IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Coachella Valley Preserve, in the Colorado Desert:
https://en.wikipedia.org/wiki/Deserts_of_California#/media/File:CoachellaValleyPreserve.jpg

April 16, 2018
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

An exceedance of the National Ambient Air Quality Standard (NAAQS) for PM_{10} at the Brawley, Calexico, El Centro, Niland and Westmorland monitors in Imperial County, California on April 16, 2018

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ACRONYM DESCRIPTIONS

AOD	Aerosol Optical Depth
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)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
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)
PST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
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
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

In 2007, the United States Environmental Protection Agency (US EPA) adopted the "Treatment of Data Influenced by Exceptional Events Rule" (EER)[1] to govern the review and handling of certain air quality monitoring data for which the normal planning and regulatory processes are not appropriate. Under the terms of the EER, the US EPA may exclude monitored exceedances of the National Ambient Air Quality Standard (NAAQS) if a State adequately demonstrates that an exceptional event caused the exceedance.

The 2016 revision to the EER added sections 40 CFR §50.1(j)-(r) [Definitions], 50.14(a)-(c) and 51.930(a)-(b) to 40 Code of Federal Regulations (CFR). These sections contain definitions, criteria for US EPA concurrence, procedural requirements and requirements for State demonstrations. The demonstration must satisfy all of the rule criteria for US EPA to concur with the requested exclusion of air quality data from regulatory decisions.

Title 40 CFR §50.14(c)(3)(iv) outlines the elements that a demonstration must include for air quality data to be excluded:

TABLE 1-1 TITLE 40 CFR §50.14(c)(3)(iv) 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)	Pg. 9
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	Pg. 17
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	Pg. 26
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	Pg. 37
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	Pg. 44

[1] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

Aside from the above, a State must demonstrate that it has met several procedural requirements during the demonstration process, including:

	TABLE 1-2 PROCEDURAL CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})	DOCUMENT SECTION
1	**Public Notification [40 CFR §50.14(c)(1)]** – In accordance with mitigation requirement at 40 CFR 51.930(a)(1), notification to the public promptly whenever an event occurs or is reasonably anticipated to occur which may result in the exceedance of an applicable air quality standard	Pg. 3. and Appendix C
2	**Initial Notification of Potential Exceptional Event [40 CFR §50.14(c)(2)]** - Submission to the Administrator of an Initial Notification of Potential Exceptional Event and flagging of the affected data in US EPA's Air Quality System (AQS) as described in 40 CFR §50.14(c)(2)(i),	Pg. 3
3	**Public Comment Process [40 CFR §50.14(c)(3)(v)]** - Documentation of fulfillment of the public comment process described in 40 CFR §50.14(c)(3)(v), and	Pg. 4 and Appendix C
4	**Mitigation of Exceptional Events [40 CFR §51.930]** - Implementation of any applicable mitigation requirements (Mitigation Plan) as described in 40 CFR §51.930	Pg. 4

The Imperial County Air Pollution Control District (ICAPCD) has been submitting criteria pollutant data since 1986 into the US EPA's Air Quality System (AQS). In Imperial County, prior to 2017, Particulate Matter Less Than 10 Microns (PM_{10}) was measured by either Federal Reference Method (FRM) Size Selective Instruments (SSI) or Federal Equivalent Method (FEM) Beta Attenuation Monitor's, Model 1020 (BAM 1020). Effective 2017 Imperial County stopped utilizing FRM instruments relying solely on BAM 1020 monitors to measure PM_{10}. It is important to note that the use of non-regulatory data within this document, typically continuous PM_{10} data prior to 2013, measured in local conditions, does not cause or contribute to any significant differences in concentration difference or analysis.

As such, this report demonstrates that a naturally occurring event caused an exceedance observed on Monday, April 16, 2018 which elevated particulate matter within San Diego, Riverside and Imperial Counties and affected air quality. The analyses contained in this report includes regulatory and non-regulatory data that provides support for the elements listed in **Table 1-1** and **Table 1-2**. This demonstration substantiates that this

event meets the definition of the US EPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[2].

I.1 Public Notification [40 CFR §50.14(c)(1)]

The ICAPCD utilizes a web-based public notification process to alert the public of forecasted weather conditions and potential changes in ambient air concentrations that may affect the public. The ICAPCD identifies these public notifications as Advisory Events. On Monday, April 16, 2018 the ICAPCD published on its webpage a forecast synopsis from both the San Diego and Phoenix NWS offices advising the public that high winds caused by a low pressure system moving inland along the West Coast had the potential to suspend particulate matter into the air. Included in the advisory, were a High Wind Warning for the mountains and deserts of San Diego County and a Wind Advisory for Imperial County. **Appendix C** contains copies of notices pertinent to the April 16, 2018 event.

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

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. The notification process identified within the EER as the Initial Notification of Potential Exceptional Event (INPEE) is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

On Monday, April 16, 2018, a naturally occurring event elevated particulate matter within San Diego, Riverside and Imperial Counties, causing an exceedance at the Brawley (06-025-0007), Calexico (06-025-0005), El Centro (06-025-1003), Niland (06-025-4004), and Westmorland (06-025-4003) air quality monitoring stations. Subsequently, the ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM_{10} hourly concentrations from the Brawley, Calexico, El Centro, Niland, and Westmorland monitors on April 16, 2018. After review, CARB submitted the INPEE, for the April 16, 2018 event in July of 2019. The submitted request included a brief description of the meteorological conditions for April 16, 2018 indicating that a potential natural event occurred. The ICAPCD has engaged in discussions with US EPA Region IX regarding the demonstration prior to formal submittal.

[2] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

I.3 Public Comment Process [40 CFR §50.14(c)(3)(v)(A-C)]

(A) The CARB and USEPA have reviewed and commented on the draft version of the April 16, 2018 exceptional event prepared by the ICAPCD. After addressing all substantive and non-substantive comments by both CARB and USEPA the ICAPCD has published a notice of availability in the Imperial Valley Press announcing a 30-day public review process. The published notice invites comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 407 µg/m^3 measured by the Brawley monitor; 407 µg/m^3 measured by the Calexico monitor; 173 µg/m^3 measured by the El Centro monitor; 222 µg/m^3 measured by the Niland monitor; and 351 µg/m^3 measured by the Westmorland monitor on April 16, 2018.

(B) Concurrently with the Public Review period for the April 16, 2018 exceptional event, the ICAPCD is formally submitting to CARB for remittance to USEPA the Final April 16, 2018 exceptional event.

(C) Upon the ending of the review period the ICAPCD will remit to CARB and USEPA all comments received during the Public Review period along with a formal letter addressing any comments that dispute or contradict factual evidence in the demonstration.

The ICAPCD acknowledges that with the submittal to US EPA of the 2018 exceptional events, there is supporting evidence of documented recurring seasonal events that affect air quality in Imperial County.

I.4 Mitigation of Exceptional Events [40 CFR §51.930]

According to 40 CFR §51.930(b) all States having areas with historically documented or known seasonal events, three events or event seasons of the same type and pollutant that recur in a 3-year period, are required to develop and submit a mitigation plan to the US EPA.

The ICAPCD received notice from US EPA September 15, 2016 identifying Imperial County as an area required to develop and submit a mitigation plan within two years of the effective date, September 30, 2016, of the final published notification to states with areas subject to mitigation requirements. On September 21, 2018, after notice and opportunity for public comment the ICAPCD submitted the High Wind Exceptional Event Fugitive Dust Mitigation Plan (Mitigation Plan) for review and verification. Subsequently, on November 28, 2018 CARB received verification from US EPA of its review and approval of the

Mitigation Plan. For a copy of the Mitigation Plan visit the Imperial County Air Pollution Control District website at
https://www.co.imperial.ca.us/AirPollution/otherpdfs/MitigationPlan.pdf

The Imperial County Mitigation Plan contains important geographical and meteorological descriptions, pages 3 through 6, of the areas within Imperial County and the surrounding areas that are sources of transported fugitive dust. **Figure 1-1** helps depict the geological aspects that are within Imperial County and outside of Imperial County that affect air quality.

Essentially, the Anza-Borrego Desert State Park, which lies in a unique geologic setting along the western margin of the Salton Trough, extends north from the Gulf of California (Baja California) to the 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. These areas are sources of transported fugitive dust emissions into Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increase in wind speeds.

During the monsoonal season, natural open desert areas to the east, southeast, and south of Imperial County are sources of transported fugitive dust emissions when thunderstorms cause outflows to blow winds across natural opens desert areas within Arizona and Mexico.

FIGURE 1-1
IMPERIAL COUNTY

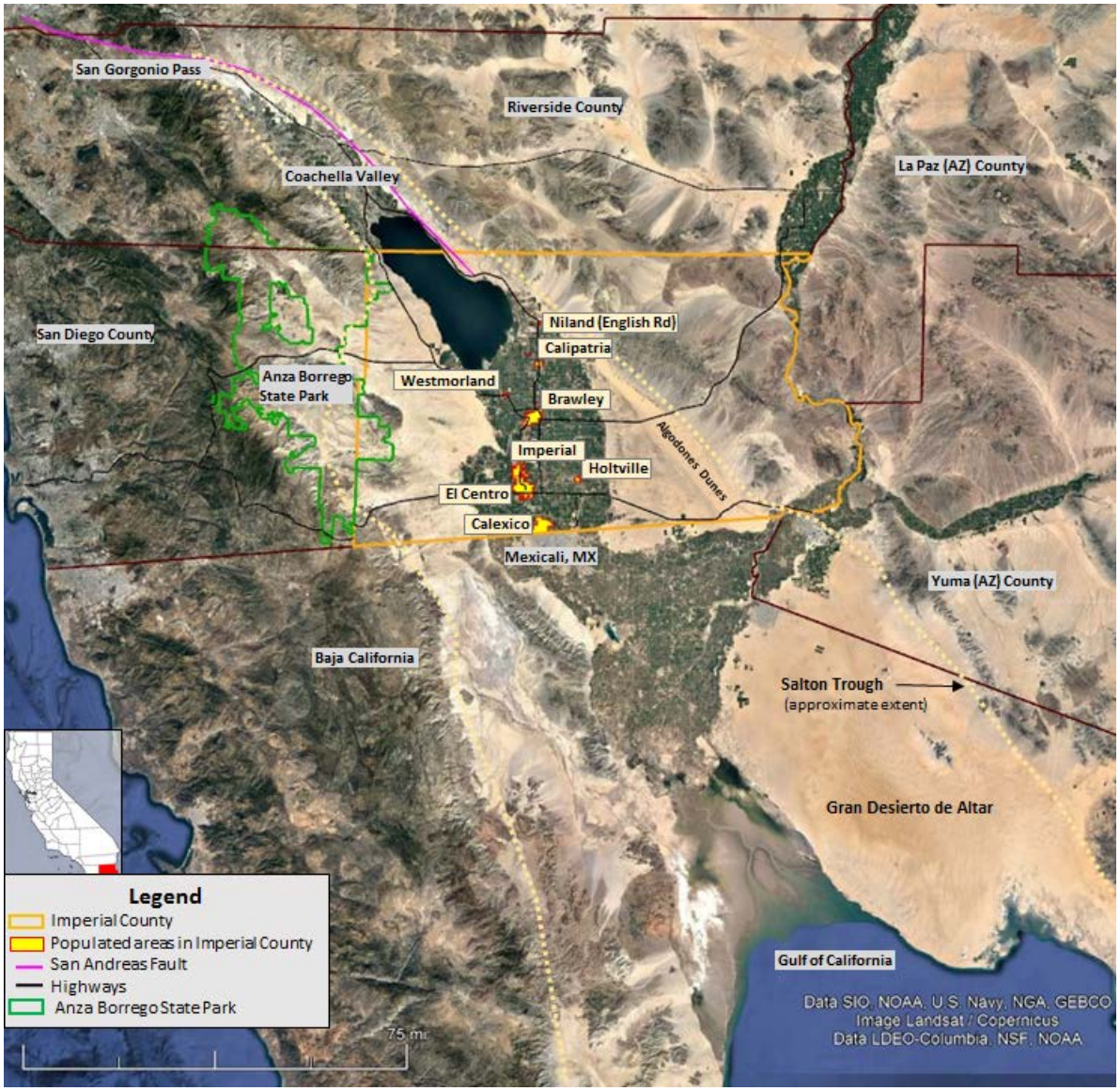


Fig 1-1: Imperial County a Southern California border region, within far southeast California bordering Arizona and Mexico has a small economically diverse region with a population of 174,528

Likewise, the Mitigation Plan contains a high wind event meteorological analysis broken down into four types of seasonal natural occurrences that cause elevated particulate matter that affects Imperial, San Diego, Riverside and Yuma Counties. The historical analysis has defined the meteorological events that lead to high winds and elevated PM_{10} events in Imperial County, page 7, as follows:

- **Type 1:** Pacific storms and frontal passages;
- **Type 2:** Strong pressure and surface pressure gradients;
- **Type 3:** Monsoonal Gulf Surges from Mexico; thunderstorm downburst, outflow winds and gust fronts from thunderstorms
- **Type 4:** Santa Ana wind events

A complete description of these events begins on page 8 of the Mitigation Plan. While there is some overlap in discussed components between the Mitigation Plan and this demonstration such as the public notification process and the warning process, the Mitigation Plan does elaborate a little further. The Mitigation Plan discusses in detail the educational component, the notification component, the warning component and the implementation of existing mitigation measures, such as Regulation VIII.

Finally, the Mitigation Plan contains a complete description of the methods, processes and mechanisms used to minimize the public exposure, page 14, retain historical and real-time data, page 15, and the consultation process with other air quality managers to abate and minimize air impacts within Imperial County, page 16.

In all, the Mitigation Plan helps explain the recurring events, by type and influence upon Imperial County and provides supporting justification of a natural event.[3]

[3] Title 40 Code of Federal Regulations §50.1 (k) defines a Natural Event as meaning 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.

FIGURE 1-2
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

Fig 1-2: Depicts a select group of PM_{10} monitoring sites in Imperial County, eastern Riverside County, and southwestern Arizona (Yuma County). Generated through Google Earth

II Conceptual Model – A narrative that describes the event causing the exceedance and a discussion of how emissions from the event led to the exceedance at the affected monitors

II.1 Description of the event causing the exceedance

Days before and during Monday, April 16, 2018 the National Weather Service (NWS) offices in Phoenix and San Diego issued Area Forecast Discussions describing a Pacific low pressure system and associated cold front that was forecast to move inland along the West Coast and pass through southeast California Monday afternoon and across Arizona Monday night.[4] As a result onshore gradients increased creating gusty westerly winds along the mountains and deserts within San Diego County with the strongest winds during the evening hours of April 16, 2018.[5] The severity of the winds caused the NWS to issue seventeen (17) Urgent Weather Message for the mountains and deserts of San Diego County and for Imperial County that advised of advisory level winds within Riverside, San Diego, Imperial and Yuma counties.[6] In addition, the Phoenix NWS office issued blowing dust advisories for Imperial and Yuma counties.[7] **Appendix A** contains all pertinent NWS notices.

The event was best described by the NWS Phoenix office within its early dawn Area Forecast Discussion issued April 16, 2018.

> "…A band of mid-/upper-level cloudiness continues to spread northeastward from the Pacific, ahead of a storm system off the coast of northern California…The more significant impact will be the increasing wind speeds across the area. Forecast models indicate a significant strengthening in flow within the H5-7 layer will occur this afternoon as the upper-level disturbance accelerates east of the area. Diurnal mixing beneath the increasing flow aloft, along with a tightening gradient in response to rapid pressure falls across the eastern Great Basin and northern Rockies, will result in increasing wind speeds this afternoon. The most notable signal for strong winds remains across southeast California into the lower Colorado River Valley, where gusts in excess of 40 mph will be possible this afternoon…."[8]

II.2 How emissions from the event led to an exceedance

On April 16, 2018, the air monitors in Imperial, Riverside and Yuma counties measured elevated concentrations of particulate matter when a forecasted low pressure system and

[4] National Weather Service, Area Forecast Discussion, Apr. 15, 2018, Phoenix office, 333am MST
[5] National Weather Service, Area Forecast Discussion, Apr. 15, 2018, San Diego office, 344am PDT
[6] National Weather Service, Urgent Weather Message, Apr. 14, 2018 to Apr. 17, 2018, both the San Diego and Phoenix offices
[7] National Weather Service, Urgent Weather Message, Apr. 16, 2018 to Apr. 17, 2018, 715pm MST, 753pm MST and 1254am MST
[8] National Weather Service, Area Forecast Discussion, Apr. 16, 2018, Phoenix office, 318am MST

associated cold front moved inland from the Pacific coast over California bringing gusty westerly winds across southeastern California. The strong gusty westerly winds associated with the system generated emissions from within the open mountain ranges and surrounding open natural deserts within San Diego and Imperial Counties. These windblown dust emissions were transported to all the Imperial County regional air quality monitors causing an exceedance of the PM_{10} NAAQS (**Table 2-1**).

FIGURE 2-1
MONITORING AND METEOROLOGICAL SITES

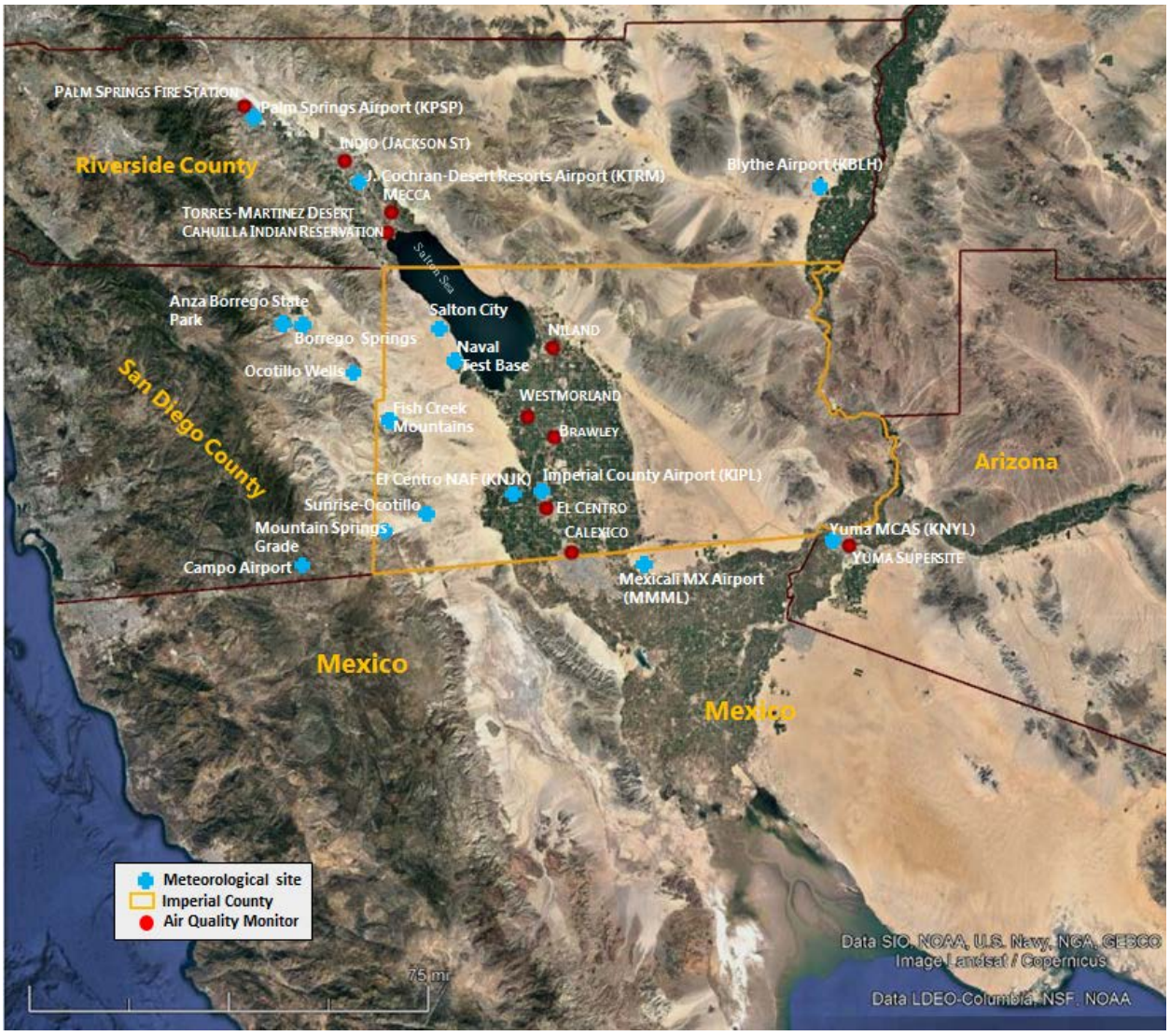


Fig 2-1: Includes a general location of the sites used in this analysis. The site furthest south is in Mexicali, Mexico and the site furthest north is the Palm Springs Fire Station

TABLE 2-1
HOURLY CONCENTRATIONS OF PARTICULATE MATTER

SITE	DATE	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Hrly MAX	24-HR AVERAGE
PALM SPRINGS FIRE STATION	20180415	28	28	24	21	22	21	36	12	16	20	23	23	21	24	24	25	28	31	25	27	21	19	16	15	36	22
	20180416	15	12	16	18	17	20	26	25	18	18	27	46	38	78	133	120	57	46	39	73	80	62	41	18	**133**	43
	20180417	24	31	19	8	11	14	11	10	10	11	6	10	4	7	7	5	7	10	7	12	8	5	9	10	31	10
INDIO	20180415	31	34	62	32	34	34	37	28	40	28	33	26	29	22	31	33	28	32	49	31	28	27	24	36	62	32
	20180416	23	32	24	16	17	19	27	32	19	13	21	254	481	453	951	982	696	767	794	366	86	67	56	33	**982**	259
	20180417	25	29	30	4	8	11	22	11	6	15	8	7	123	16	7	5	9	7	9	11	21	15	11	9	123	17
MECCA	20180415	59	25	56	64	22	33	34	61	38	24	8	47	16	18	29	30	28	36	61	27	36	32	23	19	64	34
	20180416	17	17	30	11	20	29	46	61	30	21	10	21	22	44	178	263	237	478	479	972	927	152	177	69	**972**	179
	20180417	29	28	37	18	20	28	23	22	5	12	23	49	33	8	16	16	9	14	59	15	39	60	16	25	60	25
TORRES-MARTINEZ TRIBAL	20180415	31	35	32	30	37	41	58	87	51	69	25	24	27	25	27	33	31	33	25	34	61	62	25	19	87	38
	20180416	16	23	26	28	24	31	56	73	59	52	18	33	23	375	118	340	778	932	250	347				1240	**1240**	230
	20180417	36	20	19	17	22	140	32	18	21	20	18	67	89	10	16	17	8	15	30	40	32	3	31	18	140	30
WESTMORLAND	20180415	45	37	26	28	29	114	92	56	46	30	28	36	38	37	37	40	40	41	49	44	44	40	41	31	114	43
	20180416	27	23	24	69	121	142	71	39		45	33	45	301	626	411	638	618	973	995		804	767	647	303	**995**	351
	20180417	109	124	23	15	15	26	29	29	36	20	24	20	16	22	13	11	13	29	22	34	31	16	7	16	124	29
NILAND	20180415	17	26	30	25	24	17	106	32	33	40	32	35	31	31	29	37	47	74	38	46	85	76	61	24	106	41
	20180416	29	29	18	22	50	44	53	54	51		73	55	40	57	154	104	165	737	508	995	995	759	80	36	**995**	222
	20180417	45	18	16	11	16	19	31	20	15	18	19	16	10	23	13	9	9	13	19	21	15	21	26	17	45	18
BRAWLEY	20180415	52	38	31	26	24	40	46	36	38	28	27	28	36	38	37	41	31	46	38	41	48	44	75	40	75	38
	20180416	19	30	11	25	80	240	64	67	64	39	39		151	503	703	995	995	625	830	995	995	640	397	855	**995**	407
	20180417	226	94	27	19	17	40	30	28	32	23	23	18	14	17	13	12	11	16	19	26	22	10	23	26	226	32
EL CENTRO	20180415	27	21	18	24	28	35	70	29	30	35	103	42	48	59	56	43	60	38	32	24	35	35	34	34	103	40
	20180416	37	28	45	26	73	162	76	42	43	42	32	20	26	42	124	102	183	408	468	995	965	139	63	30	**995**	173
	20180417	284	154	188	307	78	26	37	33	41	29		29	25	21	15	13	14	13	17	31	27	18	21	9	307	62
CALEXICO	20180415	77	57	45	26	38	89	199	120	58	51	48	58	55	45	35	39	42	50	45	39	48	30	34	41	199	57
	20180416	42	34	34	39	84	91	45	148	114	57	31	42	65	78	94	97	196	154	250	922	1373	4621	930	230	**4621**	407
	20180417	661	356	550	126	27	23	27	31	28	27		32	33	31	24	16	14	26	45	42	68	69	140	79	661	107
YUMA AZ SUPERSITE (PST)	20180415	52	42	66	51	56	50	31	29	30	18	14	14	17	19	16	25	35	34	42	44	41	36	34	46	66	35
	20180416	25	22	34	30	57	61	72	78	105	92	52	51	45	40	40	44	34	30	135	847	836	980	1029	530	**1029**	219
	20180417	450	166	75	59	55	38	46	52	35	52	34	48	41	35	52	25	14	16	24	22	20	27	27	24	450	59
YUMA AZ SUPERSITE (MST)	20180415	64	52	42	66	51	56	50	31	29	30	18	14	14	17	19	16	25	35	34	42	44	41	36	34	66	35
	20180416	46	25	22	34	30	57	61	72	78	105	92	52	51	45	40	40	44	34	30	135	847	836	980	1029	**1029**	199
	20180417	530	450	166	75	59	55	38	46	52	35	52	34	48	41	35	52	25	14	16	24	22	20	27	27	530	80

Color coding information – **Red bold** highlighted sites indicate sites that exceeded the NAAQS. **Bold Blue** dates indicate date of Exceptional Event. **Red fill and Red bold** hourly concentrations represent concentrations above 100 µg/m^3. Pink squares around concentrations identify peak hourly concentrations

FIGURE 2-2
CONCENTRATIONS FOR ALL SITES LISTED IN TABLE 2-1

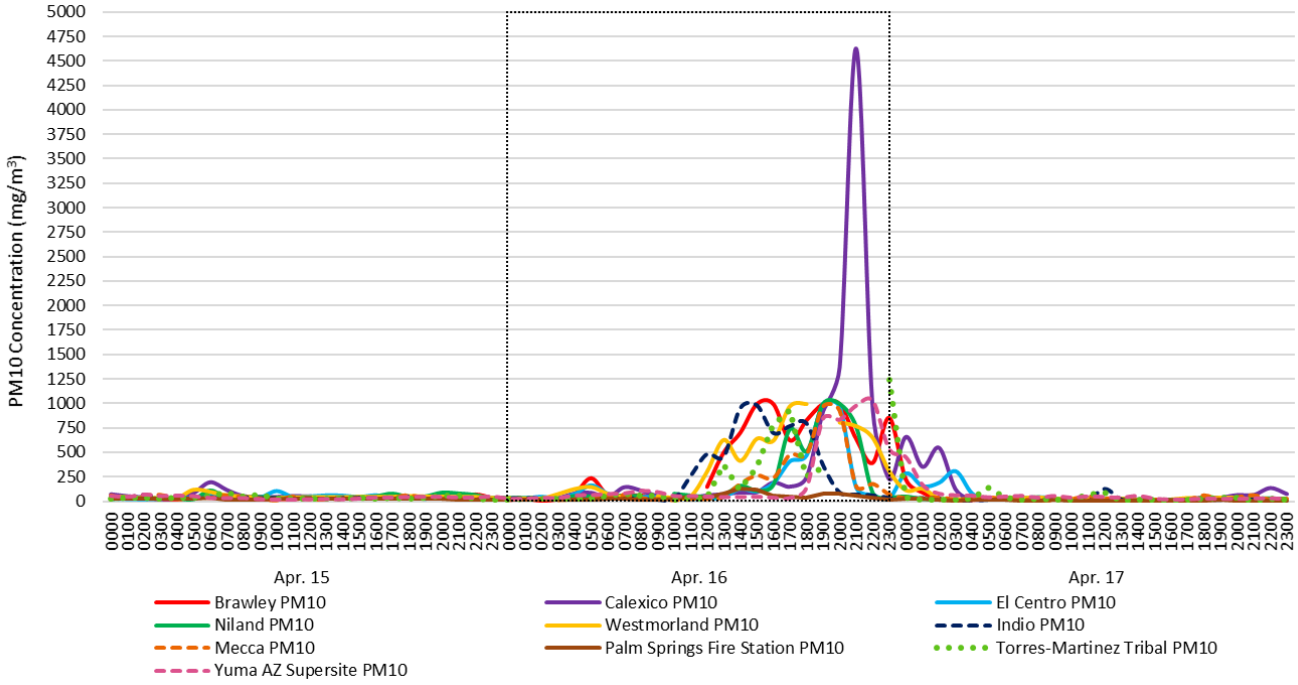


Fig 2-2: is a three-day graphical representation of the PM_{10} concentrations measured at the sites identified in **Table 2-1**. Note that nearly all of the monitors depicted, and in particular those in Imperial County, have high hourly concentrations on April 16, 2018 (boxed area)

Wind speed, wind direction and airflow patterns combined all help explain how windblown emissions resulting from the strong gusty westerly winds affected the all of the monitors in Imperial County on Wednesday, April 16, 2018.

As mentioned above, the early weather forecast notices and advisories issued by both the San Diego and Phoenix NWS offices indicated that a strong Pacific low pressure and associated cold front moving inland would increase the onshore pressure gradient and produce strong gusty westerly winds across the desert southwest. As mentioned above, seventeen (17) Urgent Weather Messages were issued by the NWS office in San Diego and Phoenix advising of advisory level westerly winds within the San Diego Mountains and deserts and Imperial County (**Appendix A**).

Figures 2-3 and 2-4 depict the compiled wind data for regional and neighboring airports and upstream sites. Airports within Imperial, Riverside, San Diego and Yuma counties as well as sites further west, measured wind speeds at or above 25 mph or measured wind gusts at or above 25 mph, coincident with measured elevated concentrations.

FIGURE 2-3
LOCAL AND VICINITY AIRPORT WIND SPEEDS AND GUST

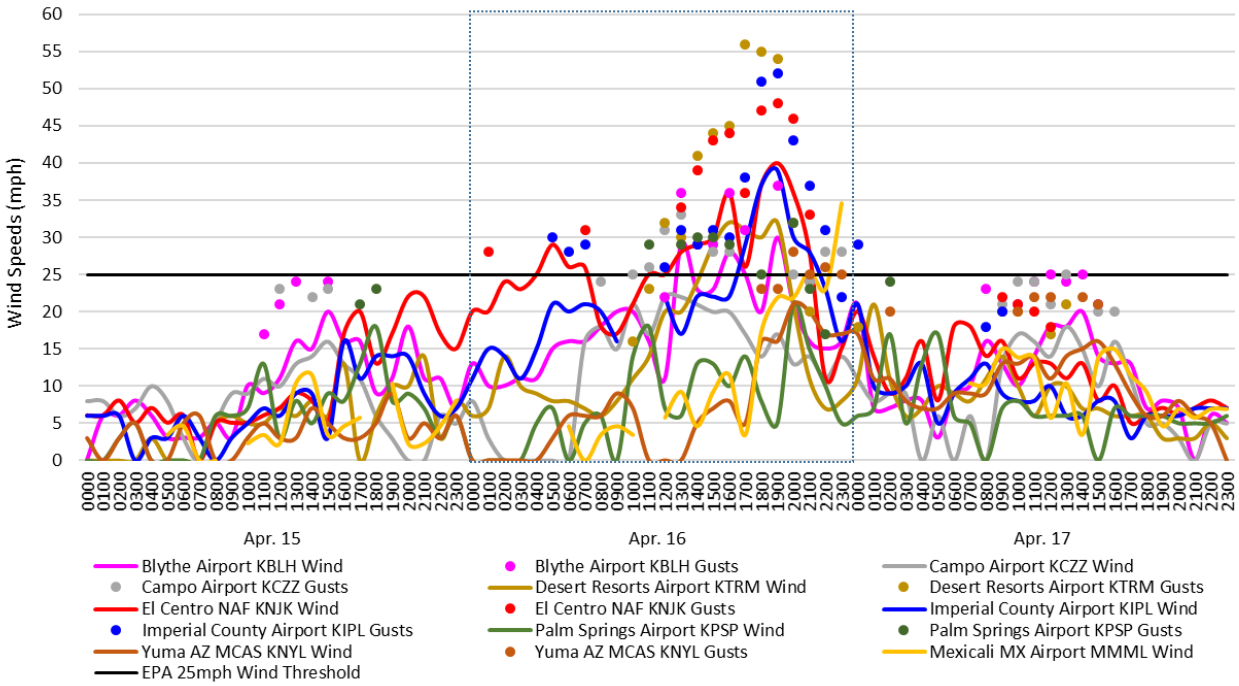


Fig 2-3: is a three-day graphical representation of the measured wind speed and wind gust (if available) from local and neighboring airports. All data derived from the Local Climatological Data Hourly Observations (LCDHO) reports released by the NOAA https://www.ncdc.noaa.gov/. MMML is from the University of Utah's Meso West https://mesowest.utah.edu/index.html

FIGURE 2-4
WIND SPEEDS AND GUST UPSTREAM SITES

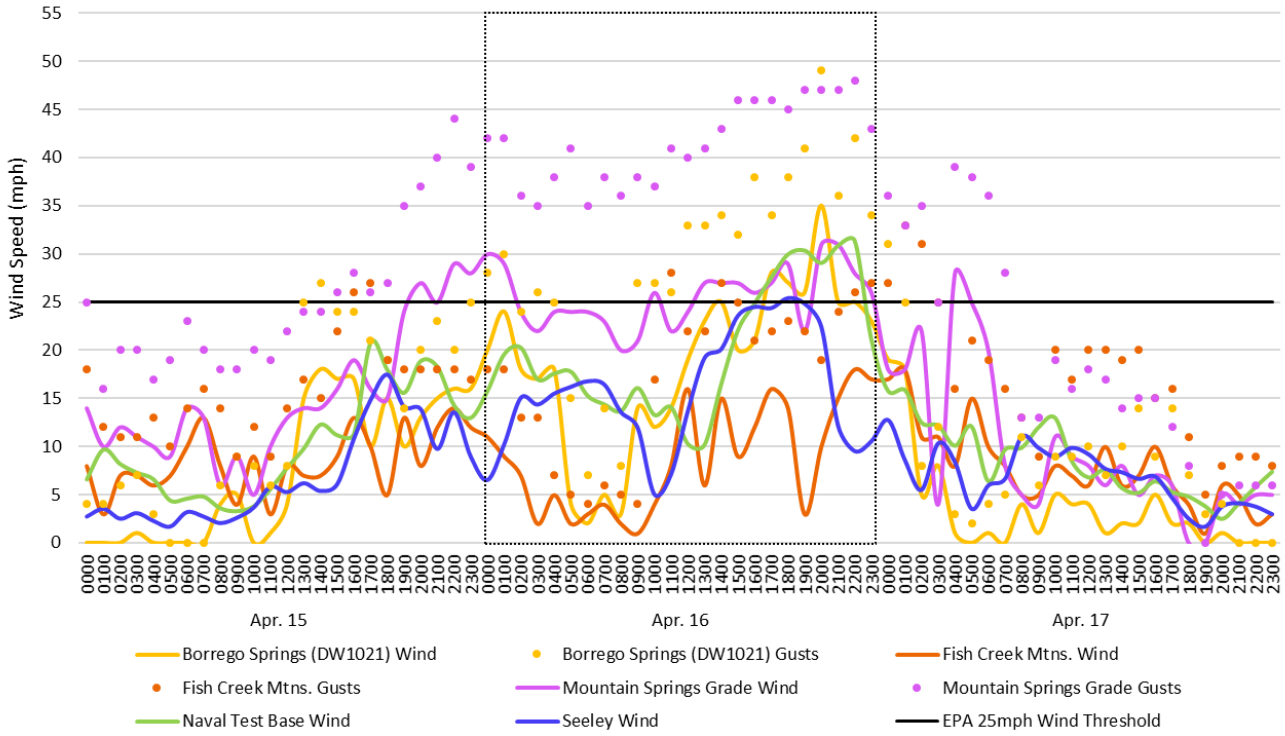


Fig 2-4: is a three-day graphical representation of the measured wind speed and wind gust (if available) from sites located upwind from the monitors in Imperial County. All data derived from the University of Utah's Meso West https://mesowest.utah.edu/index.html

The National Oceanic and Atmospheric Administration (NOAA) Laboratory HYSPLIT back-trajectory models[9] provide supporting evidence of the westerly airflow within Imperial County on April 16, 2018. As an evening event, the HYSPLIT back-trajectory models in **Figures 2-5 and 2-6** depict the airflow during the mid-day hour (1200 PST) and evening (1900 PST) to help illustrate the shift of airflow from a southwesterly direction, to a due west direction.

Figure 2-5 depicts the general airflow from a southwest direction coincident with elevated concentrations above 100 µg/m^3 at the Westmorland, and Brawley monitors. **Figure 2-6** depicts the evening due west airflow coincident with peak hourly measured concentrations at the Brawley, Niland and El Centro monitors.

[9] 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 2-5
HYSPLIT MODEL All SITES APRIL 16, 2018 1200 PST

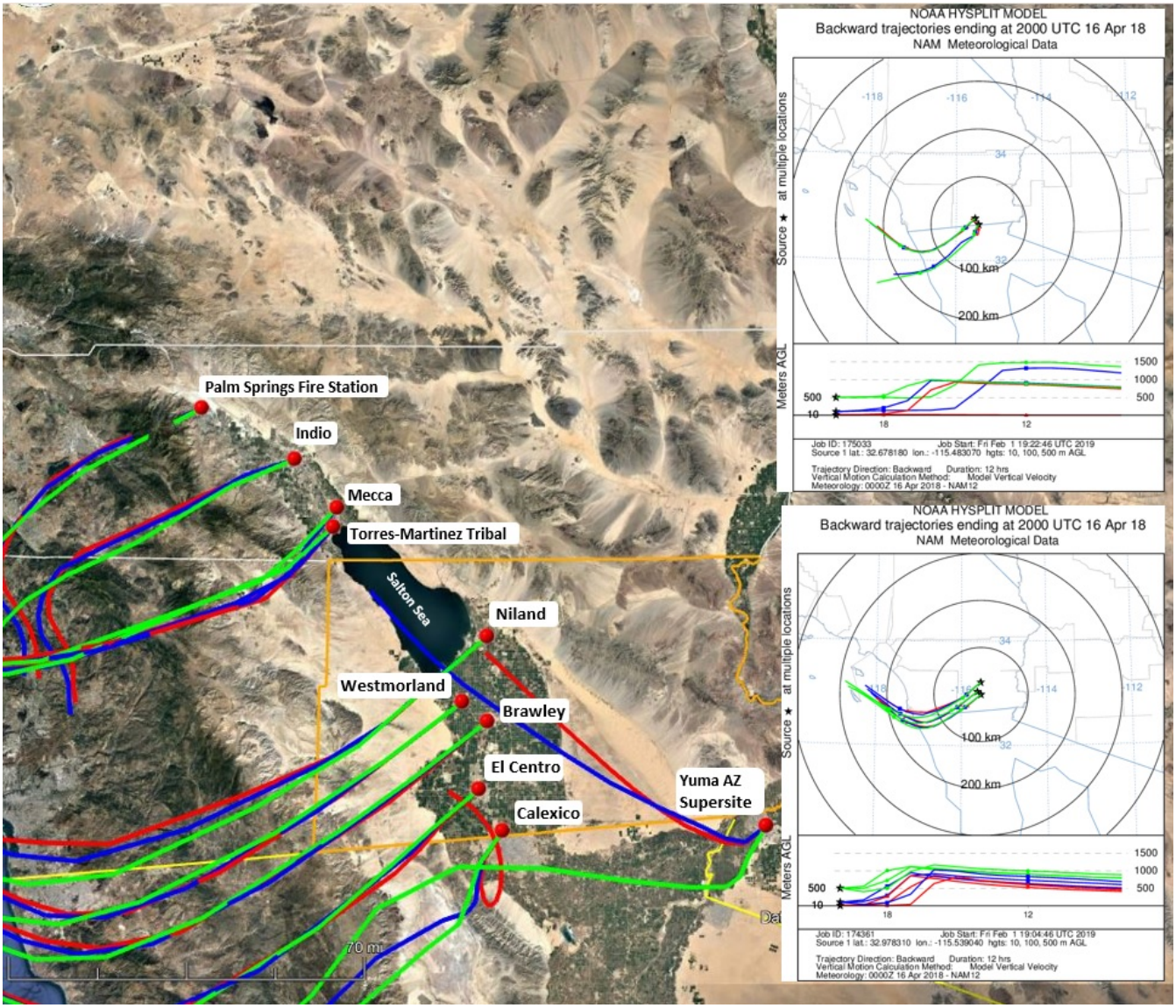


Fig 2-5: A 12-hour HYSPLIT back-trajectory ending at 1200 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

FIGURE 2-6
HYSPLIT MODEL All SITES APRIL 16, 2018 1900 PST

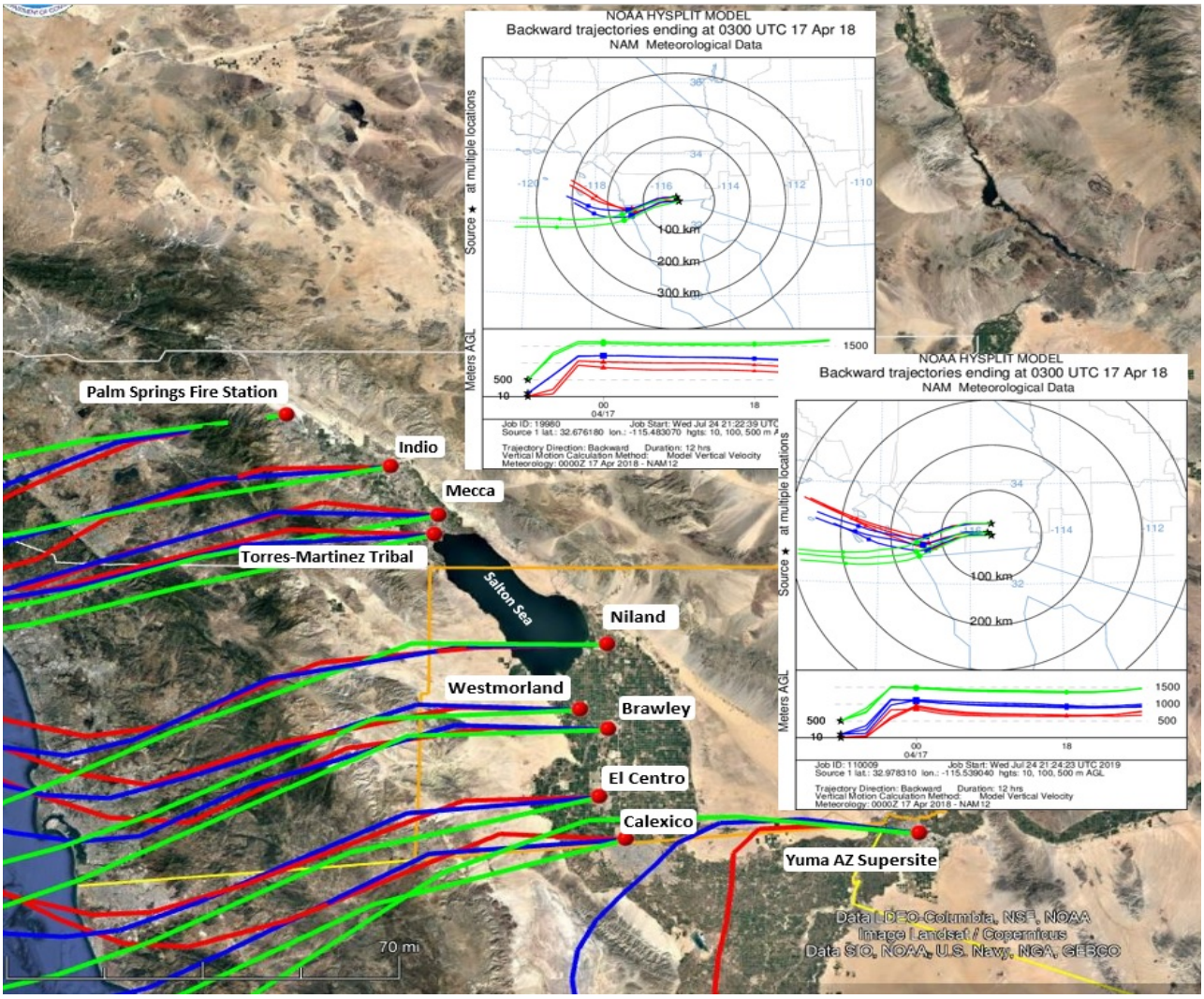


Fig 2-6: A 12-hour back-trajectory HYSPLIT ending at 1900 PST for all sites identified in **Table 2-1**. Note that the airflow is much more due west at the ICAPCD monitors, rather than SW as in the previous trajectories. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

As strong gusty westerly winds blew over open natural mountains and desert areas west of Imperial County, fugitive windblown dust affected all air quality monitors throughout the southeastern region, causing an exceedance at all regulatory monitors in Riverside, except the Palm Springs Fire Station, Imperial and Yuma counties. On April 16, 2018 both El Centro NAF (KNJK) and Imperial County Airport (KIPL) had at least five hours of winds at or above 25 mph. Peak gusts at KIPL reached 52 mph while peak gusts at KNJK reached 48 mph.

III Clear Causal Relationship – A demonstration that the event affected air quality illustrating the relationship between the event and the monitored exceedance

As mentioned above, a Pacific low pressure system with an associated cold front was forecast to move inland along the West Coast and pass through southeast California Monday, April 16, 2018 during the afternoon and across Arizona Monday night.[10] As a result onshore gradients increased creating gusty westerly winds along the mountains and deserts within San Diego County with the strongest winds during the evening hours of April 16, 2018.[11] These gusty westerly winds preceding the weather system easily generated emissions within the natural open mountains in San Diego and transported windblown dust causing an exceedance at all the air quality monitors in Imperial County.

The severity of the winds caused the NWS to issue seventeen (17) Urgent Weather Message for the mountains and deserts of San Diego County and for Imperial County. Each of these advisories described the timing, location and effect of these advisory level winds within Riverside, San Diego, Imperial and Yuma counties.[12] In addition, the Phoenix NWS office issued blowing dust advisories for Imperial and Yuma counties.[13] **Appendix A** contains all pertinent NWS notices.

While elevated wind speeds play a significant and important role in the transportation of dust, gust plays an equally significant role in deposition of particulates onto a monitor and the overall affect onto ambient air.[14] As winds and gusts increased on April 16, 2018 windblown dust from outlaying open deserts entered Imperial County and degraded air quality. As mentioned in Section I.1 above, the ICAPCD issued an advisory of the potential for elevated particulate matter and the potential of degradation of air quality to a moderate or unhealthy level. In addition, the NWS service issued Area Forecast Discussions and Urgent Weather Messages advising of the potential for advisory level winds and blowing dust.

Figure 3-1 below provides an illustration of some of the meteorological conditions, as described above and demonstrated in the HYSPLITS, for April 16, 2018, which affected air quality in Imperial County causing an exceedance of the PM_{10} NAAQS at all the air quality monitors in Imperial County on April 16, 2018.

[10] National Weather Service, Area Forecast Discussion, Apr. 15, 2018, Phoenix office, 333am MST
[11] National Weather Service, Area Forecast Discussion, Apr. 15, 2018, San Diego office, 344am PDT
[12] National Weather Service, Urgent Weather Message, Apr. 14, 2018 to Apr. 17, 2018, both the San Diego and Phoenix offices
[13] National Weather Service, Urgent Weather Message, Apr. 16, 2018 to Apr. 17, 2018, 715pm MST, 753pm MST and 1254am MST
[14] Gust is a rapid fluctuation of wind speed with variations of 10 knots or more between peaks and lulls; National Weather Service Glossary https://w1.weather.gov/glossary/index.php?letter=g

FIGURE 3-1
VISUAL RAMP-UP ANALYSIS AS DISCUSSED FOR APRIL 16, 2018

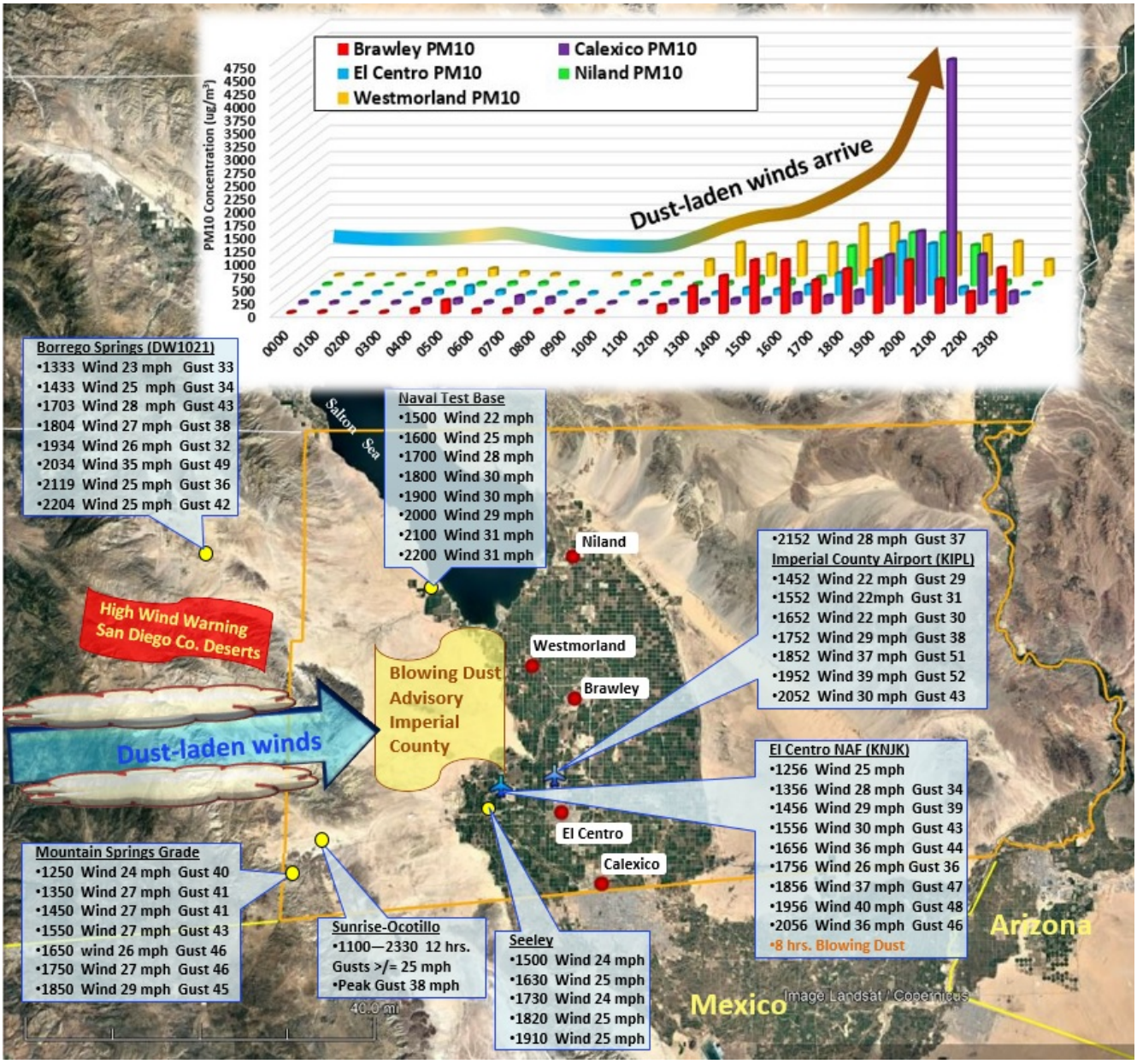


Fig 3-1: On April 16, 2018, a low pressure system moved over the region and increased the onshore surface pressure gradient, creating strong gusty westerly winds from southern California to southern Nevada and western Arizona, and southeastern California in particular. Google Earth base map

An indicator of air quality can be discerned from the level of visibility at any given time and day. While the ICAPCD air monitoring stations do not measure levels of visibility the local and surrounding airports do. The El Centro NAF (KNJK), Jacqueline Cochran-Desert Resorts Airport (KTRM), and Imperial County Airport (KIPL) all reported reduced visibility at midday through the afternoon, coincident with elevated concentrations at all the

monitors. **Figure 3-2** and **Tables 3-1 and 3-2** provide information regarding the reduced visibility in Imperial County and the relation to hourly concentrations at local air monitors.

While **Figure 3-2** is a graphical representation of the reduced visibility within Imperial County and surrounding areas, **Tables 3-1 and 3-2** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the Brawley, Calexico, El Centro, Niland, and Westmorland monitors. Together, the data provides the supporting relationship between the elevated winds, blowing dust and reduced visibility.

According to the compiled information found in **Figure 3-2,** visibility reduced at three of the major airports, the El Centro NAF (KNJK), the Imperial County Airport (KIPL) and the Desert Resorts Airport (KTRM) throughout the day on April 16, 2018 coincident with elevated hourly concentrations at the air quality monitors in Imperial County.

FIGURE 3-2
72-HOUR TIME SERIES PM_{10} CONCENTRATIONS AND VISIBILITY

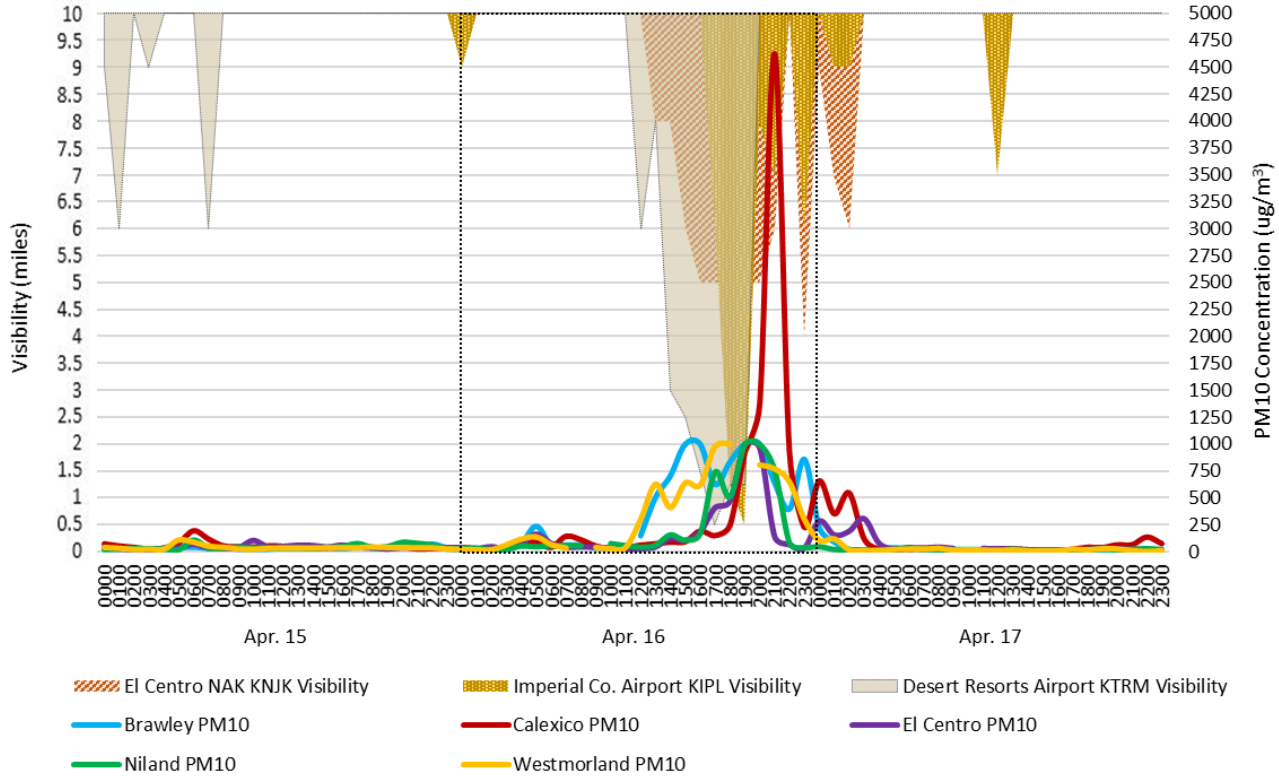


Fig 3-2: is a graphical representation of the compiled data from Jacqueline Cochran-Desert Resorts Airport (KTRM), the Imperial County Airport (KIPL), and the El Centro NAF (KNJK). Reported reduced visibility is coincident with elevated winds and hourly levels of concentrations either just prior to peak concentrations or after. Visibility data from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/

Because the EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states[15] the **Tables 3-1 and 3-2** are provided in support of the relationship between the elevated winds and elevated concentrations. In each table the measured elevated concentrations of PM_{10} either follow or occur during periods of elevated winds or gusts. Each table has a select group of meteorological sites that compare the hourly winds with the closest measured hourly concentration at each of the monitors for April 16, 2018.

TABLE 3-1
WIND AND PM_{10} CONCENTRATIONS APRIL 16, 2018

	WSTMLD		NLND		EC		CX		WSTMLD	BRLY	NLND	EC	CX
HOUR	W/S	W/D	W/S	W/D	W/S	W/D	W/S	W/D	PM_{10} (ug/m^3)				
000	8	288	15	260	6	291	3	308	27	19	29	37	42
100	9	282	16	256	9	288	4	315	23	30	29	28	34
200	7	287	16	255	10	275	3	318	24	11	18	45	34
300	8	289	16	242	9	263	4	266	69	25	22	26	39
400	11	287	16	243	11	267	4	216	121	80	50	73	84
500	5	268	16	245	15	262	3	240	142	240	44	162	91
600	5	235	16	222	11	266	7	260	71	64	53	76	45
700	4	215	14	208	10	253	4	238	39	67	54	42	148
800	5	228	12	205	6	239	3	178		64	51	43	114
900	4	199	12	224	8	266	2	246	45	39		42	57
1000	2	235	11	209	8	267	5	291	33	39	73	32	31
1100	CALM	CALM	6	190	6	250	2	274	45		55	20	42
1200	13	220	2	185	5	195	4	145	301	151	40	26	65
1300	16	231	8	271	3	178	7	134	626	503	57	42	78
1400	12	244	18	273	8	269	6	139	411	703	154	124	94
1500	12	242	22	269	13	272	8	312	638	995	104	102	97
1600	11	257	25	267	10	279	13	297	618	995	165	183	196
1700	12	268	27	262	12	284	12	312	973	625	737	408	154
1800	16	280	31	270	18	273	17	290	995	830	508	468	250
1900	16	291	36	257	23	266	22	283		995	995	995	922
2000	17	289	32	261	20	276	20	286	804	995	995	965	1373
2100	17	292	27	260	19	280	26	282	767	640	759	139	4621
2200	19	278	25	272	18	258	21	285	647	397	80	63	930
2300	16	291	19	267	7	270	12	300	303	855	36	30	230

Wind data for Air Monitoring Stations from AQS data base. Wind speeds = mph; Direction = degrees

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

TABLE 3-2
WIND AND PM_{10} CONCENTRATIONS APRIL 16, 2018

	EL CENTRO NAF (KNJK)				IMPERIAL COUNTY AIRPORT (KIPL)			SEELEY (CI068)		BORREGO SPRINGS (D1021)			MOUNTAIN SPRINGS GRADE (TNSC1)			SUNRISE-OCOTILL0 (IMPSD)			NAVAL TEST BASE		WSTMLD	BRLY	NLND	EC	CX
HOUR	W/S	W/G	W/D	OBS.	W/S	W/G	W/D	W/S	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/D	PM_{10} (ug/m^3)				
000	20		280		11		280	7	322	20	28	248	30	42	216	5	9	336	16	279	27	19	29	37	42
100	20	28	270		15		280	10	323	24	30	238	29	42	209	6	11	8	20	282	23	30	29	28	34
200	24		270		14		260	15	298	18	24	236	24	36	203	12	24	266	20	277	24	11	18	45	34
300	23		260		11		270	14	310	17	26	241	22	35	221	13	21	256	17	281	69	25	22	26	39
400	25		250		15		280	16	296	18	25	228	24	38	218	15	22	249	18	263	121	80	50	73	84
500	29		250		21	30	260	16	279	4	15	231	24	41	223	17	25	248	18	266	142	240	44	162	91
600	26		240		20	28	260	17	283	2	7	145	24	35	222	18	28	247	15	261	71	64	53	76	45
700	26	31	230		21	29	260	16	281	5	14	197	23	38	224	17	23	245	14	265	39	67	54	42	148
800	18		220		20		240	14	267	3	8	207	20	36	235	12	20	252	14	262		64	51	43	114
900	17		220		16		250	12	272	14	27	290	21	38	224	10	16	242	16	266	45	39		42	57
1000	21		230					5	245	12	27	248	26	37	238	10	17	245	13	268	33	39	73	32	31
1100	25		260					7	290	14	26	297	22	41	218	12	26	250	14	251	45		55	20	42
1200	25		260		22	26	250	14	270	19	33	245	24	40	244	13	29	256	10	145	301	151	40	26	65
1300	28	34	260		17	31	240	19	276	23	33	243	27	41	222	13	27	261	10	224	626	503	57	42	78
1400	29	39	260		22	29	270	20	291	25	34	247	27	43	224	16	31	267	17	268	411	703	154	124	94
1500	30	43	260	BLDU	22	31	270	24	293	20	32	244	27	46	230	16	34	271	22	276	638	995	104	102	97
1600	36	44	260	BLDU	22	30	290	25	293	21	38	269	26	46	229	15	26	263	25	282	618	995	165	183	196
1700	26	36	280	BLDU	29	38	280	24	292	28	34	290	27	46	226	13	25	283	28	284	973	625	737	408	154
1800	37	47	260	BLDU	37	51	260	25	285	27	38	300	29	45	223	12	26	251	30	278	995	830	508	468	250
1900	40	48	250	BLDU	39	52	260	25	285	26	41	254	22	47	232	11	18	297	30	273		995	995	995	922
2000	36	46	260	BLDU	30	43	280	22	292	35	49	245	31	47	240	16	25	288	29	274	804	995	995	965	1373
2100	28	33	240	BLDU	28	37	260	12	283	25	36	236	31	47	237	21	38	281	31	286	767	640	759	139	4621
2200	11		290	BLDU	23	31	260	10	232	25	42	240	28	48	235	17	35	262	31	263	647	397	80	63	930
2300	15		270	BLDU	16	22	280	11	261	23	34	249	26	43	245	14	25	259	21	271	303	855	36	30	230

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Seeley (CI068),Borrego Springs (D1021), Mountain Springs Grade (TNSC1), and Sunrise-Ocotillo (IMPSD) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. **BLDU** = Blowing dust. Seeley does not measure wind gusts. Wind speeds = mph; Direction = degrees. BLDU = blowing dust. Due to the different times that wind data and air quality data is sampled at various sites, the hour given represents the hour in which the measurement was taken

As mentioned above, Area Forecast Discussions or Urgent Weather Messages containing a Wind Advisory and a Blowing Dust Advisory described the gusty westerly winds for the region extending into the San Diego Mountains and deserts, and Imperial County. The Pacific trough strengthened the pressure gradient and produced strong gusty westerly winds that affected all regional air quality monitors in Riverside County, Imperial County and Arizona (**Table 2-1**).

The ICAPCD monitors air quality for each of its stations and issues web-based Air Quality Indices in response to changes in air quality.[16] As transported windblown dust entered Imperial County on the afternoon of April 16, 2018, the air quality in the Brawley area degraded from Unhealthy to Very Unhealthy. Overall, the strong gusty westerly winds associated with the low pressure system affected air quality in Imperial County.

FIGURE 3-3
IMPERIAL VALLEY AIR QUALITY INDEX FOR BRAWLEY
APRIL 16, 2018

Fig 3-3: The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Green" or good level to a "Purple" or Very Unhealthy level

[16] 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 affects 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. Source: https://airnow.gov/index.cfm?action=aqibasics.aqi

FIGURE 3-4
IMPERIAL VALLEY AIR QUALITY INDEX FOR CALEXICO
APRIL 16, 2018

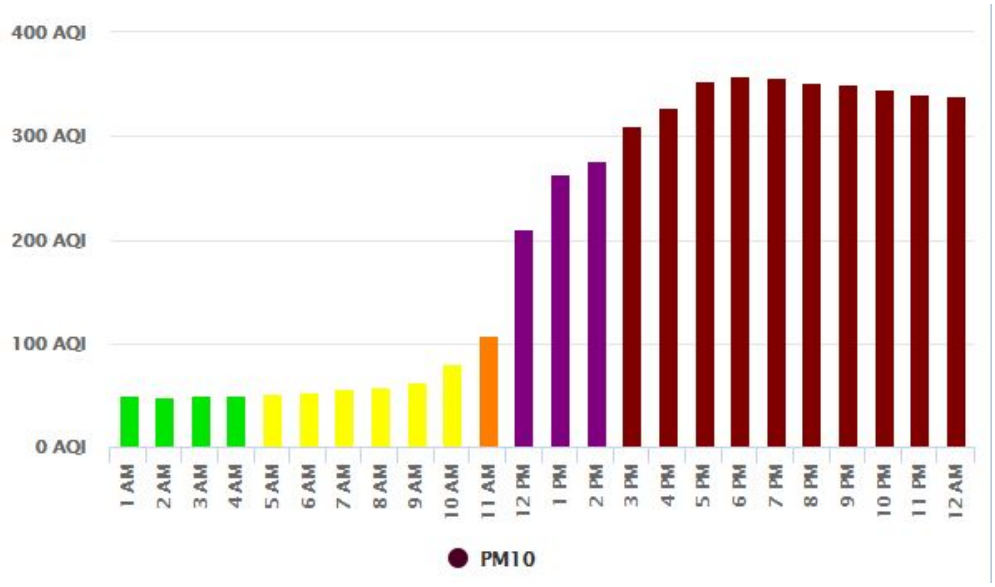


Fig 3-4: The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Green" or good level to a "Maroon" or Hazardous

FIGURE 3-5
IMPERIAL VALLEY AIR QUALITY INDEX FOR EL CENTRO
APRIL 16, 2018

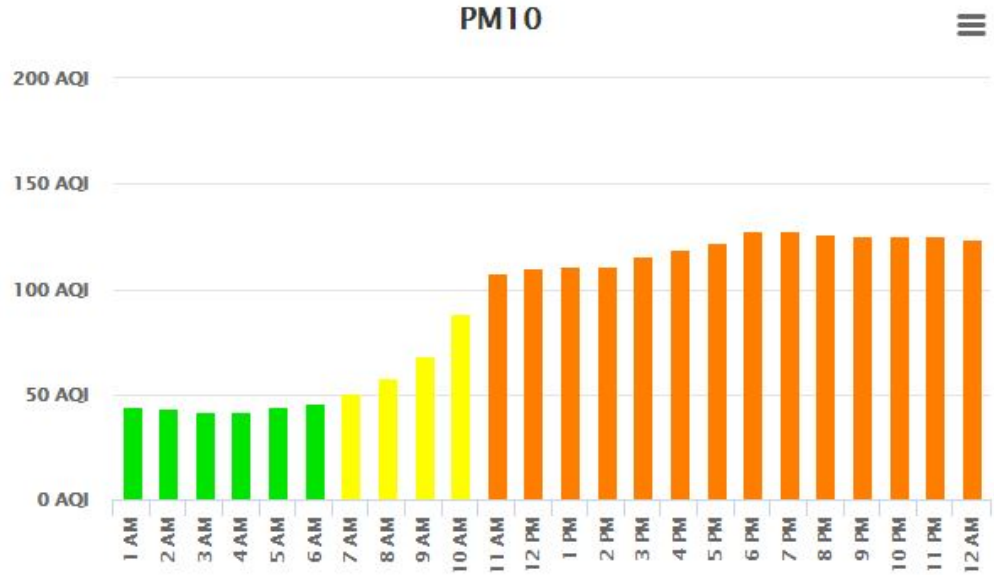


Fig 3-5: The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Green" or good level to an "Orange" or a level that is Unhealthy for sensitive groups

FIGURE 3-6
IMPERIAL VALLEY AIR QUALITY INDEX FOR NILAND
APRIL 16, 2018

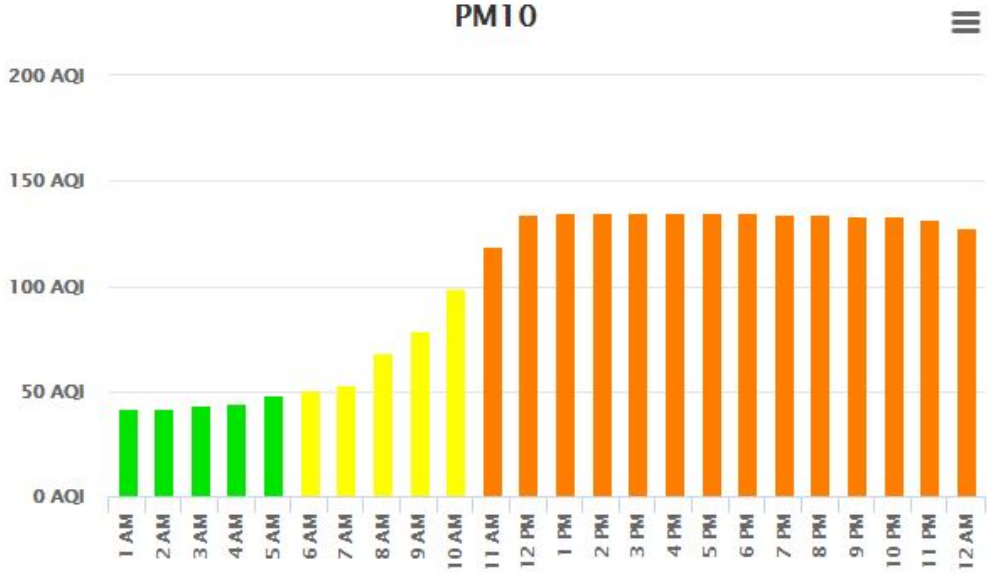


Fig 3-6: The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Green" or good level to an "Orange" or a level that is Unhealthy for sensitive groups

FIGURE 3-7
IMPERIAL VALLEY AIR QUALITY INDEX FOR WESTMORLAND
APRIL 16, 2018

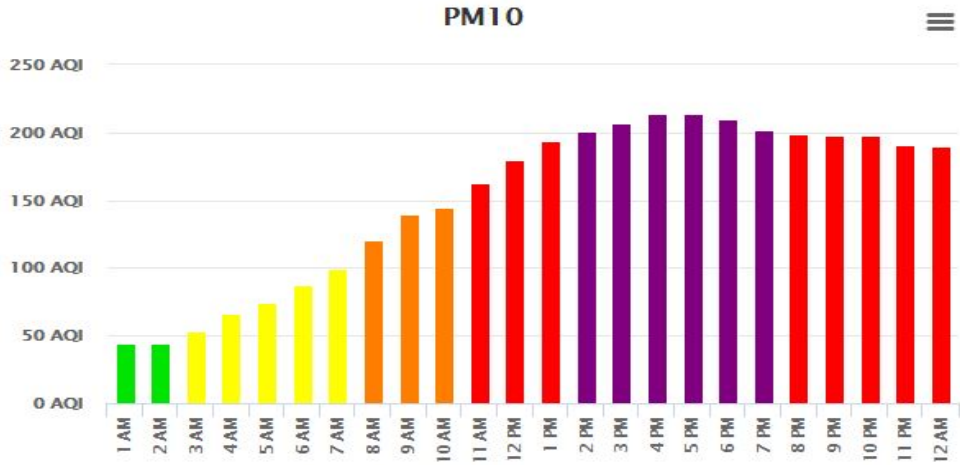


Fig 3-7: The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Green" or good level to a "Red" or Unhealthy level

III.1 Summary of Forecasts and Warnings

Days before and during Monday, April 16, 2018 the NWS offices in Phoenix and San Diego began issuing Area Forecast Discussions and Urgent Weather Messages describing strong gusty westerly winds that preceded a Pacific low pressure system with an associated cold front that moved inland across southern California and the Desert Southwest.

The severity of the winds prompted the NWS office in San Diego and Phoenix to issue, a combined, seventeen (17) Urgent Weather Messages that advised of advisory level winds within the mountains and deserts of San Diego County and Imperial County. **Appendix A** contains all pertinent NWS notices.

III.2 Summary of Wind Observations

As demonstrated above wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County as well as from other automated meteorological instruments upwind from the monitors. Data analysis indicates that on April 16, 2018 different sites measured wind speeds at or (in some instances far) above 25 mph.

IV Concentration to Concentration Analysis – An analyses comparing the event-influenced concentrations to concentrations at the same monitoring site at other times

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.

Figures 4-1 through 4-10 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at all air quality monitors for the period of January 1, 2010 through April 16, 2018. The compiled data set below includes non-regulatory data prior to 2013. As a consequence, continuous monitoring data (hourly concentrations) prior to 2013 were not reported into the US EPA Air Quality System (AQS).[17] The difference between the standard and local condition concentrations is not significant enough to change the outcome of the analysis.

Compiled and plotted 24-hour averaged PM_{10} concentrations, between January 1, 2010 and April 16, 2018, as measured by the Brawley, Calexico, El Centro, Niland and Westmorland monitors, were used to establish the historical and seasonal variability over time.[18] All figures illustrate that the exceedance, which occurred on April 16, 2018, was 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.

[17] 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/m^3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP 760torr and 25C). 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.

[18] FRM sampling ended December 2016.

FIGURE 4-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 16, 2018

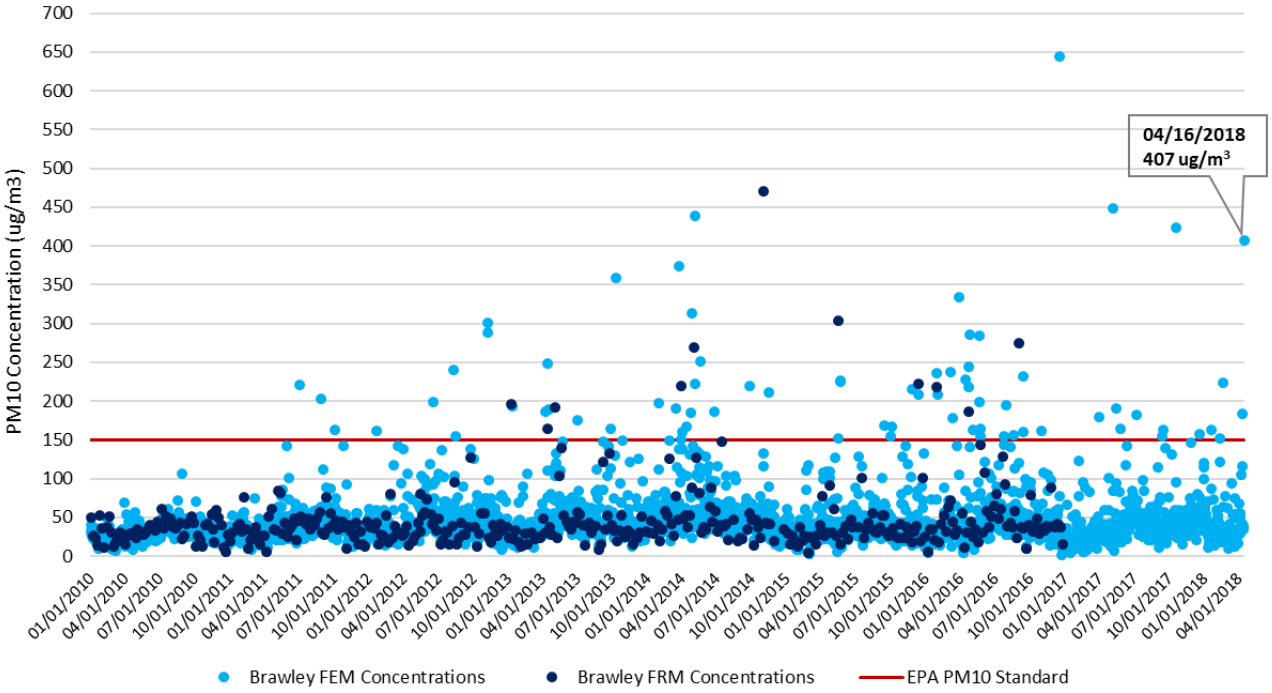


Fig 4-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 407 µg/m^3 on April 16, 2018 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-1,** for Brawley includes 3,028 sampling days (January 1, 2010 through April 16, 2018). Of the 3,028 sampling days the Brawley monitor measured 72 exceedance days which translates into an occurrence rate less than 2.5%. Historically, there were fourteen (14) exceedance days measured during the first quarter; twenty-nine (29) exceedance days measured during the second quarter; sixteen (16) exceedance days measured during the third quarter; and thirteen (13) exceedance days measured during the fourth quarter.

FIGURE 4-2
CALEXICO HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 16, 2018

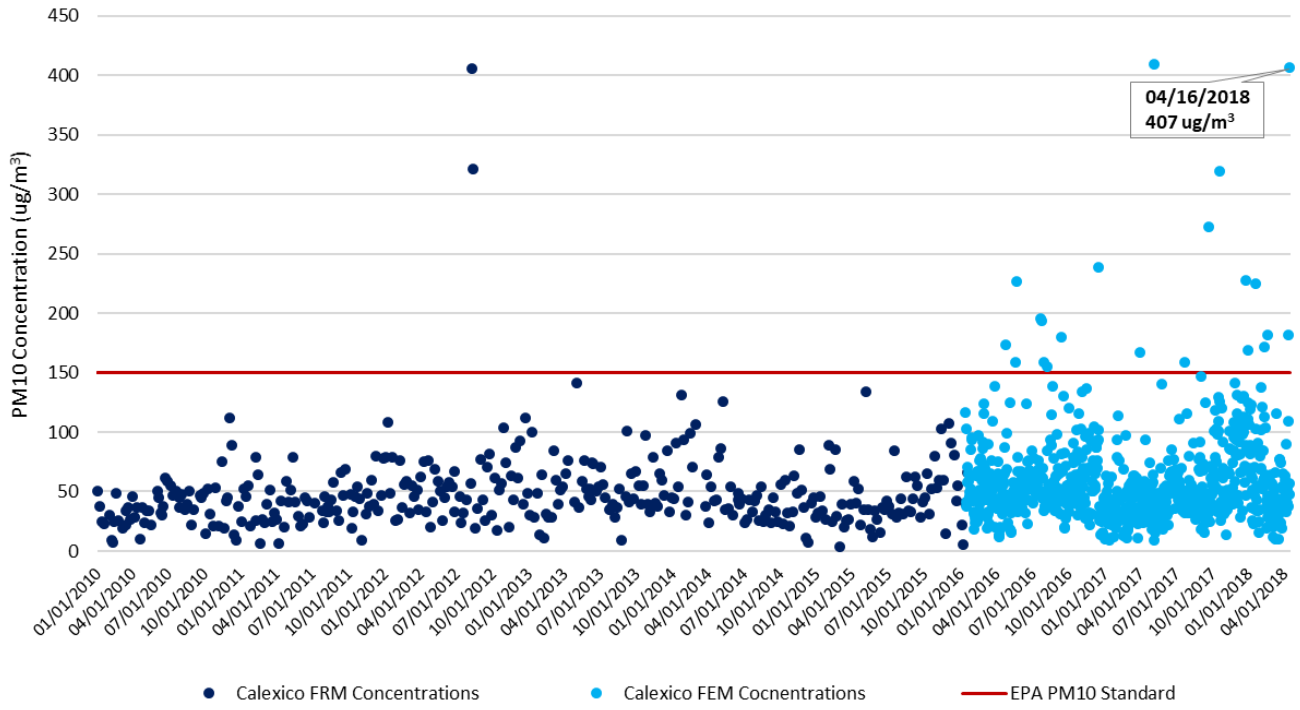


Fig 4-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 407 µg/m^3 on April 16, 2018 by the Calexico monitor was outside the normal historical concentrations when compared to similar event days and non-event days.

The time series, **Figure 4-2,** for Calexico includes 1,239 sampling days (January 1, 2010 through April 16, 2018). Of the 1,239 sampling days the Calexico monitor measured 23 exceedance days which translates into an occurrence rate less than 2%. Historically, there were five (5) exceedance days measured during the first quarter; six (6) exceedance days measured during the second quarter; nine (9) exceedance days measured during the third quarter; and three (3) exceedance days measured during the fourth quarter.

FIGURE 4-3
EL CENTRO HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 16, 2018

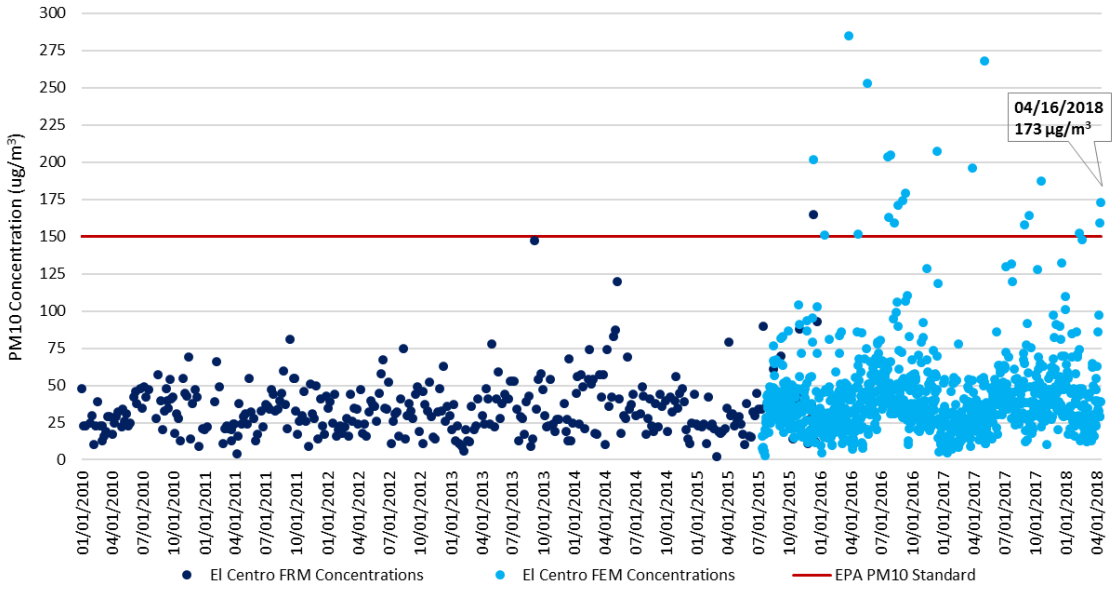


Fig 4-3: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 173 µg/m³ on April 16, 2018 by the El Centro monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-3,** for El Centro includes 1,366 sampling days (January 1, 2010 through April 16, 2018). Of the 1,365 sampling days the El Centro monitor measured 18 exceedance days which translates into an occurrence rate less than 1.5%. Historically, there were two (2) exceedance days measured during the first quarter; four (4) exceedance days measured during the second quarter; nine (9) exceedance days measured during the third quarter; and three (3) exceedance days measured during the fourth quarter.

FIGURE 4-4
NILAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 16, 2018

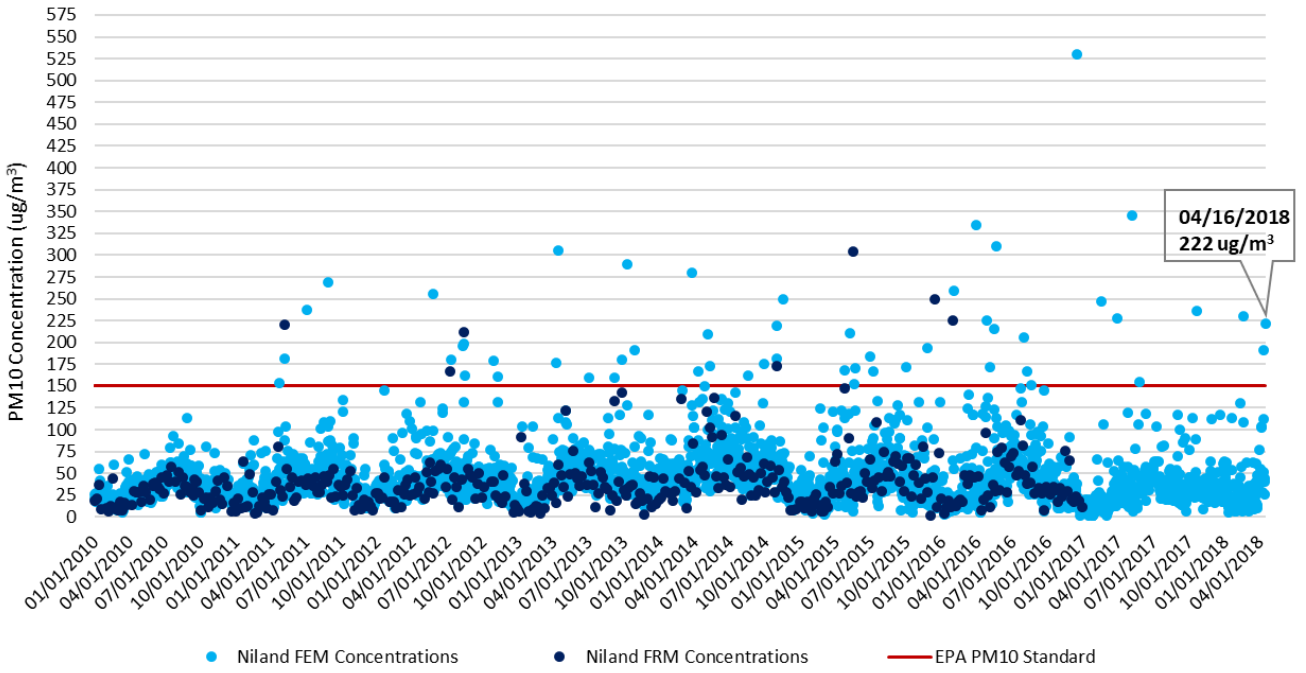


Fig 4-4: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 222 µg/m³ on April 16, 2018 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-4,** for Niland includes 3,028 sampling days (January 1, 2010 through April 16, 2018). Of the 3,028 sampling days the Niland monitor measured 53 exceedance days which translates into an occurrence rate less than 2%. Historically, there were six (6) exceedance days measured during the first quarter; (twenty) 20 exceedance days measured during the second quarter; fifteen (15) exceedance days measured during the third quarter; and twelve (12) exceedance days measured during the fourth quarter.

FIGURE 4-5
WESTMORLAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO APRIL 16, 2018

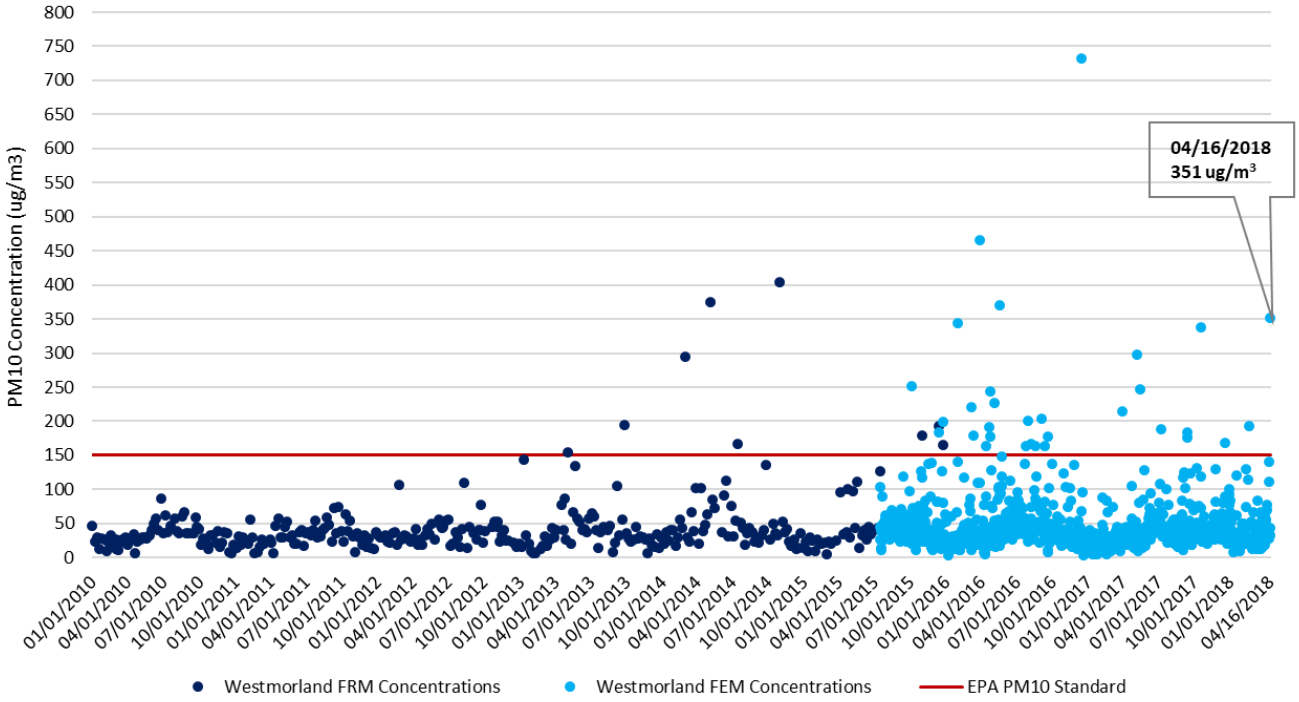
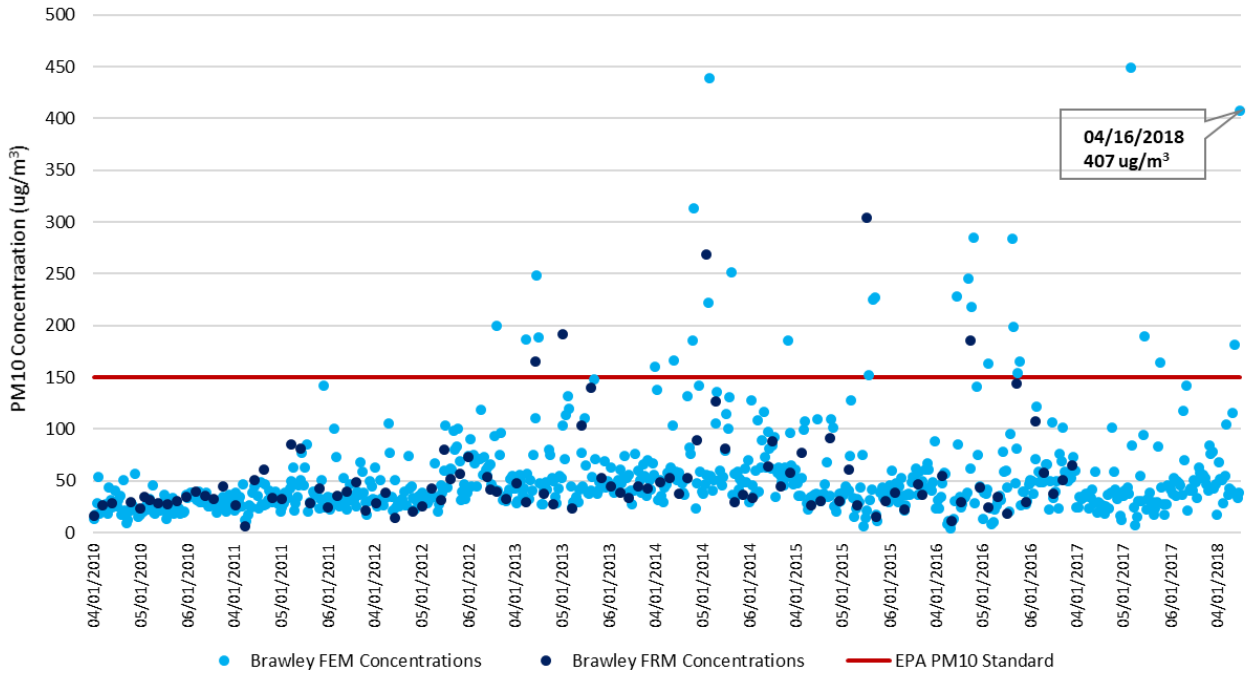


Fig 4-5: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 351 µg/m^3 on April 16, 2018 by the Westmorland monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-5,** for Westmorland includes 1,357 sampling days (January 1, 2010 through April 16, 2018). Of the 1,357 sampling days the Westmorland monitor measured 38 exceedance days which translates into an occurrence rate less than 3%. Historically, there were seven (7) exceedance days measured during the first quarter; nine (9) exceedance days measured during the second quarter; twelve (12) exceedance days measured during the third quarter; and eight (8) exceedance days measured during the fourth quarter.

FIGURE 4-6
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 TO APRIL 16, 2018**

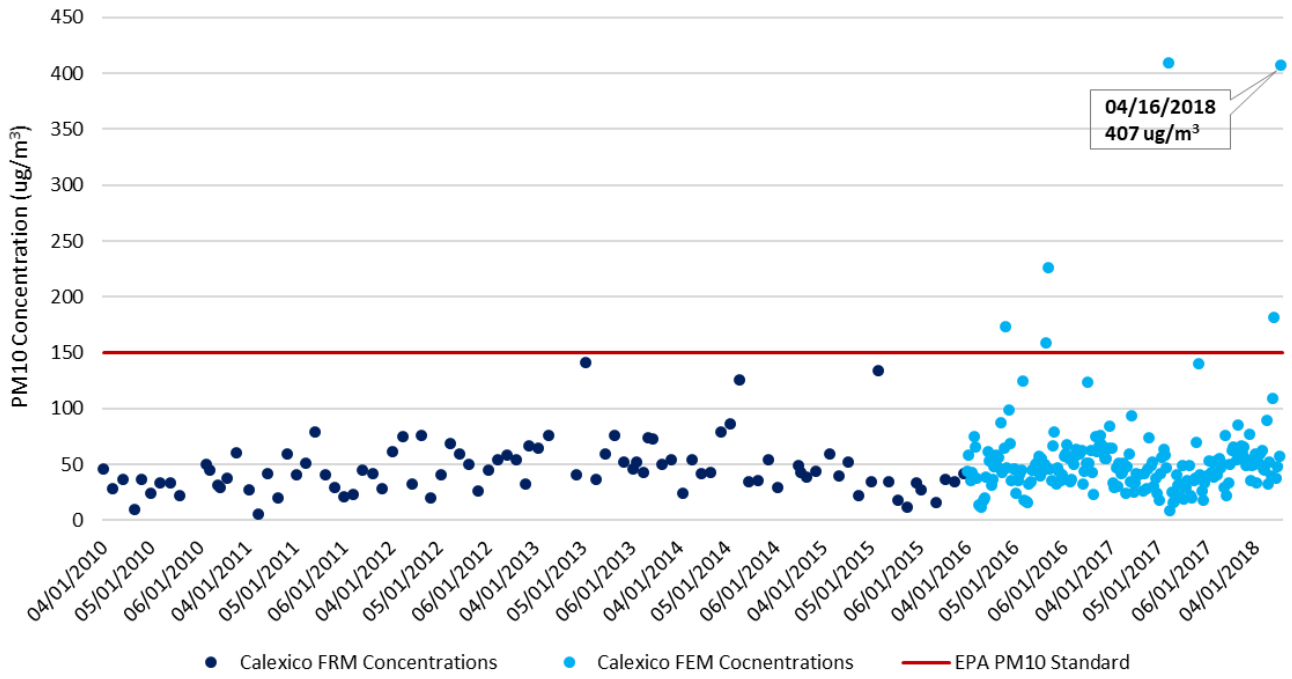


***Quarterly: April 1, 2010 to June 30, 2017 and April 1, 2018 to April 16, 2018**

Fig 4-6: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentration of 407 µg/m³ by the Brawley monitor on April 16, 2018 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 4-6 illustrates the seasonal fluctuations over a period of 744 sampling days, 847 credible samples and twenty-nine (29) exceedance days. This translates to less than a 3.5% seasonal exceedance occurrence rate.

FIGURE 4-7
CALEXICO SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 TO APRIL 16, 2018**

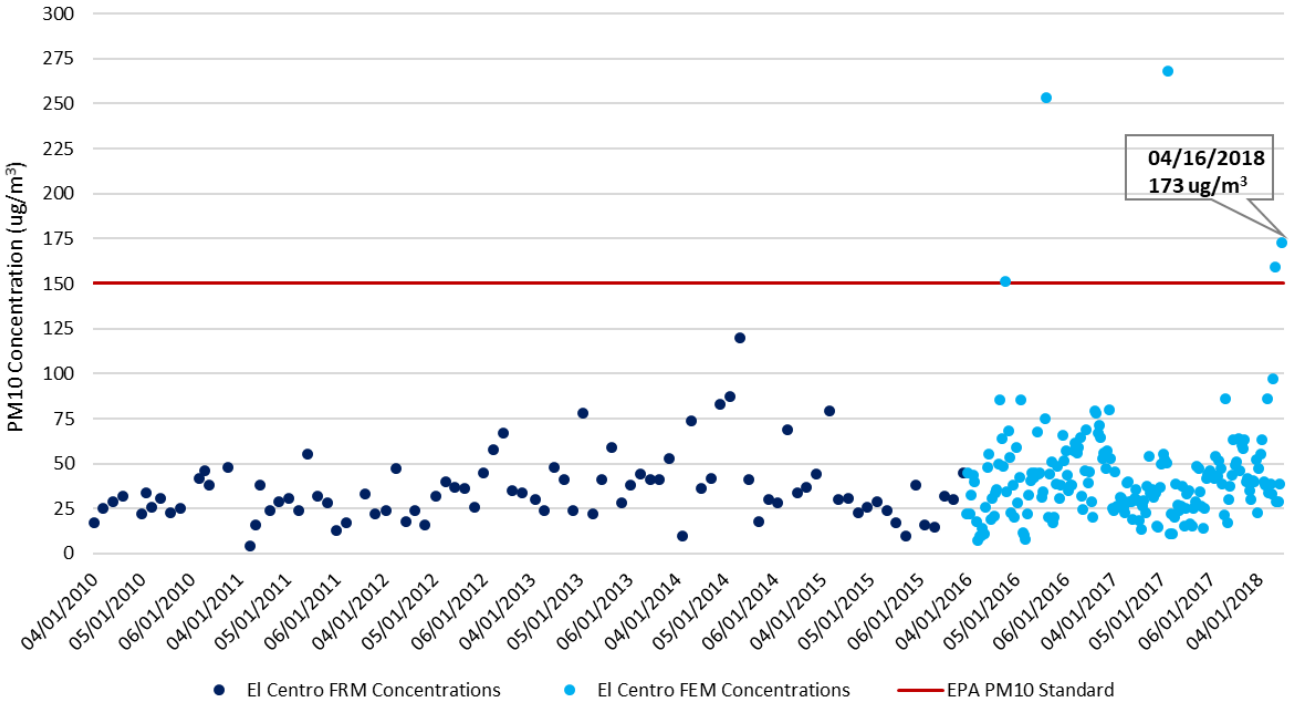


***Quarterly: April 1, 2010 to June 30, 2017 and April 1, 2018 to April 16, 2018**

Fig 4-7: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 407 µg/m³ by the Calexico monitor on April 16, 2018 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 4-7 illustrates the seasonal fluctuations over a period of 301 sampling days, 288 credible samples and six (6) exceedance days. This translates to less than a 2% seasonal exceedance occurrence rate.

FIGURE 4-8
EL CENTRO SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 TO APRIL 16, 2018**

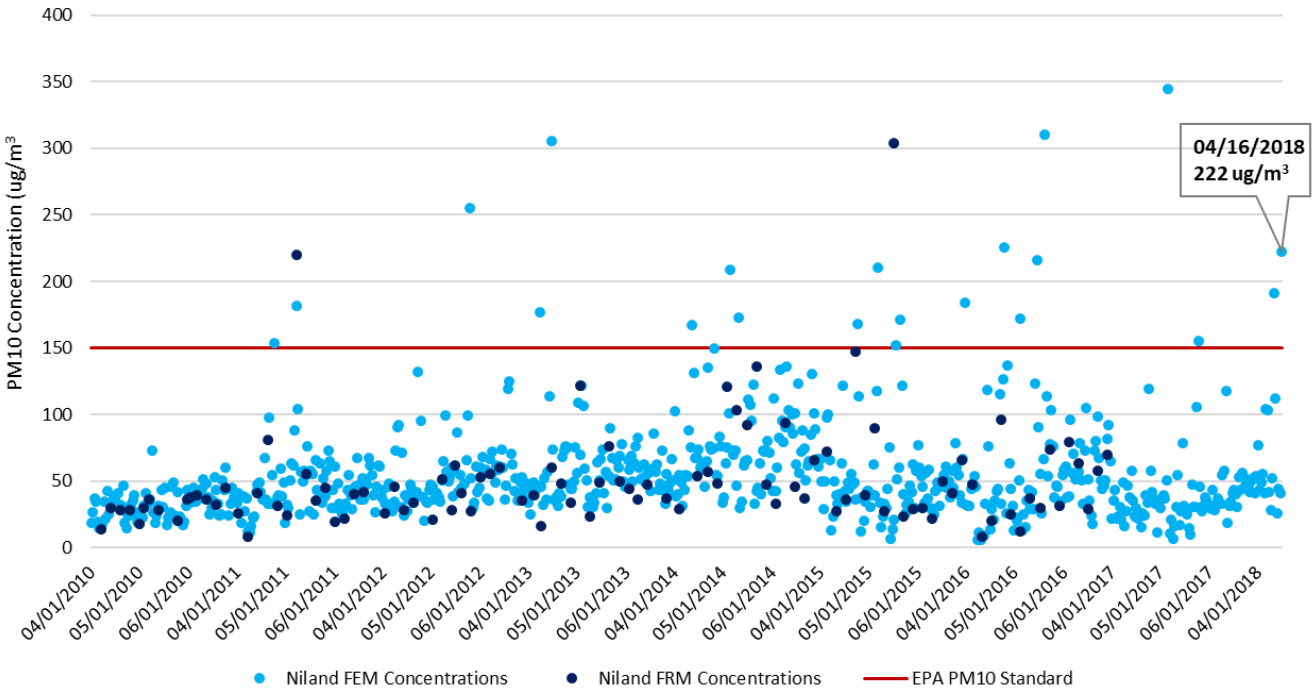


***Quarterly: April 1, 2010 to June 30, 2017 and April 1, 2018 to April 16, 2018**

Fig 4-8: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 173 µg/m³ by the El Centro monitor on April 16, 2018 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 4-8 illustrates the seasonal fluctuations over a period of 291 sampling days, 286 credible samples and four (4) exceedance days. This translates to less than a 1.5% seasonal exceedance occurrence rate.

FIGURE 4-9
NILAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 TO APRIL 16, 2018**

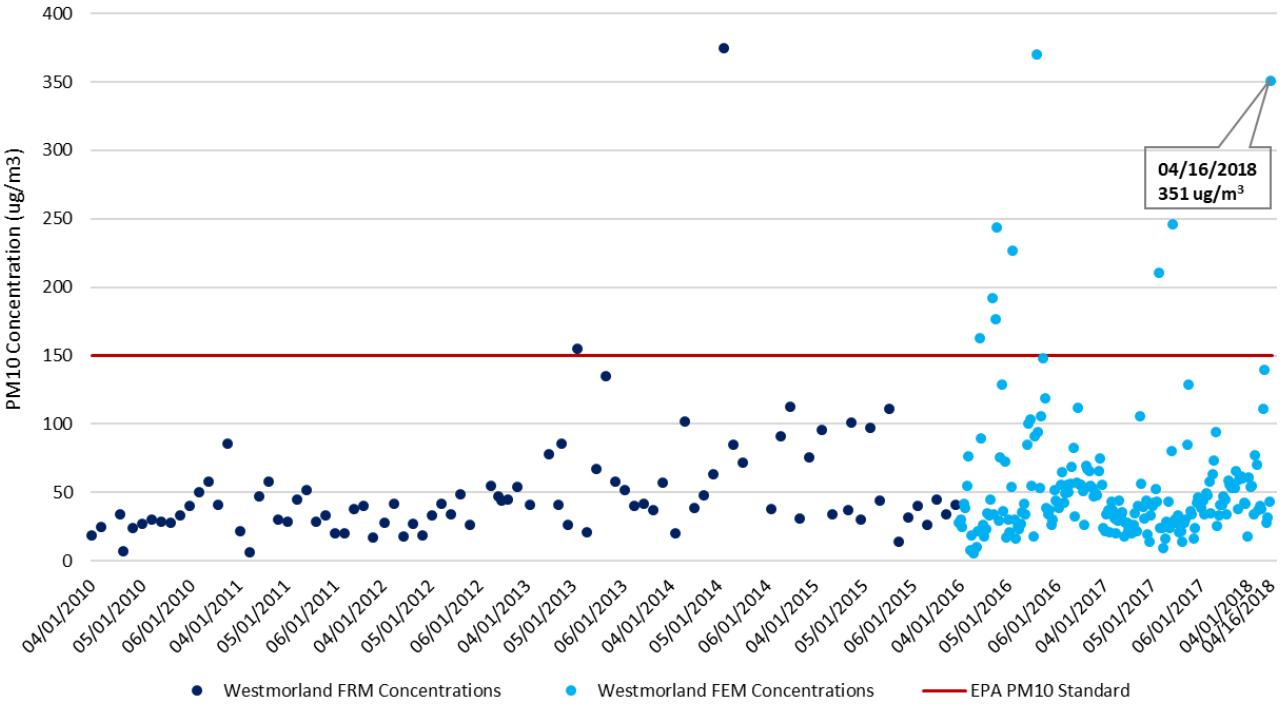


***Quarterly: April 1, 2010 to June 30, 2017 and April1, 2018 to April 16, 2018**

Fig 4-9: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 222 µg/m^3 by the Niland monitor on April 16, 2018 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 4-9 illustrates the seasonal fluctuations over a period of 744 sampling days, 844 credible samples and twenty (20) exceedance days. This translates to less than a 2.5% seasonal exceedance occurrence rate.

FIGURE 4-10
WESTMORLAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 TO APRIL 16, 2018**



***Quarterly: April 1, 2010 to June 30, 2017 and April 1, 2018 to April 16, 2018**

Fig 4-10: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 351 µg/m^3 by the Westmorland monitor on April 16, 2018 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 4-10 illustrates the seasonal fluctuations over a period of 293 sampling days, 286 credible samples and eleven (11) exceedance days. This translates to less than a 4% seasonal exceedance occurrence rate.

Examining the historical and seasonal time series concentrations as they relate to the April 16, 2018 measured exceedances, the exceedances measured on April 16, 2018 are clearly outside the normal concentration levels when comparing to similar event days and non-event days.

V Both Not Reasonably Controllable and Not Reasonably Preventable – A demonstration that the event was both not reasonably controllable and not reasonably preventable

The analysis above, under the Clear Causal Relationship, indicates that the primary sources affecting air quality in Imperial County originated within the natural open areas of the San Diego Mountains and the natural open deserts to the west of Imperial County. The origination of these emissions from these areas affected all the air quality monitors significantly on April 16, 2018. Since Imperial County does not have jurisdiction over emissions emanating from San Diego County, it is not reasonably controllable or preventable by Imperial County. For a brief description of the controls implemented by sources beyond the control of Imperial County see section V.1 below.

As mentioned above in section I.4, Mitigation of Exceptional Events contains significant information regarding the application of Best Available Control Measures that are used as measures to abate or minimize contributing controllable sources of identified pollutants (**Page 12, sub-section II.2 of the High Wind Mitigation Plan**). In addition, the mitigation plan explains the methods utilized to minimize public exposure to high concentrations of identified pollutants, the process utilized to collect and maintain data pertinent to any identified event, and the mechanisms utilized to consult with other air quality managers within the affected area regarding the appropriate responses to abate and minimize affects.

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. The October 16, 2012 adopted revision reflects the specific revisions to Regulation VIII, which USEPA approved on April 22, 2013. Since 2006, ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 5-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

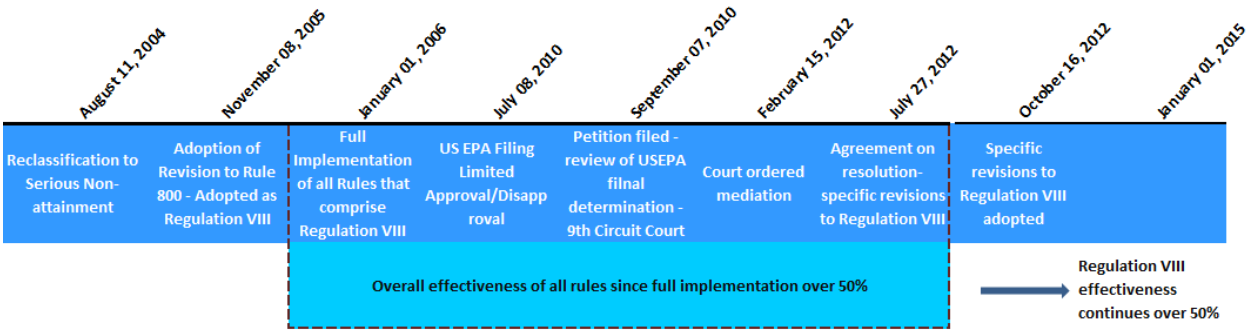


Fig 5-1: Regulation VIII Graphic Timeline

V.1 Other PM_{10} Control Measures

In addition to the rules and regulations listed above, other PM_{10} control measures have been committed to, and implemented by, local California air districts bordering ICAPCD. San Diego County (to the west of Imperial County) and eastern Riverside County (outside

of the Coachella Valley Planning Area and to the north and northeast of Imperial County) are both designated unclassified for the PM_{10} NAAQS and are not required to have BACM controls for PM_{10}. The Coachella Valley Planning Area in Riverside County, to the north and northwest of Imperial County, is designated a PM_{10} nonattainment area, and a redesignation request and maintenance plan were submitted to USEPA in 2010. These three areas and their relevant PM_{10} rules are indicated in **Tables 5-1 to 5-3**.

TABLE 5-1
SAN DIEGO AIR POLLUTION CONTROL DISTRICT (SDAPCD)

RULES REGULATING EXISTING AND NEW NON-POINT SOURCES IN SAN DIEGO COUNTY	
RULE NUMBER AND TITLE	DESCRIPTION
Rule 52 – Particulate Matter	Limits the amount of particulate matter that may be discharged from any source.
Rule 52.1 – NSPS and NESHAPS Particulate Matter Requirements	Ensures that sources subject to NSPS or NESHAPS also conform to Regulation X and XI, respectively.
Rule 54 – Dust and Fumes	Minimizes the amount of dust that can be discharged in a specified time period.
Rule 55 – Fugitive Dust Control	Provides a mechanism to regulate operations that may cause fugitive dust emissions.
Rule 101 – Burning Control	Establishes conditions, including high winds, under which burning would be curtailed or prohibited.

TABLE 5-2
MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT (AQMD)

RULES REGULATING EXISTING AND NEW NON-POINT SOURCES IN EASTERN RIVERSIDE COUNTY OUTSIDE OF THE COACHELLA VALLEY PLANNING AREA	
RULE NUMBER AND TITLE	DESCRIPTION
Rule 403 – Fugitive Dust	Limits the amount of particulate matter that may be discharged from specific sources, not including unpaved public roads or farm roads, or industrial or commercial facilities.
Rule 404 – Particulate Matter Concentration	Limits the concentration of PM_{10} allowed in discharged gas.
Rule 405 – Solid Particulate Matter Weight	Limits the amount of PM_{10} that can be discharged on an hourly basis.

TABLE 5-3
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)
RULES REGULATING
EXISTING AND NEW NON-POINT SOURCES IN RIVERSIDE COUNTY
AND THE COACHELLA VALLEY, INSIDE OF THE COACHELLA VALLEY PLANNING AREA

RULE NUMBER AND TITLE	DESCRIPTION
Rule 403– Fugitive Dust	Requires implementation of control measures to prevent, reduce, or mitigate fugitive dust emissions.
Rule 403.1 – Supplemental Fugitive Dust Control Requirements for Coachella Valley Sources	Establishes special requirements for Coachella Valley dust sources under high-wind conditions and requires SCAPCD approval of dust control plans for sources not subject to local government ordinances.
Rule 1156 – Further Reductions of Particulate Emissions from Cement Manufacturing Facilities	Establishes requirements to reduce particulate matter emissions from cement manufacturing operations and properties.
Rule 1157 – PM_{10} Emission Reductions from Aggregate and Related Operations	Establishes additional source specific performance standards and specifies operational PM_{10} controls specific to aggregate and related operations.
Rule 1186 – PM_{10} Emissions from Paved and Unpaved Roads and Livestock Operation	Limits the amount of particulate matter entrained as a result of vehicular travel on paved and unpaved public roads, and at livestock operations.
Rule 1466 – Control of Particulate Emissions from Soils with Toxic Air Contaminants	Establishes a PM_{10} ambient dust concentration limit, dust control measures, and notification requirements prior to earth-moving activities or when PM_{10} dust concentrations are exceeded.

V.2 Wind Observations

As previously discussed, wind data analysis indicates that on April 16, 2018 different sites measured wind speeds at or above (in some instances far in excess of) 25 mph. Wind speeds of 25 mph are normally sufficient to overcome most PM_{10} control measures. During the April 16, 2018 event, wind speeds were above the 25 mph threshold, overcoming the BACM in place.

V.3 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 the Brawley, Calexico, El Centro, Niland, and Westmorland monitors during the April 16, 2018 PM_{10} exceedances. 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 was one complaint regarding dust filed on April 16, 2018, officially declared as a No Burn Day, related to agricultural burning, waste burning or dust. The incident was in Bard, California, near the California-Arizona border and downwind of the exceeding monitors. Therefore, the incident had no effect on the monitors.

FIGURE 5-2
PERMITTED SOURCES

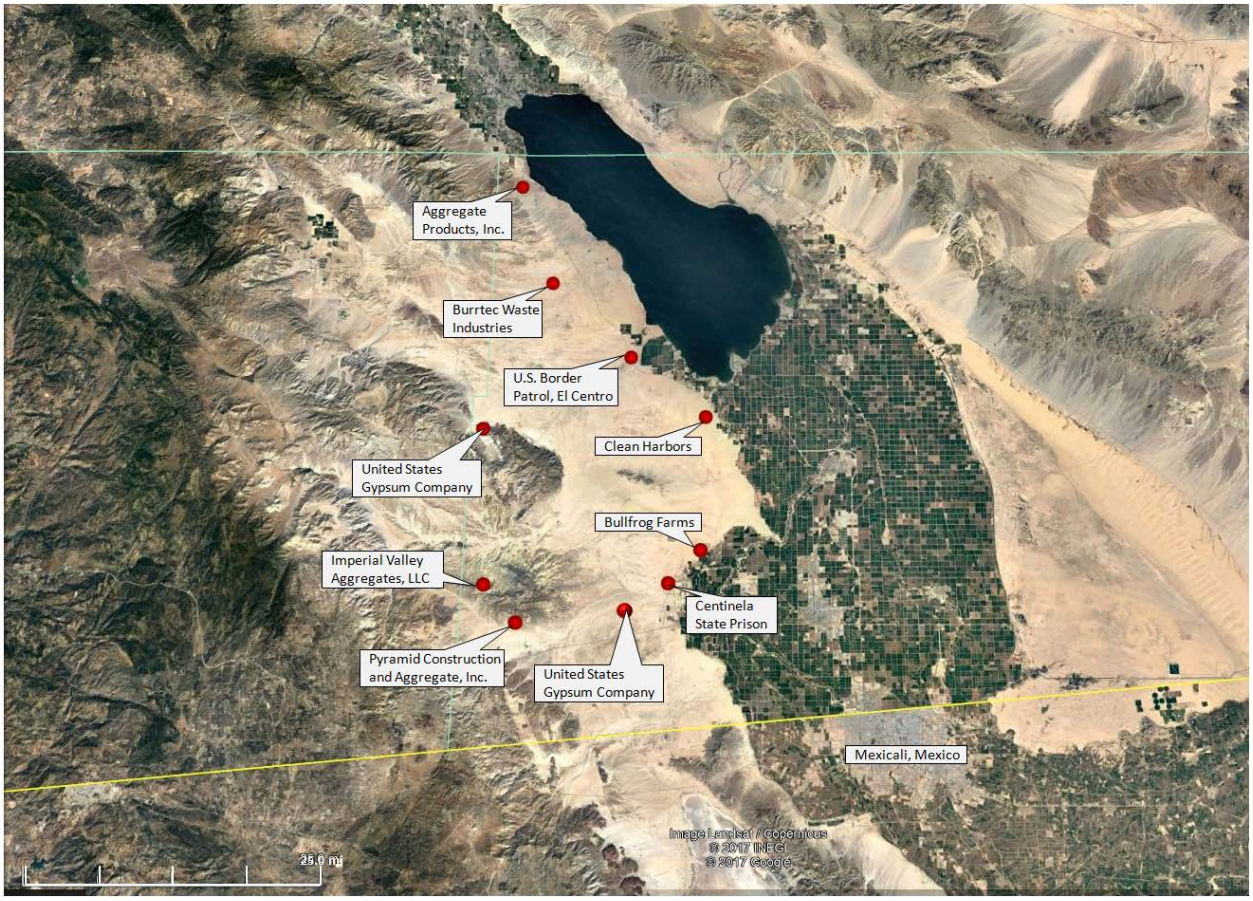


Fig 5-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley, Calexico, El Centro, Niland, and Westmorland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the 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 5-3
NON-PERMITTED SOURCES

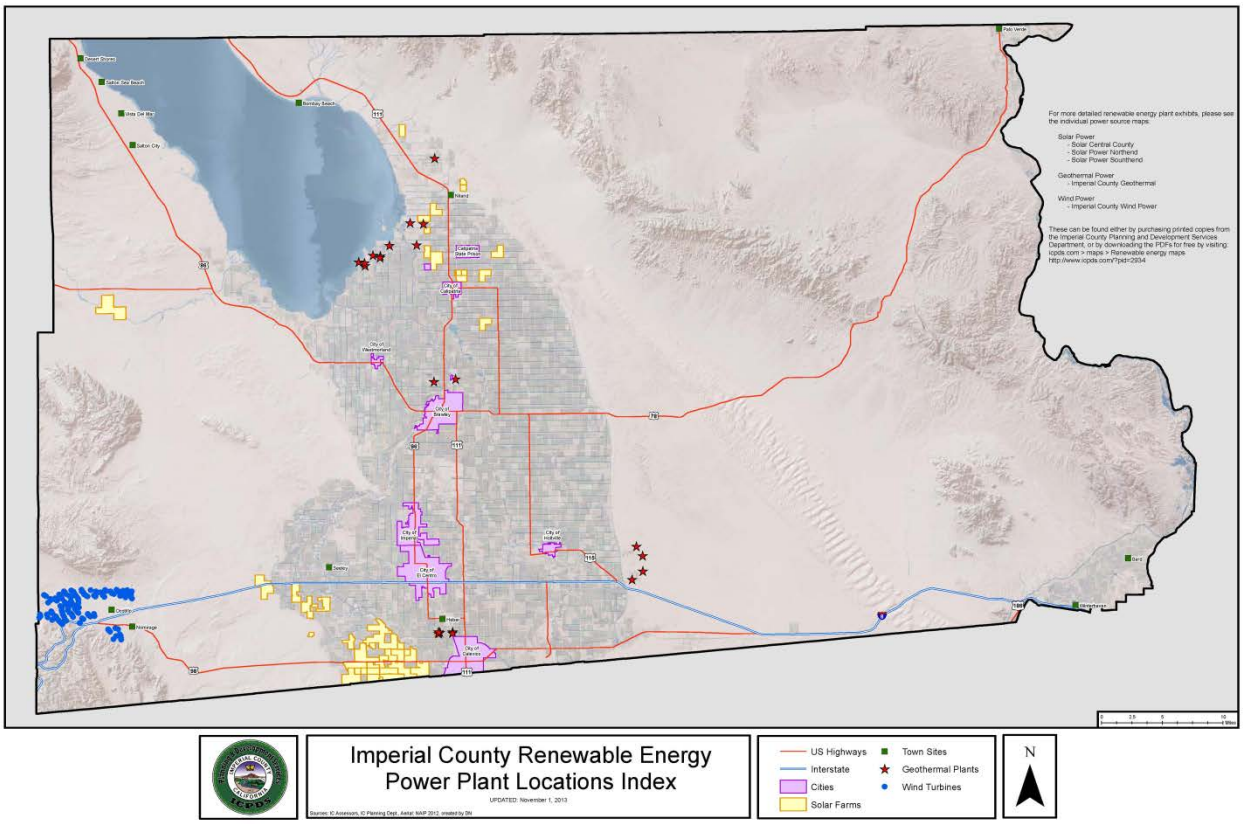


Fig 5-3: The above map identifies those power sources located west, northwest and southwest of the Brawley, Calexico, El Centro, Niland, and Westmorland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

VI A Natural Event – A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event.

Typically, Pacific weather disturbances during this time of year will bring westerly winds into the region. The strong gusty westerly winds on April 16, 2018 resulted from what the NWS identified as Pacific low pressure system with an associated cold front that moved inland along the West Coast and passed through southeast California on Monday, April 16, 2018. [19] The low-pressure system caused onshore gradients to increase creating gusty westerly winds that blew through the mountains and deserts within San Diego County with the strongest winds during the evening hours of April 16, 2018.[20] The severity of the winds caused the NWS to issue seventeen (17) Urgent Weather Messages that advised of advisory level winds for the mountains and deserts of San Diego County and for Imperial County. These advisories, similarly, warned of reduced visibility due to blowing dust and blowing sand within Riverside, San Diego, Imperial and Yuma counties.[21]

These strong gusty westerly winds preceding the weather system easily generated emissions within the natural open mountains within San Diego County and transported windblown dust into Imperial County causing an exceedance at all the air quality monitors. As the system moved into Arizona winds and particulate concentrations similarly reduced.

VI.1 Affects Air Quality

The preamble to the revised EER states that an event is considered to have affected air quality if it can be demonstrated 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. Given the information presented in this demonstration, particularly Section III, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the April 16, 2018 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

In order for an event to be defined as an exceptional event under section 50.1(j) of 40 CFR Part 50 an event must be "not reasonably controllable or preventable." The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. The nRCP is met for natural events where high wind events

[19] National Weather Service, Area Forecast Discussion, Apr. 15, 2018, Phoenix office, 333am MST
[20] National Weather Service, Area Forecast Discussion, Apr. 15, 2018, San Diego office, 344am PDT
[21] National Weather Service, Urgent Weather Message, Apr. 14, 2018 to Apr. 17, 2018, both the San Diego and Phoenix offices

entrain dust from desert areas, whose sources are controlled by BACM, where human activity played little or no direct causal role. This demonstration provides evidence that the primary source areas of windblown dust transported into Imperial County came from San Diego where Imperial County has no jurisdiction. In any event, 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} exceedances measured at the Brawley, Calexico, El Centro, Niland, and Westmorland monitors were caused by naturally occurring strong gusty westerly winds that transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at the Brawley, Calexico, El Centro, Niland, and Westmorland monitors on April 16, 2018, was 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) is an event with its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. Anthropogenic sources that are reasonably controlled are considered not to play a direct role in causing emissions. As discussed within this demonstration, the PM_{10} exceedance that occurred at the Brawley, Calexico, El Centro, Niland, and Westmorland monitors on April 16, 2018, was caused by the transport of windblown dust into Imperial County by strong westerly winds associated with a large low pressure system that passed through the region. At the time of the event, anthropogenic sources, within Imperial County were reasonably controlled with BACM. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The comparative analysis of different meteorological sites to PM_{10} concentrations measured at the Brawley, Calexico, El Centro, Niland, Westmorland monitors in Imperial County demonstrates a consistency of elevated gusty westerly winds with elevated concentrations of PM_{10} on April 16, 2018. In addition, temporal analysis indicates that the elevated PM_{10} concentrations and the gusty westerly winds were an event that was widespread, regional and not preventable. Days before 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 transported windblown dust to the exceedance on April 16, 2018.

VI.5 Concentration to Concentration Analysis

The historical annual and seasonal 24-hr average PM_{10} measured concentrations at the Brawley, Calexico, El Centro, Niland, Westmorland monitors were outside the normal historical concentrations when compared to event and non-event days.

VI.6 Conclusion

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the strong gusty westerly winds that preceded the identified cold front associated with the unseasonably deep trough as it passed through the southern region of California. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at all the air quality monitors in Imperial County on April 16, 2018.

In particular, the clear causal relationship and not reasonably controllable or preventable sections provide evidence that high gusty westerly winds transported fugitive emissions from open natural Mountain and desert areas, located within the San Diego County and Imperial County (all part of the Sonoran Desert). In addition, because anthropogenic sources in upwind areas were reasonably controlled at the time of the event, this event meets the definition of a Natural Event.[22]

[22] 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.