IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Anza Borrego Desert State Park Borrego Springs Source: https://www.tripadvisor.com/LocationPhotos-g32099-Borrego_Springs_California.html

November 16, 2014
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

October 4, 2018

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ACRONYM	DESCRIPTIONS
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HF	Historical Fluctuations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns

PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan

I Introduction

On November 16, 2014, State and Local Ambient Air Monitoring Stations (SLAMS) located in Brawley (AQS Site Code 06-025-0007), and Niland (AQS Site Code 06-025-4004), California measured exceedances of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020), in Brawley and Niland measured (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentrations of 210 µg/m^3 and 248 µg/m^3, respectively. PM_{10} 24-hr measurements above the 150 µg/m^3 are exceedances of the NAAQS. The SLAMS in Brawley and Niland were the only monitors to measure an exceedance of the PM_{10} NAAQS on November 16, 2014.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON NOVEMBER 16, 2014

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
11/16/2014	Brawley	06-025-0007	3	23	210	150
11/16/2014	Niland	06-025-4004	3	24	248	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]
November 16, 2014 was not a scheduled sampling day.

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size Selective Instruments (SSI) since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On November 16, 2014, the Brawley and Niland monitors were impacted by elevated particulate matter when gusty high winds entrained fugitive windblown dust associated with two weather events, the passing of a dry cold front which was followed by the building of a surface high pressure over the Great Basin.[2] The dry cold front passed through the evening of November 15, 2014 through November 16, 2014 while the high-pressure system lasted through November 17, 2014.

This report demonstrates that a naturally occurring event caused an exceedance observed on October 31, 2014 and November 1, 2014, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2015 Pacific Daylight Time (PDT) is March 8 through October 31. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl
[2] Area Forecast Discussion National Weather Service San Diego CA 1000 AM PST; 200 PM PST; 250 PM PST; 930 PM PST Friday, November 14, 2014 and 500 AM PST; 115 PM PST Saturday, November 15, 2014 and 245 AM PST Sunday, November 16, 2014

a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM_{10} 24-hour NAAQS exceedances of 210 µg/m^3 and 248 µg/m^3 as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[3].

I.1 Demonstration Contents

Section II - Describes the November 16, 2014 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Brawley and Niland stations this section discusses and establishes how the November 16, 2014 event affected air quality demonstrating that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the November 16, 2016 event and its resulting emissions defining the event as a "natural event".[4]

Section IV - Provides evidence that the event of November 16, 2014 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V – Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to

[3] "Treatment of Data Influenced by Exceptional Events; Final Rule", 72 FR 13560, March 22, 2007

[4] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural 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. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

concur with flagged air quality monitoring data, there are additional non-technical requirements.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD provided a weekend notification via the ICAPCD's webpage summarizing the National Weather Service (NWS) area forecast discussions. The ICAPCD notice included a discussion of the potential of elevated winds through the weekend including Sunday, November 16, 2014. The discussion explain that forecasted winds by the NWS of 35 to 45 miles per hour (mph) with potential gusts up to 55 mph could affect the region potentially elevating particulate matter. Because of the potential for suspended particles and poor air quality, on November 16, 2014 the ICAPCD issued a "No Burn" day. Included in the discussion was the NWS discussion forecasting the potential for blowing sand and dust. **Appendix A** contains copies of notices pertinent to the November 16, 2014 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on the SLAMS measured concentrations from the Brawley and Niland monitors. The request, dated May 28, 2015 requested an initial flag for the measurements from either BAM 1020 monitors or FRMs in Brawley and Niland (**Table 1-1**). Subsequently, after submittal of the request, CARB received corrected FEM data measurements in standard conditions, originally submitted in local conditions. USEPA requires data in standard conditions when making regulatory decisions. **Table 1-1** above provides the PM_{10} measured concentrations for all monitors in Imperial County for November 16, 2014. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The submitted request included a brief description of the meteorological conditions for November 16, 2014 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on April 20, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 210 µg/m^3 and 248.0 µg/m^3 (**Table 1-1**), which occurred on November 16, 2014 in Brawley and Niland. The final closing date for comments was May 21, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the November 16, 2014 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on November 16, 2014, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

- a The event created the meteorological conditions that entrained emissions and caused the exceedance.
- b The event clearly “affects air quality” such that there is the existence of a clear causal relationship between the event and the exceedance.
- c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
- d The event “is not reasonably controllable and not reasonably preventable.”
- e The event is “caused by human activity that is unlikely to recur at a particular location or [is] a natural event.”
- f The event is a “natural event” where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley and Niland.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II November 16, 2014 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the November 16, 2014 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1**).The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center, the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion, which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, and the City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

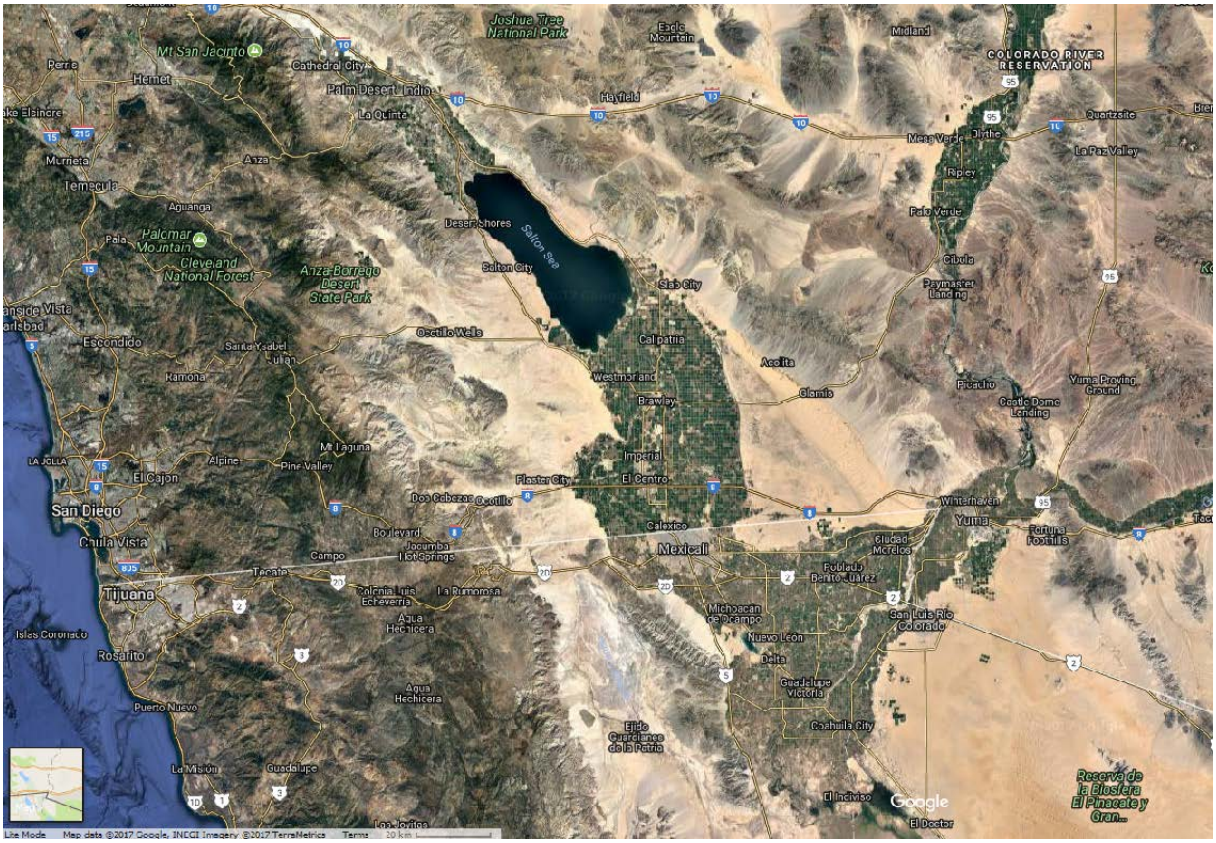


Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on November 16, 2014, occurred at the Brawley and Niland stations. The Brawley, Niland and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on November 16, 2014, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Appendix B**).

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

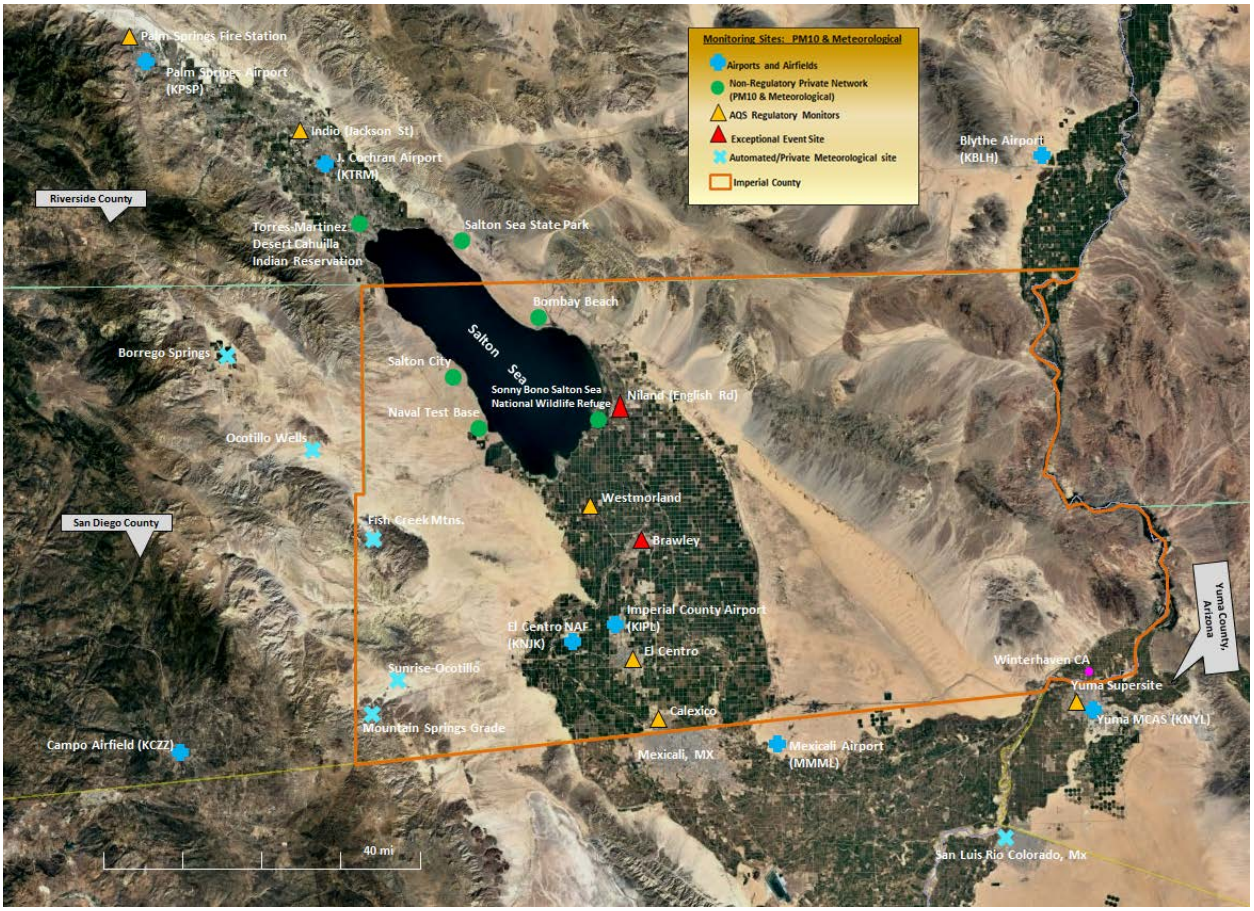


Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral

vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos, visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos, visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

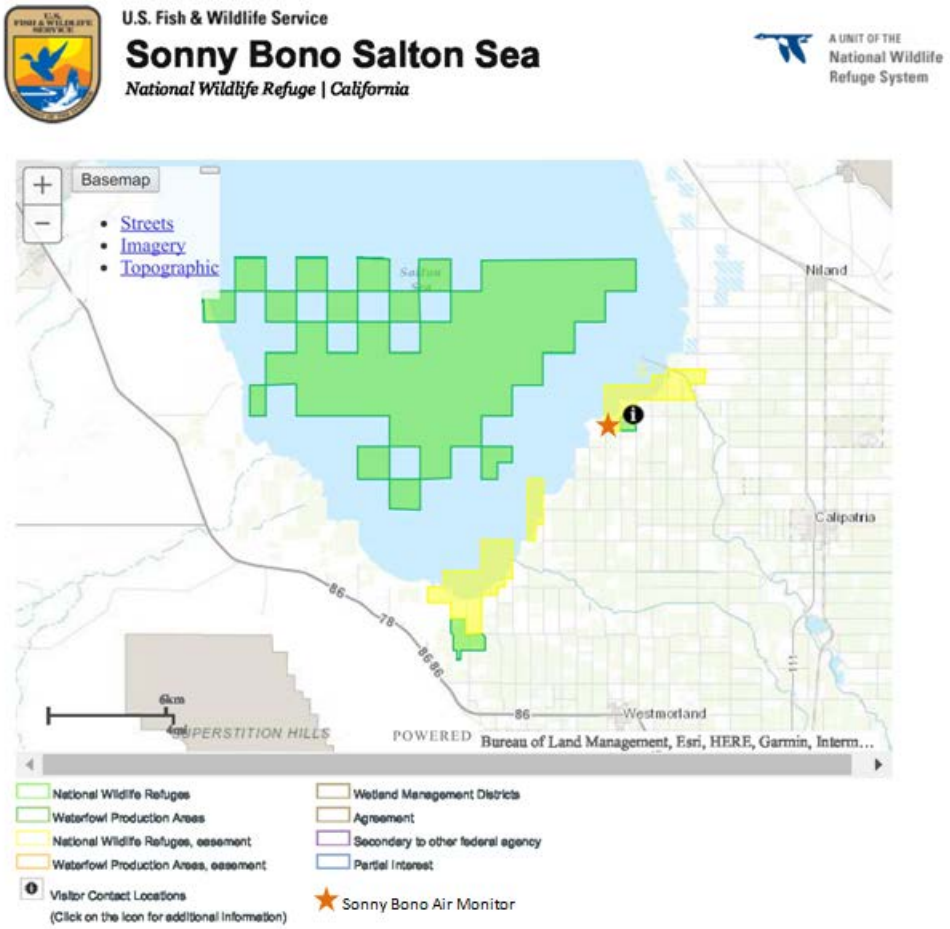


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
NOVEMBER 16, 2014

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} (ug/m^3) Avg***	1-hr PM_{10} (ug/m^3) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					210	552	700		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	-	-	-	12.1	900
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	-	-	-	10.7	900
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-54	-	-	-	20.3	1200
		BAM 1020					248	914	700		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	-	-	-	-	-
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	50	291	600	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	80	426	600	-	-
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	413	2169	900	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)
November 16, 2014 was not a scheduled sampling day

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

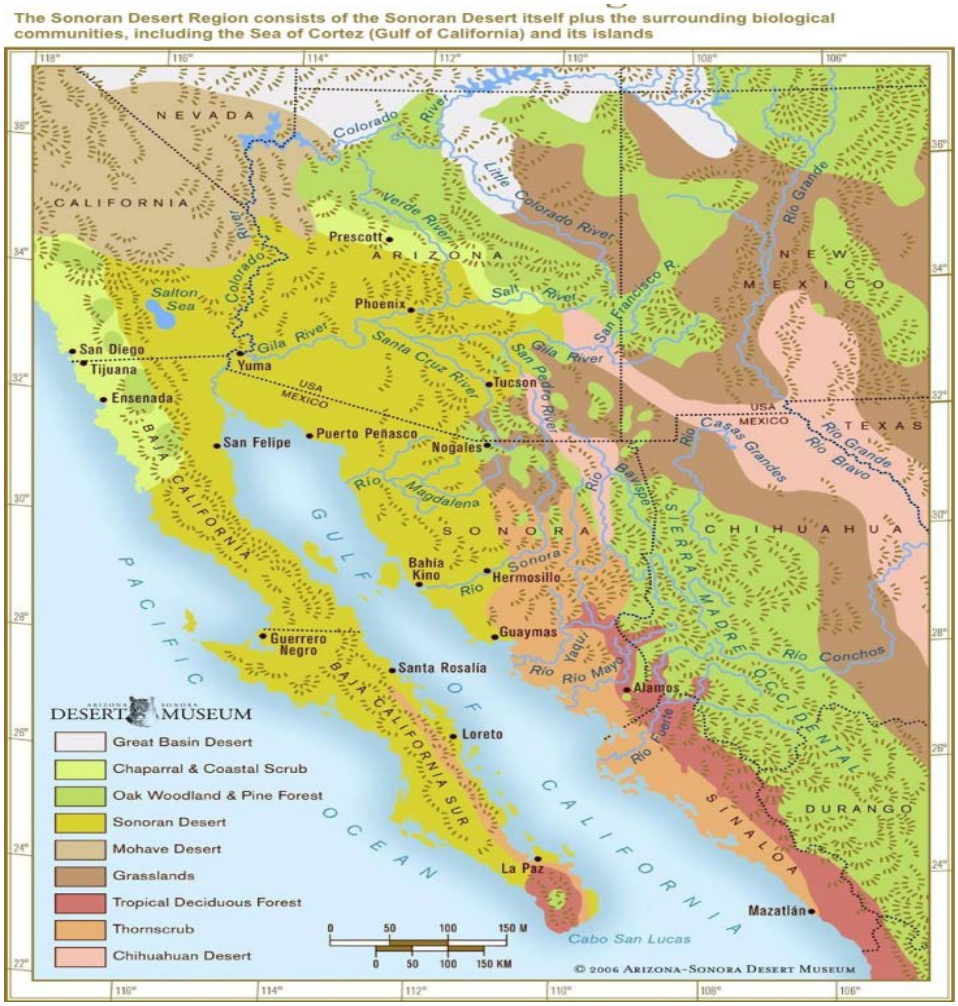


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region; the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 3.11" (**Figure 2-16)**. During the 12-month period prior to November 16, 2014, Imperial County measured total annual precipitation of 1.64 inches. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

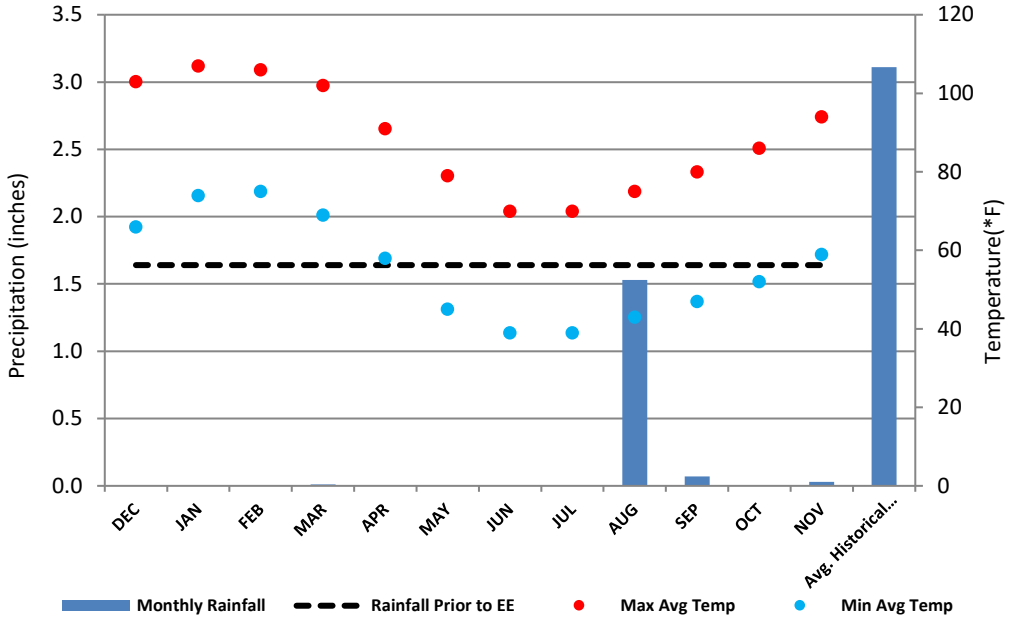


Fig 2-16: Prior to November 16, 2014, the region suffered abnormally low total annual precipitation of 1.64 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Weather Underground, California Observed Climate Normals, and Western Regional Climate Center (WRCC)

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[5] Because the pressure gradient is just the difference in pressure between high and low-pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. In instances when a high-pressure system follows or pushes a cold front, southward winds are typically from a north or northeasterly direction. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for November 16, 2014, which was caused by the passing of a dry cold front followed by the building of a strong surface high pressure over the Great Basin, brought strong and gusty winds over the mountain passes and desert slopes of San Diego and Riverside Counties and into Imperial County. As early as November 15, 2014, a surface high pressure over the Great Basin behind the dry cold front combined with moderately strong north to northeast winds aloft and brought periods of strong gusty northeast winds on November 16, 2014. The winds, which developed first over the San Bernardino County Mountains, Inland Empire, northern parts of the Coachella Valley and the Santa Ana Mountains late November 15, 2014 moved southward into Southeastern California on November 16, 2014.[6] On November 16, 2014, the tightening of the pressure gradients, associated with the passing of the dry cold front, brought strong gusty northeast winds across southeastern California and into Imperial County.

[5] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html

[6] Area Forecast Discussion National Weather Service San Diego CA 500 AM PST; 925 AM PST; 115 PM PST Saturday, November 15, 2014 and 245 AM PST; 720 AM PST Sunday, November 16, 2014

The strong gusty northeast winds entrained windblown dust affecting air quality and causing an exceedance at the Brawley and Niland monitors.

Figures 2-17 through 2-19 provide information regarding the expected movement of the cold front, associated high-pressure system and the building of the wind speeds, which led to high winds across southeastern California.

FIGURE 2-17
DAILY SURFACE MAP NOVEMBER 16, 2014

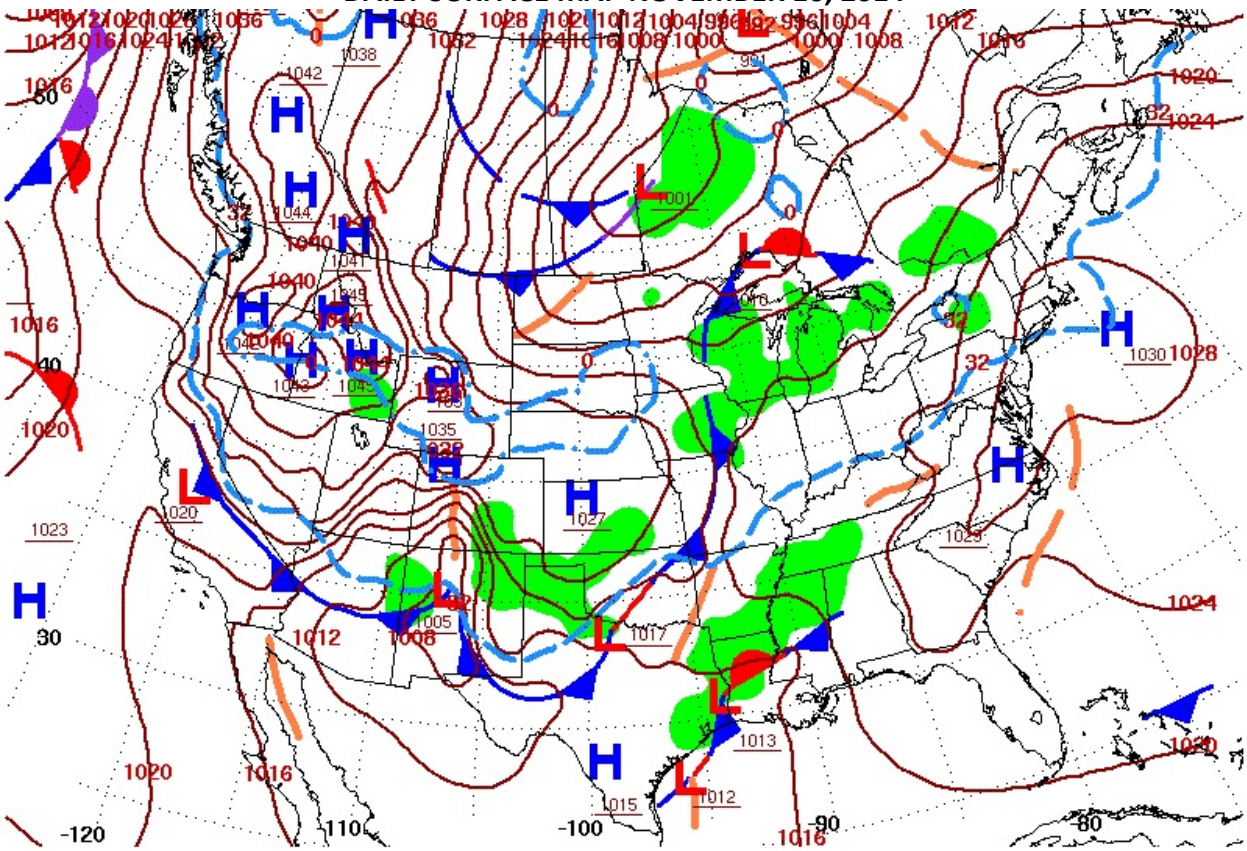


Fig 2-17: A daily surface weather map (0400 PST) shows the cold front moving southward. According to the area forecast discussion issued by the San Diego NWS office at 500 am PST, a shortwave moving southeastward through the Great Basin would push a cold front through Southern California early Sunday. The combination of the cold front and the moderately strong north to northeast winds aloft brought gusty winds on November 15, 2014 through November 16, 2014. The description of the surface high pressure over the Great Basin behind the cold front is described in the 500 am PST area forecast discussion issued by the San Diego NWS office. Source: Weather Prediction Center; http://www.wpc.ncep.noaa.gov/dailywxmap/index_20141116.html

FIGURE 2-18
SURFACE ANALYSIS MAPS

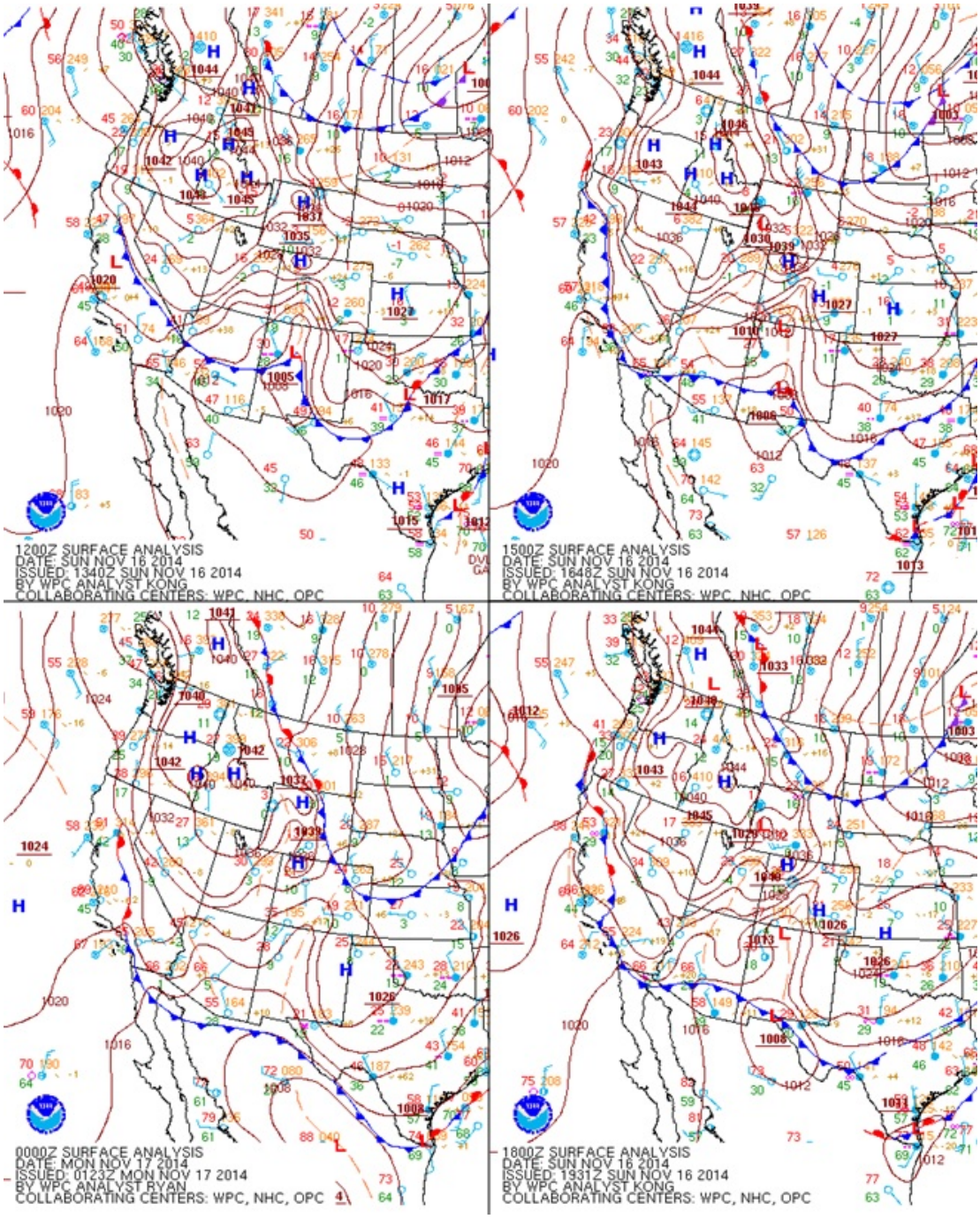


Fig 2-18: A set of four surface analysis maps show the progression of the cold front as it moved from southern Nevada southward over southern California. A surface low pressure departed the area as a surface high began to build over the Four Corners area of the Great Basin. As the low moved out of the area, gusty winds behind the cold front blew across Imperial County. Clockwise, from top left: 04:00; 07:00; 10:00; 16:00 PST November 16, 2014. Source: Weather Prediction Center Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/archives

FIGURE 2-19
GOES-W VISIBLE AND INFRARED SATELLITE IMAGES NOVEMBER 16, 2014

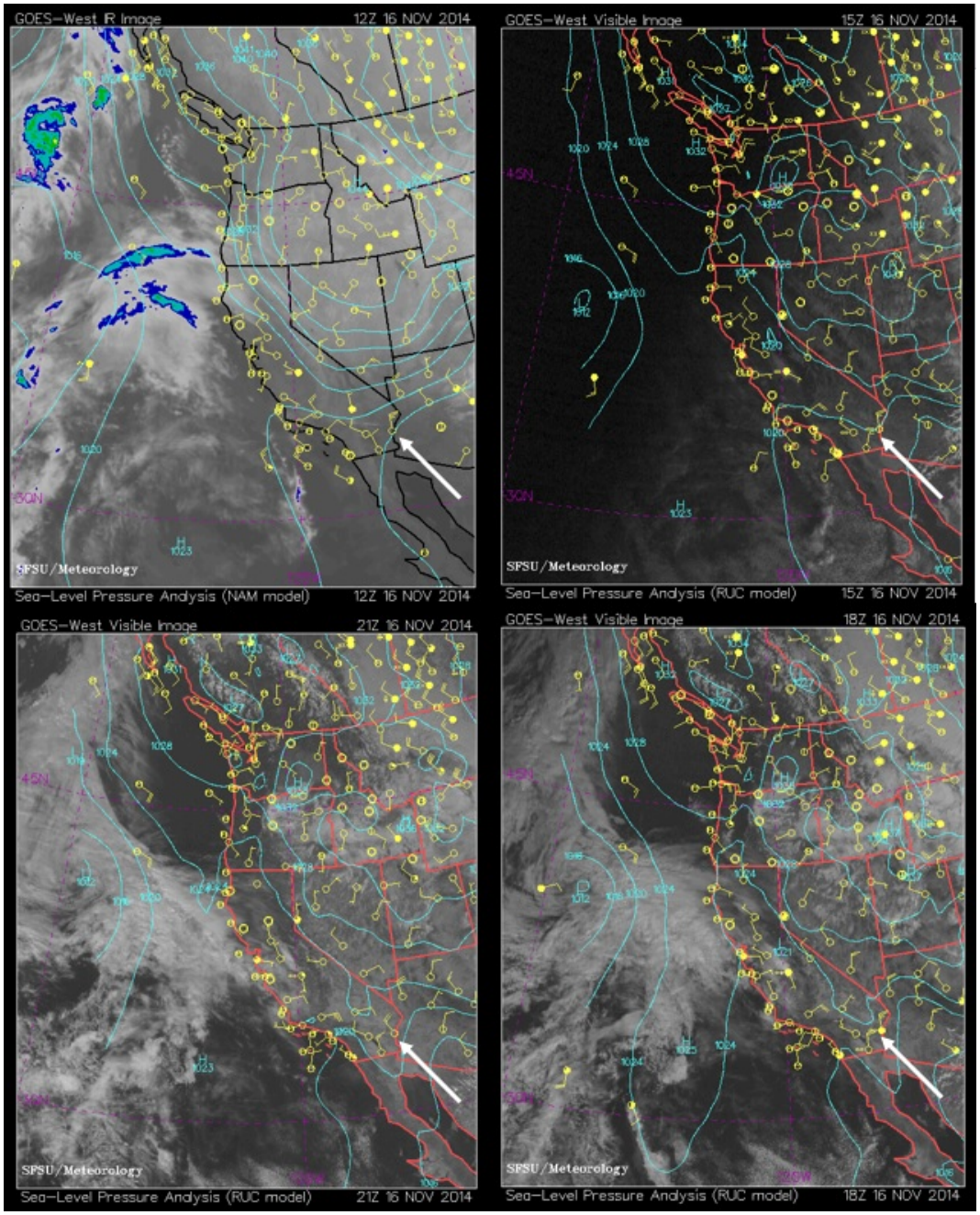


Fig 2-19: A quad of visible and infrared GOES-W satellite sea level pressure analysis images show the building of the winds on November 16, 2014. Clockwise, from top left: 0400; 0800; 1000; 1300 PST. Winds barbs (indicated by white arrow) at Blythe Airport (KBLH) in eastern Riverside county which was immediately upstream from Imperial County indicate winds of at least 28.8 mph. By 1300 PST winds decreased to around 25 mph. Courtesy of the SFSU Department of Earth and Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

The San Diego NWS forecasted advisory level winds along the coastal mountain slopes and adjacent foothills as early as Friday, November 14, 2014 due to a low-pressure system moving inland. By 1000am the Area Forecast issued by the San Diego NWS described the rebuilding of high pressure along the west coast for Sunday, November 16, 2014 through Tuesday accompanied by dry, warmer conditions and northerly winds.

Consequently, the San Diego NWS office at 1350pm PST on Friday November 14, 2014 issued the first of a series of Urgent Weather Messages, advising of potentially strong winds for Sunday, November 16, 2014 and Monday, November 17, 2014. The two Urgent Weather Messages issued November 14, 2014 by the San Diego NWS office described the building of high pressure and the surging of cold air into the Great Basin late Saturday, November 15, 2014 and Sunday, November 16, 2014 increasing offshore pressure gradients across Southern California. The expected airflow initially would begin as a northerly wind late Saturday night (November 15, 2014) and Sunday morning (November 16, 2014) before transitioning to northeasterly later in the day Sunday, November 16, 2014.

In all, the San Diego NWS office issued six Urgent Weather Messages, containing wind advisories through November 16, 2014. The Phoenix NWS office issued its first of three Urgent Weather Messages Saturday, November 15, 2016. In addition, the Phoenix NWS office issued a Hazardous Weather Outlook Sunday November 16, 2014 at 514am PST for the extreme Southwest Arizona, extreme West-Central Arizona, extreme Southeast California and Southeast California which included Imperial County. The Outlook described windy conditions developing early in the morning behind a cold front. All the advisories and outlooks described strong gusty north to northeast winds and reduced visibility due to blowing dust. **Figure 2-20** is a graphical illustration of the chain of event for November 16, 2014.

FIGURE 2-20
RAMP UP ANALYSIS NOVEMBER 16, 2014

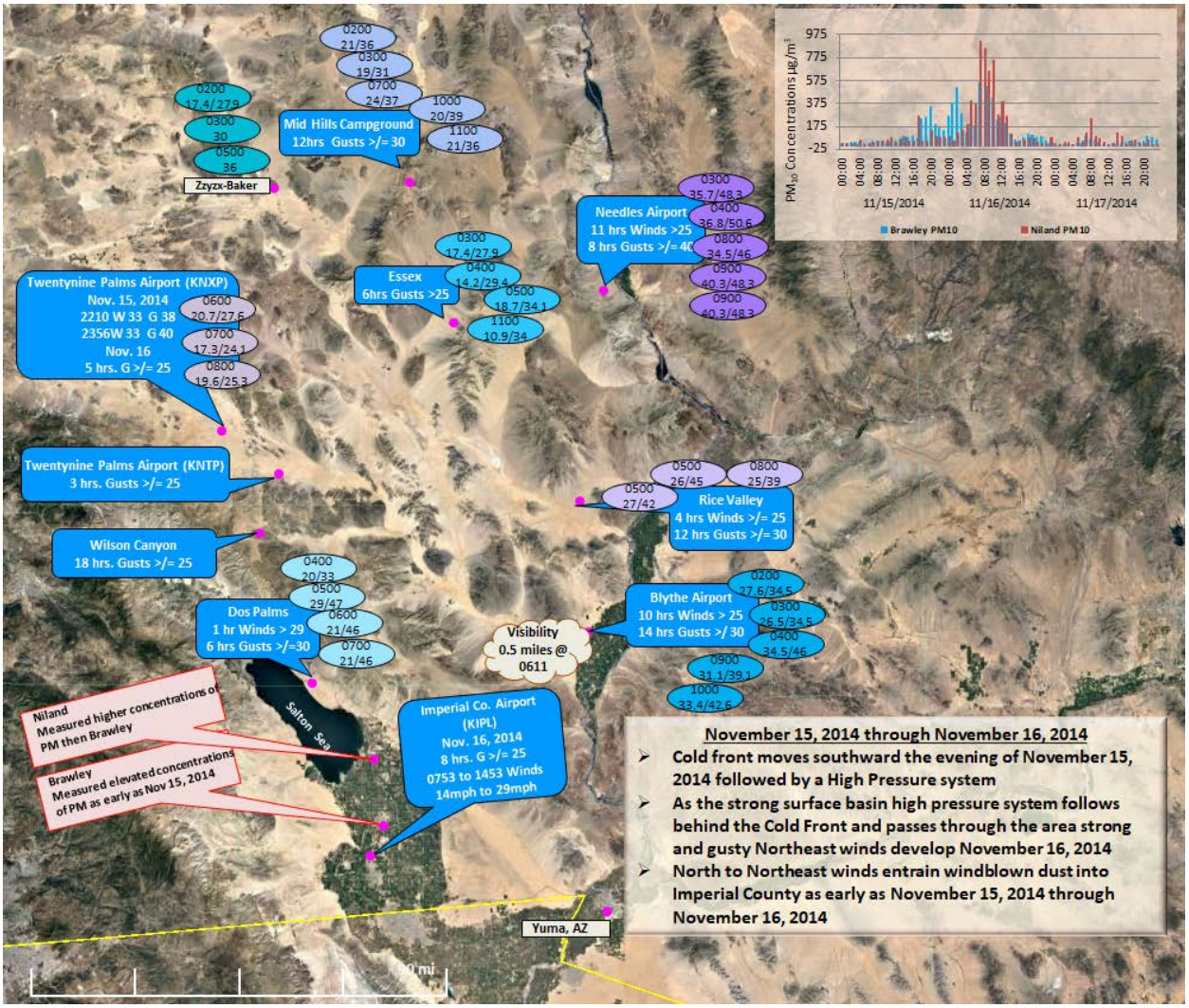


Fig 2-20: Gusty winds transported windblown dust into Imperial County as early as the evening hours of Saturday November 15, 2014. As the cold front passes and with the trailing high-pressure system suspended particulate matter remains suspended allowing northeasterly winds to transport the dust into Imperial County on Sunday, November 16, 2014. There is no record of measured wind speeds taken for November 16, 2014 by the El Centro NAF (KNJK). Base map from Google Earth

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B.**

TABLE 2-2
WIND SPEEDS ON NOVEMBER 16, 2014

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed	
						Brly	Nlnd
IMPERIAL COUNTY							
Imperial Airport (KIPL)	29	340	1053	34	1053	423	749
Naval Air Facility (KNJK)	N/A	N/A	N/A	-	-	-	-
Calexico (Ethel St)	12.1	360	900	-	-	522	656
El Centro (9th Street)	10.7	19	900	-	-	522	656
Niland (English Rd)	20.3	358	1200	-	-	255	390
RIVERSIDE COUNTY							
Blythe Airport (KBLH)	43	360	611	51	611	179	368
Palm Springs Airport (KPSP)	16	310	053	31	153	268	83
Jacqueline Cochran Regional Airport (KTRM) - Thermal	21	290	1052	28	552	423	749
ARIZONA - YUMA							
Yuma MCAS (KNYL)	29	10	1024	45	941	423	749
MEXICALI - MEXICO							
Mexicali Int. Airport (MXL)	23	360	1148	-	-	230	279

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory models,[7] **Figures 2-21 and 2-22** are 12-hour back trajectories that illustrate the path of airflow ending at midnight, 0700 PST and 1400 PST, respectively on November 16, 2014. The models support the forecast discussions by the San Diego NWS office indicating a northerly airflow late Saturday, November 15, 2014 through 0700am PST Sunday, November 16, 2014. By 1400pm PST, November 16, 2014, the last hour of elevated concentrations at the Brawley and Niland monitors airflow is predominantly northeasterly. The strongest winds 20 to 30 mph with gusts up to 40 mph transported windblown dust from the largely open natural mountain and desert areas to the northwest, north and northeast of the Brawley and Niland monitors affecting air quality and causing an exceedance. It is of some worth to point out that from time to time modeled winds differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km and integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

[7] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

FIGURE 2-21
HYSPLIT MODEL FOR BRAWLEY AND NILAND ENDING MIDNIGHT

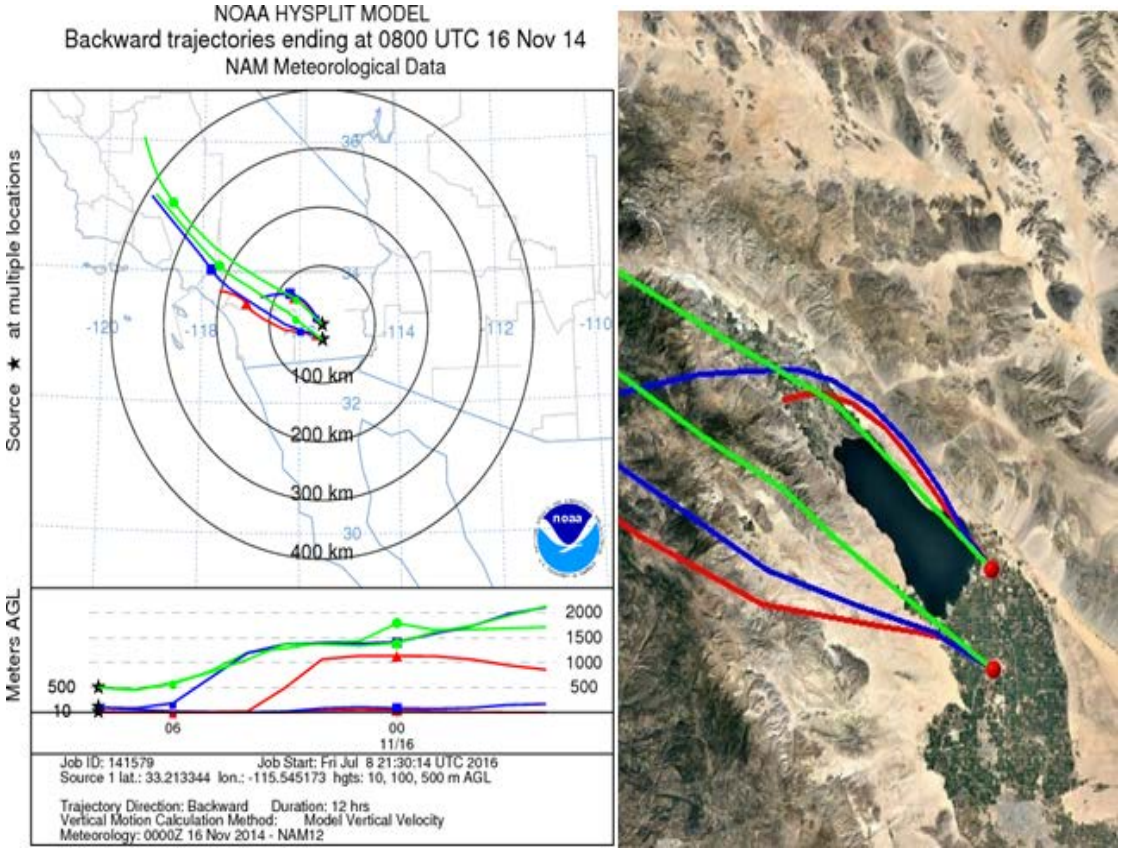


Fig 2-21: A 12-hour back-trajectory ending at 00:00 PST on November 16, 2014, illustrates the airflow as it approached the Niland (top location) and Brawley monitors from the WNW and NW. While both the Niland and Brawley monitors measured elevated concentrations of PM_{10} late afternoon November 15, 2014 only the Brawley monitor measured continuous elevated measurements as early as 1800 PST through November 16, 2014. Red indicates airflow at 10 meters AGL (above ground level); blue=100m; green=500 m. Generated through NAA's Air Resources Laboratory

FIGURE 2-22
HYSPLIT MODEL FOR BRAWLEY AND NILAND

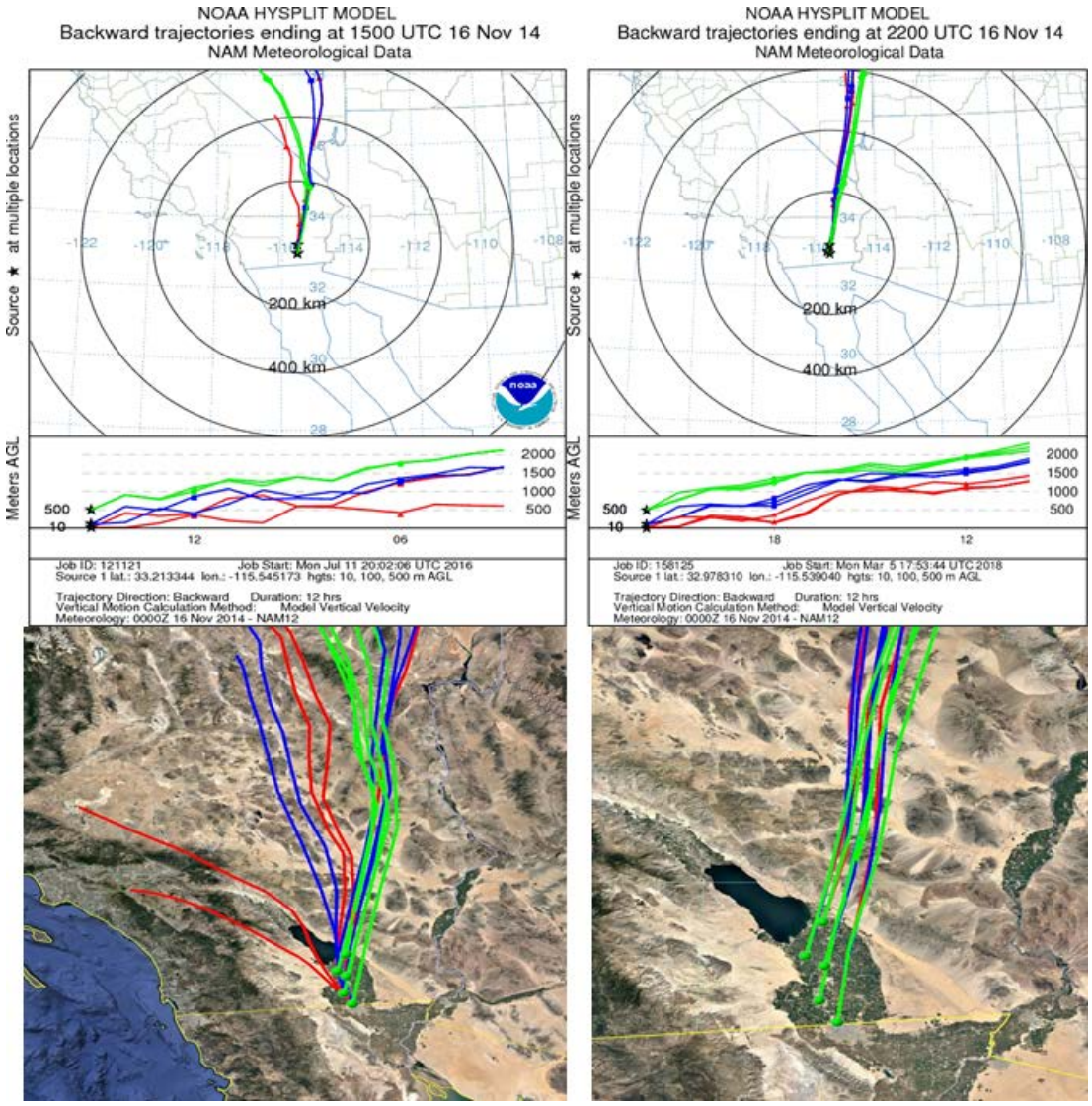


Fig 2-22: The 12-hour back trajectories ending at 0700 PST and 1400 PST illustrated the shift that occurred during the day on November 16, 2014 from a northwest direction to a north and northeast direction. As mentioned above the Brawley monitor measured continuously elevated concentrations of PM_{10} through 1400 PST while the Niland monitor measured continuously elevated concentrations of PM_{10} between 0200 PST and 1400 PST. Red indicates air movement at 10-meter AGL (above ground level); blue is 100 meters AGL; green is 500 meters AGL. Dynamically generated through NOAA Air Resources Laboratory

Figures 2-23 and 2-24 illustrate the elevated winds speeds and levels of hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma counties for a total of three days, November 15, 2014 through November 17, 2014. Elevated emissions entrained transported into Imperial County affected the Brawley and Niland monitors when gusty northerly winds,

associated with the passage of a cold front early Sunday. The surface high-pressure over the Great Basin behind the cold front combined with moderately strong north to northeast winds aloft creating strong north to northeasterly winds which blew into Imperial County as early as the evening hours of November 15, 2014 through November 16, 2014.[8] The Brawley and Niland monitors measured the highest elevated concentrations between 0000 PST and 1400 PST coincident with continual measured wind speeds and gusts above 25 mph for more than one hour at or above 25mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".[9] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the November 16, 2014 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

FIGURE 2-23
72 HOUR PM_{10} CONCENTRATIONS AT VARIOUS STATIONS

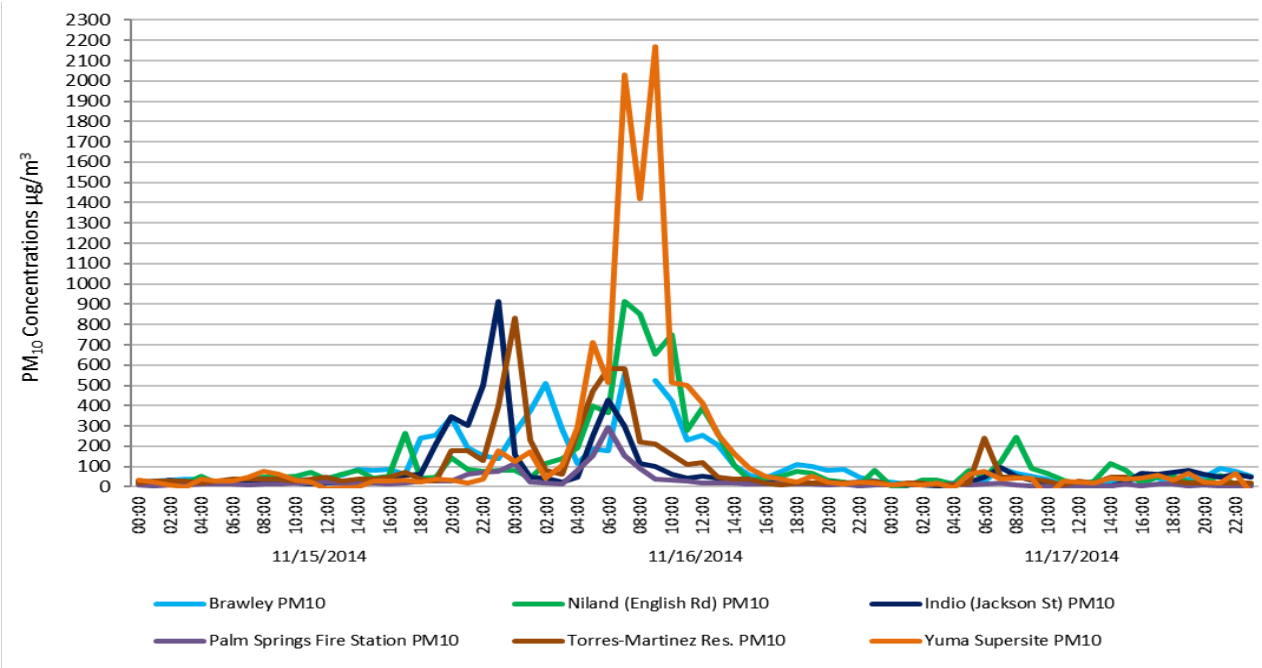


Fig 2-23: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various sites in California and Arizona. The elevated PM_{10} concentrations at all sites on November 15, 2014 and November 16, 2014, demonstrate the regional impact of the weather system and accompanying winds. Air quality data from the EPA's AQS data bank

[8] Area Forecast Discussion National Weather Service San Diego CA 500 AM PST Saturday, November 15, 2014
[9] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-24
72 HOUR WIND SPEEDS AT SELECT REGIONAL AIRPORTS

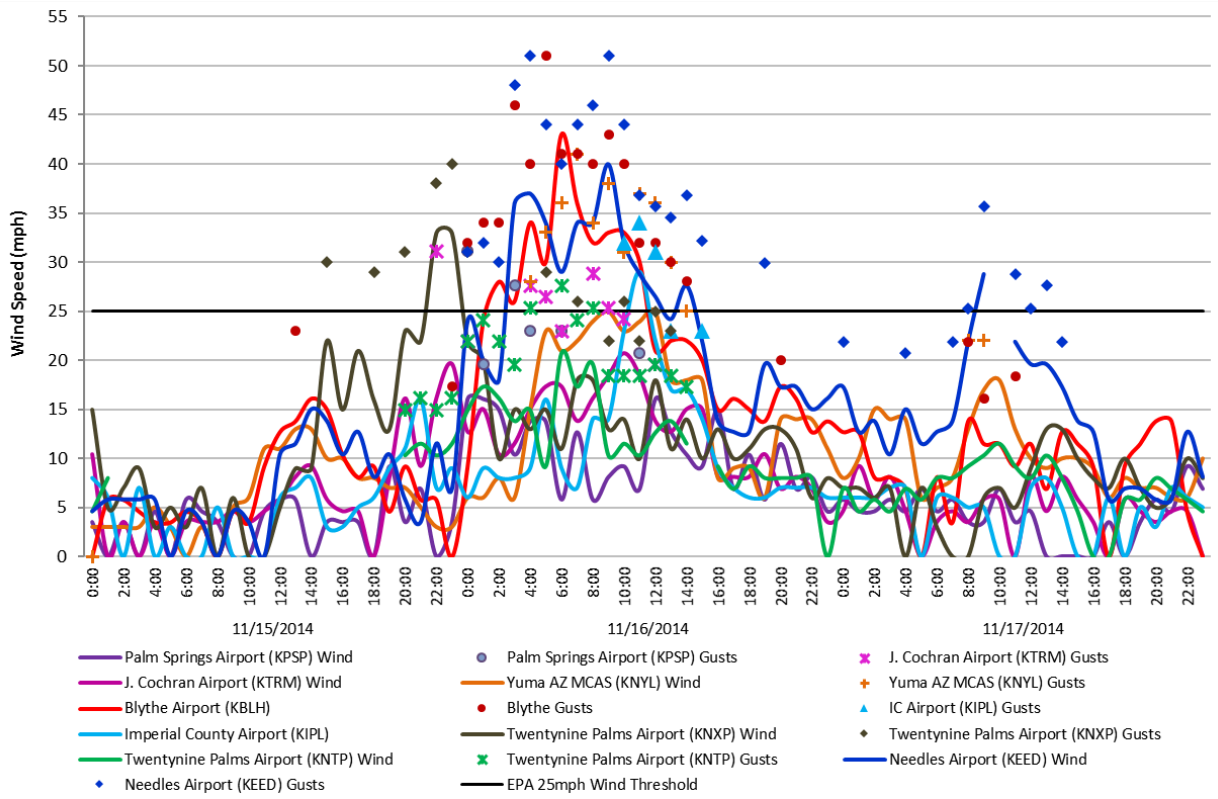


Fig 2-24: Is the graphical representation of the 72-hour measured winds speeds and gusts at various regional airports in California and Arizona. Twentynine Palms Airport (KNXP), Twentynine Palms Airport (KNTP), Blythe Airport (KBLH), and Needles Airport (KEED) all were upstream from Imperial County on November 16, 2014. The graph illustrates the significant number of hours where measured wind speeds and wind gusts where above 25mph. Wind Data from the NCEI's QCLCD system and the University of Utah's MesoWest system

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Brawley and Niland monitors on November 16, 2014, compared to non-event and event days demonstrates the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the November 16, 2014 high wind event and the exceedance measured at the Brawley and Niland monitors.

Figures 3-1 through 3-6 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley and Niland monitors for the period of January 1, 2010 through November 16, 2014. Note that prior to 2013, BAM data was not FEM therefore was not reported into AQS.[10] Properly establishing the variability of the event as it occurred on November 16, 2014, 24-hour averaged PM_{10} concentrations were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on November 16, 2014, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

[10] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 16, 2014

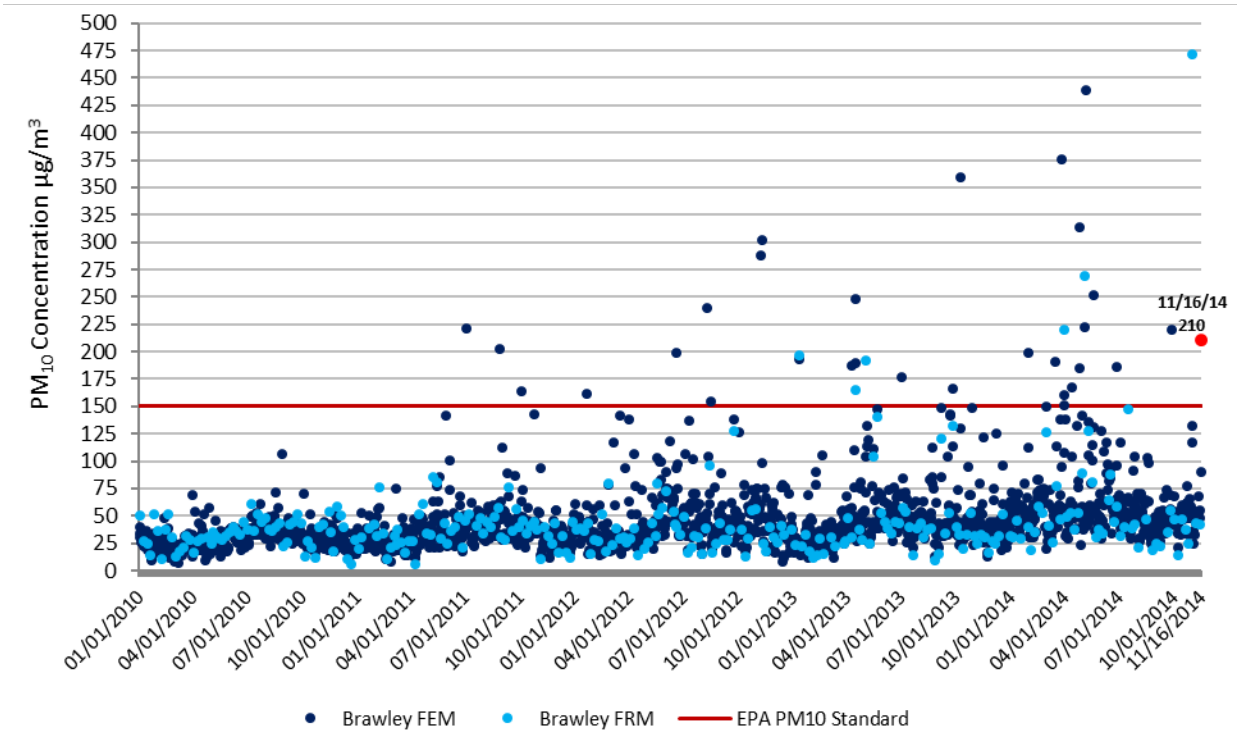


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 210 µg/m^3 on November 16, 2014 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,781 sampling days there were 31 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-2
NILAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 16, 2014

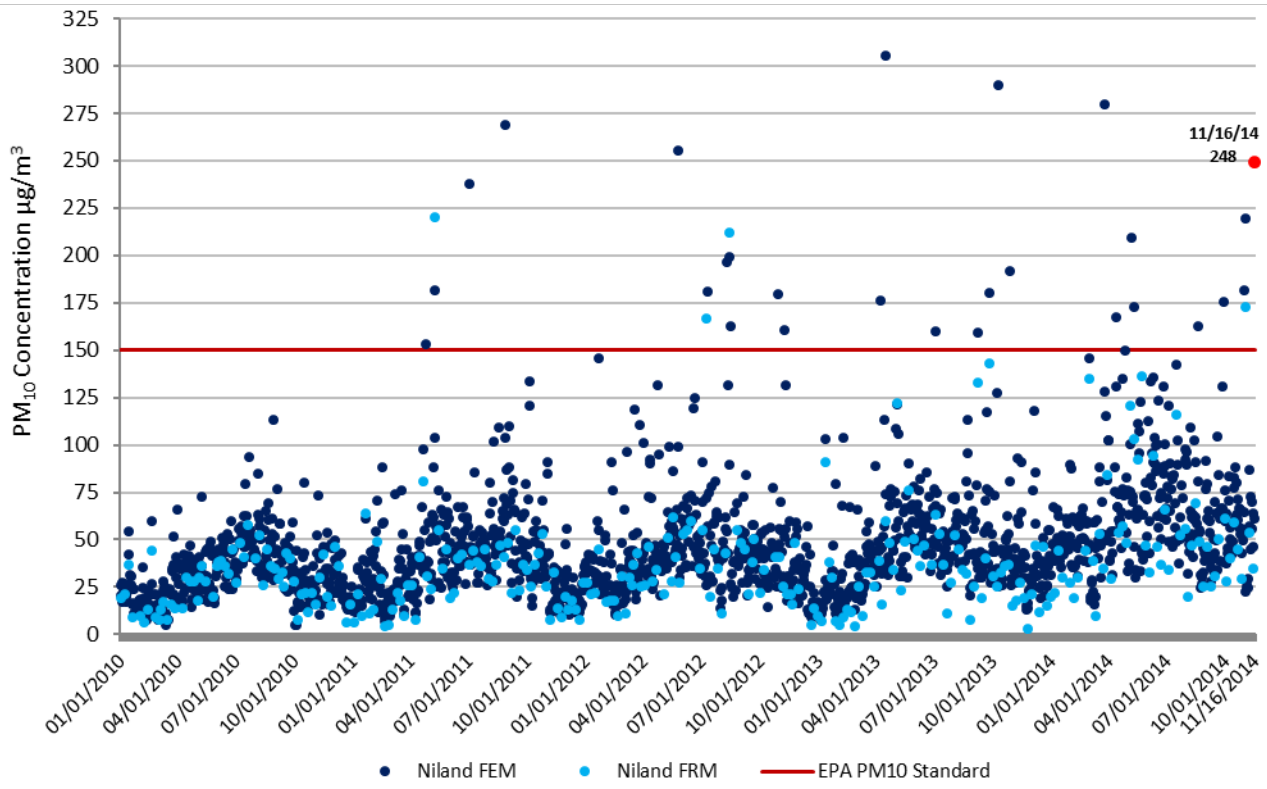


Fig 3-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 248 µg/m^3 on November 16, 2014 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,781 sampling days there were 28 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-3
BRAWLEY AND NILAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 16, 2014

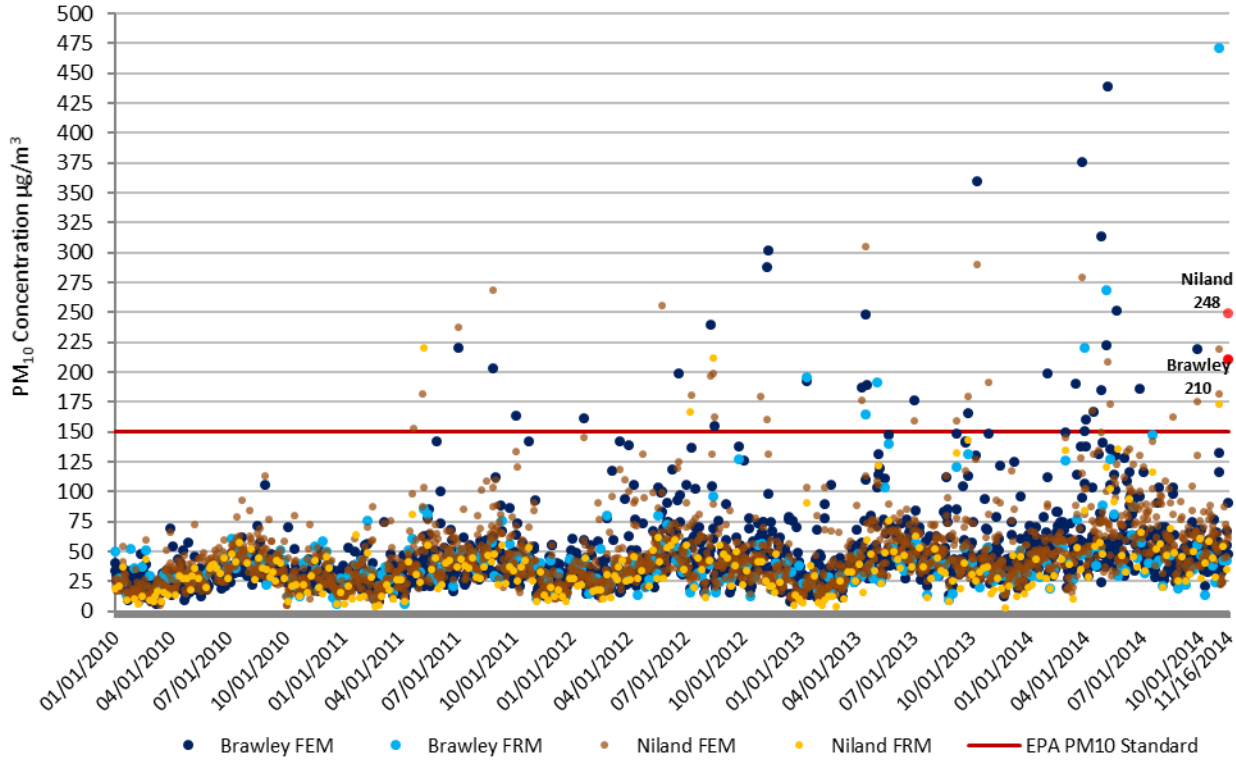
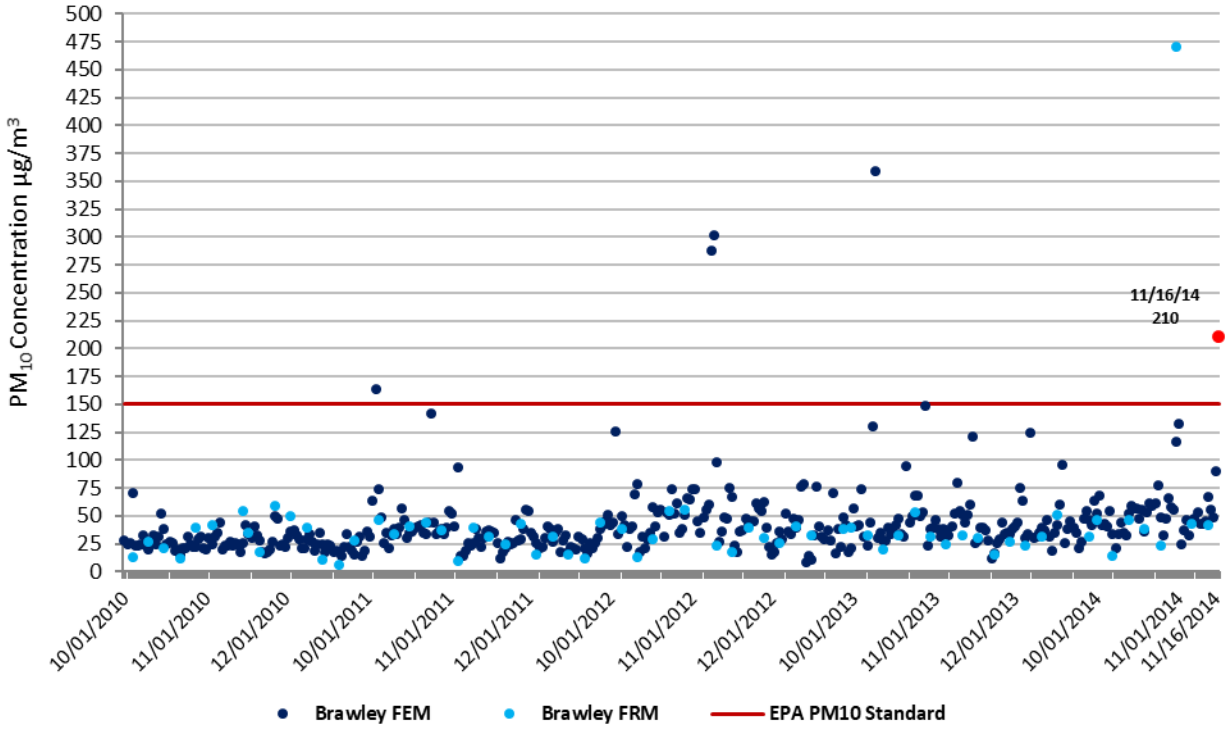


Fig 3-3: A combined comparison of PM_{10} historical concentrations demonstrates that the measured concentrations of 210 µg/m^3 and 248.0 µg/m^3 respectively on November 16, 2014 by the Brawley and Niland monitors were outside the normal historical concentrations when compared to similar event days and non-event days. Of the combined 1,781 sampling days there were 45 exceedance days which is less than a 3.0% occurrence rate

The time series, **Figures 3-1 thru 3-3** for Brawley and Niland included 1,781 sampling days (January 1, 2010 through November 16, 2014). During the January 1, 2010 through November 16, 2014 period the Brawley monitor measured 2,067 credible samples, the Niland monitor measured 2,058 credible samples.

Overall, the time series illustrates that collectively the Brawley and Niland monitors measured 45 exceedances out of the 1,781 sampling days, which is less than a 3% occurrence rate. Of the 45 exceedance days 9 exceedances occurred during fourth quarter (October through December) while the remaining 36 exceedances occurred during the first, second and third quarters. As mentioned above FEM BAM data was not considered regulatory from 2010 to 2012.

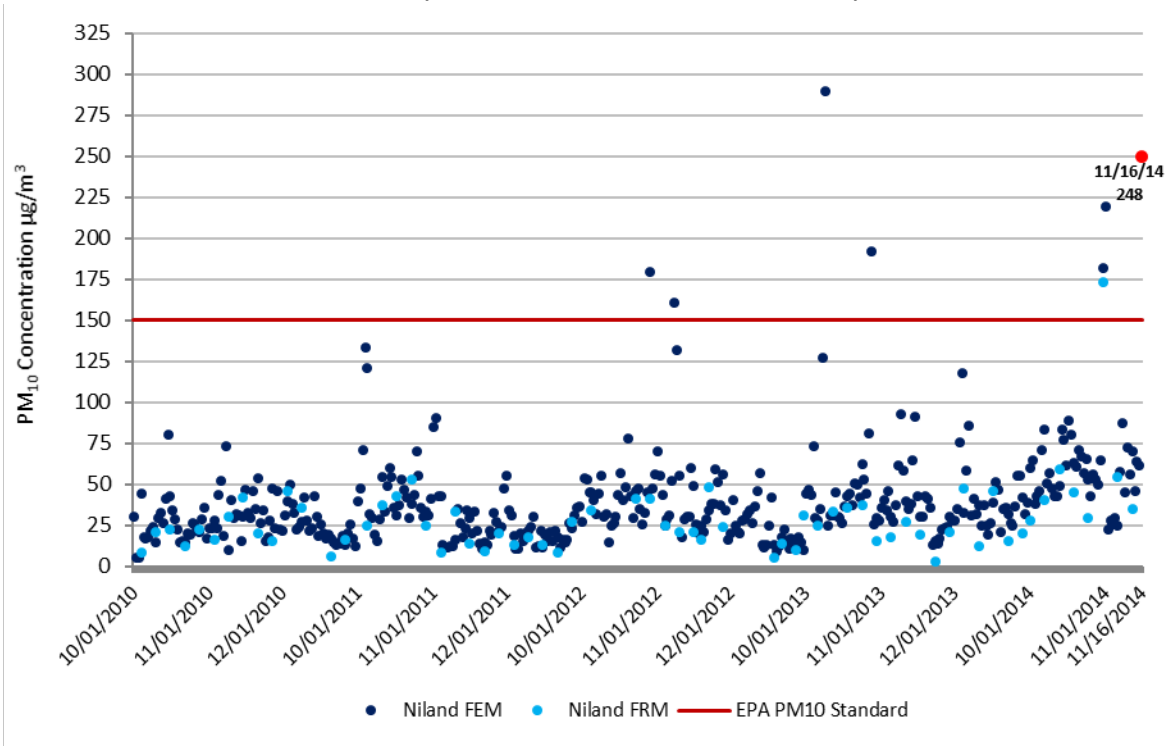
FIGURE 3-4
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 16, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 16, 2014**

Fig 3-4: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 210 µg/m^3 by the Brawley monitor on November 16, 2014 was outside the normal seasonal concentrations when compared to similar days and non-event days

FIGURE 3-5
NILAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 16, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 16, 2014**

Fig 3-5: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentrations of 210 µg/m^3 and 248 µg/m^3 on November 16, 2014 by the Niland monitor was outside the normal seasonal concentrations when compared to similar days and non-event days

FIGURE 3-6
BRAWLEY AND NILAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 1, 2014**

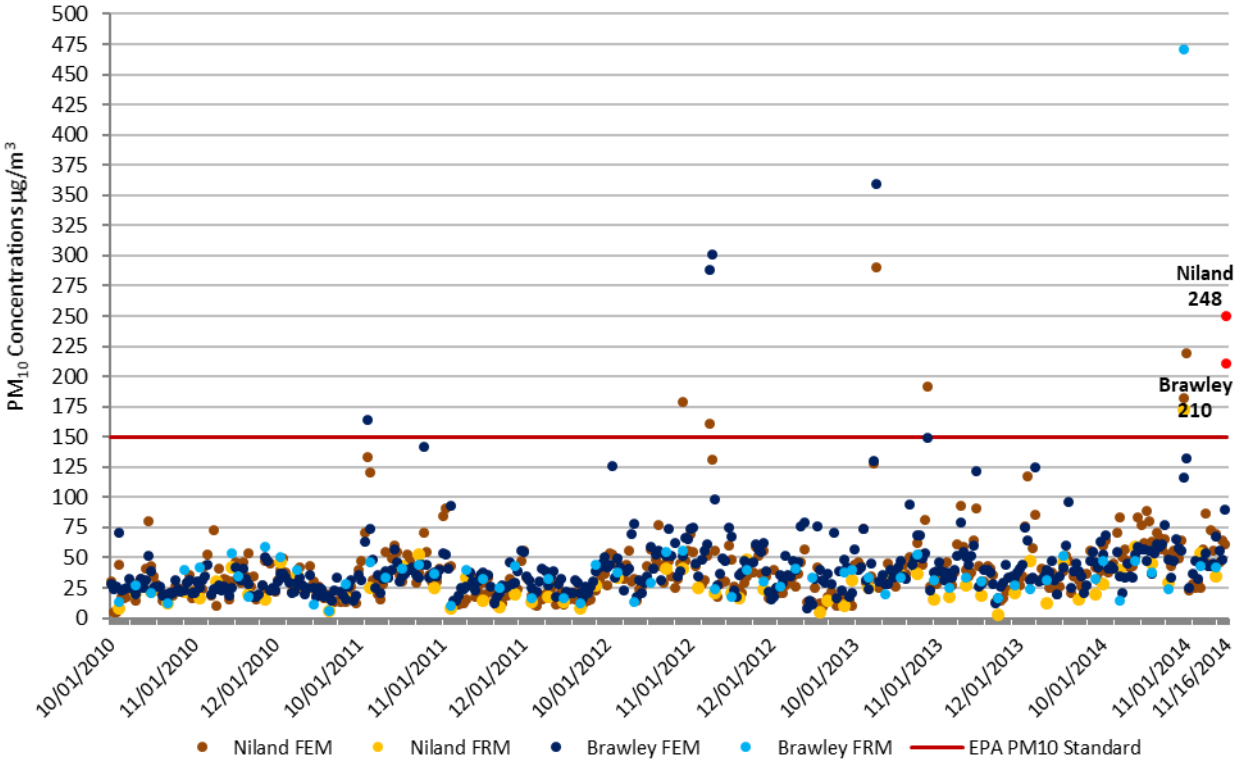


Fig 3-6: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentrations of 210 µg/m^3 and 248 µg/m^3 on November 16, 2014 by the Brawley and Niland monitors were outside the normal seasonal concentrations when compared to similar days and non-event days

FIGURE 3-7
BRAWLEY AND NILAND HISTORICAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 16, 2014

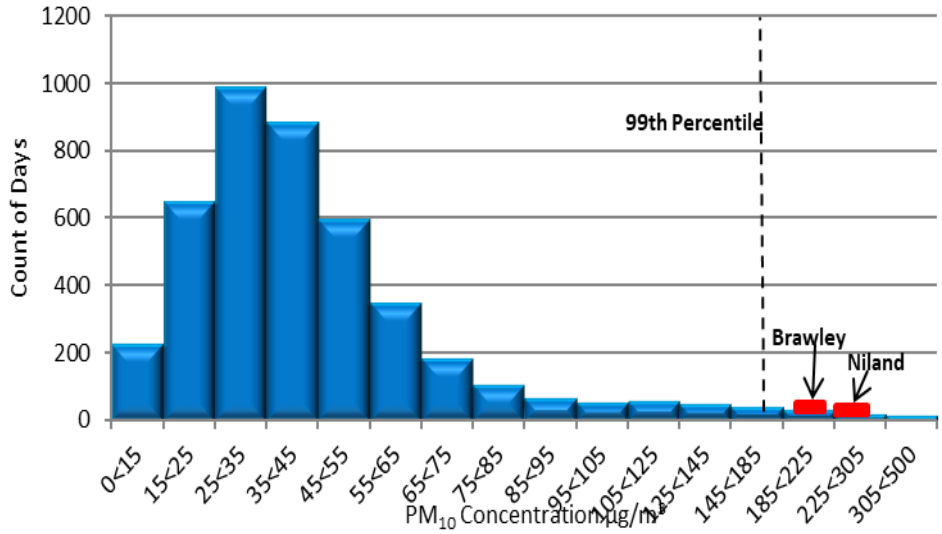
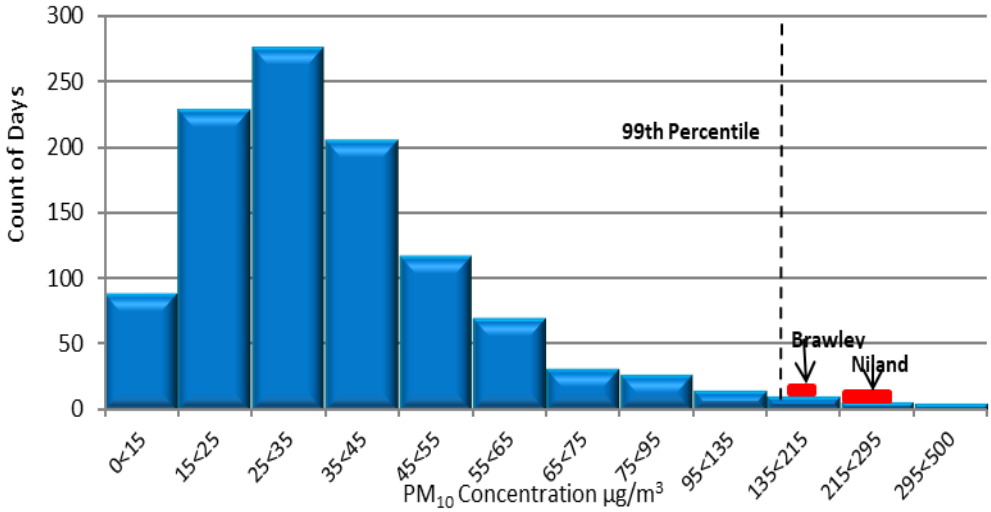


Fig 3-7: The 24-hr average PM_{10} concentration measured at the Brawley monitor demonstrates that the November 16, 2014 event was in excess of the 99th percentile

FIGURE 3-8
BRAWLEY AND NILAND SEASONAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 1, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 16, 2014**

Fig 3-8: The 24-hr average PM_{10} concentrations measured at the Niland monitor demonstrates that the November 16, 2014 event was in excess of the 99th percentile.

For the combined FRM and FEM data sets for the Brawley and Niland monitors the annual historical and the seasonal historical PM_{10} concentrations of 210 µg/m^3 and 248.0 µg/m^3 are above the 99th percentile ranking. Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile rankings for both the historical and seasonal patterns the November 16, 2014 measured exceedances are clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plot, seasonal time series plot and the percentile ranking illustrate that the PM_{10} concentrations observed on November 16, 2014 occur infrequently. When comparing the measured PM_{10} levels on November 16, 2014 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedances measured at the Brawley and Niland sites were outside the normal historical and seasonal concentration levels.

This historical concentration analysis provided here supports the determination that the November 16, 2014 natural event affected the concentrations levels at the Brawley and Niland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on November 16, 2014 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. To address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures to consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for November 16, 2014. In addition, this November 16, 2014 demonstration provides technical and non-technical evidence that strong gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley and Niland monitors on November 16, 2014. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the November 16, 2014 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

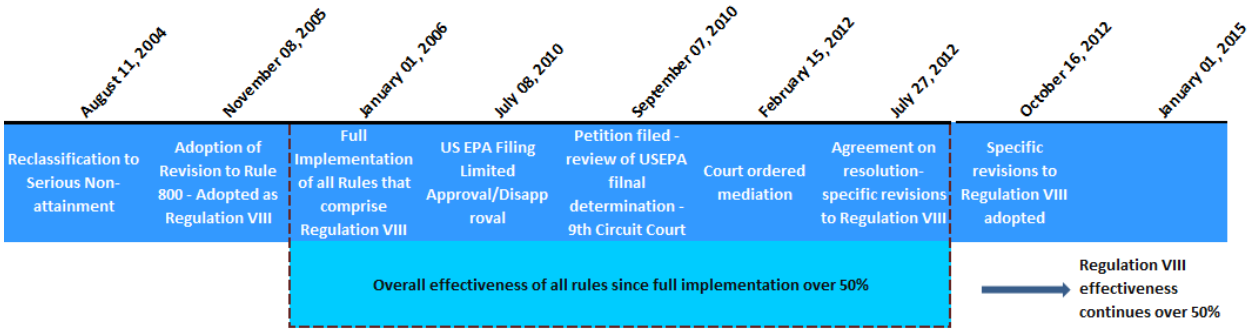


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B of Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generate dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and

- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On November 16, 2014 the ICAPCD declared a No Burn day **(Appendix A).** No complaints were filed for agricultural burning on November 16, 2014.

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Brawley and Niland during the time of the November 16, 2014 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on November 16, 2014, officially declared a No Burn day, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

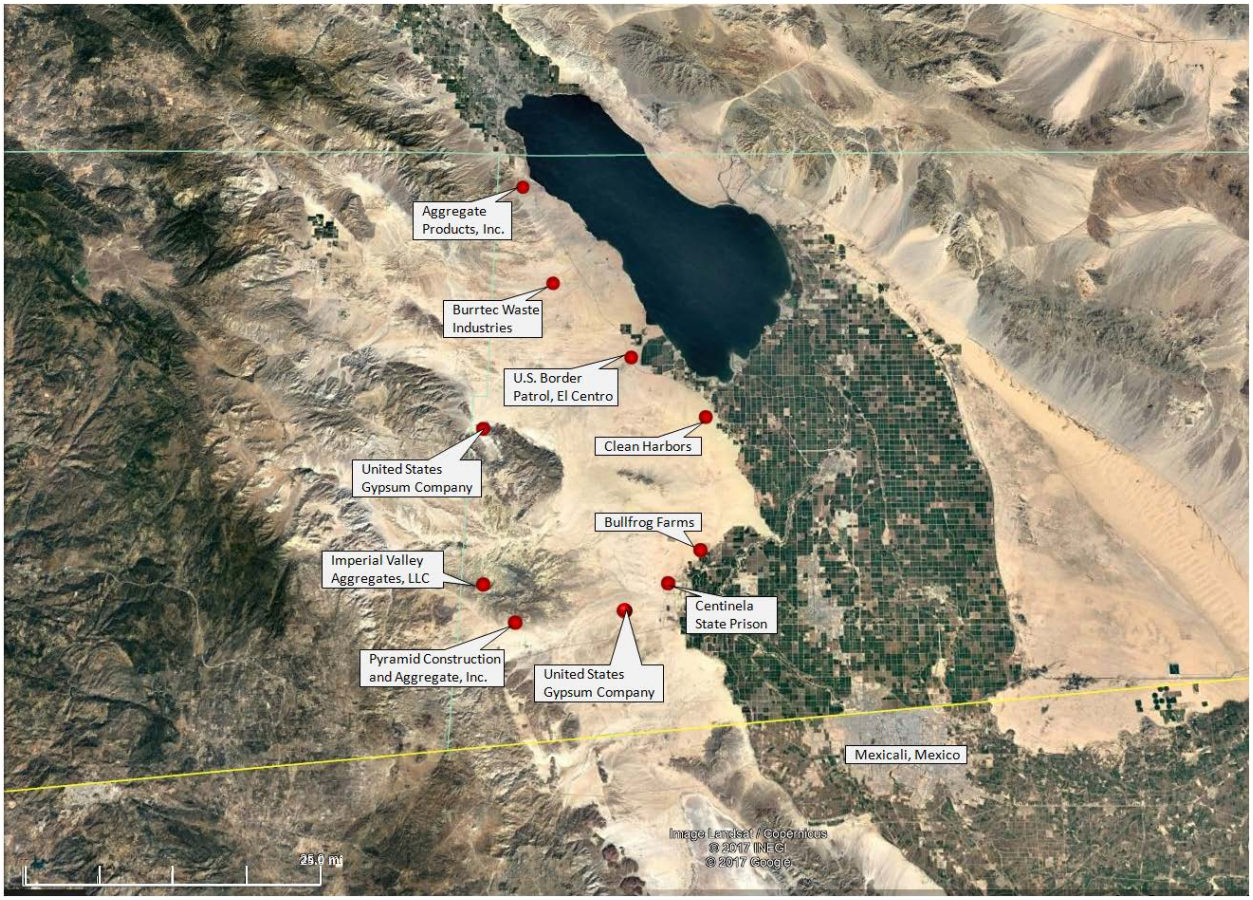


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley and Niland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

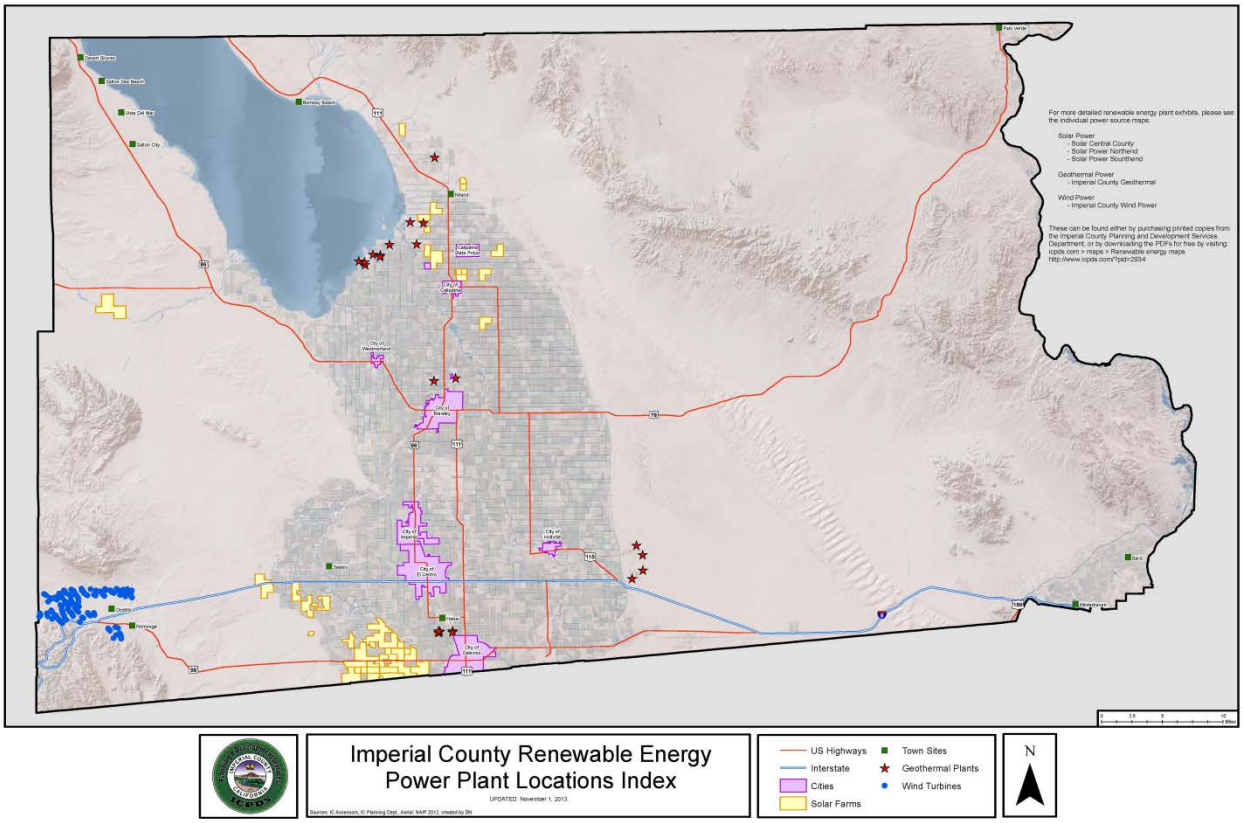


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley and Niland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

As mentioned above, the San Diego National Weather Service (NWS) forecasted advisory level winds along the coastal mountain slopes and adjacent foothills as early as Friday, November 14, 2014 due to a low-pressure system moving inland. By 10:00am the Area Forecast issued by the San Diego NWS described the rebuilding of high pressure along the west coast for Sunday, November 16, 2014 through Tuesday accompanied by dry, warmer conditions and northerly winds.

Consequently, the San Diego NWS office at 1350pm PST on Friday November 14, 2014 issued the first of a series of Urgent Weather Messages, advising of potentially strong winds for Sunday, November 16, 2014 and Monday, November 17, 2014. The two Urgent Weather Messages issued November 14, 2014 by the San Diego NWS office described the building of high pressure and the surging of cold air into the Great Basin late Saturday, November 15, 2014 and Sunday, November 16, 2014 increasing offshore pressure gradients across Southern California.

In all, the San Diego NWS office issued six Urgent Weather Messages, containing wind advisories through November 16, 2014. The Phoenix NWS office issued its first of three Urgent Weather Messages Saturday, November 15, 2016. In addition, the Phoenix NWS office issued a Hazardous Weather Outlook Sunday November 16, 2014 at 514 am PST for the extreme Southwest Arizona, extreme West-Central Arizona, extreme Southeast California and Southeast California which included Imperial County. The Outlook described windy conditions developing early in the morning behind a cold front. All the advisories and outlooks described strong gusty north to northeast winds and reduced visibility due to blowing dust. **Figure 2-20** is a graphical illustration of the chain of event for November 16, 2014. **Appendix A** contains copies of pertinent notices related to the November 16, 2014 event.

IV.3 Wind Observations

Wind data and observations during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), and northern Mexico. Elevated winds speeds and gusts were consistently observed in areas to the north, northwest and northeast of the Brawley and Niland monitors as early as November 15, 2014. Observations confirm the northwest airflow the evening of November 15, 2014 when sites such as Borrego Springs, Ocotillo Wells and Anza Borrego Desert Research Center measured elevated wind speeds and gust through the midnight hour of November 16, 2014. As airflow shifts around midnight November 16, 2014 to a more northerly and northeasterly direction stations such as the Jacqueline Cochran Airport, Blythe Airport, Twentynine Palms, Baker, Needless and Dos Palms all measure significantly and consistently higher wind speeds and gusts.

Locally, no data was available for the El Centro Naval Air Facility (KNJK), however, the Imperial County Airport measured elevated wind speed and gusts coincident with the elevated concentrations at the Brawley and Niland monitors (see **Table 2-2)**. During the November 16, 2014 event wind speeds were above the 25-mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that strong northerly winds behind a dry cold front that moved through southern California lofted dust that caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements in the Brawley and Niland and surrounding areas to the north and south of Brawley and Niland during the event were high enough (at or above 25 mph, with wind gusts reaching 34 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal

relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on November 16, 2014 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedance and the high wind event timeline and geographic location. The November 16, 2014 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for November 16, 2014, identified the building of a surface high pressure over the Great Basin behind a dry cold front, as early as November 15, 2014 that combined with moderately strong north to northeast winds aloft and brought periods of strong gusty northerly winds into Imperial County.[11] As the cold front moved eastward the evening hours of November 15, 2014, the winds developed first over the San Bernardino County Mountains, the Inland Empire, the Santa Ana Mountains and the northern part of the Coachella Valley. By early dawn November 16, 2014 as the dry cold front passed, followed by the high-pressure system which combined with moderately strong north to northeast winds aloft into Southeastern California causing the tightening of the pressure gradients creating strong gusty northeast winds.[12]

Entrained windblown dust from natural areas, particularly from the desert areas northwest, north, and northeast of the Brawley and Niland monitors, along with anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations November 16, 2014. Both the San Diego and Phoenix NWS offices issued Urgent Weather Messages, which included wind advisories and a blowing dust advisory. The Advisories forecasted strong north to northeasterly wind 20 to 30 mph with gust above 50 mph in favored areas. Disclosed impacts included lower visibility due to blowing dust causing the Phoenix NWS office to issue a blowing dust advisory effective through 1000 PST, November 16, 2014. Please note, actual surface winds can and do differ from time to time from upper-level winds.

On November 16, 2014, gusty northeast winds blew over open natural areas located northwest, north and northeast of the Brawley and Niland monitors transporting suspended windblown dust into Imperial County affecting air quality and causing an exceedance.

Figure 5-1 depicts captured GOES- West and East images illustrating the low pressure departing the region late on November 15, 2014 while a strong surface high builds over the Great Basin.

[11] Area Forecast Discussion National Weather Service San Diego CA 500 AM PST Saturday, November 15, 2014

[12] Area Forecast Discussion National Weather Service San Diego CA 115 PM PST Saturday, November 15, 2014 and 245 AM PST Sunday, November 16, 2014

FIGURE 5-1
SURFACE HIGH BUILDS OVER GREAT BASIN

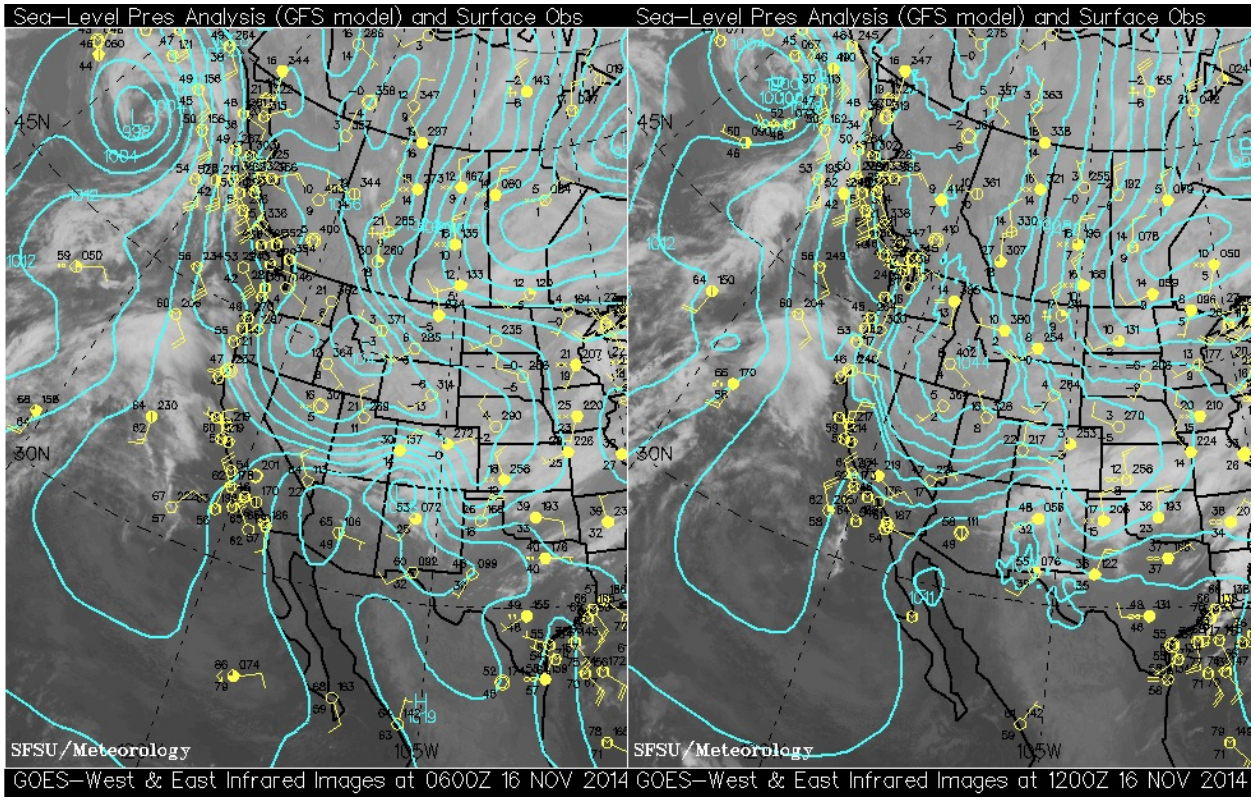


Fig 5-1: A surface high building over the Four Corners of the Great Basin led to the development of gusty northeast winds over southern California. Images captured at 2200 PST on November 15, 2014 (left), and 0400 PST November 16, 2014 (right). Source: SFSU Meteorology and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/sathts_arch.html

FIGURE 5-2
SURFACE GRADIENT TIGHTEN (0400 THROUGH 0900) NOVEMBER 16, 2014

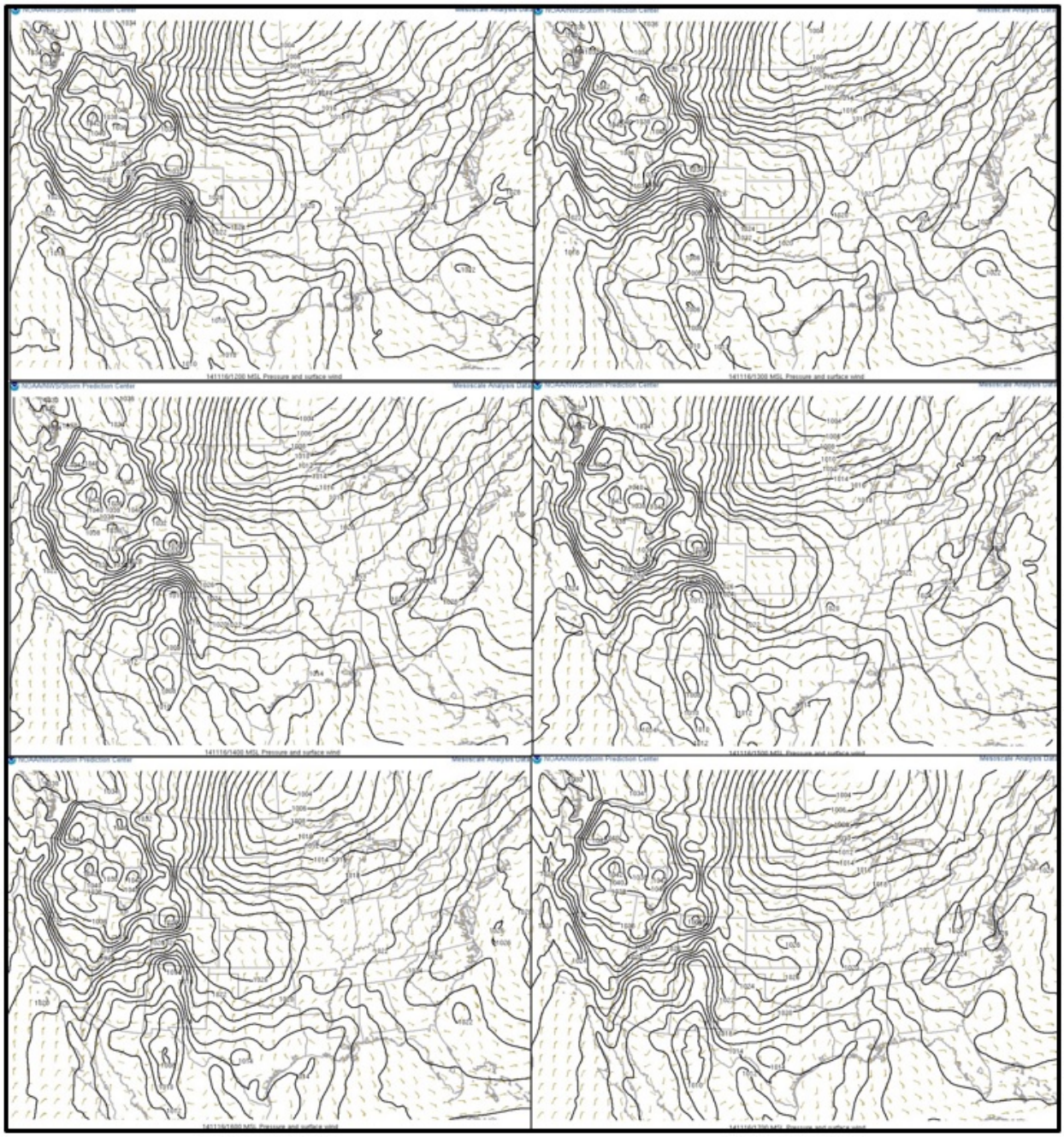


Fig 5-2: A surface high across the Great Basin combined with moderately strong north to northeast winds aloft led to periods of gusty northeast winds over southern California Sunday through Monday. These images depict the gradient at 0400 PST (top left); 0500 PST (top right); 0600 PST (middle left); 0700 PST (middle right); 0800 PST (bottom left); and 0900 PST (bottom right) on November 16, 2014. Data is absent prior to 0400. Source: NWS Storm Prevention Center MSL Archive; http://www.spc.noaa.gov/exper/archive/event.php

FIGURE 5-3
SURFACE GRADIENT TIGHTEN (1000 THROUGH 2300) NOVEMBER 16, 2014

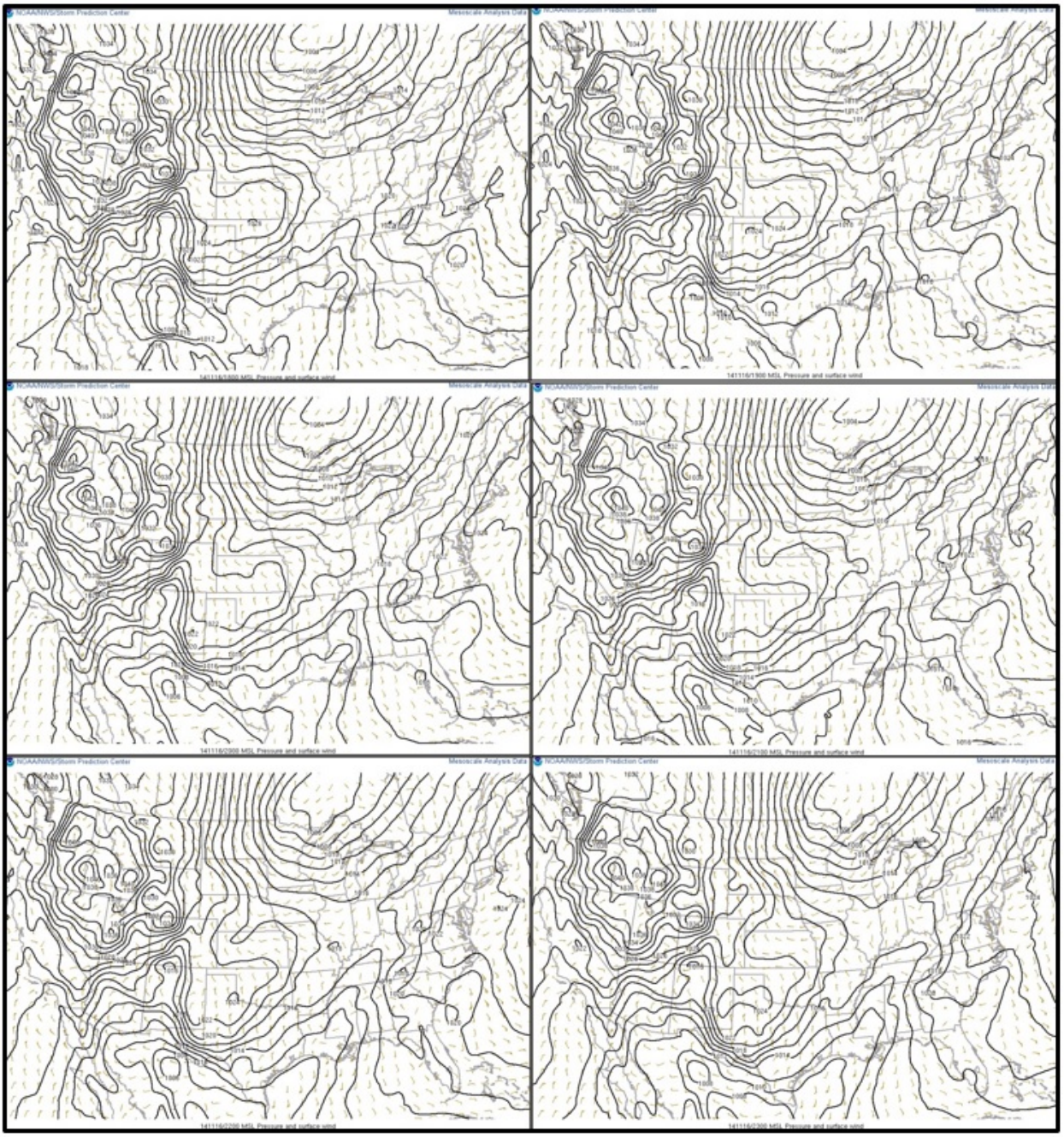


Fig 5-3: A surface high across the Great Basin combined with moderately strong north to northeast winds aloft led to periods of gusty northeast winds over southern California Sunday through Monday. These images depict the gradient at 1000 PST (top left); 1100 PST (top right); 1200 PST (middle left); 1300 PST (middle right); 1400 PST (bottom left); and 1500 PST (bottom right) on November 16, 2014. Winds began to decrease after 1500. Source: NWS Storm Prevention Center MSL Archive; http://www.spc.noaa.gov/exper/archive/event.php

Figure 5-4 is a satellite image captured by the MODIS instrument[13] onboard the Aqua satellite at ~1330 PST, two hours prior to reduced measured concentrations at both the Niland and Brawley monitors. The image depicts brownish tinted clouds, which supports the impact disclosed in wind advisories of the reduced visibility due to blowing dust. The level of brownish clouds extends beyond Imperial County, from off the California coast within San Diego County, Riverside County to over the Sea of Cortez (Gulf of California), supporting the regional nature of the event.

FIGURE 5-4
AQUA MODIS SATELLITE IMAGE NOVEMBER 16, 2014

Fig 5-4: The MODIS Aqua satellite image captured ~13:30 PST November 16, 2014, depicts a mixture of clouds and dust. While it is difficult to distinguish between the clouds and dust the brownish texture to the cloud composition would substantiate the dust advisory and lowered visibility identified by the wind advisories. These brownish clouds are evident not only within Imperial County but over the mountain areas and open areas in northern Mexico and San Diego County. Image through AirNow Tech Navigator

[13] MODIS (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 1:30pm. Source: https://modis.gsfc.nasa.gov/about. See also Appendix A.

Figure 5-5 is an image of the Deep Blue Aerosol Optical Depth (AOD) layer as captured by the MODIS instrument onboard the Terra satellite at ~1030 PST on November 16, 2014. The image was captured just after several hours of elevated measured concentrations at the Brawley and Niland monitors.[14] Between the hours of 0900 PST and 1100 PST both the Niland and Brawley monitors measured concentrations between 230 µg/m^3 and 749 µg/m^3, consistent with the thickness or the dark red and red colors depicted in the captured image and the brownish clouds depicted in **Figure 5-4**.

FIGURE 5-5
HEAVY AEROSOLS TRANSPORTED SOUTH OVER IMPERIAL COUNTY

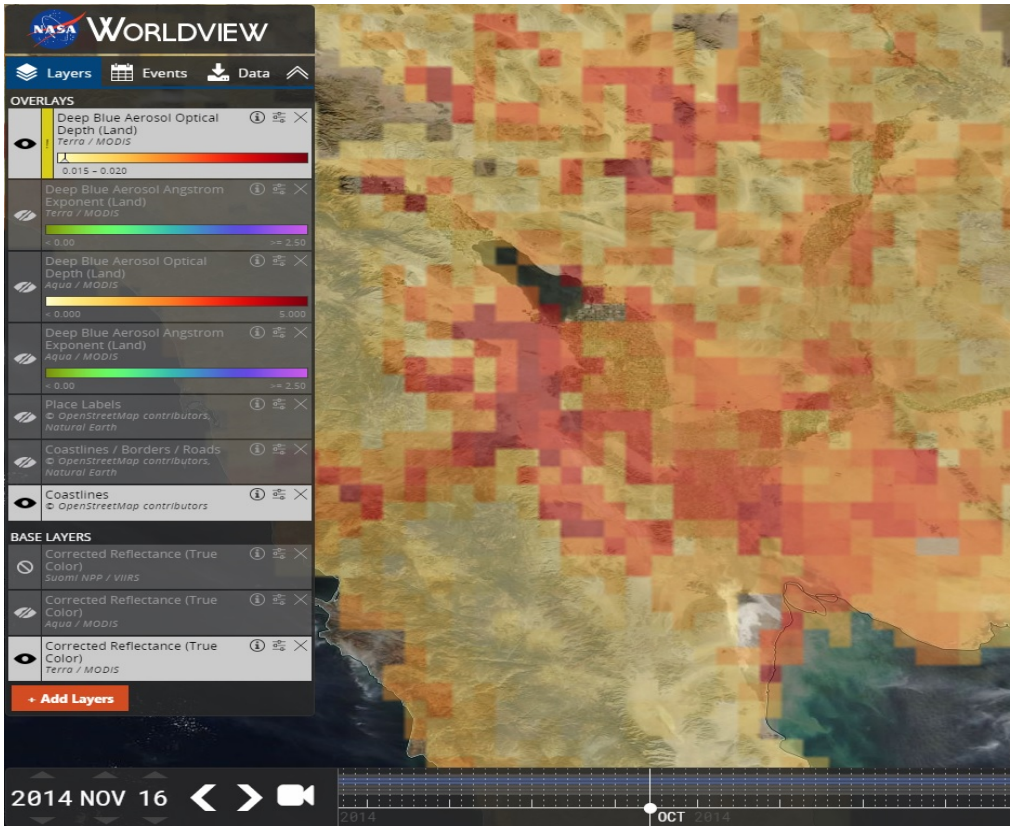


Fig 5-5: illustrates the thick layer of AOD over and within Imperial County. Winds transported particles southward, resulting in the heavy AOD seen within Imperial County (~10:30 PST). Warmer colors indicate thicker layers of aerosols. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

[14] The **Deep Blue Aerosol Optical Depth** layer is useful for studying aerosol optical depth over land surfaces. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths) where Dark Target approaches fail. **Aerosol Optical Depth (AOD) (or Aerosol Optical Thickness)** indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is "clean" - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Source: https://worldview.earthdata.nasa.gov

Figure 5-6 uses the Deep Blue Angstrom Exponent[15] layer to identify larger aerosol particles that are likely dust, as indicated by the greenish colored areas. See also the legend on the left of the image that shows that the darker green areas are likely dust.

FIGURE 5-6
DUST SIZED AEROSOLS TRANSPORTED SOUTH OVER IMPERIAL COUNTY

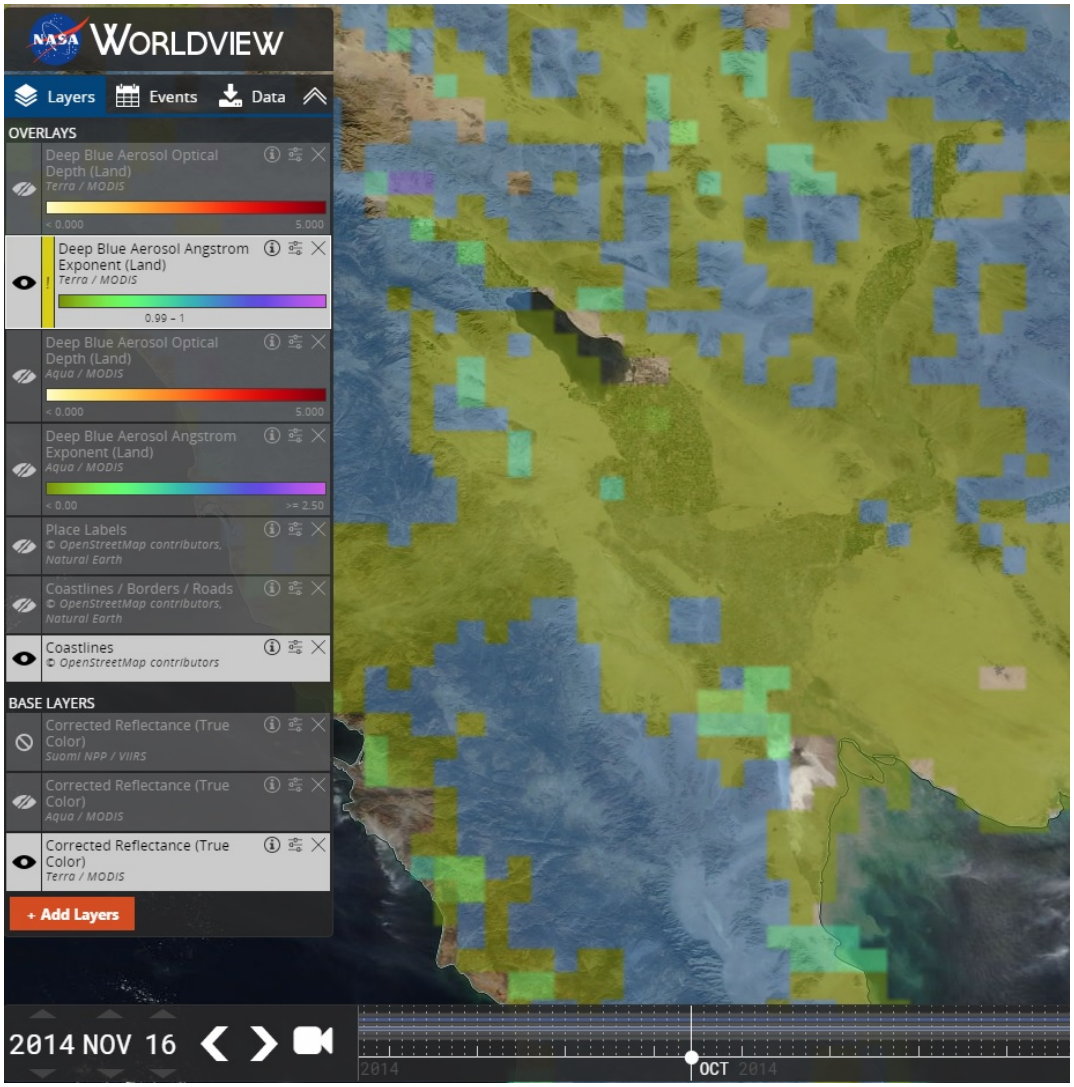


Fig 5-6: Illustrates the thick layer of the Angstrom Exponent (AE) over and within Imperial County. Winds transported particles southward, resulting in the heavy AOD seen over Imperial County (~1030 PST). The darker the green color the thicker the layer of aerosols. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

[15] The MODIS Deep Blue Aerosol Ångström Exponent layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke). Source: NASA Worldview; https://worldview.earthdata.nasa.gov

Both **Figures 5-5 and 5-6** demonstrate that particulates in sufficient amounts existed within and around outlying areas of Imperial County on November 16, 2014. Substantiating support that suspended dust particles existed within and around the outlying areas of Imperial County, NOAA's Satellite Services Division issued a Smoke Text Product that identified blowing dust within the Southwest United States and northern Mexico (**Appendix A**). Specifically, the text product described extensive areas of blowing dust across several areas of northern Mexico and southwest United States during the afternoon and evening on November 16, 2014. Locally, the text product identified light to moderate dust blowing into the northern Gulf of California.

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[16] **Tables 5-1 through 5-4** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the exceeding stations. The Brawley and Niland (English Rd) monitors shows peak hourly concentrations following or during the period of high upstream wind speeds. **Figure 5-1** displays wind data and hourly concentrations on November 15, 2014. Gusty northwesterly winds late on November 15, 2014 were responsible for entraining dust that carried over into high hourly concentrations measured during November 16, 2014. Please note, that low-level surface winds measured at airports can and do differ from upper-level measured winds.

[16] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

TABLE 5-1
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY AND NILAND NOVEMBER 15, 2014

Borrego Springs (BRGSD)				Thousand Palms (C2285)				Twentynine Palms Airport (KNXP)				Ocotillo Wells (AS398/KD6RSQ5)				Brawley	Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	PM_{10} (µg/m3)	PM_{10} (µg/m³)
000	5	7	282	005	16	28	305	056	15		290	058	9	15	328	22	29
100	1	2	339	105	20	26	302	156	5		280	150	6	9	335	30	25
200	3	4	281	205	15	25	295	256	7		260	253	1	5	28	32	21
300	2	5	304	305	3	12	266	356	9		310	356	4	6	318	36	19
400	4	6	301	405	10	15	302	456	3		VR	431	2	5	312	36	55
500	0	3		505	4	6	267	556	5		360	555	0	0		24	18
600	0	0		605	2	12	284	656	3		350	630	0	0		28	25
700	1	4	266	705	3	10	246	756	7		310	754	0	0		41	31
800	0	2		805	5	9	267	856	0		0	828	0	0		45	48
900	6	9	92	905	3	6	239	956	6		30	932	4	7	173	44	48
1000	5	7	116	1005	3	7	234	1056	0		0	1-:58	2	6	156	40	51
1100	2	5	183	1105	3	8	171	1156	0		0	1158	1	3	124	35	73
1200	4	8	115	1205	3	5	182	1256	5		70	1258	0	4		45	39
1300	1	3	87	1305	1	6	257	1356	9		20	1358	20	32	311	58	63
1400	8	19	245	1405	1	7	327	1456	9		340	1454	14	27	316	84	81
1500	9	19	282	1515	16	29	311	1556	22	30	300	1558	12	24	318	81	43
1600	6	11	285	1625	16	29	323	1656	15		300	1658	16	25	322	86	50
1700	6	10	329	1705	13	26	303	1756	21		310	1758	12	21	308	62	265
1800	10	19	303	1805	16	26	323	1856	16	29	320	1859	16	28	316	242	42
1900	9	18	246	1905	14	24	322	1956	13		310	1958	17	33	308	256	45
2000	6	13	207	2005	14	25	341	2056	23	31	300	2058	14	26	330	342	143
2100	19	29	330	2105	12	21	301	2156	22		310	2153	13	24	335	191	87
2200	18	31	334	2205	16	30	324	2256	15	28	310	2257	16	28	329	155	77
2300	23	34	340	2315	25	36	288	2356	33	40	310	2358	3	9	329	140	80

Wind data for KNXP from the NCEI's QCLCD system. Wind data for Ocotillo Wells (AS398/KD6RSQ5), Thousand Palms (C2285) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Due to the difference times at which wind data and PM10 concentrations are measured, the hour given reflects the hour in which the measurement was taken, and not necessarily the actual time

TABLE 5-2
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY AND NILAND NOVEMBER 16, 2014

Mid Hills Campground (MDHC1)				Essex (EXCC1)				Rice Valley (RVYC1)				Wilson Canyon (WCYC1)				Brawley	Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	PM_{10} (µg/m3)	PM_{10} (µg/m³)
000	12	21	315	000	2	6	306	050	15	23	304	034	9	26	325	268	82
100	18	31	344	100	4	7	316	150	21	30	344	134	14	26	329	374	43
200	21	36	349	200	10	22	13	250	18	33	3	234	13	26	317	509	116
300	19	41	351	300	17	28	11	350	25	37	0	334	14	24	321	284	140
400	19	37	10	400	14	29	16	450	20	32	1	434	15	30	321	116	192
500	19	30	13	500	19	34	3	550	27	42	355	534	12	27	339	186	399
600	20	34	358	600	12	25	357	650	26	45	15	634	8	21	337	179	367
700	24	37	8	700	10	24	4	750	23	38	353	734	10	24	355	552	914
800	14	34	7	800	12	26	13	850	25	39	355	834	12	28	352		850
900	21	32	346	900	13	23	1	950	23	42	7	934	13	24	340	521	655
1000	20	39	352	1000	11	23	9	1050	19	36	357	1034	13	27	335	423	749
1100	21	36	351	1100	11	34	10	1150	17	27	13	1134	12	24	336	230	279
1200	15	31	21	1200	13	22	11	1250	24	32	9	1234	12	25	335	254	390
1300	17	27	19	1300	13	27	7	1350	19	35	19	1334	15	29	345	205	262
1400	15	25	11	1400	15	25	4	1450	16	28	14	1434	15	30	343	103	104
1500	7	24	348	1500	12	20	9	1550	13	26	14	1534	14	29	345	55	33
1600	2	12	292	1600	10	19	14	1650	15	22	4	1634	10	24	335	43	43
1700	2	10	216	1700	10	23	16	1750	16	26	11	1734	12	25	326	78	54
1800	3	8	0	1800	5	12	11	1850	20	27	336	1834	13	27	333	111	77
1900	6	14	20	1900	10	22	31	1950	10	26	331	1934	12	24	332	98	67
2000	8	16	2	2000	13	23	23	2050	13	21	355	2034	16	27	341	81	35
2100	4	17	17	2100	8	18	352	2150	14	25	10	2134	18	29	342	88	23
2200	5	17	10	2200	5	20	287	2250	1	20	282	2234	17	27	342	48	10
23:00	12	21	315	2300	3	8	242	2350	3	9	8	2334	17	29	339	27	80

Brawley station does not measure wind data. Wind data for Mid Hills Campground (MDHC1), Essex (EXCC1), Rice Valley (RVYC1), and Wilson Canyon (WCYC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Due to the difference times at which wind data and PM10 concentrations are measured, the hour given reflects the hour in which the measurement was taken, and not necessarily the actual time

TABLE 5-3
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY AND NILAND NOVEMBER 16, 2014

Needles Airport (KEED)				Twentynine Palms Airport (KNXP)				Twentynine Palms Airport (KNTP)				Blythe Airport (KBLH)				Brawley	Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	PM_{10} (µg/m3)	PM_{10} (µg/m³)
056	24	31	20	056	22	31	300	055	15	22	280	052	9	17	350	268	82
107	20	32	10	156	20		300	155	17	24	270	152	24	32	330	374	43
256	18	30	10	256	10		310	255	16	22	280	252	28	34	350	509	116
356	36	48	10	356	15		320	355	14	20	270	352	26	34	360	284	140
456	37	51	10	456	13		300	455	15	25	290	452	34	46	360	116	192
524	34	44	20	556	15	29	310	555	9		310	552	22	32	350	186	399
641	29	40	20	656	11		330	655	21	28	320	652	27.6	38	360	179	367
756	34	44	20	756	18	26	340	755	17	24	310	752	23	31	360	552	914
856	34	46	20	856	18		330	855	20	25	310	852	22	36	350		850
956	40	51	10	956	13	22	340	955	10	18	330	952	31	39	360	521	655
1056	32	44	10	1056	14	26	360	1055	12	18	320	1052	33	43	10	423	749
1156	29	37	20	1156	10	22	360	1155	10	18	300	1152	24	32	330	230	279
1256	27	36	20	1256	18	25	350	1255	13	20	320	1252	21	32	330	254	390
1356	24	35	10	1356	11	23	360	1355	14	18	290	1352	22	32	340	205	262
1456	28	37	20	1456	14		360	1455	12	17	290	1452	22	30	360	103	104
1556	22	32	360	1556	10		360	1555				1552	20	28	360	55	33
1656	14		360	1656	13		340	1655	9		300	1652	15		10	43	43
1756	13		360	1756	10		320	1755	7		290	1752	16		360	78	54
1856	13		360	1856	11		300	1855	9		280	1852	15		360	111	77
1956	20	30	360	1956	13		290	1955	8		270	1952	14		340	98	67
2056	17		360	2056	13		280	2055	8		260	2052	17		350	81	35
2156	17		360	2156	11		270	2155	8		250	2152	16	20	330	88	23
2256	15		10	2256	6		320	2255	8		250	2252	13		40	48	10
2356	16		10	2356	8		280	2355	0			2352	14		330	27	80

Brawley station does not measure wind data. Wind data for Needles Airport (KEED) and Twentynine Palms (KNTP) from the University of Utah's MesoWest system. Twentynine Palms Airport (KNXP) and Blythe Airport (KBLH) from the NCEI's QCLCD system. Wind speeds = mph; Direction = degrees. Due to the difference times at which wind data and PM10 concentrations are measured, the hour given reflects the hour in which the measurement was taken, and not necessarily the actual time

TABLE 5-4
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY AND NILAND NOVEMBER 16, 2014

Bombay Beach				Dos Palmas (DPMC1)				Imperial Co. Airport (KIPL)				Niland				Brawley	Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	PM_{10} (µg/m3)	PM_{10} (µg/m³)
000	6		1	014	0	7		053	9		280	000	6		108	268	82
100	11		324	114	1	6	49	153	8		310	100	6		79	374	43
200	14		324	214	12	29	337	253	8		310	200	3		104	509	116
300	13		343	314	18	29	328	353	9		340	300	4		134	284	140
400	19		344	414	20	33	357	453	16		350	400	4		110	116	192
500	20		351	514	29	47	1	553	9		10	500	6		83	186	399
600	22		338	614	21	46	357	653	7		20	600	4		95	179	367
700	22		349	714	20	39	344	753	14		50	700	5		142	552	914
800	22		352	814	16	34	322	853	14		360	800	4		126		850
900	22		360	914	16	24	341	953	21	31	360	900	5		151	521	655
1000	21		11	1014	16	35	342	1053	29	34	340	1000	5		178	423	749
1100	20		7	1114	16	28	343	1153	21	28	350	1100	3		178	230	279
1200	21		10	1214	18	29	12	1253	17	23	350	1200	5		174	254	390
1300	20		17	1314	16	27	344	1353	17		10	1300	5		196	205	262
1400	23		6	1414	13	25	353	1453	14	23	330	1400	4		211	103	104
1500	21		4	1514	17	26	342	1553	9		340	1500	3		345	55	33
1600	14		0	1614	13	24	346	1653	7		350	1600	0		58	43	43
1700	8		353	1714	11	21	335	1753	6		40	1700	2		212	78	54
1800	9		348	1814	10	18	331	1853	6		30	1800	6		283	111	77
1900	13		357	1914	3	22	358	1953	7		30	1900	6		295	98	67
2000	15		4	2014	11	21	343	2053	7		280	2000	6		276	81	35
2100	17		338	2114	10	18	324	2153	7		240	2100	3		60	88	23
2200	18		358	2214	2	12	74	2253	6		300	2200	3		64	48	10
2300	16		351	2314	0	7		2353	6		280	2300	6		84	27	80

Wind data for KIPL from the NCEI's QCLCD system. El Centro NAF (KNJKL) did not measure data on November 16. Niland station does not measure wind gusts. Brawley station does not measure wind data. Wind data for Dos Palmas (DPMC1) from the University of Utah's MesoWest system. Wind data for Bombay Beach from AQMIS2. Wind speeds = mph; Direction = degrees. Due to the difference times at which wind data and PM_{10} concentrations are measured, the hour given reflects the hour in which the measurement was taken, and not necessarily the actual time

Figure 5-7 is a graphical depiction of the elements that occurred that created the conditions that affected air quality and caused an exceedance in Imperial County on November 16, 2014. The graphical depiction includes three insets of HYSPLITS.

The first inset is the reproduction of the HYSPLIT ending at midnight November 16, 2014. As the dry cold front passes through the region with the surface basin high pressure tailing behind winds have a northwesterly direction during the evening hours of November 15, 2014. Meteorological observations at various sites including the Blythe Airport (KBLH), confirm a shift in wind direction from southwest to north. Sites such as KBLH, the Niland Station, and the Bombay Beach station

reflect the shift in wind direction during the final hours of November 15, 2014 all other sites have a variable northerly component to the wind direction. It is of some importance to note that because data for HYSPLIT models have a horizontal resolution of 12 km and integrated every three hours there may be some difference between locally observed surface wind speeds and directions.

The second inset is the reproduction of the HYSPLIT ending at 0700 PST November 16, 2014, coincident with the measured peak concentrations at both the Niland and Brawley monitors. Winds at the 0700 PST hour are now north to northeast. The San Diego NWS office described the transition occurring because of the combination of the surface basin high pressure with north to northeast flow aloft creating strong gusty northeast winds.

The third inset is the HYSPLIT ending at 1400 PST, coincident with the final hour in which both the Niland and Brawley monitors measured elevated concentrations. Winds remained predominantly northeast throughout November 16, 2014. Sites located to the north and northeast of Imperial County within Riverside County and east of Imperial County measured continuous hours of elevated wind speeds and gusts. Windblown dust, suspended by winds blowing from natural areas located to the north and east of Imperial County affected air quality and caused an exceedance November 16, 2014.

FIGURE 5-7
EXCEEDANCE FACTORS AND CONDITIONS NOVEMBER 16, 2014

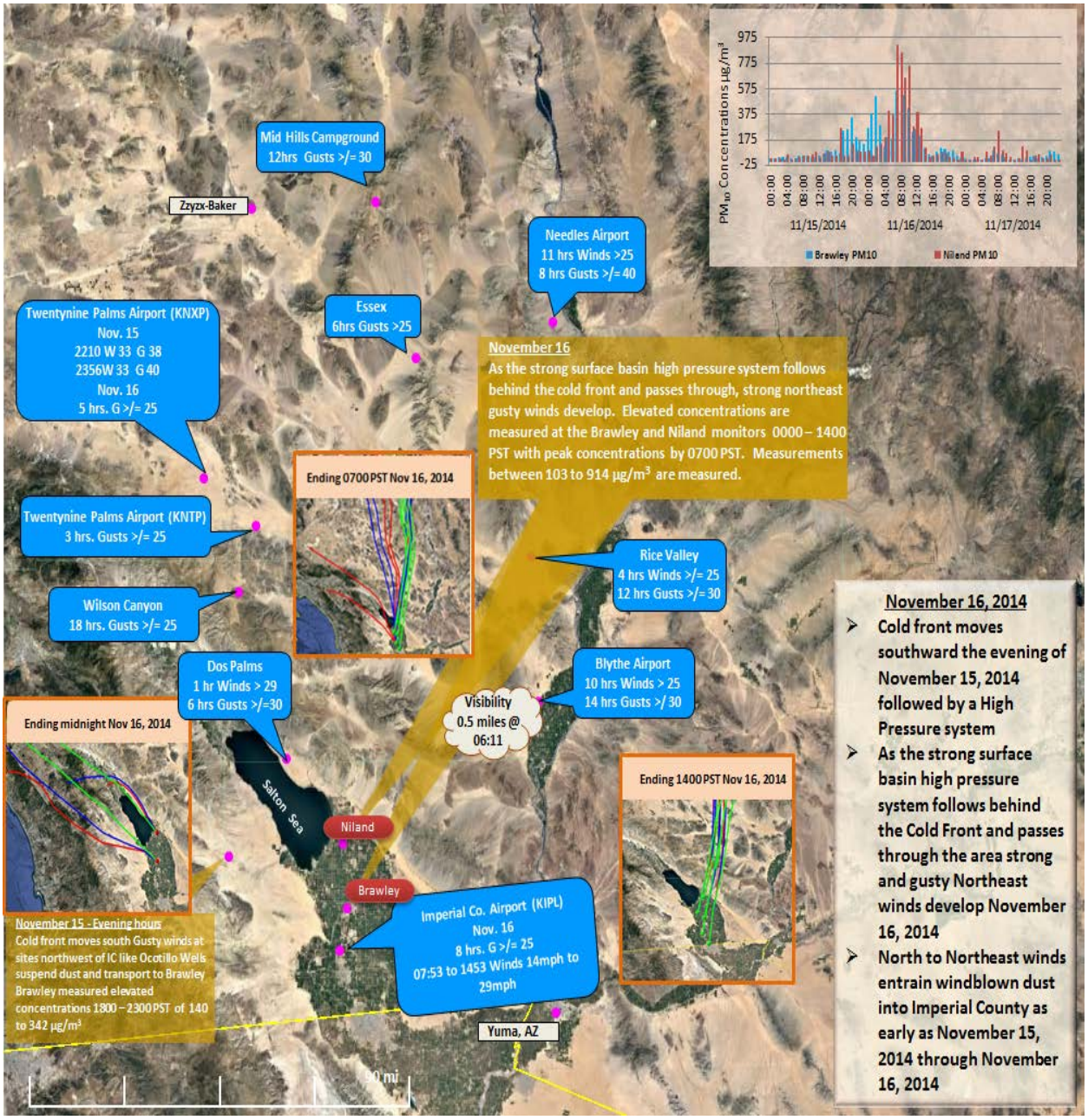


Fig 5-7: is a graphical representation of the conditions that contributed to the exceedance at the Niland and Brawley monitors on November 16, 2014. As early as the evening hours of November 15, 2014 suspended dust particle from areas located to the northwest of Imperial County affected the Brawley monitor. By November 16, 2014 gusty northeast winds suspended and entrained dust into Imperial County from natural areas located in Riverside County and east of Imperial County. Inset summary from NWS San Diego office discussions. Red indicates air movement at 10-meter AGL (above ground level); blue is 100 meters AGL; green is 500 meters AGL. Dynamically generated through NOAA Air Resources Laboratory. Wind data is from the University of Utah's MesoWest system. Air quality data is from the EPA's AQS data bank. Google Earth map

Analysis of the observed NWS issued Wind Advisories, High Wind Warnings, High Wind Watches and Blowing Dust Advisories provides supporting evidence of the regional nature of the wind event.[17] **Figure 5-10** is a graphical depiction of the areas with issued notices by either the Phoenix or San Diego NWS office. The Phoenix NWS office issued a Blowing Dust Advisory for Imperial County and Blythe November 16, 2014.

FIGURE 5-8
NWS WARNING, ADVISORIES AND WATCHES NOVEMBER 16, 2014

Fig 5-8: Due to the intensity of the wind event, the NWS office issued Wind Warning, Watches, Advisories and Blowing Dust Advisories November 16, 2014. Blue flags indicate Wind Advisories or similar. Orange flags indicate Blowing Dust Advisories. Google Earth base map. Notices from the NWS and Iowa Environmental Mesonet

Figures 5-9 through 5-10 depict PM_{10} concentrations and wind speeds over a 72-hour period at Brawley and Niland, November 15, 2014 through November 17, 2014. Fluctuations in hourly concentrations at both monitors show a positive correlation with wind speeds, and gusts, at

[17] A wind advisory is issued when the following conditions are met for one (1) hour or longer: 1) sustained winds of 31 to 39 mph, and/or; 2) wind gusts of 46 to 57 mph for any duration. Source: NWS, 2016; http://www.weather.gov/lwx/WarningsDefined#Wind Advisory. A High Wind Warning is issued when sustained winds of 40 mph or more are expected for 1 hour or longer, or for wind gusts of 58 mph or more with no time limit. A High Wind Watch is issued when these conditions may be met 12 to 48 hours in the future; https://www.weather.gov/oun/spotter-wwa-definitions. Issued when blowing dust is expected to reduce visibility to between 1/4 and 1 mile, generally with winds of 25 mph or greater. Source: https://www.weather.gov/oun/spotter-wwa-definitions.

upstream sites. **Appendix C** contains additional graphs illustrating the relationship between the high PM_{10} concentrations and increased wind speeds from other monitoring sites within Imperial and Riverside counties on November 16, 2014**.**

FIGURE 5-9
BRAWLEY 72 HOUR PM_{10} CONCENTRATIONS AND WIND SPEEDS

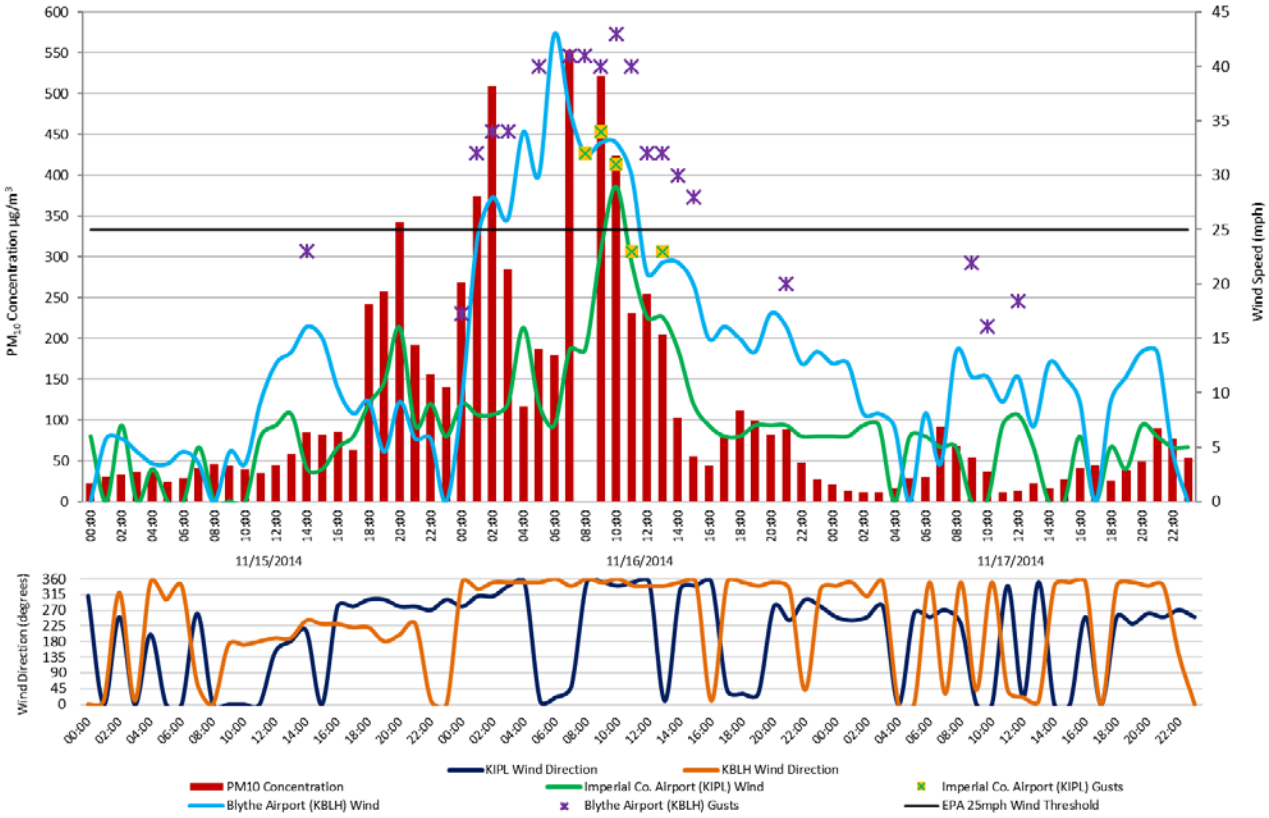


Fig 5-9: While the Brawley site does not measure wind data the use of KIPL is generally sufficient to draw a relative correlation. However, because KIPL is located 10 miles SSW of Brawley and as such downstream from Brawley and because the predominant wind direction affecting the monitor on November 16, 2014 was northeast the Blythe airport (KBLH) which is about 66 miles northeast of Brawley is included as a comparison. Air quality data from the EPA's AQS data bank. KIPL and KBLH wind data from the NCEI's QCLCD system

FIGURE 5-10
NILAND 72 HOUR PM_{10} CONCENTRATIONS AND WIND SPEEDS

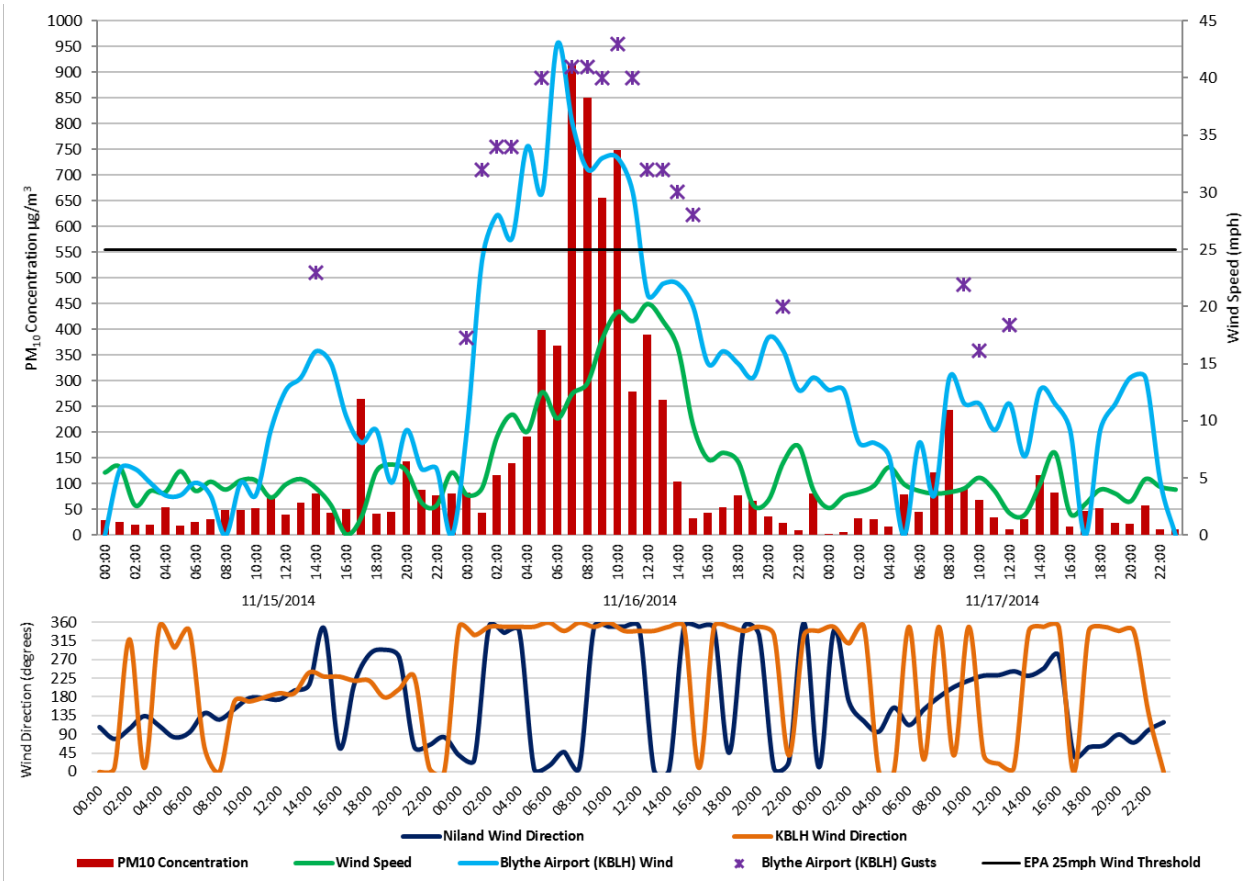


Fig 5-10: Levels of PM_{10} measured at the Niland monitor show a positive correlation with increased wind speeds measured at the Blythe airport (KBLH). KBLH is about 56 miles ENE of the Niland monitor. Air quality and wind data for Niland from the EPA's AQS data bank. Blythe wind data from the NCEI's QCLCD system

Figure 5-11 depicts the combined measured PM_{10} concentrations at the Brawley and Niland monitors and measured wind speeds at select upstream sites over a 72-hour period, November 15, 2014 through November 17, 2014. Both monitors show a positive correlation with increased wind speeds.

FIGURE 5-11
BRAWLEY AND NILAND 72 HOUR WIND SPEEDS OF UPSTREAM SITES

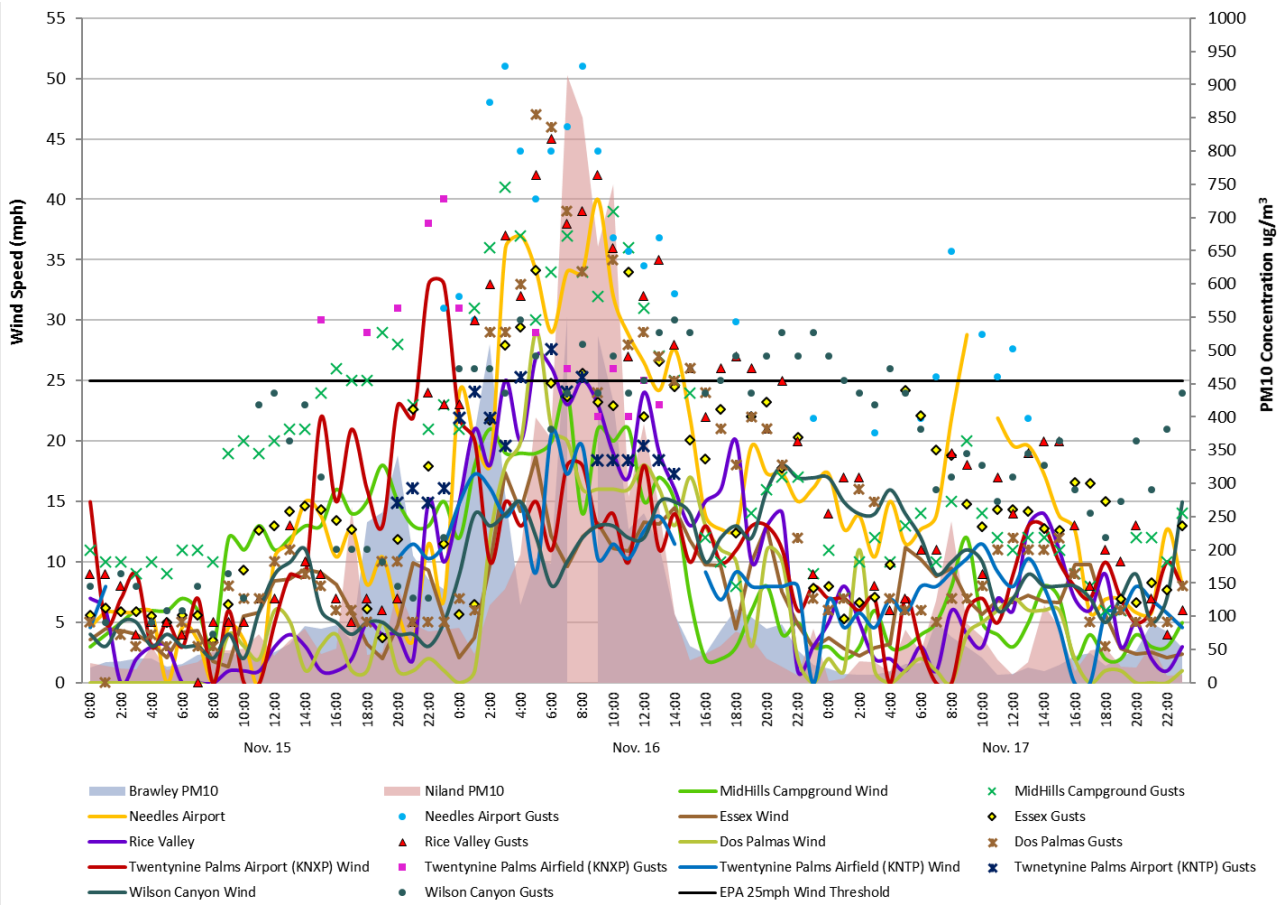


Fig 5-11: is a graph that combine the measured hourly concentrations at the Brawley and Niland monitors and compares them with select upstream sites. Concentrations correlate with elevated wind speeds and gusts. Wind data from the University of Utah's MesoWest system and the NCEI's QCLCD system

Figure 5-12 compares the 72-hour concentrations at the Brawley and Niland monitors and the visibility, November 15, 2014 through November 17, 2014. There is a correlation between the reduced visibility from the Blythe Airport and the Imperial County Airport and the measured hourly concentrations at the Niland and Brawley monitors.[18] As visibility reduced at the Blythe

[18] According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; http://www.nws.noaa.gov/asos/vsby.htm.

Airport, hourly concentrations at both the Brawley and Niland monitors increased, November 16, 2014. Elevated concentrations measured November 15, 2014 are not comparable because the wind direction had a more northwesterly component.

FIGURE 5-12
72 HOUR PM_{10} CONCENTRATIONS AND VISIBILITY AT LOCAL AIRPORTS

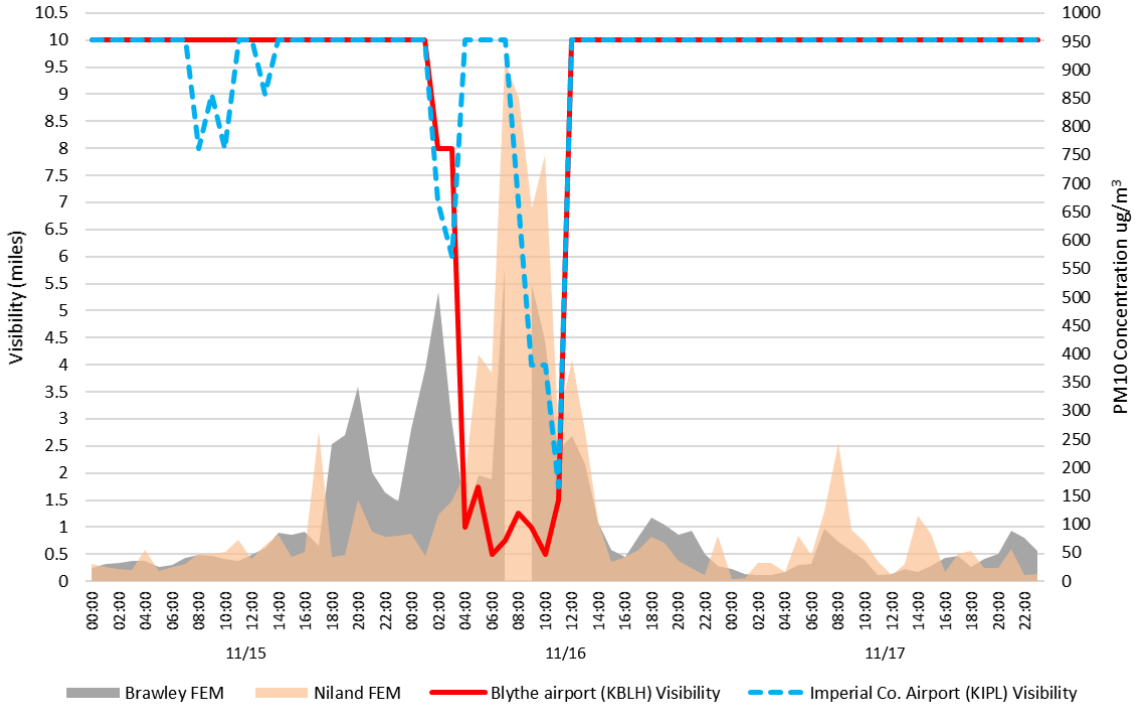


Fig 5-12: Illustrates PM_{10} concentrations relative to visibility at the Blythe Airport (KBLH) and the Imperial County Airport (KIPL). KBLH located northeast of Imperial County illustrates a positive correlation between the elevated concentrations and reduced visibility. Similarly reduced visibility at KIPL, southwest of the Brawley monitor correlates to the midnight elevated concentrations prior to the shift in a predominant wind direction to a more northeasterly direction. Air quality data from the EPA's AQS data bank. Visibility data from the NCEI's QCLCD system and the University of Utah's MesoWest

A blowing dust advisory issued by the Phoenix NWS office, November 16, 2014 at 0637 am PST indicated visibility could potentially reduce to ½ a mile. The identified impact areas included Blythe, Yuma, Brawley, Calexico and El Centro. **Figures 5-13** and **5-14** are the resultant Air Quality Indices[19] (AQI) for Brawley and Niland issued for November 16, 2014. Both Brawley and Niland

[19] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. https://airnow.gov/index.cfm?action=aqibasics.aqi.

show a corresponding drop in air quality as windblown dust entered Imperial County. Category AQI reached Red or "Unhealthy" at both the Brawley and Niland sites during the afternoon hours of November 16, 2014 coincident with the elevated hourly concentrations the previous 24 hours. Neither site reported Green or "Good" air quality November 16, 2014.

FIGURE 5-13
AIR QUALITY INDEX AT BRAWLEY NOVEMBER 16, 2014

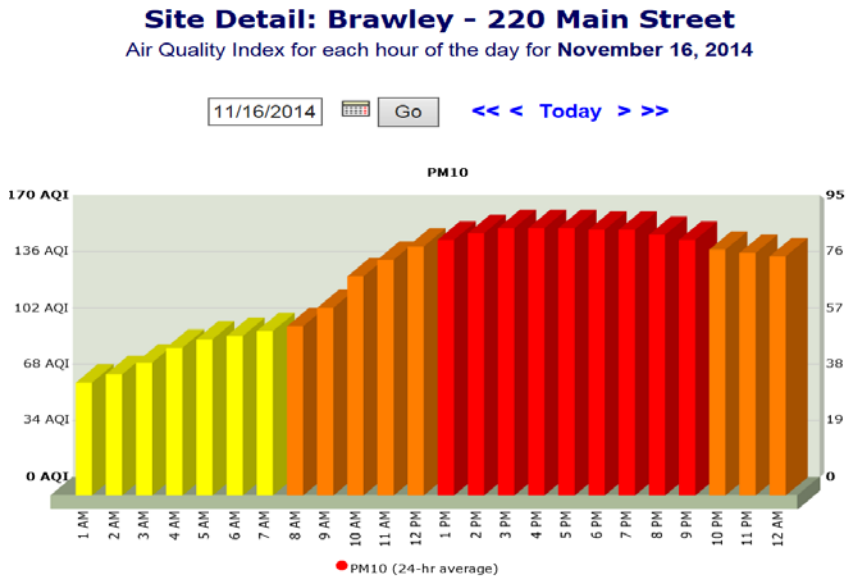


Fig 5-13: Degradation to air quality is evident as the level of the AQI increases

FIGURE 5-14
AIR QUALITY INDEX AT NILAND NOVEMBER 16, 2014

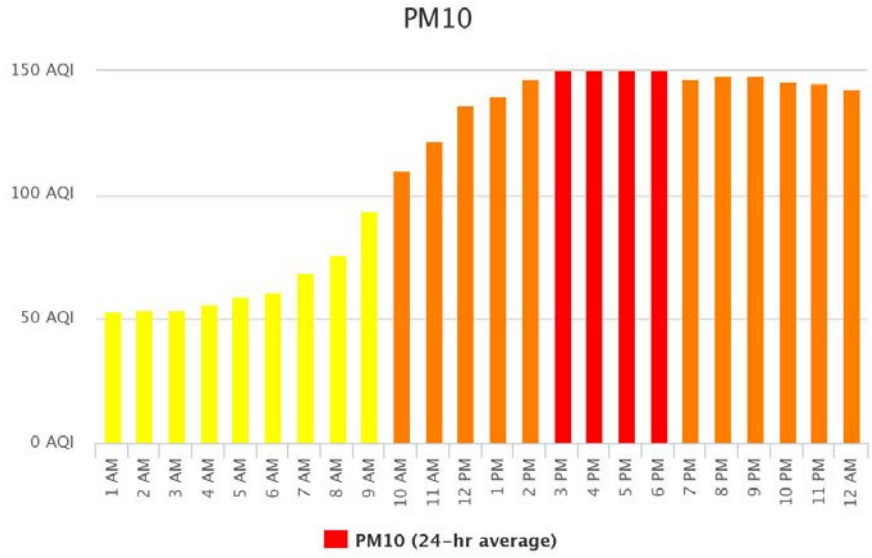


Fig 5-14: Degradation to air quality is evident as the level of the AQI increases

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the strong gusty northeasterly winds that affected nearly all of southern California. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Brawley and Niland monitors on November 16, 2014. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region extending from the natural open areas within the northwestern portion of San Diego County, the northeastern portion of Riverside County, and the natural open areas east of Imperial County. Large amounts of coarse particles (dust) and PM_{10} transported by strong northerly winds into the lower atmosphere caused a change in air quality within Imperial County. The entrained windblown dust originated from natural areas located within Riverside County and potentially as far as San Bernardino County. Combined, the information demonstrates that the elevated PM_{10} concentrations measured on November 16, 2014 coincided with regionally gusty high winds over nearly all of southern California, all of Imperial County, and parts of Arizona.

FIGURE 5-15
NOVEMBER 16, 2014 WIND EVENT TAKEAWAY POINTS

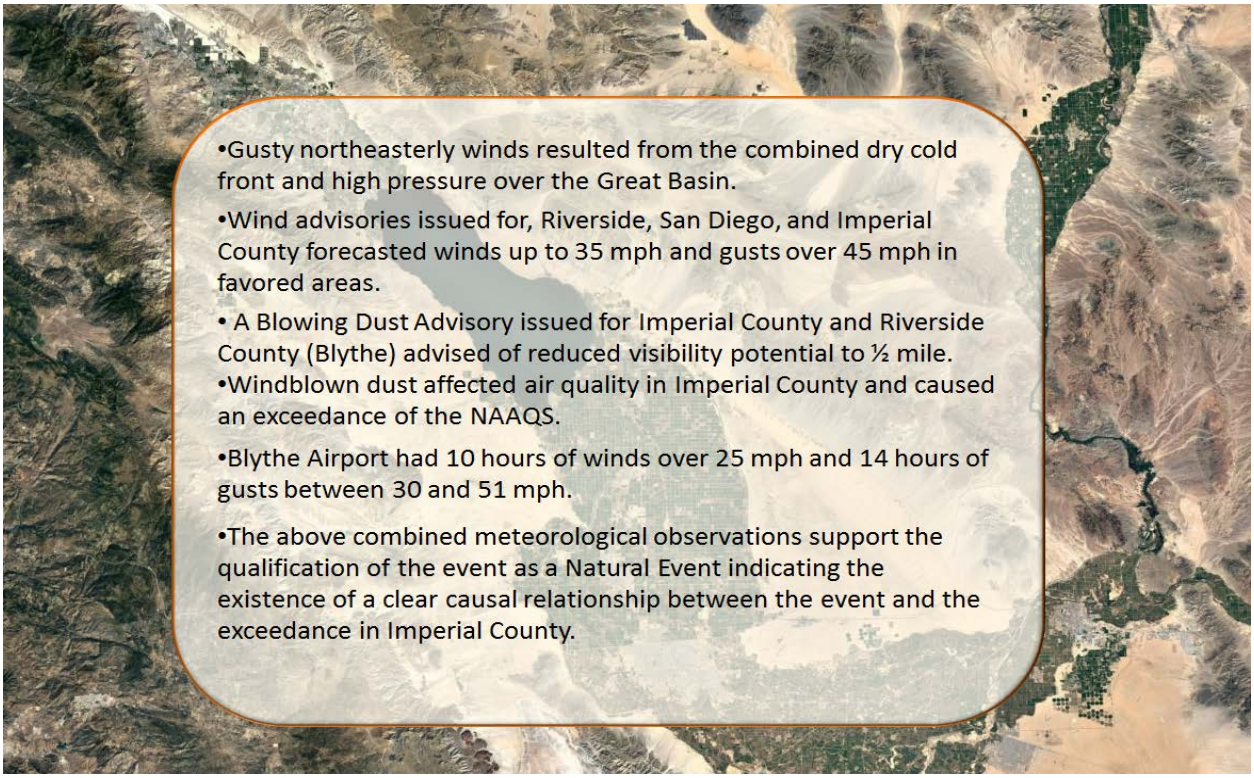


Fig 5-15: Illustrates the factors that qualify the November 16, 2014 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedances that occurred on November 16, 2014, satisfies the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})		DOCUMENT SECTION
1	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)	6-32
2	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	52-69
3	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	34-42
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	44-51
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	21-31; 49-51

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if 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. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the November 16, 2014 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be "not reasonably controllable or preventable" (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The

PM_{10} exceedance measured at the Brawley and Niland monitors caused by naturally occurring strong gusty west winds transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west and southwest of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at the Brawley and Niland monitors on November 16, 2014 were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The criteria that human activity played little or no direct causal role occurs when the event, along with its resulting emissions, are solely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled. As discussed within this demonstration, windblown dust anthropogenic sources reasonably controlled with BACM in and around Brawley and Niland on November 16, 2014 meet the criteria that human activity played little or no direct causal role therefore, the event qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley and Niland during different days, and the comparative analysis of different monitors in Imperial and Riverside counties demonstrates a consistency of elevated gusty westerly winds and concentrations of PM_{10} on November 16, 2014 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty northeasterly winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty westerly winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown dust emissions to the exceedance on November 16, 2014.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} values measured at the Brawley and Niland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1)(i))

This section contains wind advisories, weather forecasts, and other notices issued by the NWS on November 15, 2014 and November 16, 2014. In addition, this Appendix contains the air quality alert issued by the ICAPCD advising sensitive receptors of potentially unhealthy conditions in Niland and Brawley due to windblown dust. The weather notices reinforce the regional extent of the high wind event.

Appendix B: Meteorological Data.

This Appendix contains individual station graphs, wind roses, and a wind site map for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM_{10} concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the regional impact by the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.