission of the 2015 *Ambient Air Monitoring Network Plan* for the State of Nevada in June 2015. We have reviewed the submitted document based on the requirements set forth under 40 CFR 58. Based on the information provided in the plan, the U.S. Environmental Protection Agency (EPA) approves all portions of the network plan except those specifically identified below.

Please note that we cannot approve portions of the annual network plan for which the information in the plan is insufficient to judge whether the requirement has been met, or for which the information, as described, does not meet the requirements as specified in 40 CFR 58.10 and the associated appendices. EPA Region 9 also cannot approve portions of the plan for which the EPA Administrator has not delegated approval authority to the regional offices. Accordingly, the first enclosure (*A. Annual Monitoring Network Plan Items where EPA is Not Taking Action*) provides a listing of specific items of your agency's annual monitoring network plan where EPA is not taking action. The second enclosure (*B. Additional Items Requiring Attention*) is a listing of additional items in the plan that EPA wishes to bring to your agency's attention.

The third enclosure (C. *Annual Monitoring Network Plan Checklist*) is the checklist EPA used to review your plan for overall items that are required to be included in the annual network plan along with our assessment of whether the plan submitted by your agency addresses those requirements.

The first two enclosures highlight a subset of the more extensive list of items reviewed in the third enclosure. All comments conveyed via this letter (and enclosures) should be addressed (through corrections within the plan, additional information being included, or discussion) in next year's annual monitoring network plan.

We also want to thank you for your timely submission of the 2015 *Five Year Ambient Air Monitoring Network Assessment* for the State of Nevada, as required under 40 CFR Part 58.10. We recognize that preparing the network assessment was a significant project and we appreciate your effort.

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The recently revised ozone NAAQS, finalized on October 1, 2015, includes language that revokes all existing seasonal ozone waivers upon the effective date of the final rule. EPA Region 9 will consider all previously approved ozone season waivers effective until December 31, 2015. In advance of the 2016 ozone monitoring season (January – December), EPA Region 9 recommends that agencies seeking new ozone waivers for the 2015 8-hour Ozone NAAQS of 0.070 ppm submit waiver requests no later than December 1, 2015.

If you have any questions regarding this letter or the enclosed comments, please feel free to contact Meredith Kurpius at (415) 947-4534 or Michael Flagg at (415) 972-3372.

Sincerely,

Gretchen Busterud
Acting Deputy Director, Air Division

Enclosures:

A. Annual Monitoring Network Plan Items where EPA is Not Taking Action
B. Additional Items Requiring Attention
C. Annual Monitoring Network Plan Checklist

cc: Mike Elges, NDEP
cc (via email): Daren Winkelman, NDEP

**A. Annual Monitoring Network Plan Items where EPA is Not Taking Action**

We are not acting on the portions of annual network plans where either EPA Region 9 lacks the authority to approve specific items of the plan, or EPA has determined that a requirement is either not met or information in the plan is insufficient to judge whether the requirement has been met.

- System modifications (e.g., site closures or moves) are subject to approval per 40 CFR 58.14(c). Information provided in the plan was insufficient for EPA to approve the system modifications listed in the plan per the applicable requirement. Therefore, we are not acting on the following items as part of this year's annual network plan (see Checklist Rows 4 and 16):
    - Shutdown of Harvey CO SLAMS monitor

EPA identified items in your agency's annual monitoring network plan where a requirement was not being met or information in the plan was insufficient to judge whether the requirement was being met based on 40 CFR 58.10 and the associated appendices. Therefore, we are not acting on the following items:

| Item | Checklist Row | Issue |
|---|---|---|
| Modifications to SLAMS network | 3 | Insufficient information to judge |
| Sampling schedule for $PM_{2.5}$ - applies to year-round and seasonal sampling schedules | 31 | Insufficient information to judge |
| Designation of a primary monitor if there is more than one monitor for a pollutant at a site. | 15 | Insufficient information to judge |
| FRM/FEM/ARM $PM_{2.5}$ QA collocation | 23 | Insufficient information to judge |
| Document how states and local agencies provide for the review of changes to a $PM_{2.5}$ monitoring network that impact the location of a violating $PM_{2.5}$ monitor. | 19 | Insufficient information to judge |
| Distance of monitor from nearest road | 74 | Not meeting requirement |
| Traffic count of nearest road | 75 | Not meeting requirement |
| Distance from supporting structure | 78 | Insufficient information to judge |
| Distance from obstructions not on roof (horizontal distance to the obstruction and vertical height of the obstruction above the probe should be provided) | 80 | Insufficient information to judge |
| Monitor type for each monitor, and Network Affiliation(s) as | 69 | Incorrect in one instance |

| | | |
|---|---|---|
| appropriate | | |
| Scale of representativeness for each monitor as defined in Appendix D | 70 | Incorrect in one instance |
| Parameter code for each monitor | 71 | Incorrect in one instance |
| Basic monitoring objective for each monitor | 67 | Incorrect in one instance |

**B. Additional Items Requiring Attention**

- [Item 21] Minimum monitoring requirements for $PM_{2.5}$ only apply to Metropolitan Statistical Areas. Since Gardnerville Ranchos is a Micropolitan Statistical Area, there are no monitors currently required for this area by 40 CFR 58 Appendix D. Also, as a general note, SPMs do not count towards meeting minimum monitoring requirements. Also, please note that the requirement for population is by MSA, not county.

  The minimum monitoring requirements for $PM_{2.5}$ are specified in 40 CFR 58 Appendix D 4.7.1(a): "State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix." Please correct Table 2 to reflect the number of SLAMS sites, rather than monitors.

  According to information provided in the site tables, Table 2 should indicate that there is 1 active site in the Carson MSA and either remove the for Gardnerville Ranchos or list 0 active sites, as the only monitor is not a SLAMS, but an SPM.

- [Item 22] Since there are 0-1 $PM_{2.5}$ SLAMS sites required for the Carson City MSA, 40 CFR Appendix D 4.7.2 requires 0-1 continuous monitor in the MSA. No information was given in the site table to indicate whether the continuous monitor is primary.

- [Item 25] There is a in the site tables called "Suitable for $PM_{2.5}$ comparison", though this is likely the asking for "suitable for annual $PM_{2.5}$ comparison." Please correct in future plans.

- [Item 35] The information provided in your plan for the required number of $PM_{10}$ monitoring sites required by 40 CFR 58 Appendix D is incorrect. The population threshold for MSAs requiring $PM_{10}$ monitoring is 100,000. In your next plan, please note that there are no requirements per 40 CFR 58 Appendix D for $PM_{10}$ monitoring in the Carson City MSA and also none required in Micropolitan Statistical Areas, such as Elko and Pahrump. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county.

  The description of other requirements such as for maintenance plans or MOUs are good information to continue to include in the plan, but was not the intent of evaluating the network requirements of 40 CFR 58 Appendix D.

- [Item 51] Minimum monitoring requirements for ozone described in 40 CFR 58 Appendix D apply only to Metropolitan Statistical Areas. Based on the population and design value, the Carson City MSA requires one ozone site. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county.

- [Item 60] No $SO_2$ monitors are required according to the plan as the PWEI is below the threshold. However, include the calculated PWEI in next year's plan.

- [Item 62] Correct the typo on the top of page 13 (Elko Site Description) for the 723 Railroad Street site from "32-007-003" to "32-007-0003".

- [Item 68] The Carson City site should make the following changes to better align with the correct terminology: change $PM_{2.5}$ "Max Concentration" to "Highest Concentration" and change $O_3$ "Max Concentration" to "Max $O_3$ Concentration

- [Item 83] Provide measurement of unrestricted airflow in degrees for the $PM_{2.5}$ monitor at Jarbidge Wilderness IMPROVE.

Additional information for each of these items may be found for the listed in column 2, in the third enclosure (*C. Annual Monitoring Network Plan Checklist).*

**C. ANNUAL MONITORING NETWORK PLAN CHECKLIST**
(Updated October 1, 2015)

Year: 2015
Agency: Nevada Division of Environmental Protection

40 CFR 58.10(a)(1) requires that each Annual Network Plan (ANP) include information regarding the following types of monitors: SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, STN stations, State speciation stations, SPM stations, and/or, in serious, severe and extreme ozone nonattainment areas, PAMS stations, and SPM monitoring stations.

40 CFR 58.10(a)(1) further directs that, "The plan shall include a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of this part, where applicable." On this basis, review of the ANPs is based on the requirements listed in 58.10 along with those in Appendices A, C, D, and E.

EPA Region 9 will not take action to approve or disapprove any item for which Part 58 grants approval authority to the Administrator rather than the Regional Administrators, but we will do a check to see if the required information is included and correct. The items requiring approval by the Administrator are: PAMS, NCore, and Speciation (STN/CSN).

Please note that this checklist summarizes many of the requirements of 40 CFR Part 58, but does not substitute for those requirements, nor do its contents provide a binding determination of compliance with those requirements. The checklist is subject to revision in the future and we welcome comments on its contents and structure.

Key:

| | |
|---|---|
| White | meets the requirement |
| Yellow | Requirement is not met, or information is insufficient to make a determination. Action requested in next year's plan or outside the ANP process (items listed in Enclosure A). |
| Green | Item requires attention in order to improve next year's plan (items listed in Enclosure B). |



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| | ANP requirement | Citation within 40 CFR 58 | Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]? | Does the information provided[3] meet the requirement?[4] | Notes |
|---|---|---|---|---|---|
| **GENERAL PLAN REQUIREMENTS** | | | | | |
| 1. | Submit plan by July 1st | 58.10 (a)(1) | Yes | Yes | Addendum for approval to discontinue CO monitor 32-005-0009-42101-1 at Stateline, NV received August 3, 2015. |
| 2. | 30-day public comment / inspection period[5] | 58.10 (a)(1), 58.10 (a)(2) | Yes | Yes | NDEP did not receive any comments or questions from the public. |
| 3. | Modifications to SLAMS network – case when we are not approving system modifications | 58.10 (a)(2) 58.10 (b)(5) 58.10(e) 58.14 | Yes, August 3, 2015 addendum | Insufficient to Judge | EPA will not be approving the following modifications as part of the 2015 ANP review:<br>• Shutdown of Harvey CO SLAMS |
| 4. | Modifications to SLAMS network – case when we are approving system modifications per 58.14 | 58.10 (a)(2) 58.10 (b)(5) 58.10(e) 58.14 | NA | NA | |
| 5. | Does plan include documentation (e.g., attached approval letter) for system modifications that have been approved since last ANP approval? | | NA | NA | |
| 6. | Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal | 58.10 (b)(5) | Yes Pg. 13-42 | Yes | No proposals |
| 7. | A plan for establishing a near-road $PM_{2.5}$ monitor (in CBSAs ≥ 2.5 million) by 1/1/2015 **(plan was due July 1, 2014)** | 58.10(a)(8)(i) | NA | NA | |
| 8. | A plan for establishing a near-road CO monitor (in CBSAs ≥ 2.5 million) by 1/1/2015 **(plan was due July 1, 2014)** | 58.10(a)(7) 58.13(e)(1) | NA | NA | |

[1] Response options: NA (Not Applicable), Yes, No, Incomplete, Incorrect. The responses "Incomplete" and "Incorrect" assume that some information has been provided.
[2] To the best of our knowledge.
[3] Assuming the information is correct
[4] Response options: NA (Not Applicable) – [reason], Yes, No, Insufficient to Judge.
[5] The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.



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| | ANP requirement | Citation within 40 CFR 58 | Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]? | Does the information provided[3] meet the requirement?[4] | Notes |
|---|---|---|---|---|---|
| 9. | $NO_2$ plan for establishment of 2nd near-road monitor by 1/1/2015 **(plan was due July 1, 2014)** | 58.10 (a)(5)(iv) | NA | NA | |
| 10. | Precision/Accuracy reports submitted to AQS | 58.16(a); App A, 1.3 and 5.1.1 | Yes Pg. 3 | Yes | |
| 11. | Annual data certification submitted | 58.15 App. A 1.3 | Yes Pg. 3 | Yes | |
| 12. | Statement that SPMs operating an FRM/FEM/ARM that meet Appendix E also meet either Appendix A or an approved alternative. Documentation for any Appendix A approved alternative should be included.[6] | 58.11 (a) (2) | Yes Pg. 13-42 | Yes | |
| 13. | SPMs operating FRM/FEM/ARM monitors for over 24 months are listed as comparable to the NAAQS or the agency provided documentation that requirements from Appendices A, C, or E were not met.[7] | 58.20(c) | Yes Pg. 13-42 | Yes | |
| 14. | For agencies that share monitoring responsibilities in an MSA/CSA: this agency meets full monitoring requirements or an agreement between the affected agencies and the EPA Regional Administrator is in place | App D 2(e) | NA | NA | |
| **GENERAL PARTICULATE MONITORING REQUIREMENTS ($PM_{10}$, $PM_{2.5}$, Pb-TSP, Pb-$PM_{10}$)** | | | | | |
| 15. | Designation of a primary monitor if there is more than one monitor for a pollutant at a site. | Need to determine collocation | No | Insufficient to Judge | The Carson City Armory site includes two $PM_{2.5}$ monitors, but no information is given to determine which monitor is primary. |
| 16. | Distance between QA collocated monitors (Note: waiver request or the date of previous waiver approval must be included if the distance deviates from requirement.) | App. A 3.2.5.6 and 3.2.6.3 | Yes Pg. 13-42 | Yes | |

[6] Alternatives to the requirements of appendix A may be approved for an SPM site as part of the approval of the annual monitoring plan, or separately.
[7] This requirement only applies to monitors that are eligible for comparison to the NAAQS per 40 CFR §§58.11(e) and 58.30.



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| | ANP requirement | Citation within 40 CFR 58 | Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]? | Does the information provided[3] meet the requirement?[4] | Notes |
|---|---|---|---|---|---|
| 17. | For low volume PM instruments (flow rate < 200 liters/minute), all other PM instruments are > 1 m from the lovol. If no, list distance (meters) and instruments. | App E | Yes<br>Pg. 13-42 | Yes | |
| 18. | For high volume PM instruments (flow rate > 200 liters/minute), all other PM instruments are > 2m from the hivol. If no, list distance (meters) and instruments. | App E | NA | NA | |
| **$PM_{2.5}$ –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 19. | Document how states and local agencies provide for the review of changes to a $PM_{2.5}$ monitoring network that impact the location of a violating $PM_{2.5}$ monitor. | 58.10 (c) | No | Insufficient to judge | This statement is not included in the plan as required |
| 20. | Identification of any $PM_{2.5}$ FEMs and/or ARMs not eligible to be compared to the NAAQS due to poor comparability to FRM(s) (Note 1: must include required data assessment.) (Note 2: Required SLAMS must monitor $PM_{2.5}$ with NAAQS-comparable monitor at the required sample frequency.) | 58.10 (b)(13)<br>58.11 (e) | NA | NA | |



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| | ANP requirement | Citation within 40 CFR 58 | Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]? | Does the information provided[3] meet the requirement?[4] | Notes |
|---|---|---|---|---|---|
| 21. | Minimum # of monitoring **sites** for $PM_{2.5}$ [Note 1: should be supported by MSA ID, MSA population, DV, # monitoring sites, and # required monitoring sites] [Note 2: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.] | App D, 4.7.1(a) and Table D-5 | Yes Pg. 8 | Yes | Minimum monitoring requirements for $PM_{2.5}$ only apply to Metropolitan Statistical Areas. Since Gardnerville Ranchos is a Micropolitan Statistical Area, there are no monitors currently required for this area by 40 CFR 58 Appendix D. Also, as a general note, SPMs do not count towards meeting minimum monitoring requirements. Also, please note that the requirement for population is by MSA, not county.<br><br>The minimum monitoring requirements for $PM_{2.5}$ are specified in 40 CFR 58 Appendix D 4.7.1(a): "State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix." Please correct Table 2 to reflect the number of SLAMS sites, rather than monitors.<br><br>According to information provided in the site tables, Table 2 should indicate that there is 1 active site in the Carson MSA and either remove the row for Gardnerville Ranchos or list 0 active sites, as the only monitor is not a SLAMS, but an SPM. |
| 22. | Requirements for continuous $PM_{2.5}$ monitoring (number of monitors and collocation) | App D 4.7.2 | Yes Pg. 22 | Yes | Since there are 0-1 $PM_{2.5}$ SLAMS sites required for the Carson City MSA, 40 CFR Appendix D 4.7.2 requires 0-1 continuous monitor in the MSA. |
| 23. | FRM/FEM/ARM $PM_{2.5}$ QA collocation | App A 3.2.5 | Incomplete Pg. 13-42 | Insufficient to Judge | This requirement cannot be judged since the plan does not specify which monitor is primary at Carson City Armory site. Please update this in ANP under "Detailed Site Information". |
| 24. | $PM_{2.5}$ Chemical Speciation requirements for official STN sites | App D 4.7.4 | NA | NA | |
| 25. | Identification of sites suitable and sites not suitable for comparison to the annual $PM_{2.5}$ NAAQS as described in Part 58.30 | 58.10 (b)(7) | Yes Pg. 13-42 | Yes | There is a row in the site called "suitable for $PM_{2.5}$ comparison", though this is likely the row asking for "suitable for annual $PM_{2.5}$ comparison". Please correct in future plans. |
| 26. | Required $PM_{2.5}$ sites represent area-wide air quality | App D 4.7.1(b) | Yes Pg. 13-42 | Yes | |



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| | ANP requirement | Citation within 40 CFR 58 | Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]? | Does the information provided[3] meet the requirement?[4] | Notes |
|---|---|---|---|---|---|
| 27. | For $PM_{2.5}$, within each MSA, at least one site at neighborhood or larger scale in an area of expected maximum concentration | App D 4.7.1(b)(1) | Yes Pg. 13-42 | Yes | |
| 28. | Minimum monitoring requirement for near-road $PM_{2.5}$ monitor (in CBSA $\geq$ 2.5 million) by 1/1/2015 | 58.13(f)(1) App D 4.7.1(b)(2) | NA | NA | |
| 29. | If additional SLAMS $PM_{2.5}$ is required, there is a site in an area of poor air quality | App D 4.7.1(b)(3) | NA | NA | |
| 30. | States must have at least one $PM_{2.5}$ regional background and one $PM_{2.5}$ regional transport site. | App D 4.7.3 | Yes Pg. 13-42 | Yes | The IMPROVE site at Jarbidge Wilderness fulfills this requirement. |
| 31. | Sampling schedule for $PM_{2.5}$ - applies to year-round and seasonal sampling schedules (note: date of waiver approval must be included if the sampling season deviates from requirement) | 58.10 (b)(4) 58.12(d) App D 4.7 EPA flowchart | Incomplete | Insufficient to judge | Without the primary monitor specified at Carson City Armory, this requirement cannot be determined. |
| 32. | Frequency of flow rate verification for manual $PM_{2.5}$ monitors audit | App A 3.3.2 | Yes Pg. 13-42 | Yes | |
| 33. | Frequency of flow rate verification for automated $PM_{2.5}$ monitors audit | App A 3.2.3 | Yes Pg. 13-42 | Yes | |
| 34. | Dates of two semi-annual flow rate audits conducted in **CY2014** for $PM_{2.5}$ monitors | App A, 3.2.4 and 3.3.3 | Yes Pg. 13-42 | Yes | |



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|---|---|---|---|---|---|
| **$PM_{10}$ –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 35. | Minimum # of monitoring sites for $PM_{10}$ | App D, 4.6 (a) and Table D-4 | Yes Pg. 8 | Yes | The information provided in your plan for the required number of monitoring sites required by 40 CFR 58 Appendix D is incorrect. The population threshold for MSAs requiring $PM_{10}$ monitoring is 100,000. In your next plan, please note that there are no requirements per 40 CFR 58 Appendix D for $PM_{10}$ monitoring in the Carson City MSA and also none required in Micropolitan Statistical Areas, such as Elko and Pahrump. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county.<br><br>The description of other requirements such as for maintenance plans or MOUs are good information to continue to include in the plan, but was not the intent of evaluating the network requirements of 40 CFR 58 Appendix D. |
| 36. | Manual $PM_{10}$ method collocation (note: continuous $PM_{10}$ does not have this requirement) | App A 3.3.1 | NA | NA | No manual $PM_{10}$ methods |
| 37. | Sampling schedule for $PM_{10}$ | 58.10 (b)(4)<br>58.12(e)<br>App D 4.6 | Yes<br>Pg. 13-42 | Yes | |
| 38. | Frequency of flow rate verification for manual $PM_{10}$ monitors audit | App A 3.3.2 | Yes<br>Pg. 13-42 | Yes | |
| 39. | Frequency of flow rate verification for automated $PM_{10}$ monitors audit | App A 3.2.3 | Yes<br>Pg. 13-42 | Yes | |
| 40. | Dates of two semi-annual flow rate audits conducted in **CY2014** for $PM_{10}$ monitors | App A, 3.2.4 and 3.3.3 | Yes<br>Pg. 13-42 | Yes | |
| **Pb –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 41. | Minimum # of monitors for non-NCore Pb [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.] | App D 4.5<br>58.13(a) | Yes<br>Pg. 6 | Yes | No requirement |
| 42. | Pb collocation: for non-NCore sites | App A 3.3.4.3 | NA | NA | |
| 43. | Any source-oriented Pb site for which a waiver has been granted by EPA Regional Administrator | 58.10 (b)(10) | NA | NA | |



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| 44. | Any Pb monitor for which a waiver has been requested or granted by EPA Regional Administrator for use of Pb-$PM_{10}$ in lieu of Pb-TSP | 58.10 (b)(11) | NA | NA | |
| 45. | Designation of any Pb monitors as either source-oriented or non-source-oriented | 58.10 (b)(9) | NA | NA | |
| 46. | Sampling schedule for Pb | 58.10 (b)(4)<br>58.12(b)<br>App D 4.5 | NA | NA | |
| 47. | Frequency of flow rate verification for Pb monitors audit | App A 3.3.4.1 | NA | NA | |
| 48. | Dates of two semi-annual flow rate audits conducted in **CY2014** for Pb monitors | App A 3.3.4.1 | NA | NA | |
| GENERAL GASEOUS MONITORING REQUIREMENTS | | | | | |
| 49. | Frequency of one-point QC check (gaseous) | App. A 3.2.1 | Yes<br>Pg. 13-42 | Yes | |
| 50. | Date of Annual Performance Evaluation (gaseous) conducted in **CY2014** | App. A 3.2.2 | Yes<br>Pg. 13-42 | Yes | |
| $O_3$ –SPECIFIC MONITORING REQUIREMENTS | | | | | |
| 51. | Minimum # of monitoring sites for $O_3$ [Note: should be supported by MSA ID, MSA population, DV, # monitoring sites, and # required monitoring sites][8] | App D, 4.1(a) and Table D-2 | Yes<br>Pg. 8 | Yes | Minimum monitoring requirements for ozone described in 40 CFR 58 Appendix D apply only to Metropolitan Statistical Areas. Based on the population and design value, the Carson City MSA requires one ozone site. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county. |
| 52. | Identification of maximum concentration $O_3$ site(s) | App D 4.1 (b) | Yes<br>Pg. 13-42 | Yes | |
| 53. | Sampling season for $O_3$ (Note: Waivers must be renewed annually. EPA expects agencies to submit re-evaluations of the relevant data each year with the ANP. EPA will then respond as part of the ANP response.) | 58.10 (b)(4)<br>App D, 4.1(i) | Yes<br>Pg. 9, 13-42 | Yes | All ozone monitors switched to year-round monitoring starting April 1, 2015 |

[8] Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements. In addition, ozone monitors that do not meet traffic count/distance requirements to be neighborhood or urban scale (40 CFR 58 Appendix E, Table E-1) cannot be counted towards minimum monitoring requirements.



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| **$NO_2$ –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 54. | Minimum monitoring requirement for single near-road $NO_2$ monitor (in CBSA ≥ 1 million) by 1/1/2014 | 58.13(c)(3) App D 4.3.2 | NA | NA | |
| 55. | Minimum monitoring requirement for second near-road $NO_2$ monitor (in CBSA ≥ 2.5 million) by 1/1/2015 | 58.13(c)(4) App D 4.3.2 | NA | NA | |
| 56. | Minimum monitoring requirements for area-wide $NO_2$ monitor in location of expected highest $NO_2$ concentrations representing neighborhood or larger scale (operation required by January 1, 2013) | App D 4.3.3 | NA | NA | |
| 57. | Minimum monitoring requirements for susceptible and vulnerable populations monitoring (aka RA40) $NO_2$ (operation required by January 1, 2013) | App D 4.3.4 | NA | NA | |
| 58. | Identification of required $NO_2$ monitors as either near-road, area-wide, or vulnerable and susceptible population (aka RA40) | 58.10 (b)(12) | NA | NA | |
| **CO –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 59. | Minimum monitoring requirement for near-road CO monitor (in CBSA ≥ 2.5 million) by 1/1/2015 | 58.13(e)(1) App D 4.2.1 | NA | NA | |
| **$SO_2$ –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 60. | Minimum monitoring requirements for $SO_2$ [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.] | App D 4.4 | Yes Pg. 6, 8 | Yes | No monitors are required according to the plan as the PWEI is below the threshold. However, include the calculated PWEI in next year's plan. |



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| **NCORE –SPECIFIC MONITORING REQUIREMENTS** | | | | | |
| 61. | NCore site and all required parameters operational: year-round $O_3$, trace $SO_2$, trace CO, $NO_y$, NO, $PM_{2.5}$ mass, $PM_{2.5}$ continuous, $PM_{2.5}$ speciation, $PM_{10-2.5}$ mass, resultant wind speed at 10m, resultant wind direction at 10m, ambient temperature, relative humidity, and Pb at CBSAs ≥ 500,000. | 58.10 (a)(3); Pb collocation App. A 3.3.4.3; $PM_{10-2.5}$ minimum monitoring App. D 4.8; $PM_{10-2.5}$ sampling schedule 58.10 (b)(4) 58.12(f) App D 4.8; $PM_{10-2.5}$ collocation App. A 3.3.6 | NA | NA | |
| **SITE OR MONITOR - SPECIFIC REQUIREMENTS (OFTEN INCLUDED IN DETAILED SITE INFORMATION TABLES)** | | | | | |
| 62. | AQS site identification number for each site | 58.10 (b)(1) | Yes<br>Pg. 13-42 | Yes | Correct typo on the top of page 13 (Elko Site Description) for the 723 Railroad Street site from "32-007-003" to "32-007-0003". |
| 63. | Location of each site: street address and geographic coordinates | 58.10 (b)(2) | Yes<br>Pg. 13-42 | Yes | Add Jarbidge monitoring location to map. |
| 64. | MSA, CBSA, CSA or other area represented by the monitor | 58.10 (b)(8) | Yes<br>Pg. 13-42 | Yes | |
| 65. | Parameter occurrence code for each monitor | Needed to determine if other requirements (e.g., min # and collocation) are met | Yes<br>Pg. 13-42 | Yes | |
| 66. | Statement of purpose for each monitor | 58.10 (a)(1) | Yes<br>Pg. 3-4, 13-42 | Yes | The statement of purpose for the $PM_{2.5}$ monitor at Jarbidge is stated on pages 3-4, but this information would be useful if also provided in the site table. |



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| | | | | | |
|---|---|---|---|---|---|
| 67. | Basic monitoring objective for each monitor | App D 1.1<br>58.10 (b)(6) | Yes<br>Pg. 13-42 | Incorrect in one instance | The basic monitoring objective for the $PM_{2.5}$ monitor at Jarbidge Wilderness IMPROVE is "Other", which is not an applicable monitoring objective.<br>Appropriate monitoring objectives are:<br>(a) Provide air pollution data to public in a timely manner<br>(b) NAAQS comparison<br>(c) Research support |
| 68. | Site type for each monitor | App D 1.1.1 | Yes<br>Pg. 13-42 | Yes | The Carson City site should make the following changes to better align with the correct terminology:<br>• $PM_{2.5}$ – Change "Max Concentration" to "Highest Concentration"<br>• $O_3$ – Change "Max Concentration" to "Max $O_3$ Concentration |
| 69. | Monitor type for each monitor, and Network Affiliation(s) as appropriate | Needed to determine if other requirements (e.g., min # and collocation) are met | Yes<br>Pg. 13-42 | Incorrect in one stance | IMPROVE is not a monitor type, but is the Network Affiliation for the $PM_{2.5}$ Jarbidge monitor.<br>Appropriate monitor types are:<br>• SLAMS<br>• Special Purpose<br>• Industrial<br>• Non-EPA Federal<br>• Tribal<br>• EPA<br>• Other |
| 70. | Scale of representativeness for each monitor as defined in Appendix D | 58.10(b)(6); App D | Yes<br>Pg. 13-42 | Incorrect in one instance | The Linda Street $PM_{10}$ monitor is listed as an Urban scale site, however, the distance to roadway and AADT do not meeting the criteria for Urban scale (20m, 22,000 AADT) |
| 71. | Parameter code for each monitor | Needed to determine if other requirements (e.g., min # and collocation) are met | Yes<br>Pg. 13-42 | Incorrect in one instance | The $PM_{2.5}$ monitor at Jarbidge is listed as a non-FRM/FEM/ARM (IMPROVE Sampler Version II). If this information is correct, then the parameter code for $PM_{2.5}$ at this site should not be 88501, not 88101. |
| 72. | Method code and description (e.g., manufacturer & model) for each monitor | 58.10 (b)(3); App C 2.4.1.2 | Yes<br>Pg. 13-42 | Yes | |

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| | | | | | |
|---|---|---|---|---|---|
| 73. | Sampling start date for each monitor | Needed to determine if other requirements (e.g., min # and collocation) are met | Yes<br>Pg. 13-42 | Yes | |
| 74. | Distance of monitor from nearest road | App E 6 | Yes<br>Pg. 13-42 | No | Distance to roadway and AADT do not match the spatial scale for Linda Street $PM_{10}$ (Urban scale, 20m to road, 22,000 AADT). |
| 75. | Traffic count of nearest road | App E | Yes<br>Pg. 13-42 | No | Distance to roadway and AADT do not match the spatial scale for Linda Street $PM_{10}$ (Urban scale, 20m to road, 22,000 AADT).<br>The traffic count for Jarbidge Wilderness IMPROVE $PM_{2.5}$ monitor is listed as "NA". Please clarify if that is intending to state that it is negligible. |
| 76. | Groundcover | App E 3(a) | Yes<br>Pg. 13-42 | Yes | |
| 77. | Probe height | App E 2 | Yes<br>Pg. 13-42 | Yes | |
| 78. | Distance from supporting structure | App E 2 | Yes<br>Pg. 13-42 | Insufficient to judge | The following monitors may not be meeting the requirement:<br>• Elko – $PM_{10}$ (1.2m)<br>• Carson City Armory – $PM_{2.5}$ (1.5m, 1.5m)<br>• Manse Elementary – $PM_{10}$ (>1m)<br>• Glen Oaks – $PM_{10}$ (>1m) |
| 79. | Distance from obstructions on roof (horizontal distance to the obstruction and vertical height of the obstruction above the probe should be provided) | App E 4(b) | Yes<br>Pg. 13-42 | Yes | |
| 80. | Distance from obstructions not on roof (horizontal distance to the obstruction and vertical height of the obstruction above the probe should be provided) | App E 4(a) | Incomplete<br>Pg. 13-42 | Insufficient to judge | Provide vertical heights of obstructions above the probe (and tree height above the probe as trees can act as obstructions) at all sites. |
| 81. | Distance from the drip line of closest tree(s) | App E 5 | Yes<br>Pg. 13-42 | Yes | |
| 82. | Distance to furnace or incinerator flue | App E 3(b) | Yes<br>Pg. 13-42 | Yes | |
| 83. | Unrestricted airflow (expressed as degrees around probe/inlet or percentage of monitoring path) | App E, 4(a) and 4(b) | Yes<br>Pg. 13-42 | Yes | In next year's ANP, please provide measurement of unrestricted airflow in degrees for the $PM_{2.5}$ monitor at Jarbidge Wilderness IMPROVE |
| 84. | Probe material ($NO/NO_2/NO_y$, $SO_2$, $O_3$; For PAMS: VOCs, Carbonyls) | App E 9 | Yes<br>Pg. 13-42 | Yes | |



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| | | | | | |
|---|---|---|---|---|---|
| 85. | Residence time ($NO/NO_2/NO_y$, $SO_2$, $O_3$; For PAMS: VOCs, Carbonyls) | App E 9 | Yes<br>Pg. 13-42 | Yes | |

**Public Comments on Annual Network Plan**
Were comments submitted to the S/L/T agency during the public comment period?

*No*

If no, skip the remaining questions.
If yes:

- Were any of the comments substantive?
  - If yes, which ones?
  - Explain basis for determination if any comments were considered not substantive:
- Did the agency respond to the substantive comments? Yes
  - If yes, was the response adequate?
- Do the substantive comments require separate EPA response (i.e., agency response wasn't adequate)?



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# APPENDIX B
# NPS 2015 Data Certification Letter

# United States Department of the Interior

NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, Colorado 80225

April 27, 2016

Mr. Lew Weinstock
U.S. Environmental Protection Agency
Research Triangle Park, NC 27709
Room C304-02
Re: Certification of National Park Service, Gaseous Pollutant Monitoring Program Data for 2015

Dear Mr. Weinstock,

The National Park Service, Air Resources Division, hereby certifies the NPS Gaseous Pollut ant Mon itoring Program (GPMP) ozone data for the year 2015 that currently reside on the EPA AQS. The ambient concentration data and associated quality assurance data have been completely submitted to AQS for the year 2015. These data have undergone stringent validation procedures and are believed to be a consistent and accurate representation of ambient air quality conditions within the monitored NPS units. All quality assurance findings have been taken into account in determining the data's validity.

Attached are:

- A summary table of NPS unitsthat the NPS intends to certifyfor 2015.
- AMP600 Data Certification Reportfor 2015 data.

Please refer to the attached summary table that lists which sites the NPS intends to certify. There are sites operated by the NPS that we do not wish to certify because of the method used or because the site does not belong solely to the NPS. These sites are not included in the table. Please contact me (barkley_sive@nps.gov; 303-987-6947) if you have any questions.

Sincerely,

Barkley Sive
Program Manager

BS:jw

Cc: John Vimont
Kristi Morris

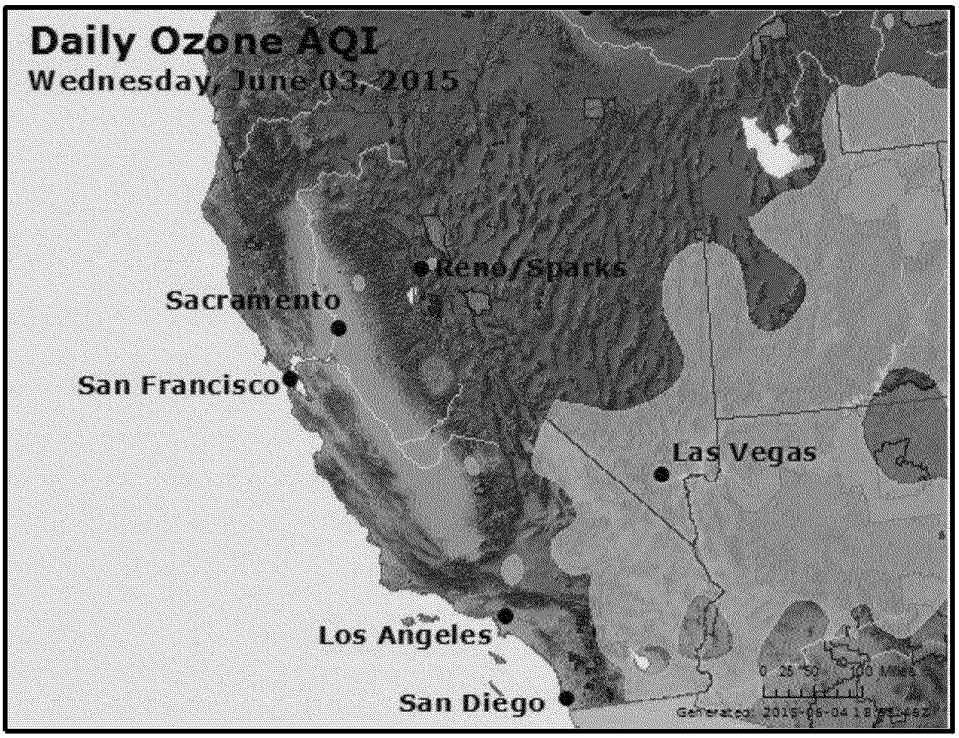
National Park Service
Gaseous Pollutant Monitoring Program
Data Certification for
Calendar Year 2015
List of Sites

| State | AQS Number | Site(s) |
|---|---|---|
| Alaska | 02-068-0003 | Denali National Park |
| Arizona | 04-003-8001 | Chiricahua National Monument |
| | 04-005-8001 | Grand Canyon National Park |
| | 04-017-0119 | Petrified Forest National Park |
| California | 06-027-0101 | Death Valley National Park |
| | | Joshua Tree National Park |
| | 06-071-9002 | Black Rock |
| | 06-089-3003 | Lassen Volcanic National Park |
| | 06-069-0003 | Pinnacles National Monument |
| | | Sequoia National Park |
| | 06-107-0009 | Ash Mountain |
| | 06-107-0006 | Lower Kaweah |
| | 06-043-0003 | Yosemite National Park |
| Colorado | 08-083-0101 | Mesa Verde National Park |
| | 08-069-0007 | Rocky Mountain National Park |
| Idaho | 16-023-0101 | Craters of the Moon National Monument |
| Kentucky | 21-061-0501 | Mammoth Cave National Park |
| Minnesota | 27-137-0034 | Voyageurs National Park |
| Montana | 30-029-8001 | Glacier National Park |
| Nevada | 32-033-0101 | Great Basin National Park |
| Tennessee | | Great Smoky Mountains National Park |
| | 47-155-0102 | Clingmans Dome |
| | 47-155-0101 | Cove Mountain |
| | 47-009-0101 | Look Rock |
| Texas | 48-043-0101 | Big Bend National Park |
| Utah | 49-037-0101 | Canyonlands National Park |
| | 49-047-1002 | Dinosaur National Monument |
| | 49-053-0130 | Zion National Park |
| Virginia | 51-113-0003 | Shenandoah National Park |
| Wyoming | 56-039-0008 | Grand Teton National Park |
| | | Yellowstone National Park |
| | 56-039-1011 | Water Tank |
| | 56-039-1013 | Old Faithful Snow Lodge |

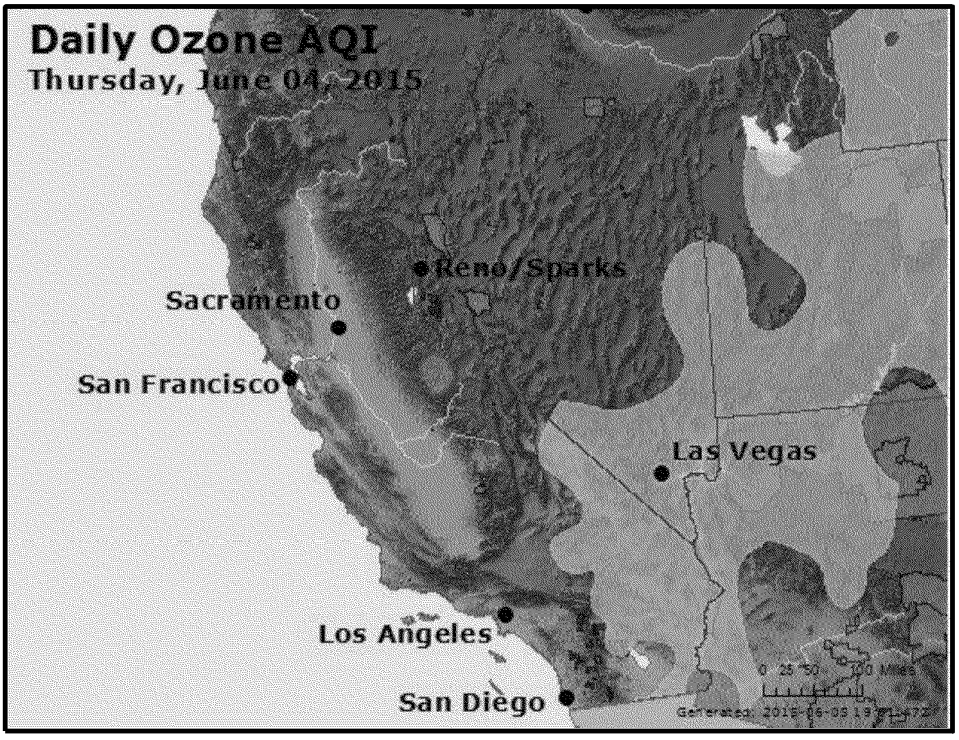
Data for the sites listed above are directly collected, validated, and reported by the NPS ARD. Only data from these sites are certified by the NPS. Several state agencies also monitor ambient air quality in selected national parks. These agencies are directly and independently responsible for their data and its submission to AQS.

# APPENDIX C

# AQI Values for the Western United States June 3 through 10, 2015



AQI Values for the western United States on June 3, 2015.



AQI Values for the western United States on June 4, 2015.



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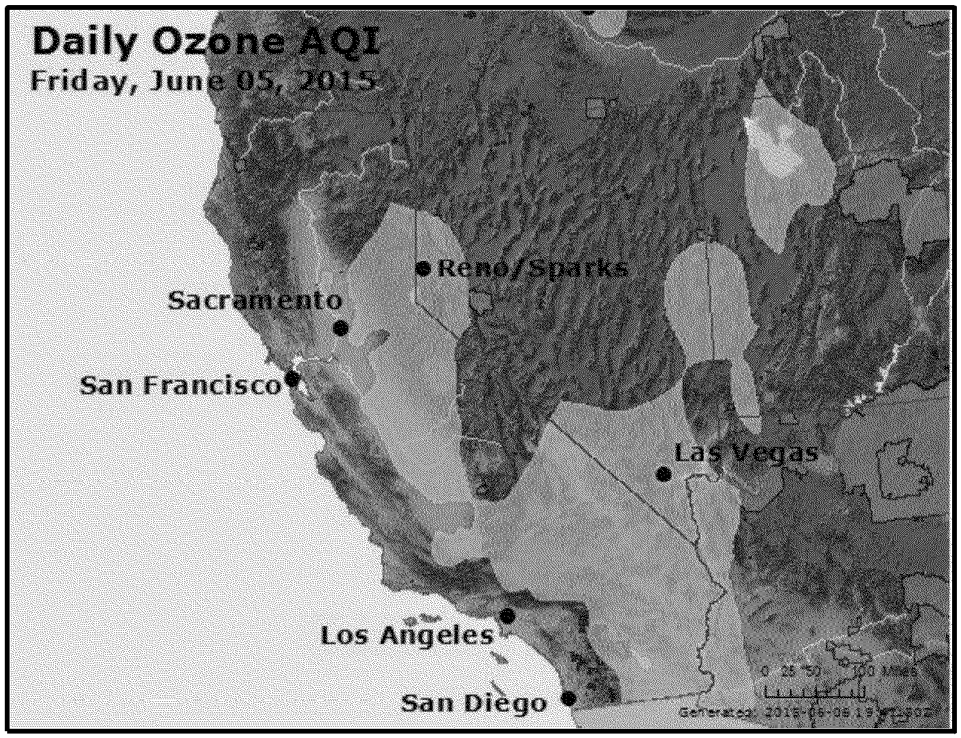
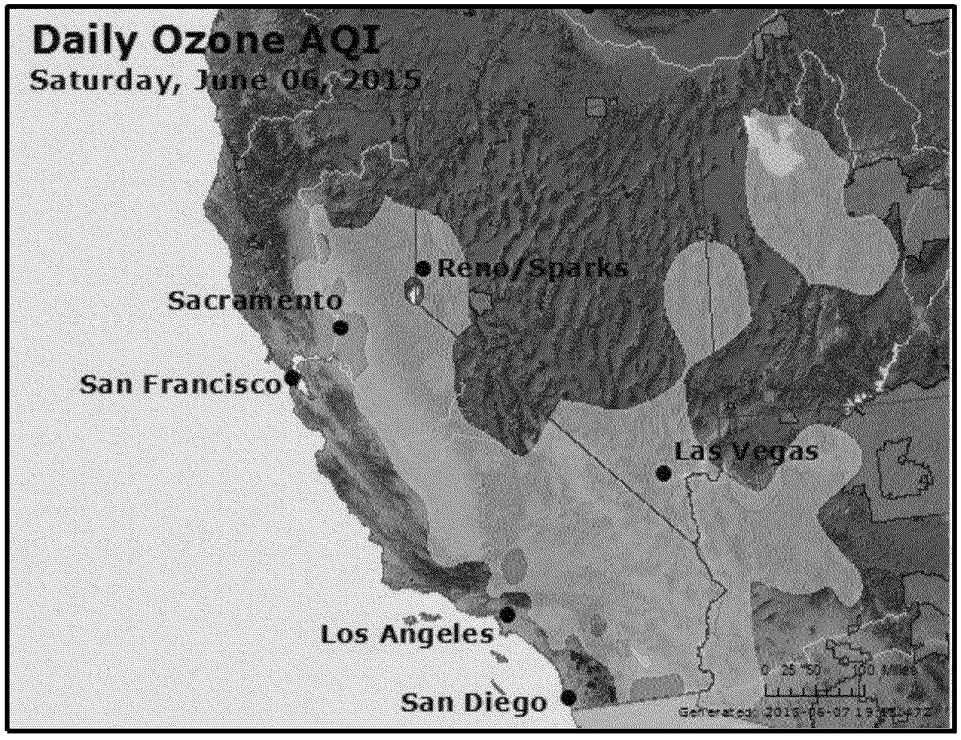


AQI Values for the western United States on June 5, 2015.



AQI Values for the western United States on June 6, 2015.



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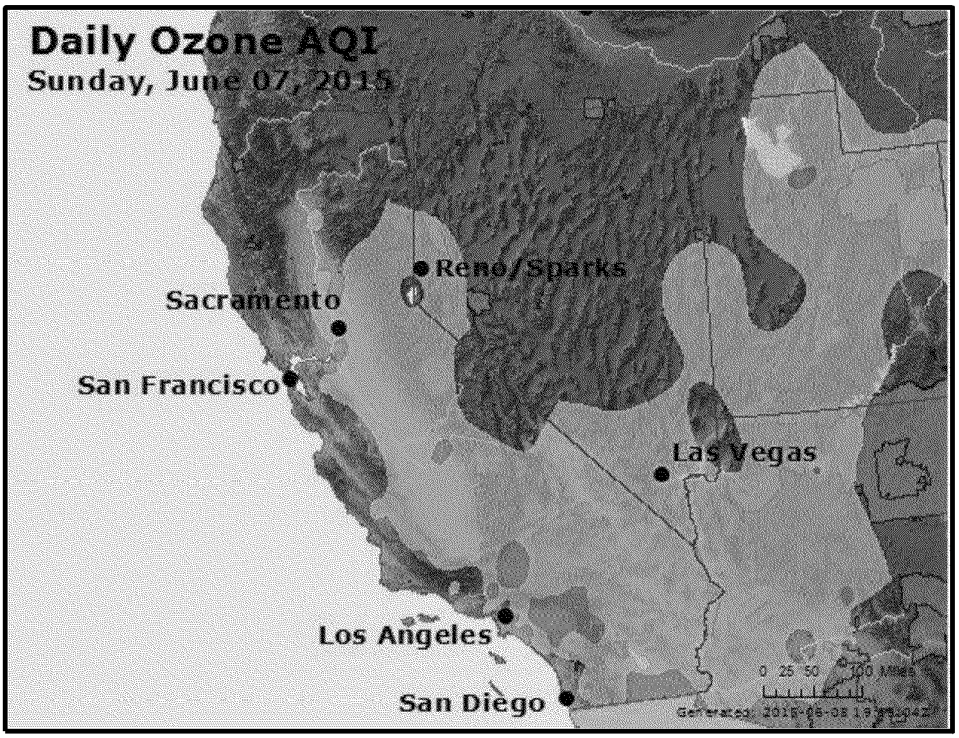
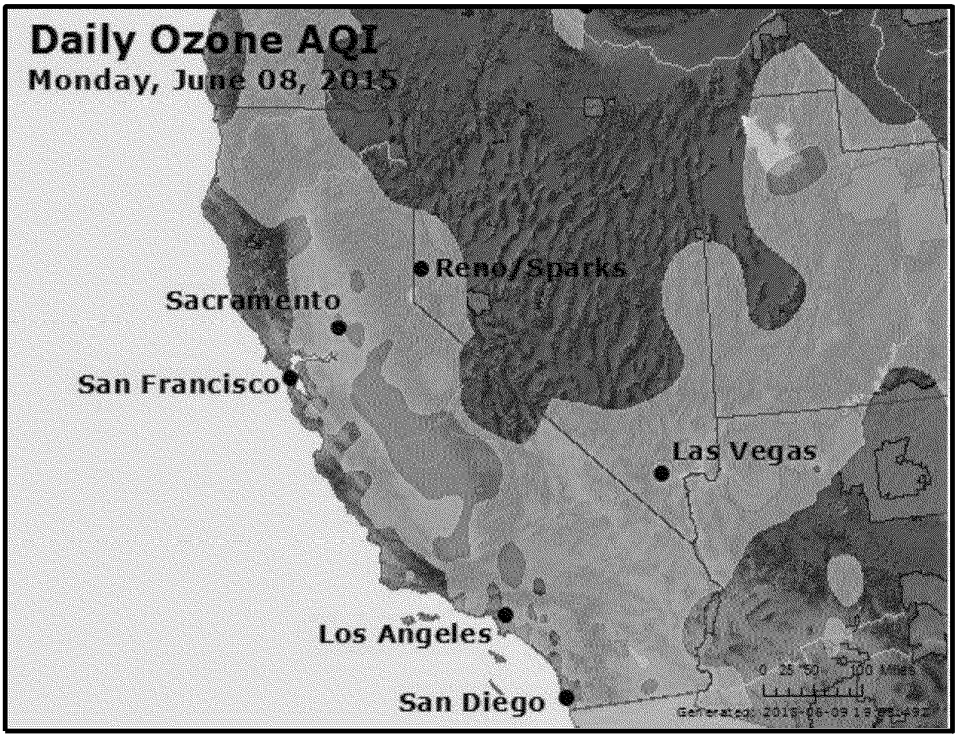


AQI Values for the western United States on June 7, 2015.



AQI Values for the western United States on June 8, 2015.



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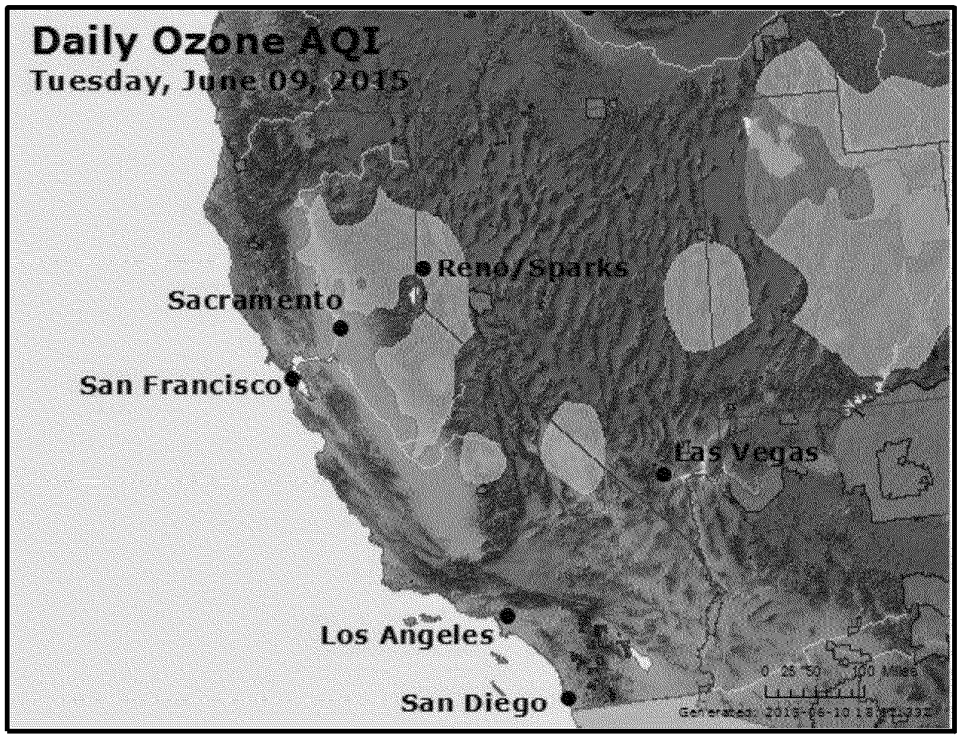
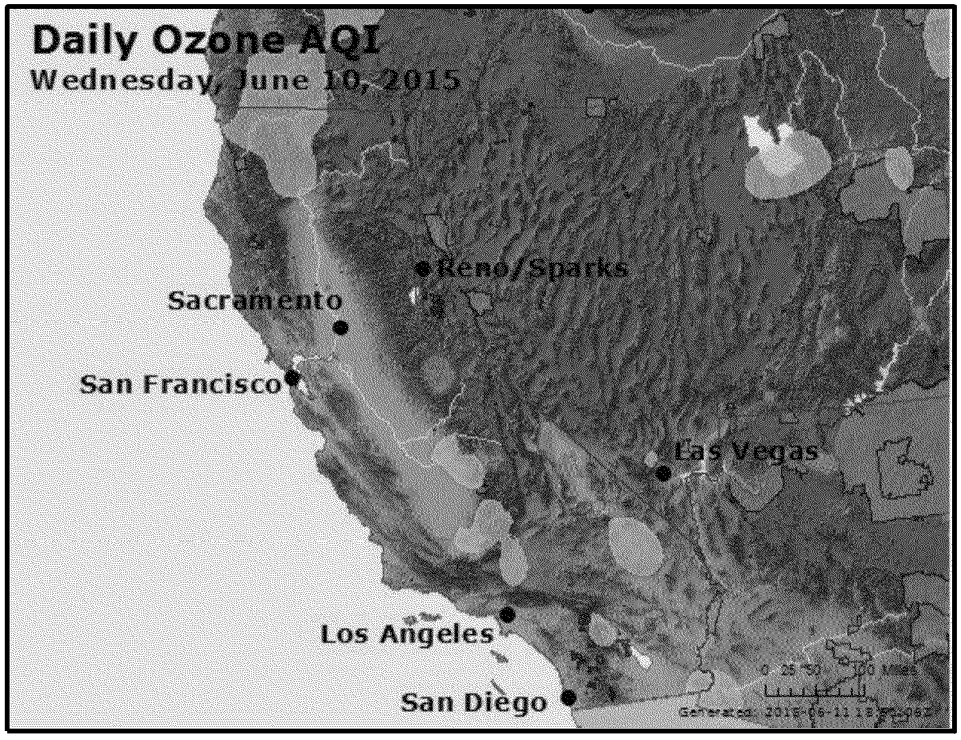


AQI Values for the western United States on June 9, 2015.



AQI Values for the western United States on June 10, 2015.



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# APPENDIX D
# ARS CASTNET Audit Results

# EEMS Spot Report

**Data Compiled:** 1/13/2016 6:58:13 PM

| SiteVisitDate | Site | Technician |
|---|---|---|
| 05/08/2015 | GRB411 | Alison Ray |

| Line | Audited Parameter | DAS | Ch. # | Criteria +/- | Counts | QaResult | Units | Pass/Fail |
|---|---|---|---|---|---|---|---|---|
| 1 | Ozone Slope | P | 0 | 1.1 | 4 | 0.94442 | unitless | **P** |
| 2 | Ozone Intercept | P | 0 | 5 | 4 | -0.27184 | ppb | **P** |
| 3 | Ozone correlation | P | 0 | 0.995 | 4 | 0.99997 | unitless | **P** |
| 4 | Ozone % difference avg | P | 7 | 10 | 4 | 5.9 | % | **P** |
| 5 | Ozone % difference max | P | 7 | 10 | 4 | 6.3 | % | **P** |



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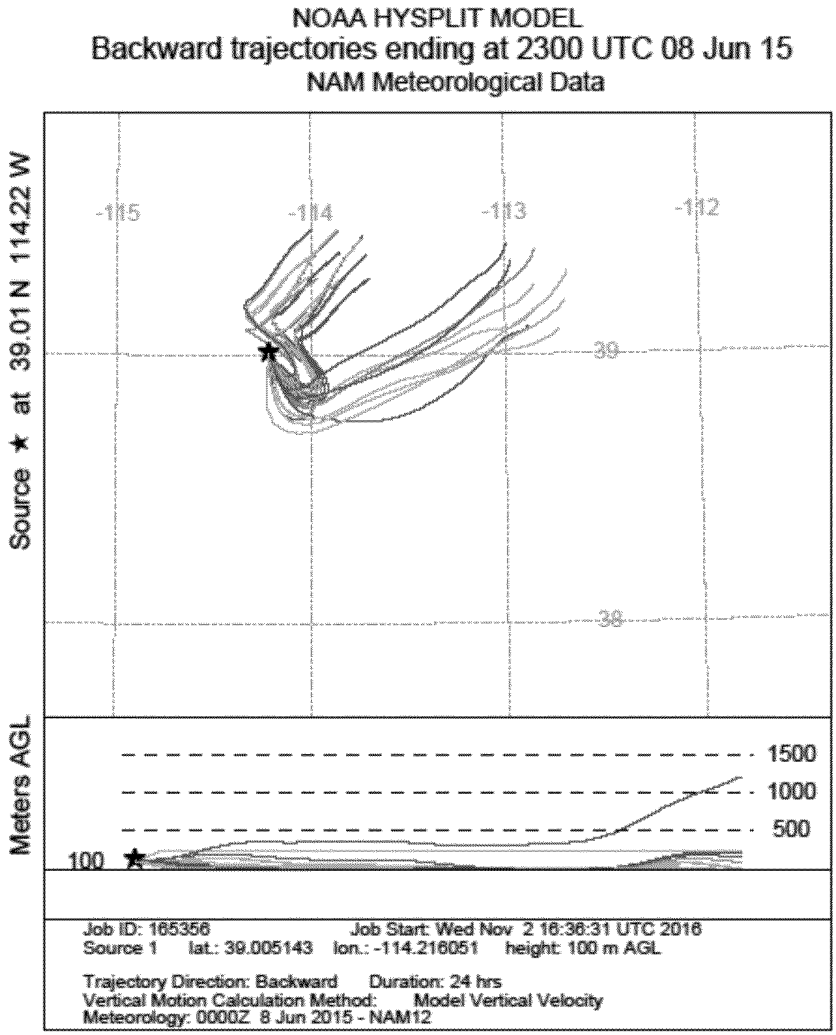
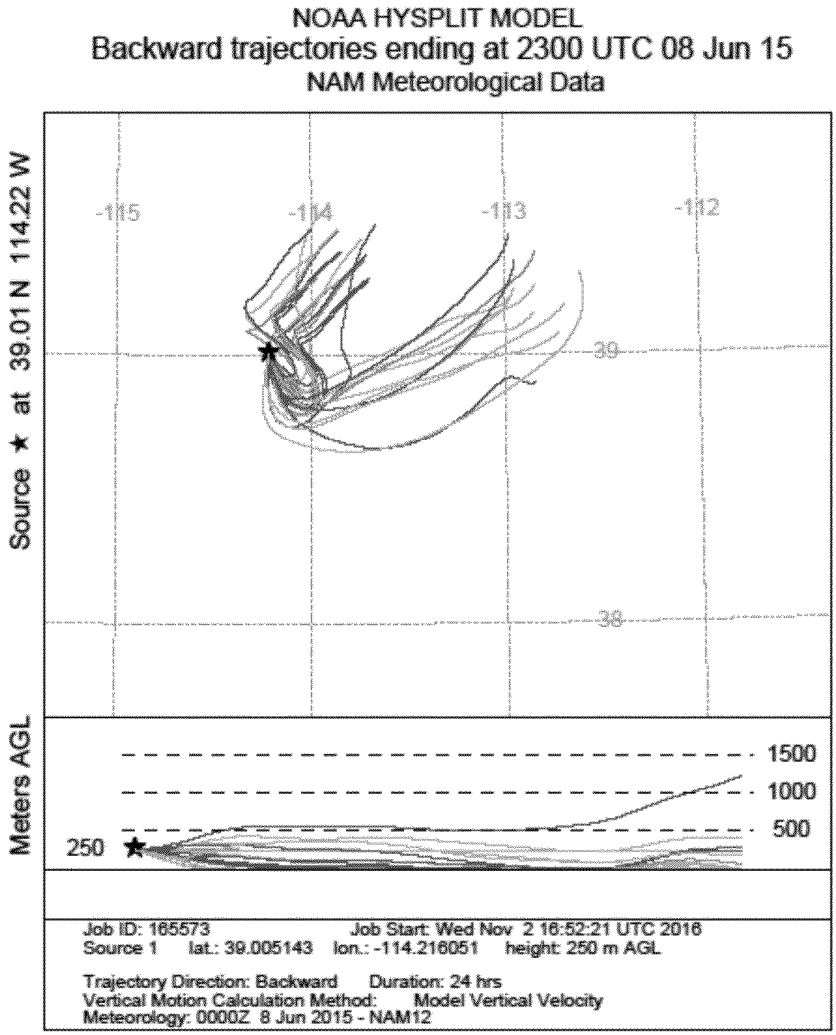
# APPENDIX E
# HYSPLIT Backward Trajectories




24-hour backward trajectory from Great Basin National Park (GBNP), Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 100 m above ground level (agl).



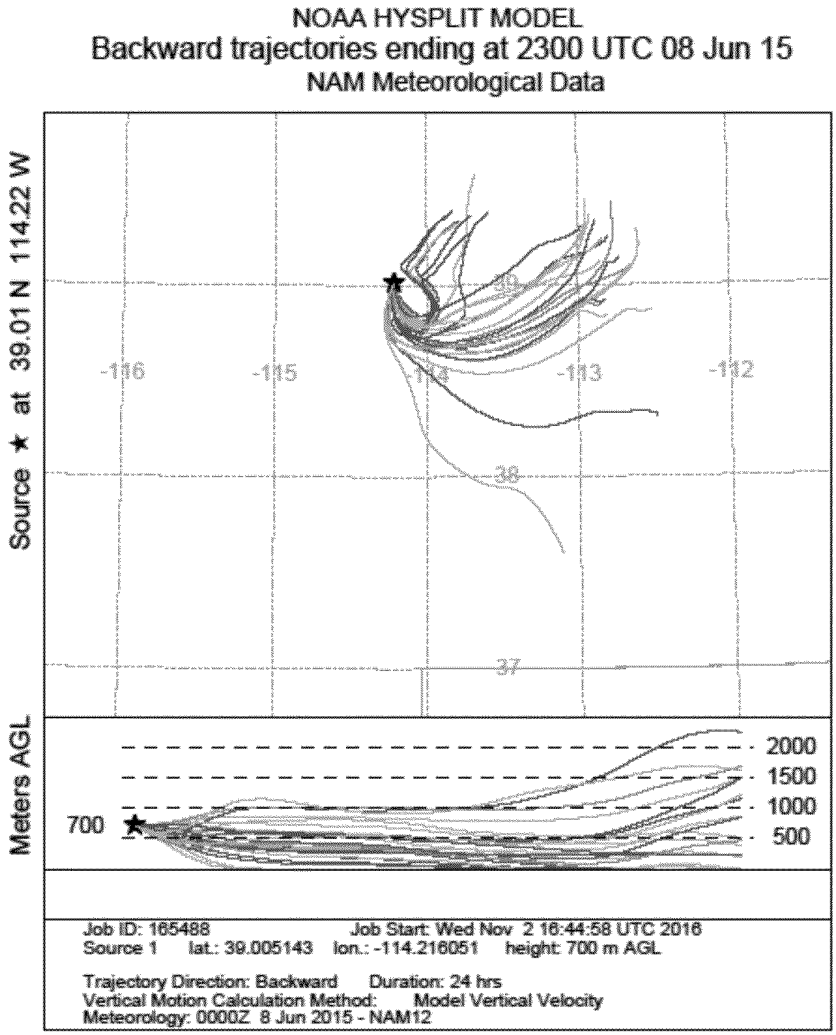
ED_001361_00016472




24-hour backward trajectory from GBNP, Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 250 m agl.



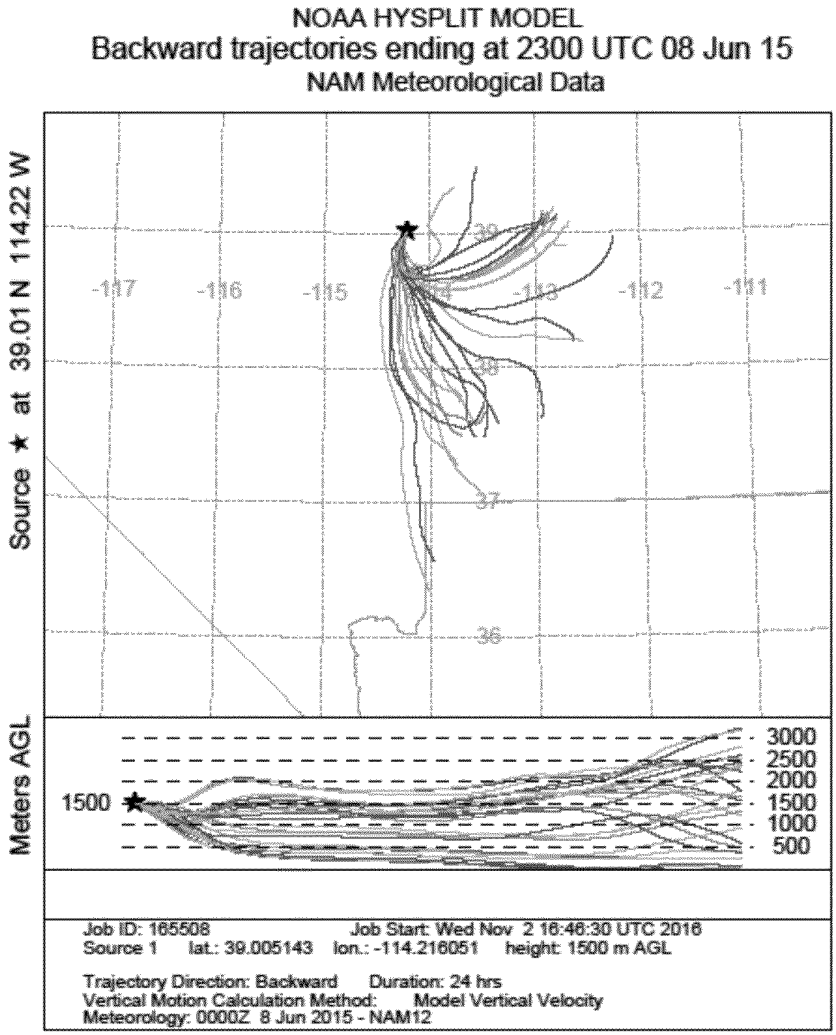
ED_001361_00016472




24-hour backward trajectory from GBNP, Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 700 m agl.



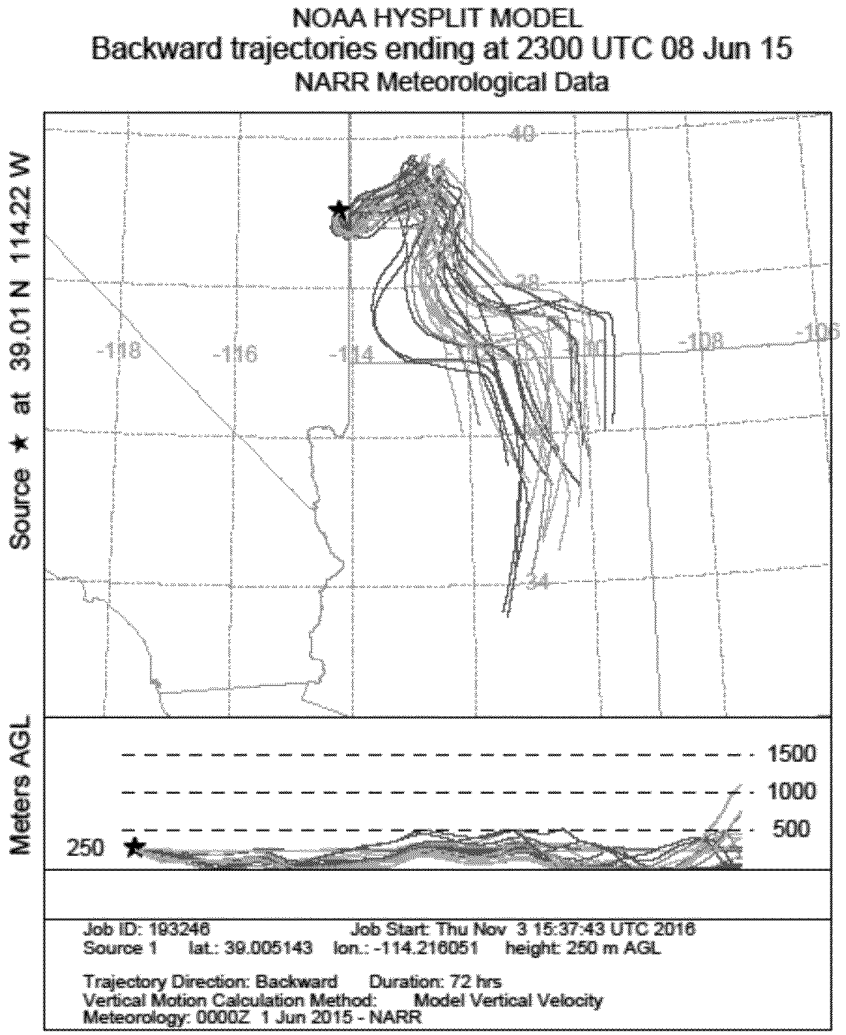
ED_001361_00016472




24-hour backward trajectory from GBNP, Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 1500 m agl.



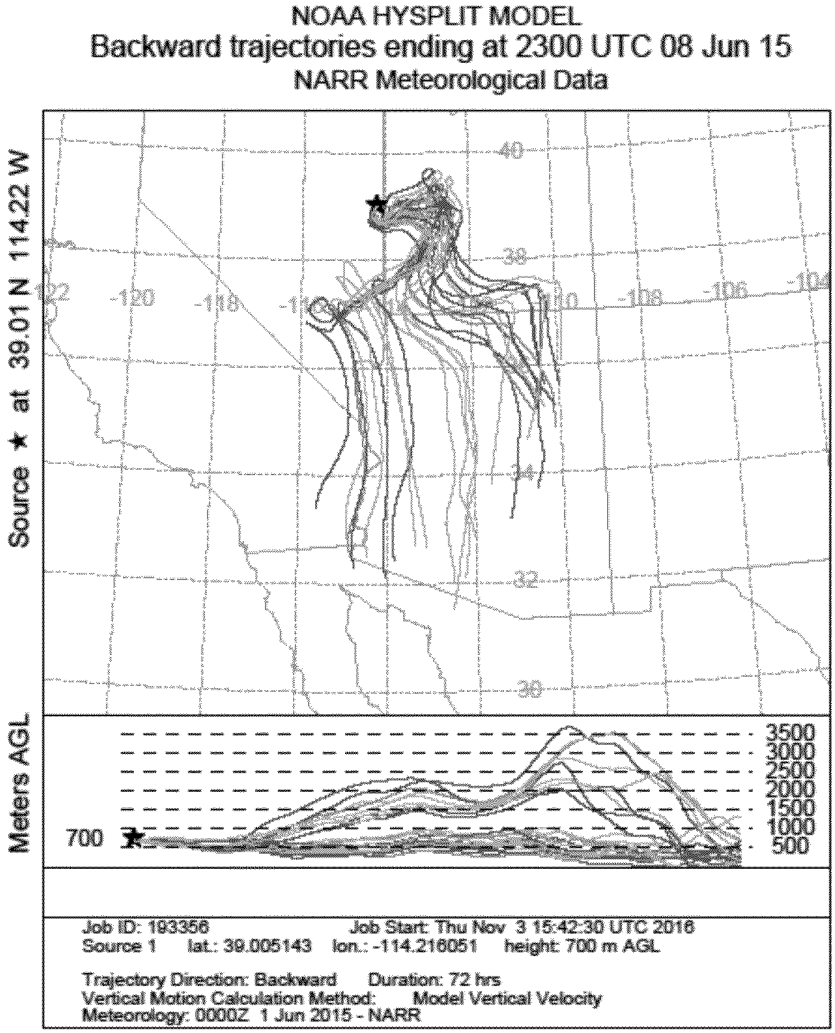
ED_001361_00016472




72-hour backward trajectory from GBNP, Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 250 m agl.



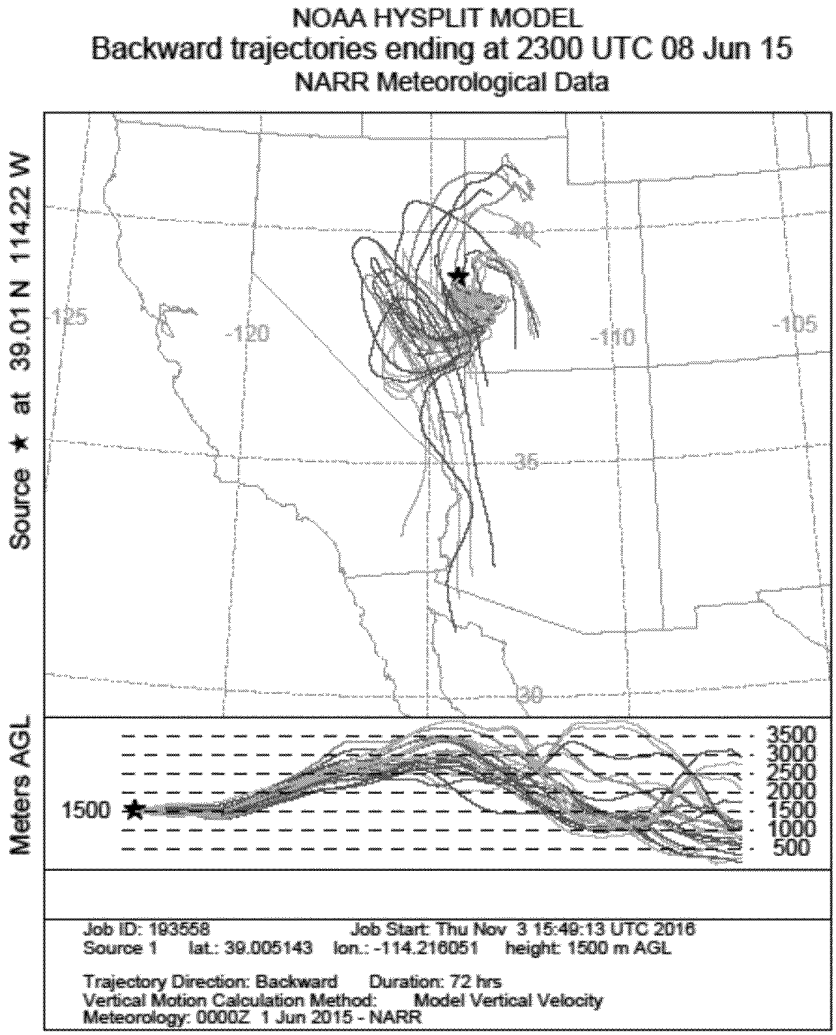
ED_001361_00016472




72-hour backward trajectory from GBNP, Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 700 m agl.



ED_001361_00016472




72-hour backward trajectory from GBNP, Nevada, initiated at 2300 UTC (1500 PST) June 8, 2015 from 1,500 m agl.



ED_001361_00016472

**To:** Danilo Dragoni[ddragoni@ndep.nv.gov]
**From:** Mebust, Anna
**Sent:** Wed 9/7/2016 3:25:35 PM
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Sure—you should be able to reach me at my office number.

Anna Mebust

415.972.3265

mebust.anna@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Wednesday, September 07, 2016 8:24 AM
**To:** Mebust, Anna <Mebust.Anna@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Anna,

Would now be ok?

**From:** Mebust, Anna [mailto:Mebust.Anna@epa.gov]
**Sent:** Wednesday, September 07, 2016 8:17 AM
**To:** Danilo Dragoni
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Danilo,

Would you mind giving me a call sometime this morning when you're available to discuss this? I have a meeting from 9am-10am but otherwise should be around.

Anna Mebust

415.972.3265

mebust.anna@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Tuesday, September 06, 2016 4:16 PM
**To:** Mebust, Anna <Mebust.Anna@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Anna,

Daren told me about the phone conversation you guys just had (sorry I couldn't be present).

It is my understanding that there is some good chance that the rule won't be signed until the end of September (if not later). Is that right?

If so, we (Washoe and NDEP) are operating on a tight and uncertain schedule. If the rule is not approved by September 30th, we won't be able to do the concurrent submission and will be late, no matter what.

At this point, I am looking for starting our comment period on October 1st, and therefore submit the demonstration on November 1st.

Would EPA accept this? Please consider that Washoe is in a similar situation as we are, and their demonstration has more regulatory impact than ours.

With this respect, I understand if EPA is not considering reviewing the NDEP demonstrations for the wildfire of August 21st 2015 and SI of June 2015. But NDEP is moving forward with the submission anyway, because we haven't ruled out for sure that we won't need those EE demonstrations to stay in attainment. So, we would need at least confirmation that our submissions won't be excluded (for potential future reviews) because late.

If possible, I'd like to sort this out before the end of the week, as I am leaving for 2 weeks starting next Monday.

Many thanks in advance!

Regards

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Mebust, Anna [mailto:Mebust.Anna@epa.gov]
**Sent:** Thursday, August 18, 2016 1:12 PM
**To:** Danilo Dragoni; Flagg, MichaelA; Kurpius, Meredith; Lee, Anita
**Cc:** Daren Winkelman; 'Dan Inouye (DInouye@washoecounty.us)'; CHANG, RANDALL; Lee, Anita
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Danilo,

We had our quarterly call with Washoe County early this morning. We told Dan on the call we would discuss this with our EE workgroup colleagues on another call we had scheduled afterwards and follow up.

We learned on the workgroup call that the proposed rule is expected to be published, and therefore effective, in early September. They are pushing hard to ensure it is published before the October 1st deadline for demonstration submittals. Once the rule is effective, the public comment period can run concurrently with EPA review. So, assuming the rule is published as planned, **you would be able to submit the demonstrations on October 1st and begin your public comment period at the same time.**

Please note that this is dependent on the final rule being published before you submit the demonstration. If you were to submit the demonstration before the proposed rule is published, then it would be subject to the old 2007 rule and concurrent public review would not be acceptable. So, don't submit too early (I don't think you were worried about that but thought I should mention it!).

Also, there is a desire to hold more strictly to the deadline than we have in the past. After the deadline, there may be opportunities to improve areas of the demonstration that are lacking, but you are strongly encouraged to submit as much as you can by October 1st.

I understand this is different than what we have said in previous conversations. Michael, Randy, or I would be happy to answer any follow up questions you might have.

Anna Mebust

415.972.3265

mebust.anna@epa.gov

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]

**Sent:** Wednesday, August 17, 2016 5:27 PM
**To:** Flagg, MichaelA <Flagg.MichaelA@epa.gov>; Kurpius, Meredith <Kurpius.Meredith@epa.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Cc:** dwinkelman@ndep.nv.gov; 'Dan Inouye (DInouye@washoecounty.us)' <DInouye@washoecounty.us>; CHANG, RANDALL <Chang.Randall@epa.gov>; Mebust, Anna <Mebust.Anna@epa.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Michael,

Thanks for the message and clarification, I really appreciate the prompt response. However, I am a bit confused. We have been doing some CFR digging, and the new proposed rule seems to allow for concurrent public notice. At 50.14(c)(3)(v)(A) it says

"With the submission of the demonstration […] the State must:

(A) Document that the public comment process was followed and that the comment period was open for a minimum of 30 days, **which could be concurrent with the Administrator's review** of the associated demonstration provided the State can meet all requirements in this paragraph;"

In the preamble, this situation is described as occurring in very limited cases, like claims as part of near-term regulatory action such as

" demonstration for events in the third year of a 3-year design value that will be used in initial area designations for a new or revised NAAQS under a 2-year designation schedule, the public comment period could be concurrent with the EPA's review provided the submitting air agency sends any public comments and responses to the EPA by a specified date should comments be submitted. If an air agency receives public comment disputing the technical

elements of a demonstration during a comment period that runs concurrent with the EPA's review and these comments result in the air agency's need to reanalyze or reassess the validity of a claimed event, a second public comment period may be necessary"

Our situation seems to fit these very limited cases.

Clearly, this rule hasn't be finalized yet, but I had the impression the EPA was already following it for certain aspects (e.g., the initial notification process).

I really appreciate the availability of extending the deadline of October 1st, which, as you say, would result anyway in more time for us to provide a better technical documentation. However, I feel a bit uneasy to take this path, as it could lead to an undesirable situation where we have been missing a critical deadline, even with all the best intentions from Nevada and Region 9.

As alternative, and I am not sure if something like this would be even possible, I am open to discuss the possibility of some sort of 'agreement' between Region 9 and Nevada that would somewhat give us an official one-month extension on the submission.

Again, thanks for your time and prompt response. Looking forward to continuing this discussion.

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Flagg, MichaelA [mailto:Flagg.MichaelA@epa.gov]
**Sent:** Wednesday, August 17, 2016 3:25 PM
**To:** Kurpius, Meredith; Danilo Dragoni; Lee, Anita
**Cc:** Daren Winkelman; 'Dan Inouye (DInouye@washoecounty.us)'; CHANG, RANDALL; Mebust, Anna; Lee, Anita
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Danilo,

I am not sure what we can allow a concurrent public notice at the same time as the deadline.

We have to make a determination that the public comment process was complete as part of our review and while you do not anticipate comments, if some are received, you would have to address them and possibly have to resubmit anyway.

If more technical analysis is needed, I would focus on that rather than meeting the October 1, 2016 deadline. As long as we know there is a good faith effort to get the demonstrations in as soon as possible, it should not be a barrier for review.

Let me know if you have questions.

**From:** Kurpius, Meredith
**Sent:** Wednesday, August 17, 2016 2:50 PM
**To:** Danilo Dragoni <ddragoni@ndep.nv.gov>; Lee, Anita <Lee.Anita@epa.gov>
**Cc:** dwinkelman@ndep.nv.gov; 'Dan Inouye (DInouye@washoecounty.us)' <DInouye@washoecounty.us>; Flagg, MichaelA <Flagg.MichaelA@epa.gov>; CHANG, RANDALL <Chang.Randall@epa.gov>; Mebust, Anna <Mebust.Anna@epa.gov>; Lee, Anita

<Lee.Anita@epa.gov>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Michael/Randy/Anna,

Can one of you please get back to Danilo on his time-sensitive question below? Thanks!

Meredith

**From:** Danilo Dragoni [mailto:ddragoni@ndep.nv.gov]
**Sent:** Wednesday, August 17, 2016 2:03 PM
**To:** Lee, Anita <Lee.Anita@epa.gov>; Kurpius, Meredith <Kurpius.Meredith@epa.gov>
**Cc:** dwinkelman@ndep.nv.gov; 'Dan Inouye (DInouye@washoecounty.us)' <DInouye@washoecounty.us>
**Subject:** RE: Exceptional Event Demonstration submission and public notice

Hi Meredith,

This is Danilo from Nevada BAQP. We (NDEP and Washoe) were trying to get in touch with Anita Lee with a question about exceptional event demonstration submission and public notice, but she will be back on Monday.

Given that we are in a bit of time constrain, I thought that you may help us, or know someone else who could. I pasted the original message to Anita below, but in essence, our question is if we can have the beginning of the public notice coinciding with the date of submission. This would save us quite some time and allow to better refine our work.

Any help would be very much appreciated.

Many thanks in advance

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

**From:** Danilo Dragoni
**Sent:** Wednesday, August 17, 2016 1:41 PM
**To:** Lee, Anita
**Cc:** Daren Winkelman; Dan Inouye (DInouye@washoecounty.us)
**Subject:** Exceptional Event Demonstration submission and public notice

Hi Anita,

This is Danilo from BAQP Nevada. I have a question about the possibility of overlapping our 30-day public notice with submission of an exceptional event demonstration.

As you probably are aware, both BAQP and Washoe County are preparing a demonstration for a wild fire event that occurred in August of 2015, and BAQP is working on a stratospheric intrusion occurred in June of 2015.

The deadline for such submissions is October 1st, which pushes the beginning of the public

notice to September 1st.

We are working as fast and diligently as we can, but there are a few factors that are making these submissions more difficult: a) there are not so many previously approved demonstrations for SI; b) the wild fire EE was caused by several fires in the region (rather than just a big one), which complicates considerably the analysis.

If I am not wrong, it is possible for SIP submissions to have a parallel process that makes the beginning of the public notice coincide with the submission due date. We are not expecting that our demonstration conclusions will change as results of the public notice, so I was wondering if we could do the same here. This would allow us and Washoe to have a few more days to prepare and submit a more refined work.

Any help will be very appreciated. Please, don't hesitate to call me if you have questions or comments.

Thanks!

Danilo

**********

Danilo Dragoni, PhD

Bureau Chief - Air Quality Planning

Nevada Division of Environmental Protection

901 S. Stewart Street, Suite 4001

Carson City, NV 89701

Phone (775) 687 9340

**********

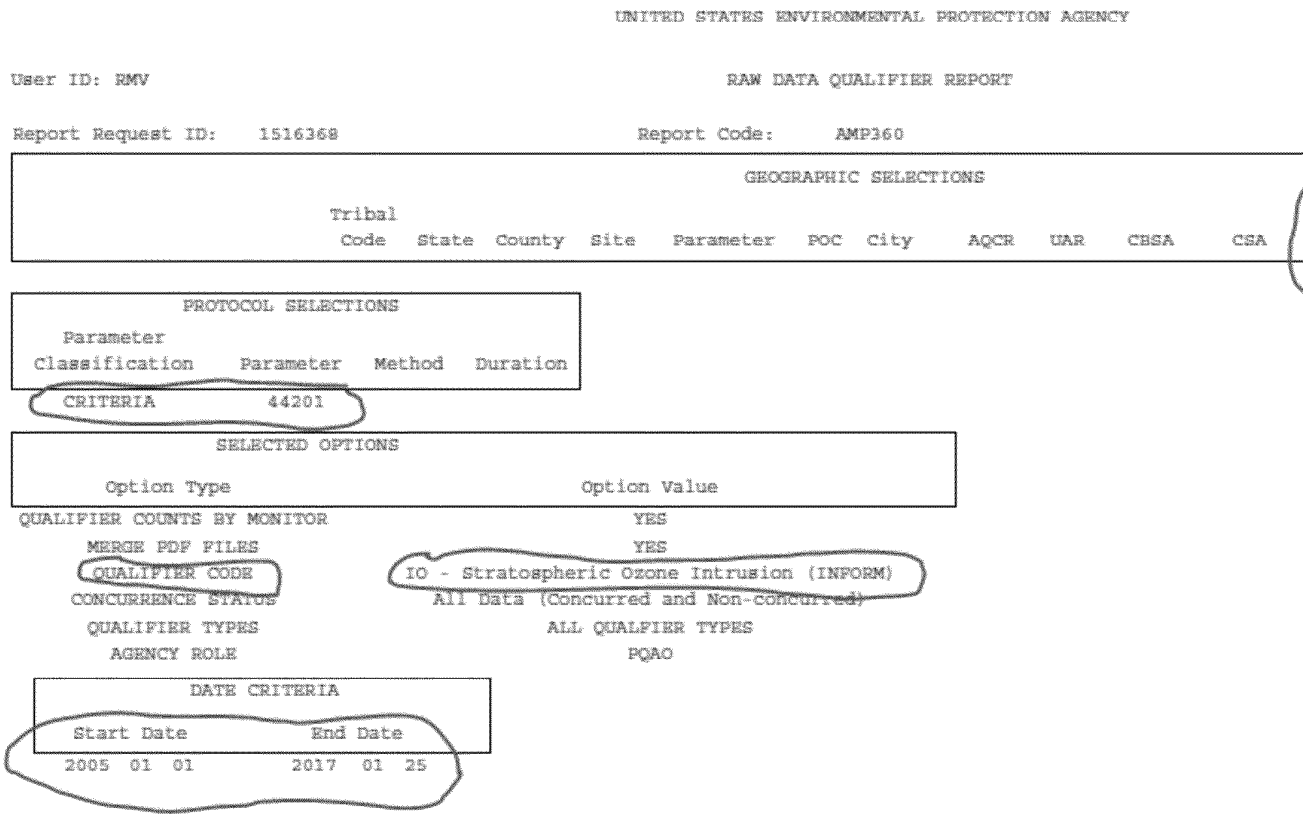
**To:** k.e.knowland@nasa.gov[k.e.knowland@nasa.gov]
**Cc:** Palma, Elizabeth[Palma.Elizabeth@epa.gov]
**From:** Payton, Richard
**Sent:** Thur 1/26/2017 8:14:49 PM
**Subject:** RE: Stratospheric intrusion research at NASA Goddard
AMP360 R1 R2 2005-2016 IO.pdf
AMP360 R1 R2 2005-2016 RO.pdf
AMP360 R3 R4 2005-2016 IO.pdf
AMP360 R3 R4 2005-2016 RO.pdf
AMP360 R5 R6 2005-2016 IO.pdf
AMP360 R5 R6 2005-2016 RO.pdf
AMP360 R7 R10 2005-2016 IO.pdf
AMP360 R7 R10 2005-2016 RO.pdf
AMP360 R8 2005-2016 IO.pdf
AMP360 R8 2005-2016 RO.pdf
AMP360 R9 2005-2016 IO.pdf
AMP360 R9 2005-2016 RO.pdf
AMP360 R3 R4 2005-2016 RO.txt
AMP360 R5 R6 2005-2016 RO.txt
AMP360 R8 2005-2016 IO.txt
AMP360 R8 2005-2016 RO.txt
AMP360 R9 2005-2016 RO.txt

Hi Emma.

The tools for pulling flag data out of AQS are somewhat inefficient, so getting the info you requested was a little convoluted. Attached are pdf and txt versions of the stratospheric ozone flags in AQS from 2005. Data pulls covering the entire country would time out and not complete when run on AQS, so I did pulls for no more than 2 of the 10 EPA regions at a time. The data pulls for EPA Regions 1, 2, 3, 5, 7 and 10 found no stratospheric ozone flags, whether IO (information) or RO (request exclusion); you can verify that with the pdfs. I have not included txt files for each of these, since they all consist of just a header row and a "0 records written." line.

Stratospheric ozone flags were found in EPA regions 4, 6, 8 and 9. For those, the pdf files show the query criteria on the first page, then gives summary data for each flag (that is, for each flagged hourly value) on the subsequent pages. It will probably be easier to work with the txt files than the pdfs, however, since, in the worst case, the Region 8 RO pdf file is 514 pages long (5330 records).

**pdf page 1, showing query criteria (44201 is the code for ozone data):**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: RMV

RAW DATA QUALIFIER REPORT

Report Request ID: 1516368

Report Code: AMP360

GEOGRAPHIC SELECTIONS

| Tribal Code | State | County | Site | Parameter | POC | City | AQCR | UAR | CBSA | CSA |
|---|---|---|---|---|---|---|---|---|---|---|

PROTOCOL SELECTIONS

| Parameter Classification | Parameter | Method | Duration |
|---|---|---|---|
| CRITERIA | 44201 | | |

SELECTED OPTIONS

| Option Type | Option Value |
|---|---|
| QUALIFIER COUNTS BY MONITOR | YES |
| MERGE PDF FILES | YES |
| QUALIFIER CODE | IO - Stratospheric Ozone Intrusion (INFORM) |
| CONCURRENCE STATUS | All Data (Concurred and Non-concurred) |
| QUALIFIER TYPES | ALL QUALFIER TYPES |
| AGENCY ROLE | PQAO |

DATE CRITERIA

| Start Date | End Date |
|---|---|
| 2005 01 01 | 2017 01 25 |

For both pdf and txt files, locations are given by the AQS site id number; that has the format SS-CCC-mmmm, where SS and CCC are the Federal Information Processing Standard (FIPS) state and county codes, and mmmm is the 4-digit site specific ID number; the FIPS state and county codes can be found at https://aqs.epa.gov/aqsweb/documents/codetables/states_and_counties.csv. If you need positional data beyond the county level, one approach would be to use the kmz file at https://www.epa.gov/sites/production/files/2016-08/ozone.kmz, which has location lat/long for current and historical ozone monitors. Another approach would be to use the csv at http://aqsdr1.epa.gov/aqsweb/aqstmp/airdata/aqs_sites.zip which has the monitor id and lat/long (and other data) for all monitoring sites in the country (current and historical).

**aqs_sites.csv format:**

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | State Code | County Code | Site Number | Latitude | Longitude | Datum | Elevation | Land Use | Location S | Site Est |
| 2 | 1 | 1 | 1 | 32.43746 | -86.472891 | WGS84 | 64 | RESIDENT | SUBURBAI | 5/1/19 |
| 3 | 1 | 1 | 2 | 32.42847 | -86.443585 | WGS84 | 0 | AGRICULT | RURAL | 1/1/19 |
| 4 | 1 | 1 | 3 | 32.33266 | -86.791521 | WGS84 | 41 | FOREST | RURAL | ####### |
| 5 | 1 | 3 | 1 | 0 | 0 | NAD27 | 0 | UNKNOW | RURAL | 1/1/19 |
| 6 | 1 | 3 | 2 | 30.55237 | -87.706911 | WGS84 | 0 | COMMER( | RURAL | 1/1/19 |
| 7 | 1 | 3 | 3 | 30.55547 | -87.713599 | WGS84 | 49 | COMMER( | URBAN AI | ####### |
| 8 | 1 | 3 | 10 | 30.49748 | -87.880258 | NAD83 | 37.19 | COMMER( | SUBURBAI | 1/1/20 |
| 9 | 1 | 5 | 1 | 31.89127 | -85.13521 | WGS84 | 85 | COMMER( | SUBURBAI | 1/1/19 |
| 10 | 1 | 5 | 2 | 31.6643 | -85.606175 | WGS84 | 143.26 | FOREST | SUBURBAI | ####### |
| 11 | 1 | 7 | 1 | 32.90405 | -87.233057 | WGS84 | 445 | AGRICULT | RURAL | ####### |
| 12 | 1 | 9 | 1 | 33.95702 | -86.464443 | WGS84 | 250 | MOBILE | URBAN AI | 1/1/19 |

Let me know if you have trouble with the files or any questions.

Richard Payton

EPA Region 8 Air Quality Monitoring
(303) 312-6439

**From:** Katherine Emma Knowland [mailto:katherine.e.knowland@nasa.gov]
**Sent:** Tuesday, January 24, 2017 1:49 PM
**To:** Patrick Reddy <preddyresearch@gmail.com>; k.e.knowland@nasa.gov; Payton, Richard <Payton.Richard@epa.gov>
**Cc:** Landes - CDPHE, Scott <scott.landes@state.co.us>; Welsh - CDPHE, Dan <dan.welsh@state.co.us>; Amber Ortega - CDPHE <amber.ortega@state.co.us>; Gordon Pierce <gordon.pierce@state.co.us>; gregory.harshfield@state.co.us; Duncan, Bryan N. (GSFC-6140) <bryan.n.duncan@nasa.gov>; Tonnesen, Gail <Tonnesen.Gail@epa.gov>
**Subject:** Re: Stratospheric intrusion research at NASA Goddard

Hi Richard,

To elaborate a bit more on the details I gave Pat, I am looking for a list of the dates and locations of ozone observations which received 'full event flag' or 'information flag only' labels associated with stratospheric intrusion events for the spring of 2012 and I'd be interested in flag information going back to 2005 if available. Do you have this level of detail on stratospheric intrusion events that you can share with me? I have tried to find this information in the public

domain as I was hoping to reference a link in the paper I am working on.

Kind regards,

Emma

--
K. Emma Knowland, PhD
Global Modeling and Assimilation Office/USRA
NASA Goddard Space Flight Center Bldg 33
Code 610.1, Greenbelt, MD, 20771
Phone: +1-301-614-6342

On 01/24/2017 11:32 AM, Patrick Reddy wrote:

> Hi Emma,
>
> I am looking forward to seeing your paper. Probably the best person to contact about this information is Richard Payton at EPA Region 8. I think he has some spreadsheets with this information. Otherwise, the EPA might be able to generate reports of the data you need. Hopefull the recently announced freeze on the EPA will not hamper their ability to provide you this information.
>
> Regards,
>
> Patrick Reddy
>
> On Tue, Jan 17, 2017 at 1:16 PM, Katherine Emma Knowland <katherine.e.knowland@nasa.gov> wrote:
>
> > Hi Pat,
> >
> > For the last few months I have focused on stratospheric intrusions over western USA during spring of 2012 with case studies over Colorado. In my analysis of the case studies, I have used similar indicators for tropopause folding events as you listed, specifically meteorological and constituent (O3, CO) data from observations, the MERRA-2 reanalysis, and GEOS-5 simulated tracers. I am working on a possible GRL paper on the representation of the case study folds in the high-resolution MERRA-2 reanalysis as a prequel to a greater study building a climatology of stratospheric

intrusion events over the western and eastern USA using a tracking algorithm. In an effort to validate the long-term study with information on other years and other sites, I am wondering if there is a publicly available list of the dates and locations which receive 'full event flag' and 'information flag only' labels or is that information internal only? I've found some of your work online such, as http://www.westar.org/12%20Tech%20Conf/Presentations/Reddy.pdf which shows a table with exceedences with dates in green for stratospheric intrusions, but I have struggled to find this information on the CDPHE website or EPA website. I found possibly an outdated list on http://webapps.datafed.net/exceedance.aspx?parameter=ozone which has a few events in the 2010-2012 period marked with a stratospheric intrusion data quality flag from AQS.

Kind regards,

Emma

On 11/02/2016 03:24 PM, Patrick Reddy wrote:

> Hi Emma,
>
> Sorry for the delay in getting back to you. Yes, I am still a good contact for this topic. I am working part time for CDPHE until December 15, and I am a visiting scientist at NCAR ACOM, and I might continue to contribute to interagency workgroups on intrusions next year. Scott Landes (meteorologist), Dan Welsh (meteorologist), and Amber Ortega (atmospheric chemist and meteorologist) are now responsible for this topic at CDPHE and for identifying and analyzing events for flagging. In the past we have used meteorological data (isentropic potential vorticity, relative humidity, storm structure data) and whatever satellite (total column ozone, AIRS 600 mb CO) and modeled data (the IDEA stratospheric intrusion tool and RAQMS and NCAR MOZART stratospheric O3 or 500 mb O3 and various large source groups for CO) we could find. CO is an inverse indicator for stratospheric air and a positive indicator for possible Asian or west coast US ozone.
>
> In general an event received an informational flag if the contribution of stratospheric ozone seemed relatively small and/or the data that would normally support a full event flag was sparse or inconclusive. Many of the ambiguous intrusion events occur in late May or June when there is significant anthropogenic ozone, a continuing influx of material from Asia, and when greater mixing dilutes some of the meteorological indicators for intrusions. Model data is always a welcome addition.

The folks I just mentioned are busy working on smoke and intrusion exceptional events for 2016. Because of the new O3 standard, these reports have to be finished by next spring. I think they would love to work with you on these exceptional events in general, and it might make sense for all of you to consider how you can help each other with your respective projects.

Regards,

Pat Reddy

On Tue, Oct 25, 2016 at 11:58 AM, Katherine Emma Knowland <katherine.e.knowland@nasa.gov> wrote:

> Dear Pat,
>
> My name is Emma Knowland and I am a new research scientist at NASA Goddard working with Lesley Ott and Bryan Duncan. I'm interested in regional and seasonal differences in stratospheric intrusions over the US, and how well our GEOS-5 products can represent these intrusions. Lesley provided me with your list of stratospheric intrusions over Colorado during spring of 2012, some of which have 'full event flag' and others with 'information flag only'. I'm interested in knowing more about your work at CDPHE, in particular, the tools you used to identify the impact of stratospheric air on surface observations and the differences in the classifications of 'full event' and 'information flag only'. Did an event only get an 'information flag' because the models were not able to confirm the intrusion? Was there a lack of other observational data to support the surface observations? Bryan tells me you are now retired (congratulations!) and I was wondering if you are still the right person to direct my questions to regarding stratospheric intrusion candidates, or if there is someone else at CDPHE I should contact.
>
> Thank you.
>
> Kind regards,
>
> Emma Knowland

--
K. Emma Knowland, PhD
Global Modeling and Assimilation Office/USRA
NASA Goddard Space Flight Center Bldg 33
Code 610.1, Greenbelt, MD, 20771
Phone: +1-301-614-6342

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301-614-6342