Exceptional Event Documentation

Wildland Fire Smoke PM2.5 Atascadero August 14, 2009 San Luis Obispo County

July 22, 2010



3433 Robert Court, San Luis Obispo, CA 93401 • 805-781-5912 •FAX: 805-781-1002 info@slocleanair.org ❖ www.slocleanair.org

Table of Contents

1.	BACKGROUND	. 1-1
2.	EXCEPTIONAL EVENT CRITERIA	
3.	DESCRIPTION OF EVENTS	. 3-1
4.	PUBLIC NOTIFICATION AND EDUCATION	
5.	REFERENCES	. 5-1
6.	APPENDIX – SUPPORTING DOCUMENTS	. 6-1

List of Acronyms

AGL	Above Ground Level
AIRNOW	Website <u>http://www.airnow.gov/</u>
APCD	San Luis Obispo County Air Pollution Control District
AQI	Air Quality Index
ARB	California Air Resources Board
ARL	NOAA Air Resource Laboratory
BAM	Beta Attenuation Mass Monitor
CAA	Clean Air Act
CALFIRE	California Department of Forestry and Fire Protection
CALTRANS	California Department of Transportation
CHP	California Highway Patrol
EDAS	NOAA meteorological data set
EPA	United States Environmental Protection Agency
GMT	Greenwich Mean Time
hrs	Hours
HYSPLIT	NOAA trajectory model
ID	Identification
m	Meter
ug/m3	Micrograms per cubic meter
μm	Micrometre
MODIS	NASA high resolution satellite image
Ν	North
NAAQS	National Ambient Air Quality Standard
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
OES	Office of Emergency Services
PDT	Pacific Daylight Time
PG&E	Pacific Gas and Electric Company
PM2.5	Particulate matter that is less than $2.5 \ \mu m$ in diameter
SLO	San Luis Obispo
UTC	Greenwich Mean Time
W	West

Exceptional Event Documentation

FINE PARTICULATE MATTER – PM2.5 WILDLAND FIRE SMOKE SAN LUIS OBISPO COUNTY – AUGUST 14, 2009

An exceedance of the fine particulate (PM2.5) National Ambient Air Quality Standards (NAAQS) recorded at the Atascadero, CA air monitoring station in San Luis Obispo (SLO) County on August 14, 2009 meets the criteria for an exceptional event as defined by federal policies. This report demonstrates that a wildland fire produced fine particulate emissions which increased the PM2.5 concentrations at the Atascadero, CA air monitoring station in SLO County. Air quality data has been flagged in the United States Environmental Protection Agency (EPA) air quality data base to indicate that this data has been influenced by wildland fire smoke.

1. BACKGROUND

An exceptional event is an air quality event for which the normal planning and regulatory process established by the Clean Air Act (CAA) is not appropriate. Air quality monitoring data influenced by exceptional events can be excluded from regulatory determinations related to exceedances or violations of the National Ambient Air Quality Standards (NAAQS). In addition, the EPA can avoid designating an area as nonattainment, redesignating an area as nonattainment, or reclassifying an existing nonattainment area to a higher classification if a state or local air quality agency adequately demonstrates that an exceptional event has caused an exceedance of a NAAQS.

The EPA requires states to take reasonable measures to mitigate the impacts of an exceptional event. In accordance with the language in section 319, EPA defines the term "exceptional event" to mean an event that:

- (i) Affects air quality;
- (ii) Is not reasonably controllable or preventable;
- (iii) Is an event caused by human activity that is unlikely to recur at a particular location or a natural event; and
- (iv) Is determined by EPA through the process established in the regulations to be an exceptional event.

Air quality monitoring data influenced by an exceptional event is flagged in the EPA air quality data base. Data flagging serves multiple purposes. According to the 1986 EPA guidance document, *Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events*, knowledge and understanding of what data represent are critical in the overall air quality process. A major goal of a data flagging system is information exchange, and data flags are meant to prevent the misuse of data. Flagging the NAAQS exceedances will ensure that the data is not misinterpreted.

Wildfires can be considered exceptional events. EPA notes that natural events, such as wildfires, are one form of exceptional events that may frequently recur. For the purposes of this rule, EPA defines "natural event" as an event in which human activity plays little or no direct causal role to the event in question. The EPA recognizes that over time, certain human activities may have had some impact on the conditions which later give rise to a "natural" air pollution event. However, EPA does not believe that small historical human contributions should preclude an event from being deemed "natural."

2. EXCEPTIONAL EVENT CRITERIA

The fine particulate matter (PM2.5) exceptional event criterion was satisfied on August 14, 2009 at the Atascadero air monitoring station where a PM2.5 concentration of 51.6 ug/m3 was recorded. Smoke from the Lockheed Fire near Santa Cruz, CA significantly impacted particulate measurements at the Atascadero air monitoring station.

A summary of the exceptional event criteria follows:

1) <u>The event affected air quality.</u>

The PM2.5 NAAQS was exceeded at the Atascadero air monitoring station and there was substantial evidence of smoke impacting the air pollution measurements.

2) There is a clear causal connection between the exceedances and the claimed exceptional event.

The satellite images, NOAA smoke animations and HYSPLIT trajectory analysis shows movement of smoke plumes from the Lockheed Fire near Santa Cruz, CA to Atascadero, CA and SLO County. PM2.5 monitor filter tapes show evidence of brown particulate matter related to wood smoke.

3) <u>The event is associated with measured concentration in excess of normal historical</u> <u>fluctuations including background.</u>

The PM2.5 concentration of 51.6 ug/m3 recorded at Atascadero during the fire event was the highest recorded PM2.5 ozone concentration in SLO County since January 1, 2001. The August 14, 2009 concentration is 300% greater than the second highest August PM2.5 concentration recorded prior to August 13, 2009. Typically, PM2.5 concentrations decrease in summer which makes the August peak all the more exceptional. Peak annual values are typically recorded in the colder months when fireplace use is at a maximum.

4) <u>There would have been no exceedance "but for" the event.</u>

Satellite images and NOAA smoke animations indicate large quantities of smoke impacted SLO County during this period. The August 14, 2009 concentration is 300% greater than the second highest August PM2.5 concentration recorded prior to August 13, 2009.

3. DESCRIPTION OF EVENT

The Lockheed Fire began on the evening of August 12, 2009 in the Santa Cruz Mountains. As the fire grew, northwesterly transport winds carried smoke to Atascadero as shown on the HYSPLIT trajectory model in Figure 1.



Figure 1. Air parcel backward trajectory for August 14, 2009, 1 pm PDT with Atascadero as the receptor.

An animation of smoke transport from the Lockheed fire to SLO County may be viewed by visiting the following NOAA smoke animation website:

August 14, 2009 animation: http://www.ready.noaa.gov/data/archives/fires/national/arcweb/20090814/loop.gif

As evident in the animation, emissions from the fire traveled southward and impacted Atascadero and SLO County on August 14, 2009.

MODIS satellite images indicate wildland fire smoke transport to Atascadero and SLO County, as shown in Figures 2, 3, 4.



Lockheed Fire Plume

Atascadero

Figure 2. Satellite image for August 13, 2009



Lockheed Fire Plume

Atascadero

Figure 3. Satellite image for August 14, 2009 (MODIS - Terra satellite)



Lockheed Fire Plume

Atascadero



Smoke impacts were evident in the Atascadero PM2.5 data and on the BAM PM2.5 air monitor particulate matter filter tape. Figure 5 shows the smoke plume impacts on the PM2.5 data, with a large increase and decrease in PM2.5 as the smoke plume passed by. The filter tape in Figure 6 shows typical black soot from the morning commute hours on August 13, 2009. By late evening on August 13, 2009 and into the morning hours of August 14, 2009, the filter shown in Figure 7 displays brown colored particulate matter indicating wood smoke particulate from the fire.



Figure 5. Hourly PM2.5 concentrations (ug/m3) measured at Atascadero.



Figure 6. Atascadero BAM filter strip on August 13 – before smoke reached Atascadero.



Figure 7. Atascadero BAM filter strip late on August 13 and the morning of 14 August.



The location of the Atascadero monitoring station is shown in Figure 8.

Figure 8. SLO County air monitoring stations

Smoke impacts were also evident in images (Figures 9 & 10) taken in Santa Margarita (11 miles south of the Atascadero PM2.5 monitor) on the evening of August 13, 2009 and early morning on August 14, 2009.



Figure 9. Smoke in Santa Margarita sunset August 13, 2009 (Photo: Andy Mutziger)



Figure 10. Smoke in Santa Margarita dawn August 14, 2009 (Photo: Andy Mutziger)



Atascadero PM2.5 January 1999 - December 2009

Figure 11. Plot of Atascadero PM2.5 filter measurements for January 1999 to December 2009.

The PM2.5 recorded during the wildfire smoke event on August 14, 2009 was the highest PM2.5 concentration recorded at Atascadero during the period February 2001 to December 2009. During the period February 2001 to December 2009, the August 14, 2009 concentration is 67.5% greater than the second highest PM2.5 concentration of 30.8 ug/m3 recorded on December 23, 2004. As shown in Figure 11 and Table 1, the peak annual values are typically recorded in the cooler months, November to January, when fireplace use is at a maximum.

PM2.5 concentrations typically decrease in summer, as shown in the annual PM2.5 plots provided in the appendix (starting on page 6-5). Frequency distributions for 1999 to 2008 data demonstrate the unusual nature of a PM2.5 concentration in the 50-60 ug/m3 range in the summer. Figure 12 is a PM2.5 frequency distribution for August for the 1999 to 2008 data set, indicating particulate matter concentrations greater than 20 ug/m3 have never been recorded in August before the August 14, 2009 event, which makes the August 14, 2009 PM2.5 concentration all the more exceptional. The August 14, 2009 concentration is 300% greater than the second highest August PM2.5 concentration recorded prior to August 13, 2009 (17 ug/m3 recorded August 18, 2002).

This plot contains 24 hour averaged filter measurements only. No filter measurement was made on August 14, 2009. The PM2.5 measurement on August 14, 2009 was made using a BAM monitor which measures hourly values.

Year	Peak Annual	Date
	PM2.5	
	Concentration	
	(ug/m3)	
2009	51.6	August 14, 2009
2008	28.5	January 13, 2008
2007	23.9	December 4, 2007
2006	25.2	December 7, 2006
2005	29.2	December 6, 2005
2004	30.8	December 23, 2004
2003	29.2	December 17, 2003
2002	28.0	December 4, 2002
2001	57.6	January 1, 2001
2000	50.9	November 20, 2000
1999	27.2	December 26, 1999

Table 1. Atascadero	peak annual PM2.5 concentrations.
---------------------	-----------------------------------



Frequency Distribution - PM2.5 - Atascadero - August - 1999 to 2008

Figure 12. Atascadero PM2.5 frequency distribution using August data for 1999 to 2008

Figure 13 is a PM2.5 frequency distribution for the period June to August, using the 1999 to 2008 data set. For the period 1999 to 2008, the highest PM2.5 concentration reported during June, July and August was 20.3 ug/m3 on July 17, 2008 and appears to be impacted by wildfire smoke from the June/July 2008 wildfire event. The frequency distributions demonstrate the exceptional nature of the August 14, 2009 PM2.5 concentration, especially considering PM2.5 is typically low in the summer months. The 10 year average concentration is 8.9 ug/m3 and the 10 year August average concentration is 6.6 ug/m3 (1999-2008 data).



Frequency Distribution - PM2.5 - Atascadero - June to August - 1999 to 2008

Figure 13. Atascadero PM2.5 frequency distribution - June, July and August data - 1999 to 2008

Figure 14 demonstrates the exceptional nature of the smoke impact on August 14, 2009 with respect to other days in July, August and September 2009. Several wildfires, including the Lockheed and the La Brea fires, impacted air quality in San Luis Obispo County during August 2009; however the impacts on August 14, 2009 were exceptional.



Figure 14. Atascadero PM2.5 daily averages for July, August, September 2009

4. PUBLIC NOTIFICATION AND EDUCATION

As stated in the EPA rule, state and local air quality agencies must assure that reasonable measures were taken to protect the public from the emissions created by the wildland fire smoke. Under this rule, state and local air districts are also strongly encouraged to institute educational programs that alert the public to the health effects associated with exposure to emissions from wildland fire smoke.

The APCD issued a press release and an EnviroFlash/AIRNOW email notification on August 14, 2009 to educate the public on the health concerns generated by the wildland fire smoke. This information was also posted on the APCD's website. The press release and EnviroFlash/AIRNOW email notification statement is provided in the appendix, beginning on page 6-2.

5. REFERENCES

California Air Resources Board (ARB): AQMIS data base, <u>http://www.arb.ca.gov/aqmis2/paqdselect.php</u>

Environmental Protection Agency (EPA): Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events. July 1986.

Federal Register: March 22, 2007 (Volume 72, Number 55)], [Rules and Regulations], [Page 13559-13581] From the Federal Register Online via GPO Access [wais.access.gpo.gov], [DOCID:fr22mr07-14], Environmental Protection Agency, 40 CFR Parts 50 and 51, [EPA-HQ-OAR-2005-0159; FRL-8289-5], RIN 2060-AN40, Treatment of Data Influenced by Exceptional Events.

Mutziger, Andy: Santa Margarita Photo Images August 13 & 14, 2009

National Aeronautics and Space Administration (NASA): Moderate Resolution Imaging Spectroradiometer (MODIS) website, <u>http://rapidfire.sci.gsfc.nasa.gov/subsets/index2.php?subset=AERONET_Fresno</u>

National Oceanic and Atmospheric Administration (NOAA): Atmospheric Research Laboratory, website, <u>http://www.arl.noaa.gov/ready/cmet.html</u> Smoke Product websites, <u>http://www.ready.noaa.gov/smoke/verify.html</u> <u>http://www.ready.noaa.gov/ready-bin/smokevrf.pl?yr=2008&mn=06&dy=24</u> August 14, 2009 animation: http://www.ready.noaa.gov/data/archives/fires/national/arcweb/20090814/loop.gif

SLO County Air Pollution Control District: Air Monitoring Data, Annual Monitoring Reports

6. APPENDIX – SUPPORTING DOCUMENTS

PUBLIC NOTICE

The following notice was posted on the APCD website on July 22, 2010 and in the San Luis Obispo Tribune on July 29, 2010:

SAN LUIS OBISPO COUNTY AIR POLLUTION CONTROL DISTRICT

NOTICE OF INTENT TO SUBMIT EXCEPTIONAL EVENT DOCUMENTATION

NOTICE IS HEREBY GIVEN that public comments are being received on Exceptional Event Documentation describing wildland fire smoke impacts that resulted in high ambient PM2.5 concentrations at the Atascadero air monitoring station on August 14, 2009.

Interested persons may submit comments to:

Gary Arcemont Air Quality Specialist San Luis Obispo County Air Pollution Control District 3433 Roberto Court San Luis Obispo, CA 93401-7126 Phone: (805) 781-5743 Email: garcemont@co.clo.ca.us

Comments will be received for a 30 day period ending on August 31, 2010.

NOTICE IS FURTHER GIVEN THAT, according to the United States Environmental Protection Agency (US EPA) policy, high pollution concentrations are not considered in the San Luis Obispo County attainment designation when there is a clear, causal relationship between the exceptional event and the high pollution concentrations.

The San Luis Obispo County Air Pollution Control District will submit documentation regarding the causes and contributing factors of the high pollution episodes to the California Air Resources Board. The San Luis Obispo County Air Pollution Control District is requesting that the California Air Resources Board submit the Exceptional Event documentation to the US EPA for concurrence.

Copies of the documents can be obtained by calling (805) 781-5912, or by faxing your request to (805) 781-1002. You may also review the documentation by visiting the San Luis Obispo County Air Pollution Control District website www.slocleanair.org

PRESS RELEASE

FOR IMMEDIATE RELEASE: August 14, 2009

Contact:

Larry Allen, 781-5912 SLO County Air Pollution Control District

Dr. Penny Borenstein, 781-5500 SLO County Public Health Department

AIR QUALITY ALERT SMOKE IMPACTS IN SAN LUIS OBISPO COUNTY

SAN LUIS OBISPO, CALIFORNIA, – The San Luis Obispo (SLO) County Air Pollution Control District (APCD) and County Public Health Department are upgrading the prior press release to an air quality alert. APCD monitoring data indicates poor air quality in north and central San Luis Obispo County due to smoke from the Lockheed fire near Santa Cruz. The northwest winds carrying the smoke and ash to our area are expected to continue over the next few days. A change to southerly winds is expected near the middle of next week, which will likely bring additional smoke and ash to our area from the rapidly expanding La Brea Fire east of Santa Maria in the San Rafael Wilderness. Changing winds and weather conditions make it difficult to predict which areas of the county may be most affected. However, until the fires are put out, smoke and ash will likely be intermittently present in our region for what may be days to come.

If you smell smoke, County officials urge you to take precautions and use common sense to reduce harmful health effects by limiting outdoor activities. These precautions are especially important for children, the elderly and people with respiratory and heart conditions. If a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain occurs, outdoor activity should be stopped and the affected person should seek medical attention. Residents are also cautioned to avoid stirring up particles during cleanup of soot and ash.

County officials will continue to closely monitor smoke impacts and air quality throughout our region. The public can also monitor real-time air quality throughout the county by following the air quality index (AQI). The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air and is available to the public via the APCD website www.slocleanair.org, email, pager messages and text messages. Sign up to receive the daily air quality forecast via email, page or text message by subscribing online at www.enviroflash.info/

###

ENVIROFLASH/AIRNOW EMAIL NOTIFICATION MESSAGE

Air Quality Forecast San Luis Obispo County Air Pollution Control District 08/14/2009 02:08 PM

A(n) Action Day has been declared for Atascadero, CA, on Friday, Aug 14

Today and Tomorrow's Forecast

Friday, Aug 14:	153 AQI	Unhealthy	Particle Pollution (2.5 microns)
Saturday, Aug 15:	65 AQI	Moderate	Particle Pollution (2.5 microns)
Extended Forecast			
Sunday, Aug 16:	57 AQI	Moderate	Particle Pollution (2.5 microns)
Monday, Aug 17:	51 AQI	Moderate	Particle Pollution (2.5 microns)
Tuesday, Aug 18:	45 AQI	Good	Particle Pollution (2.5 microns)
Wednesday, Aug 19:	55 AQI	Moderate	Particle Pollution (2.5 microns)

AIR QUALITY ALERT --- Several wildfires are impacting the air quality in San Luis Obispo County. Until the wildfires are put out, smoke and ash will intermittently be present in our county's air for what may be days to come. Due to changing winds and weather conditions, it is difficult to predict which areas of the county may be most affected by smoke and ash from the fire. If you smell smoke or see ash fall, the San Luis Obispo County Air Pollution Control District and County Health Department officials urge that you take precautions to reduce the harmful health effects by limiting outdoor activities. These precautions are especially important for children, the elderly and people with respiratory and heart conditions. If a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain occurs, outdoor activity should be stopped and the affected person should seek medical attention. Residents are encouraged to use common sense and take precautions to reduce the harmful health effects associated with smoke exposure. When it is obvious that there is smoke in the air, County officials recommend that individuals avoid strenuous outdoor activity and remain indoors as much as possible. Levels of particulates in the smoke may be high enough that the potential exists for even healthy people to be affected. To clean ash, try to use a damp cloth, spray areas lightly with water, and direct ash-filled water to ground areas, and away from the runoff system. Take your car to the car wash. Wash off toys that have been outside in the ash. Clean ash off pets. Due to the corrosive nature of ash, avoid any skin contact with the ash (wear gloves, long-sleeved shirts). If you have heart or lung problems, try not to do any ash cleanup or do anything that stirs the particles back up into the air. Do not allow kids to play in the ash. Do not use leaf blowers!

For more information, visit www.slocleanair.org

FIRE INFORMATION

Source: CALFIRE

LOCKHEED FIRE

Lockheed Fire Incident Information:

Last Updated:	August 23, 2009 6:30 pm		
Date/Time Started:	August 12, 2009 7:16 pm		
Administrative Unit:	CAL FIRE San Mateo - Santa Cruz Unit		
County:	Santa Cruz County		
Location:	Bonny Doon area - Smith Drainage		
Acres Burned:	7,817 acres		
Containment	7,817 acres - 100% contained		
Structures Destroyed:	13 outbuildings destroyed and 1 damaged		
Threatened:	Currently there is no further threat to structures in the area.		
Evacuations:	All evacuations have been lifted.		
Injuries:	10		
Cause:	Under Investigation		
Cooperating Agencies:	CAL FIRE, OES, CHP, PG&E, CALTrans, Santa Cruz County Sheriff, Dept. of Corrections and Rehabilitation, California Conservation Corp., numerous Local Government Agencies, and Santa Cruz Parks and Rec.		
Total Fire Personnel:	819		
Engines:	50		
Fire crews:	8		
Dozers:	5		
Water tenders:	28		
Costs to date:	\$26.6 million		

Atascadero PM2.5 Annual Plots From SLO County APCD Annual Monitoring Data Reports (Filter based measurements only)



















H:\PLAN\Exceptional Event\ExceptionalEventAug_14_2009_AtascaderoPM2.5.doc