IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Storm Report for 9 July 2018 by NWS Phoenix – last updated 8 PM 14 July 2018:
https://www.weather.gov/psr/09July2018stormreport

July 9, 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 July 9, 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. 18
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. 30
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	Pg. 41
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. 47

[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, July 9, 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 July 9, 2018, the ICAPCD published advisories concerning the potential for elevated concentrations of particulate matter caused by severe monsoonal conditions that were forecasted to cause blowing dust. As a consequence, the ICAPCD replicated the blowing dust advisories for Coachella Valley and Borrego Springs as issued by the San Diego National Weather Service (NWS). An update to the Advisory advised the public of the potential for monsoonal moisture and subsequent thunderstorms that may produce gusty outflow winds all week. **Appendix C** contains copies of notices pertinent to the July 9, 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, July 9, 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 May 25, 2018. After review, CARB submitted the INPEE, for the July 9, 2018 event in July of 2019. The submitted request included a brief description of the meteorological conditions for July 9, 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 July 9, 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 230 µg/m^3 measured by the Brawley monitor; 307 µg/m^3 measured by the Calexico monitor; 256 µg/m^3 measured by the El Centro monitor; 181 µg/m^3 measured by the Niland monitor; and 185 µg/m^3 measured by the Westmorland monitor on July 9, 2018.

(B) Concurrently with the Public Review period for the July 9, 2018 exceptional event, the ICAPCD is formally submitting to CARB for remittance to USEPA the Final July 9, 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

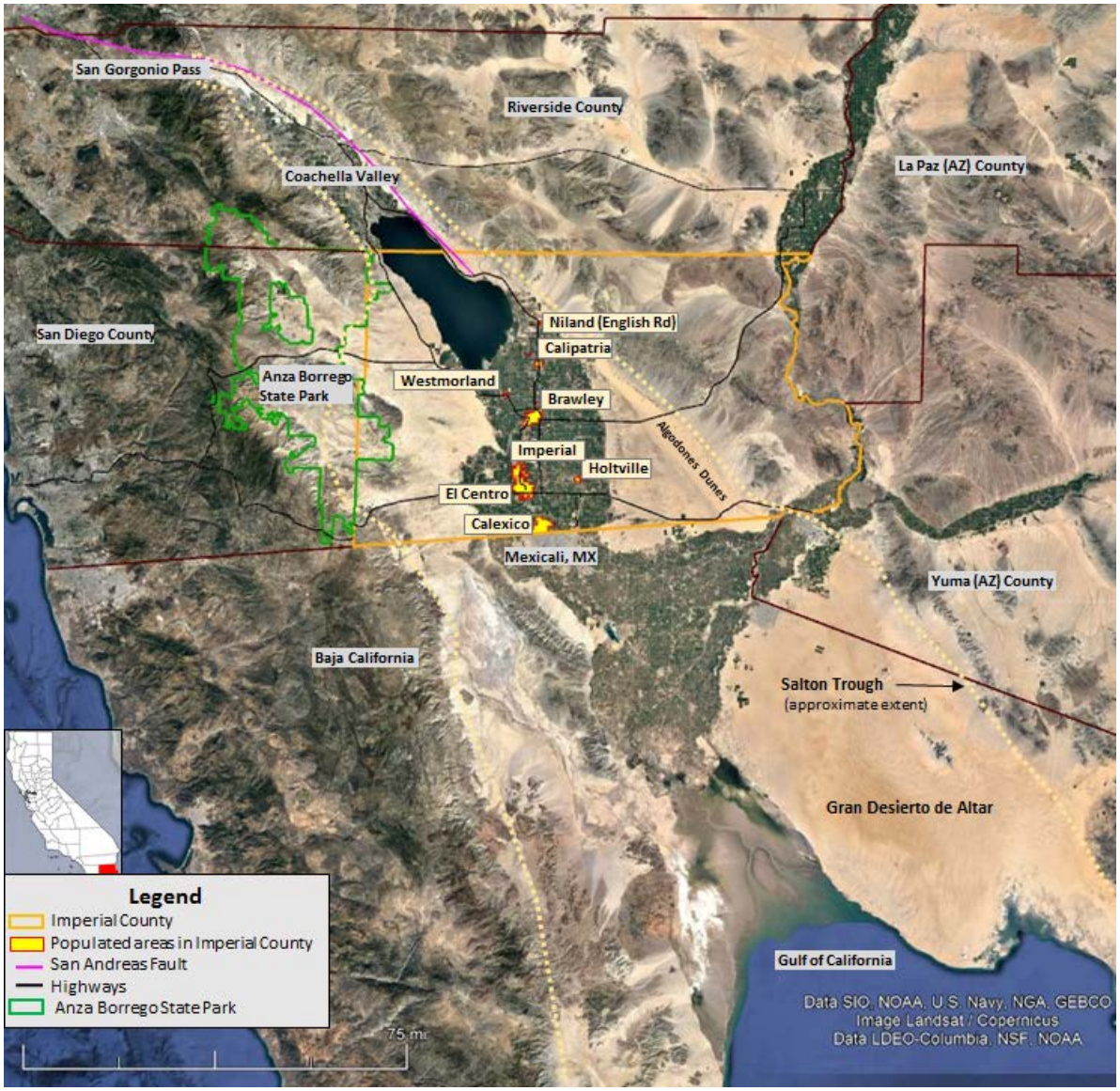


Fig 1-1: Imperial County a Southern California border region, within far southeast California bordering Arizona and Mexico has a small economically diverse region with a population of 174,528

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, July 9, 2018 the NWS office in Phoenix and San Diego issued Area Forecast Discussions describing increasing monsoonal moisture moving into the region during the weekend and remaining in place through the week.[4,5,6] Meteorological conditions indicated a stronger than normal monsoon day on Monday, July 9, 2018, according to the Phoenix NWS office:

> "…An upper level trough moving through today and early Tuesday should *enhance monsoon activity creating better chances for more widespread storms than a typical monsoon day*…The strong easterly wave will have plenty of moisture to work with as it moves into *a well-conditioned Monsoon environment*…" [7]

Numerous weather notices ranging from Special Weather Statements, Severe Thunderstorm Warning, Dust Advisories, Dust Storm Warnings, and Significant Weather Advisories were issued effecting the western half of Arizona, all of Imperial County, and the deserts of eastern San Diego County including the Coachella Valley. **Appendix A** contains all pertinent NWS notices.

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

On July 9, 2018, the air monitors in Imperial, Riverside and Yuma counties measured elevated concentrations of particulate matter when unstable monsoonal air surged out of northern Mexico and produced gusty east-to-southeast-south winds that generated emissions from within the natural open desert areas within northern Mexico and southwestern Arizona. 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**).

[4] National Weather Service, Area Forecast Discussion, July 7, 2018, Phoenix office 343am MST
[5] National Weather Service, Area Forecast Discussion, July 7, 2018, Phoenix office 231am MST
[6] National Weather Service, Area Forecast Discussion, July 7, 2018, San Diego office, 953pm PST
[7] National Weather Service, Area Forecast Discussion, July 9, 2018, Phoenix office 305pm MST

FIGURE 2-1
MONITORING AND METEOROLOGICAL SITES

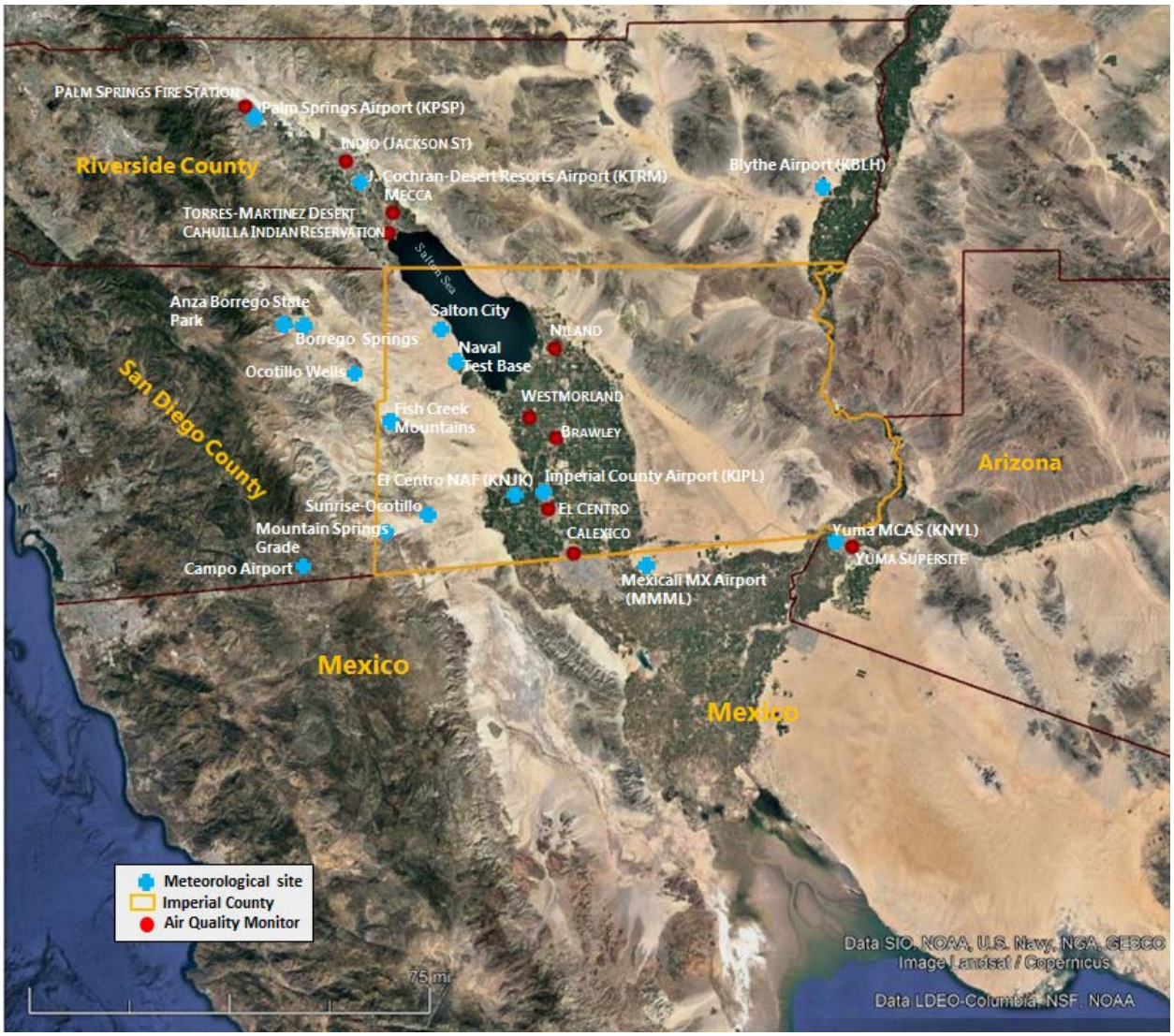


Fig 2-1: Includes a general location of the sites used in this analysis. The site furthest south is in Mexicali, Mexico and the site furthest north is the Palm Springs Fire Station

TABLE 2-1
HOURLY CONCENTRATIONS OF PARTICULATE MATTER

SITE	DATE	000	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Hrly MAX	24-HR AVERAGE
PALM SPRINGS FIRE STATION	20180708	26	28	33	21	36	38	54	30	21	21	25	26	32	37	37	25	23	32	41	45	34	30	34	32	54	31
	20180709	35	30	653	877	538	495	274	436	474	676	735	661	551	434	463	421	429	405	309	332	365	193	197	143	**877**	421
	20180710	401	250	198	184	184	152	139	168	173	275	211	193	169	222	210	154	147	130	143	118	95	96	83	74	401	173
INDIO	20180708																				40	40	64	41	35	64	44
	20180709	32	293	977	680	445	200	239	228	377	449	428	424	525	258	245	327	458	394	169	96	58	86	235	430	**977**	335
	20180710	226	164	159	221	254	229	237	273	261	192	186	115	74	92	95	107	124	118	68	51	54	44	83	95	273	146
MECCA	20180708	48	51	34	38	30	48	27	20	15	15	26	25	27	47	46	58	56	63	58	35	56	29	33	57	63	39
	20180709	47	1067	1060	630	239	134	179	217	230	283	277	305	264	278	330	239	93	66	71	42	25	52	280	185	**1067**	274
	20180710	178	159	136	210	222	271	263	181	231	180	95	47	30	32	41	29	35	47	50	59	67	37	25	4	271	109
TORRES-MARTINEZ TRIBAL	20180708	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL		
	20180709							731	219	437	494	525	604	454	616	566		171	79	73	48	52	35		726	**731**	364
	20180710	440	283	223	385	357	293	437	319	295	288	133	92	55	122	137	114	66	64	42	35	60	43	35	48	440	181
WESTMORLAND	20180708	59	51	48	30	26	39	49	42	41	42	39	45	54	49	55	75	51	51	49	108	57	76	39	35	108	50
	20180709			442	295	250	183	154	114		138	83	42	48	51	36	38	50	43	60	114	77	974	264	437	**974**	185
	20180710	422	361	133	50	49	79	60	73	75	56	55	58	52	43	64	79	58	68	52	65	68	98	85	71	422	94
BRAWLEY	20180708	55	52	40	21	22	31	111	23	42	35	34	58	55	44	44	65	46	47	42	53	75	43	46	45	111	47
	20180709	995		382	369	287	194	145	69	148	97	57	49	41	38			127	49	66	72	62	816	323	451	**995**	230
	20180710	404	335	149	44	52	65	70	79	65	47	51	56	56	51	37	69	65	58	46	73	83	61	67	69	404	89
NILAND	20180708	120	40	69	68	43	106	39	62	44	32	35	52	49	47	40	41	57	98	47	117	67	60	54	48	120	59
	20180709	995	995	343	124	69	61	39	149	130	140	109	51	47	40	36	38	39	36	37	43	60	629	102	53	**995**	181
	20180710	96	91	35	34	46	76	66	101	87	71	69	67	60	51	44	41	30	21	26	38	44	67	80	91	101	59
EL CENTRO	20180708	71	76	63	40	29	32	44	37	43	44	53	67	52	56	67	60	52	56	43	76	71	61	50	52	76	53
	20180709	329		878	347	130	68	121	113	115	119	62	48	45	56	53	56	67	65	72	116	50	995	995	995	**995**	256
	20180710	358	98	101	101	76	69	69	69	62	64	73	72	82	74	68	67	86	81	89	105	76	81	82	107	358	92
CALEXICO	20180708	48	53	38	31	24	33	45	36	37	46	64	53	47	54	62	50	51	45	51	54	64	93	55	48	93	49
	20180709	178	1819	492	253	49	76	88	60	58	65	46	47	55	60	47	53	54	51	59	36	40	1428	1584	680	**1819**	307
	20180710	202	65	97	82	60	37	51	51	54	68	89	89	92	89	77	78	87	79	65	84	74	56	24	32	202	74
YUMA AZ SUPERSITE (PST)	20180708	27	27	24	22	20	28	28	20	72	52	38	46	40	29	22	18	22	47	28	30	24	20	23	19	72	30
	20180709	1889	941	106	30	12	11	20	14	20	17	30	22	16	17	24	30	62	67	51	47	2365	1105	86	28	**2365**	292
	20180710	20	19	25	9	11	9	33	41	36	19	18	25	35	47	31	30	35	57	53	53	57	48	17	20	57	31
YUMA AZ SUPERSITE (MST)	20180708	27	24	22	20	28	28	20	72	52	38	46	40	29	22	18	22	47	28	30	24	20	23	19	1889	1889	107
	20180709	1889	941	106	30	12	11	20	14	20	17	30	22	16	17	24	30	62	67	51	47	2365	1105	86	28	**2365**	292
	20180710	19	25	9	11	9	33	41	36	19	18	25	35	47	31	30	35	57	53	53	57	48	17	20	17	57	31

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

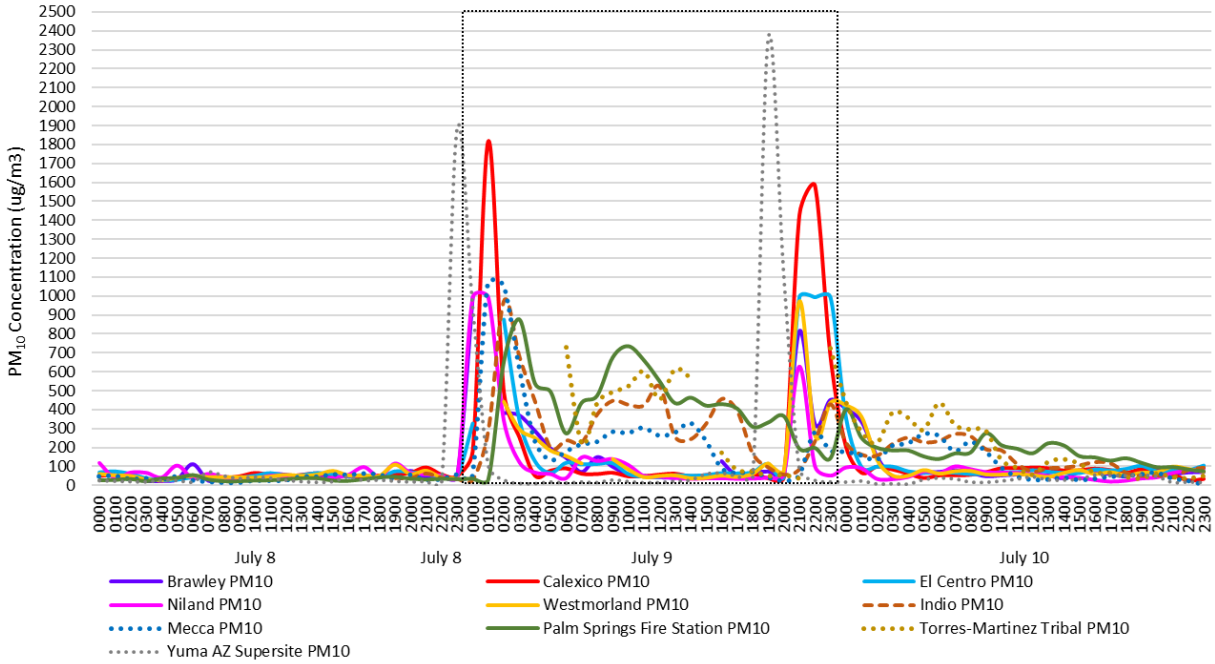


Fig 2-2: is a three-day graphical representation of the PM_{10} concentrations measured at the sites identified in **Table 2-1**. Note the consistency amount monitors

Wind speed, wind direction and airflow patterns combined all help explain how windblown emissions resulting from the strong gusty easterly to southeast to southerly winds affected all of the monitors in Imperial County on Monday, July 9, 2018.

As mentioned above, weather forecast notices issued by San Diego and Phoenix NWS offices prior to and during the July 9, 2018 monsoonal event discussed the impact of the strong southerly outflow winds associated with thunderstorm activity. Gusty easterly and southerly winds generated emissions from natural open desert areas within western and southwestern Arizona and northern Mexico and transported those emissions into 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 Mexicali, Mexico, Imperial, Riverside and Yuma counties all measured increased wind speeds and gusts during July 9, 2018.

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

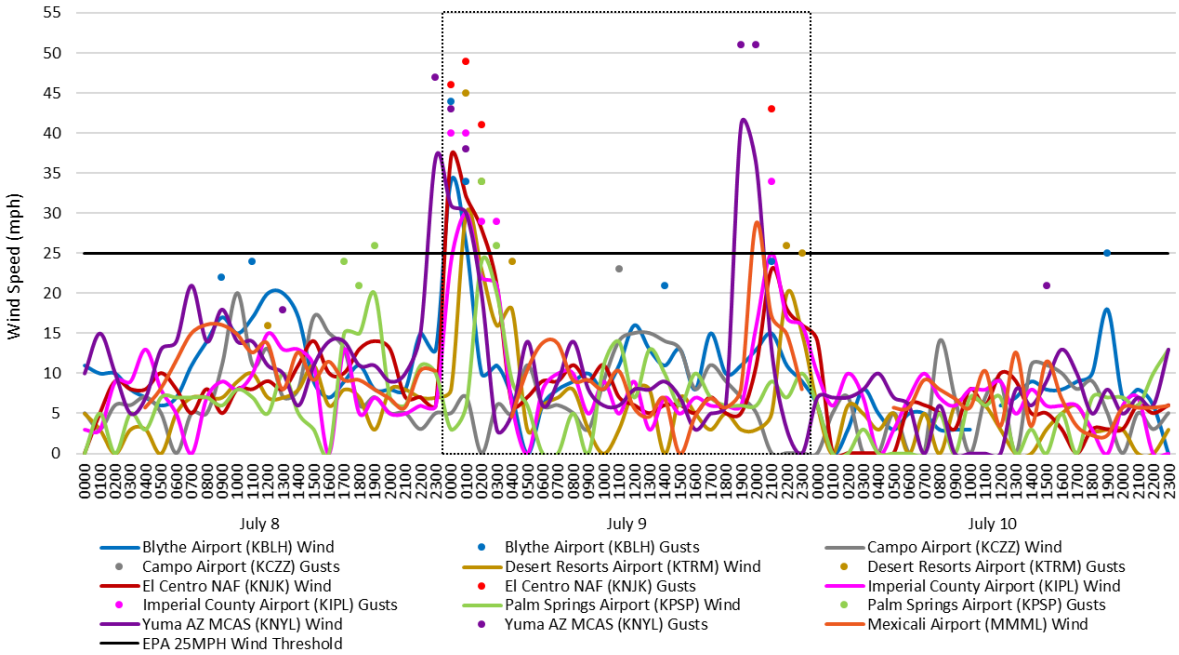


Fig 2-3: is a three-day graphical representation of the measured wind speed and wind gusts (if available) from local and neighboring airports. All data derived from the Local Climatological Data Hourly Observations (LCDHO) reports released by the NOAA https://www.ncdc.noaa.gov/. MMML is from the University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

FIGURE 2-4
WIND SPEEDS AND GUST UPSTREAM SITES

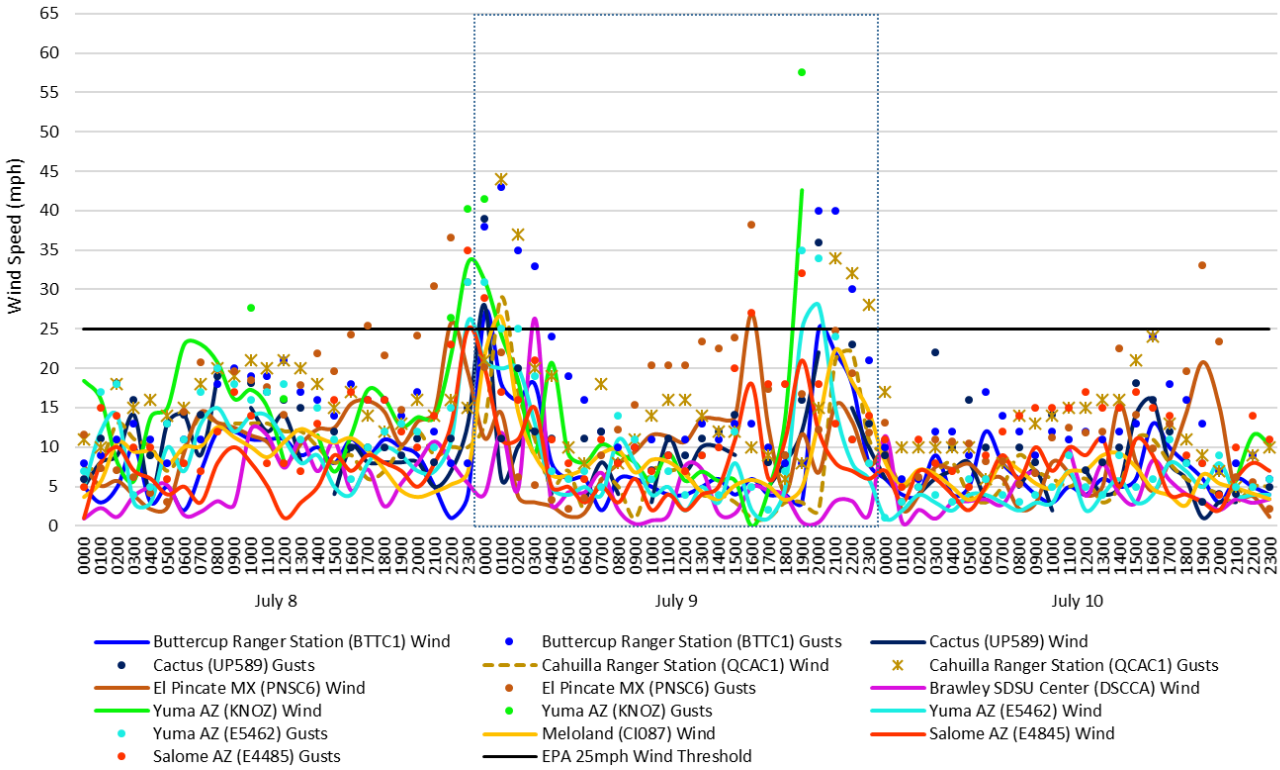


Fig 2-4: is a three-day graphical representation of the measured wind speed and wind gust (if available) from sites located upwind from the air quality monitors in Imperial County. All data derived from the University of Utah's Meso West https://mesowest.utah.edu/index.html

The National Oceanic and Atmospheric Administration (NOAA) Laboratory HYSPLIT back-trajectory models[8] provide supporting evidence of the northwesterly and southeasterly airflow within Imperial County on July 9, 2018. As an all-day event, the HYSPLIT back-trajectory models in **Figures 2-5 and 2-6** depict the airflow during the morning (000 PST), and evening (2100 PST) to help illustrate the shift of airflow from a westerly direction, to a southeasterly flow as monsoonal influence increases and thunderstorm activity increases. The westerly airflow is influenced by the upper level trough, as it passes through, providing for the enhancement of monsoonal thunderstorm activity during the late afternoon and evening hours.[9]

[8] 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.

[9] National Weather Service, Area Forecast Discussion, July 9, 2018, Phoenix office 305pm MST

Figure 2-5 depicts the westerly airflow during the early morning hours as the trough passes through influencing the monsoonal enhancement within Riverside and Imperial counties which is coincident with measured peak hourly concentrations well above 100 µg/m^3 and hourly peak concentrations at the Brawley and Niland monitors during the dawn hours of July 9, 2018. **Figure 2-6** depicts the southerly airflow during the evening hours as the monsoonal environment creates an airflow shift coincident with resultant monsoonal thunderstorm activity and evening peak hourly measured concentrations at the Westmorland and El Centro monitors.

FIGURE 2-5
HYSPLIT MODEL All SITES JULY 9, 2018 0000 PST

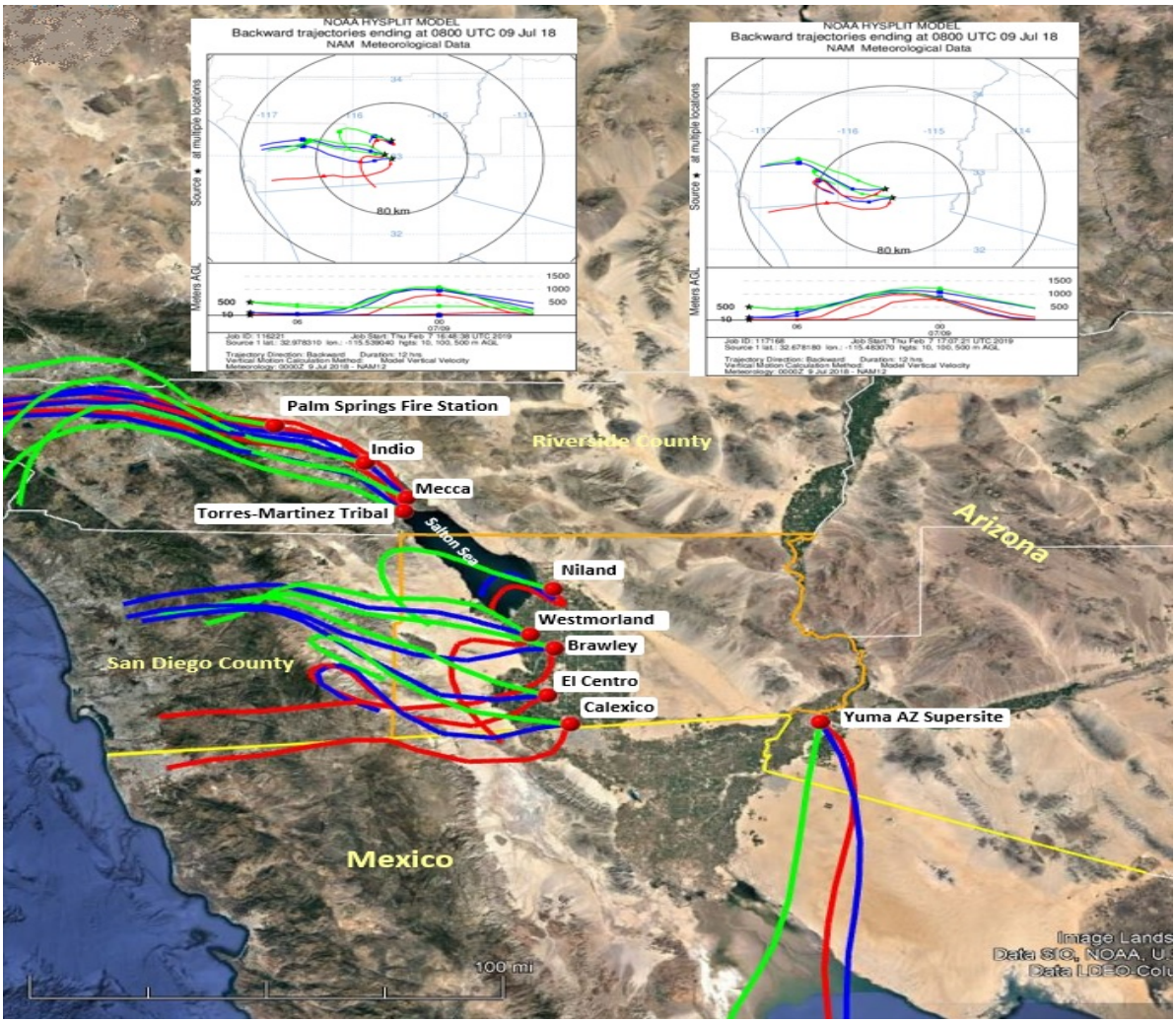


Fig 2-5: A 12-hour HYSPLIT back-trajectory ending at 0000 PST (midnight) for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

FIGURE 2-6
HYSPLIT MODEL All SITES JULY 9, 2018 2100 PST

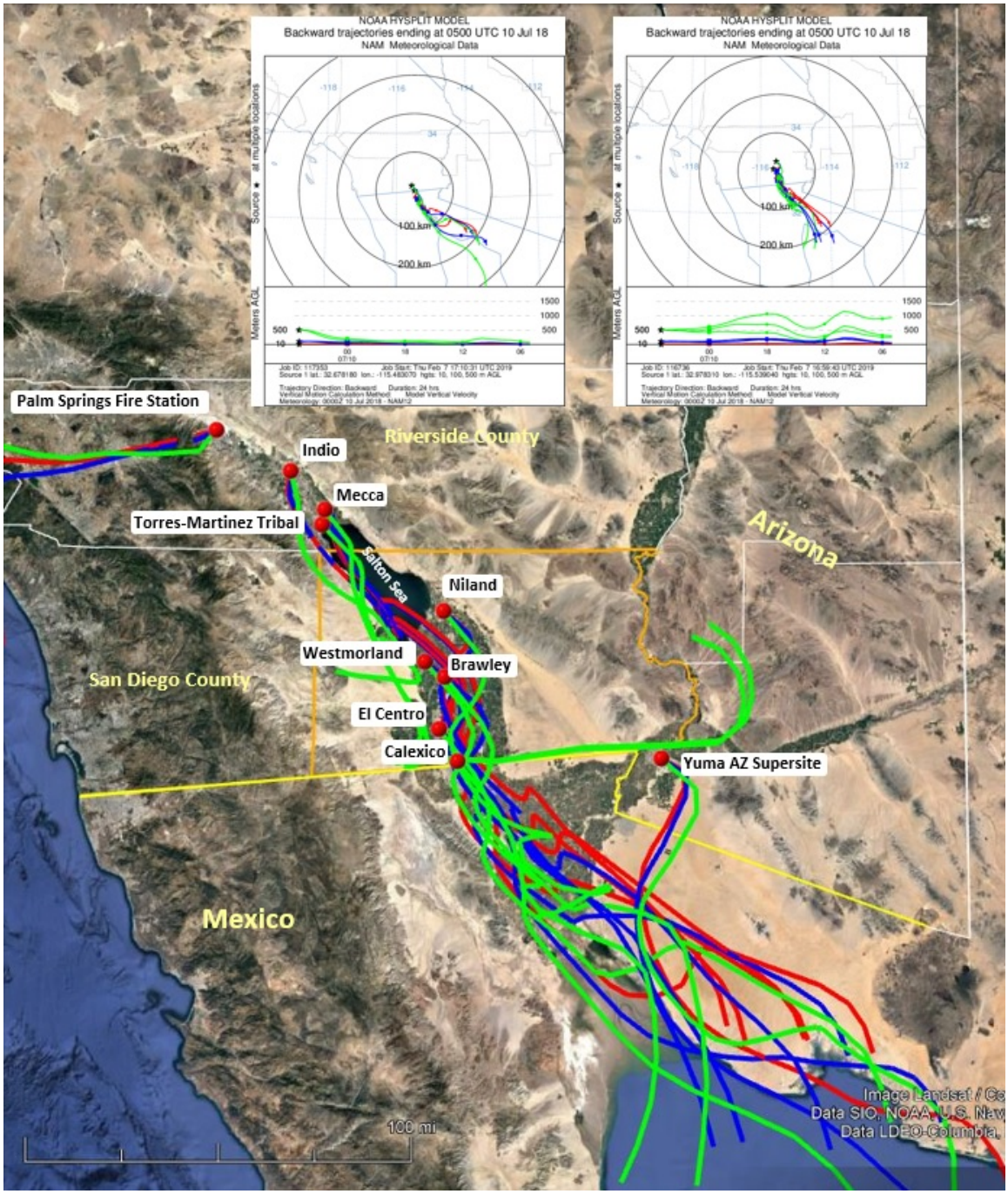


Fig 2-6: A 12-hour back-trajectory HYSPLIT ending at 2100 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

As monsoonal moisture increased and thunderstorm activity created dust storms outflow boundary gusty southerly winds blew over open natural desert areas, within Arizona and

Mexico, and into Imperial County causing an exceedance of the NAAQS at all air quality monitors.

Both the Imperial County Airport (KIPL) and the El Centro NAF (KNJK) measured several hours of winds at or above 25 mph with peak gusts of 44 mph and 49 mph, respectively. The Yuma MCAS Airport measured several hours at or above 25 mph and measured a single hour at 40 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, monsoonal conditions were conducive to thunderstorm activity influencing thunderstorm activity within the area. The Phoenix NWS office described the conditions within the area as a "well conditioned Monsoon environment" that would create "better chances for more widespread storms than a typical monsoon day."[10] According to NWS information there were two stages of powerful dust laden outflow winds that swept through Imperial County on July 9, 2018.

The first, occurred when winds associated with thunderstorm activity to the south arrived around midnight generating and transporting emissions from the north into Imperial County. These winds were outflow boundary winds associated with a thunderstorm complex near Yuma, Arizona.[11] As winds reduced, a second wave of powerful winds swept through Imperial County during the evening also associated with thunderstorms located to the east.[12] Because of the intensity of the thunderstorms, numerous weather notices ranging from Special Weather Statements, Severe Thunderstorm Warning, Dust Advisories, Dust Storm Warnings, and Significant Weather Advisories were issued for the western half of Arizona, all of Imperial County, and the deserts of eastern San Diego County including the Coachella Valley.[13]

While elevated wind speeds play a significant and important role in the transportation of dust, gusts play 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 July 9, 2018 windblown dust from outlaying open natural 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 to the graphic Mesoscale Discussions depicting storm activity and wind gusts within the region, issued by the NWS Storm Prediction Center the NWS issued a graphic Preliminary Storm Report depicting the monsoon storm activity and blowing dust. (**Appendix C**). The issued report described a potent outflow of considerable dust sufficient to allow for dust storm development in the natural open deserts to the south and southeast of Imperial County. This pronounced wall

[10] National Weather Service, Area Forecast Discussion, July 9, 2018, Phoenix office, 305pm MST
[11] National Weather Service, Area Forecast Discussion, July 9, 2018, San Diego office, 903am PST
[12] National Weather Service, Area Forecast Discussion, July 9, 2018, San Diego office, 930pm PST
[13] *Id.*
[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

of dust traveled clear across the Sonoran Desert, a distance of roughly 200 miles."[15] As referenced in the Preliminary Storm Report the following image (**Figure 3-1**) illustrate the identified "Wall of Dust" near Dateland about 60 miles from the CA-AZ border in southwestern Arizona moving west toward Imperial County.

FIGURE 3-1
WALL OF DUST MOVING WEST TOWARD IMPERIAL COUNTY

Fig 3-1: The NWS issued a Preliminary Storm Report for July 9, 2018 that included an image of a dust storm along Interstate 8 near Dateland in southwestern Arizona, about 60 miles from the CA-AZ border. Photo courtesy of Trey Greenwood. Google Earth base map

Figures 3-2 and 3-3 are radar images for July 9, 2018 depicting the intensity of the identified dust storm.

[15] National Weather Service, Preliminary Storm Report, July 9, 2018 (updated July 14, 2018), Phoenix office, Various Times MST

FIGURE 3-2
REFLECTIVITY START OF THE STORM 0018 PST JULY 9, 2018

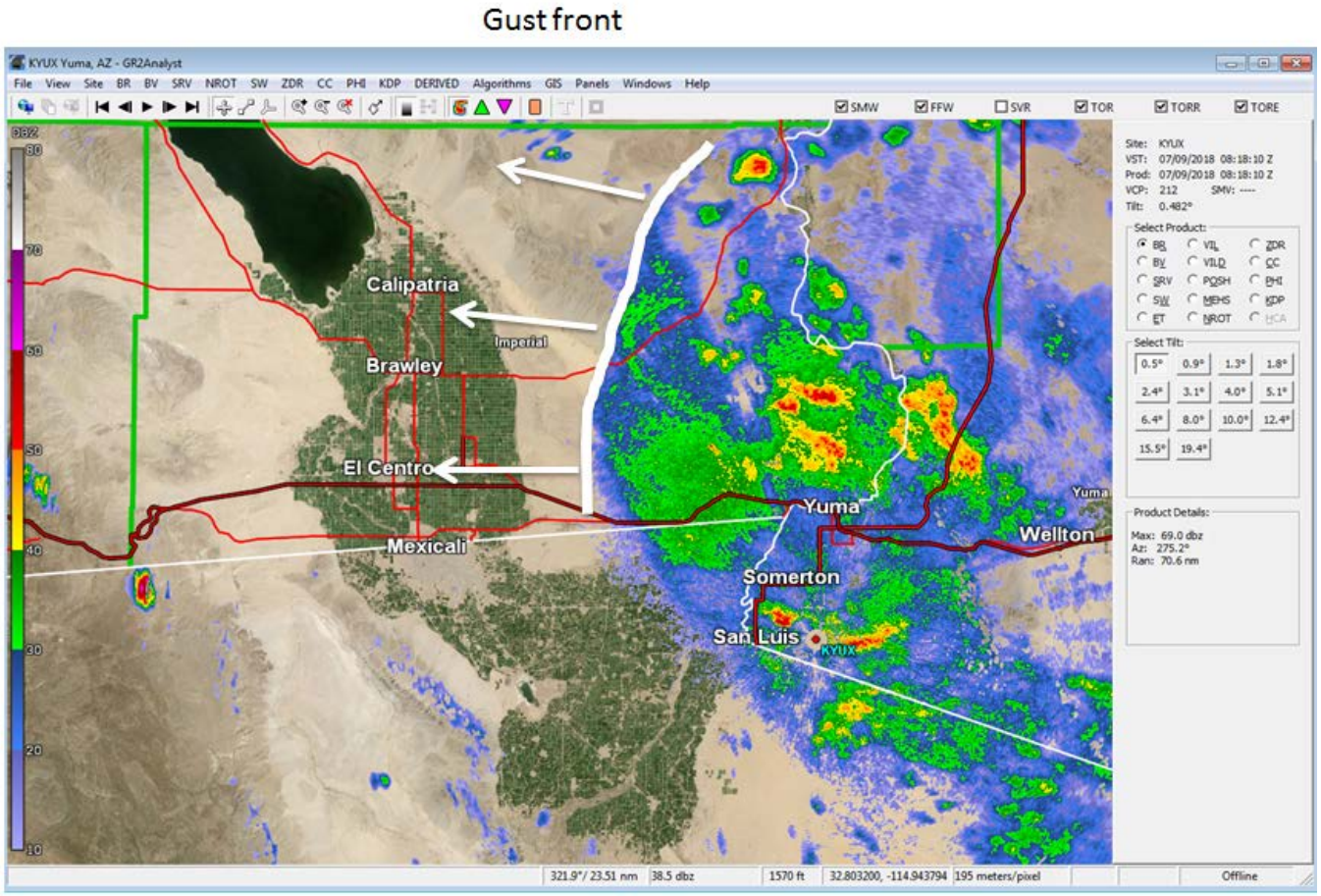


Fig 3-2: The gust front of the storm caused by the unstable monsoon air was captured by Doppler radar at KYUX at 0018 PST on July 9, 2018. Gusty outflow winds entrained dust within western Arizona and transported fugitive emissions into Imperial County. Yellow-orange-red colors depict the stronger parts of the storm. Image courtesy of Andrew Deemer at the Phoenix NWS office

FIGURE 3-3
VELOCITY START OF THE STORM 0018 PST JULY 9, 2018

Wind velocity/gust front

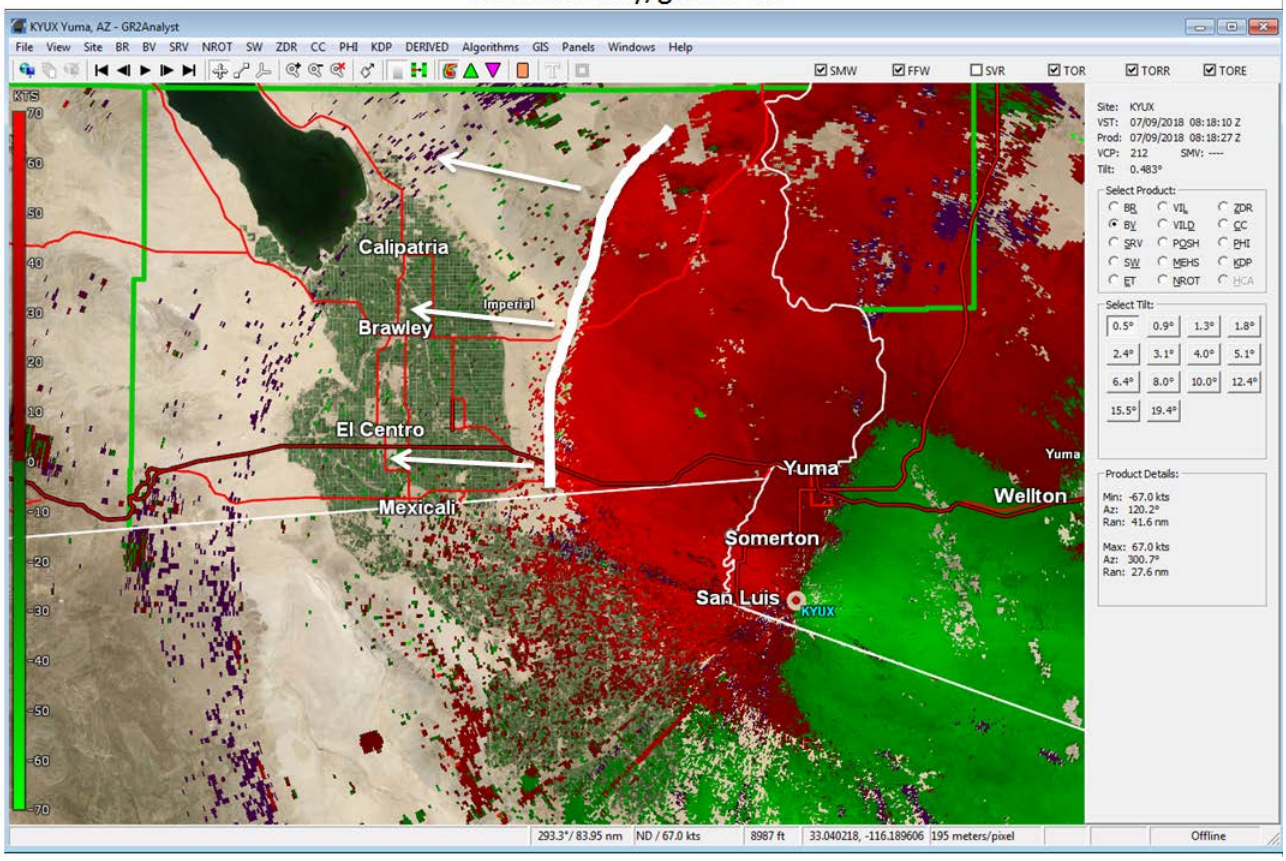


Fig 3-3: The velocity of the gust front of the storm caused by the unstable monsoonal air was captured by Doppler radar at KYUX at 0018 PST on July 9, 2018. Gusty outflow winds generated windblown dust from within western Arizona and transported those dust emissions into Imperial County. Red depicts high velocity winds moving away from the radar at KYUX in Yuma, Arizona. Image courtesy of Andrew Deemer at the Phoenix NWS office

Figure 3-4 below provides an illustration of some of the meteorological conditions, as described above for July 9, 2018, which affected air quality in Imperial County causing an exceedance at all the air quality monitors. Gusty easterly to southeasterly winds generated dust from within western and southwestern Arizona and transported those dust emissions into Imperial County during the early hours of July 9, 2018. Although winds reduced during the mid-day a second wave of gusty winds generated and transported additional dust into Imperial County. All regional monitors depicted in **Table 2-1** exceeded on July 9, 2018.

FIGURE 3-4
VISUAL RAMP-UP ANALYSIS AS DISCUSSED FOR JULY 9, 2018

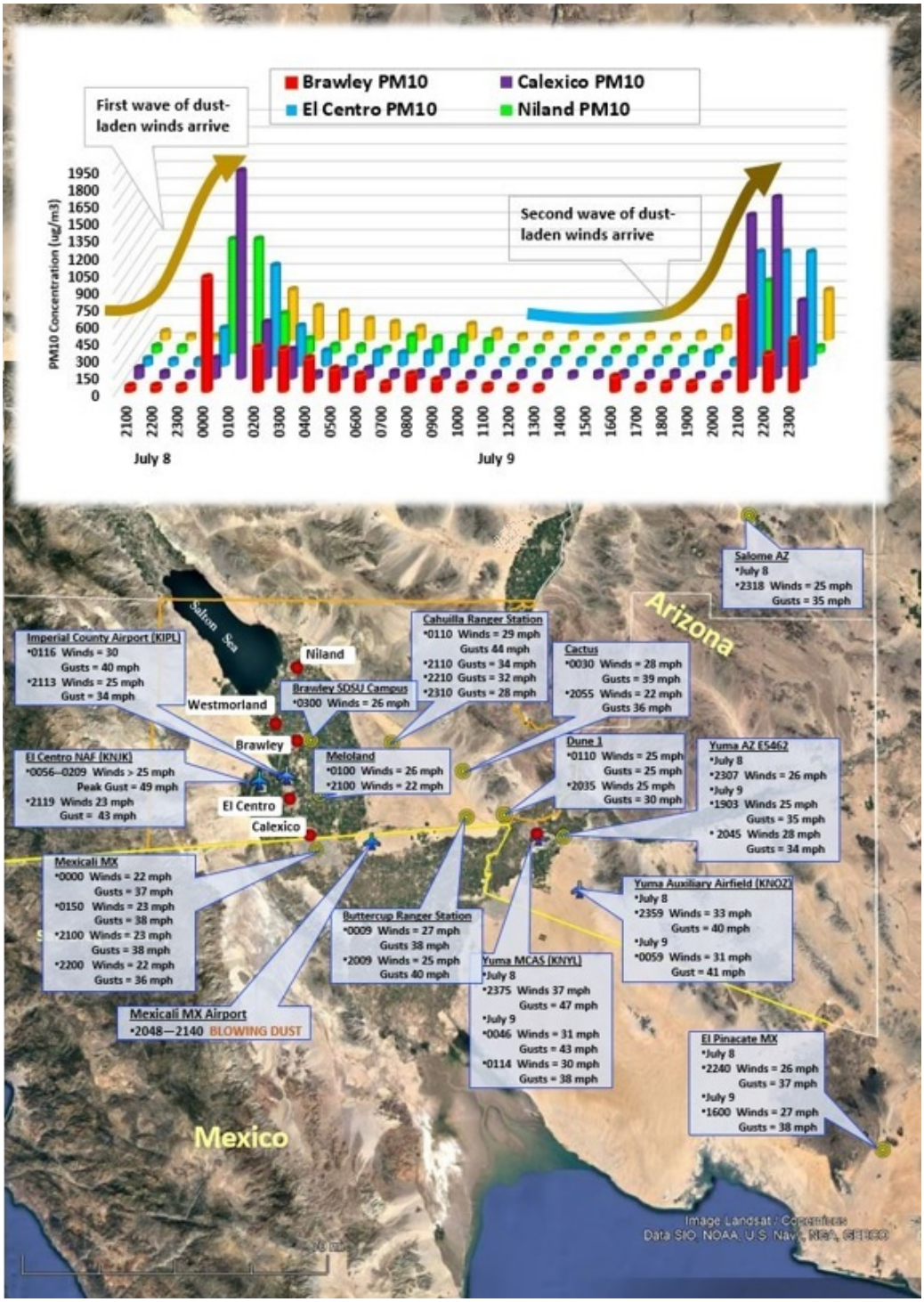


Fig 3-4: On July 9, 2018, gusty winds, easterly to southeasterly to southerly winds transported dust into Imperial County from western and southwestern Arizona and northern Mexico. The first episode of winds arrived around midnight on July 9, 2018. The second episode of winds arrived in the evening of July 9, 2018. Windblown dust from outflow monsoonal winds caused an exceedance of all monitors depicted in **Table 2-1**. Google Earth base map

An indicator of the affect to 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.[16] The Imperial County Airport (KIPL), the El Centro NAF (KNJK), the Blythe Airport (KBLH), the Palm Springs Airport (KPSP), the Jacqueline Cochran-Desert Resorts Airport, the Yuma MCAS (KNYL) and the Mexicali International Airport (MMML), all reported reduced visibility coincident with elevated wind speeds, wind gusts and hourly concentrations of particulates. **Figure 3-5** and **Table 3-1** provide information regarding the reduced visibility in Imperial County and the relation to hourly concentrations at local air monitors.

While **Figure 3-5** is a graphical representation of the reduced visibility within Imperial County and surrounding areas, **Table 3-1** provides 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 3-5,** all airports including the airport located in Mexicali, Mexico reported reduced visibility coincident with elevated winds and concentrations at all air quality monitors.

[16] 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, a representative visibility utilizes an algorithm. 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

FIGURE 3-5
72-HOUR TIME SERIES PM_{10} CONCENTRATIONS AND VISIBILITY

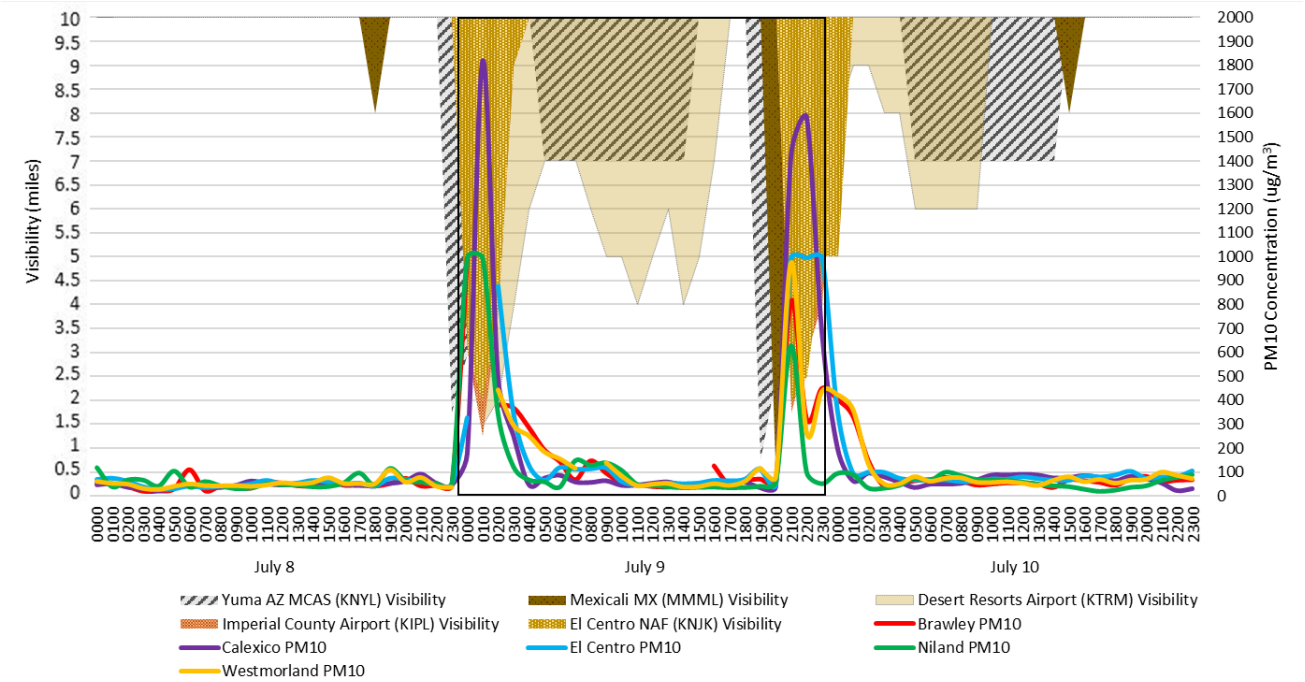


Fig 3-5: is a graphical representation of the compiled data from local and surrounding airports. Reported reduced visibility is coincident with elevated winds and hourly levels of concentrations either just prior to peak concentrations or after. Visibility data from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/

Because the EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states[17] **Table 3-1** is provided in support of the relationship between the elevated winds and elevated concentrations. In the table the measured elevated concentrations of PM_{10} either follow or occur during periods of elevated winds or gusts. The table has a select group of meteorological sites that compare the hourly winds with the closest measured hourly concentration at each of the exceeding monitors.

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

TABLE 3-1
WIND SPEED AND PM_{10} CONCENTRATIONS *JULY 9, 2018

	YUMA (E5462)			YUMA AUXILIARY AIRFIELD (KNOZ)			BUTTERCUP RANGER STATION (BBTC1)			IMPERIAL COUNTY AIRPORT (KIPL)				EL CENTRO NAF (KNJK)				WESTMLD	BRAWLEY	NILAND	EL CENTRO	CALEXICO
HR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	OBS	W/S	W/G	W/D	OBS	PM_{10} (ug/m^3)				
2100	7	10	S	14		SE	5	12	SSE	5		SSW		7		SW		76	43	60	61	93
2200	11	15	SSE	22	26	SSE	1	8	SE	6		SSW		7		S		39	46	54	50	55
2300	26	31	E	33	40	E	4	8	SE	6		SSE		6		S		35	45	48	52	48
0000	21	31	ESE	31	41	ESE	27	38	E	24	40	ESE	Hz	37	46	ESE			995	995	329	178
0100	20	25	SE	24		SE	18	43	E	30	40	ESE	Hz	32	49	ESE				995		1819
0200	20	25	SE	18		SE	16	35	ESE	22	29	SE	Hz	28	41	SE		442	382	343	878	492
0300	13	19	S	9		N	18	33	SSE	21	29	S		21		S		295	369	124	347	253
0400	5	7	N	21		N	8	24	ESE	6		E		6		E		250	287	69	130	49
0500	4	6	ENE	9		S	6	19	WNW	0		N		7		SE		183	194	61	68	76
0600	5	7	SSW	8		ESE	6	16	ESE	8		N		9		N		154	145	39	121	88
0700	4	5	NE	10		SSE	2	12	SSE	10		NE		9		NE		114	69	149	113	60
0800	11	14	SE	9		SSE	6	10	ENE	10		ENE		11		E			148	130	115	58
0900	8	11	SE	8		SSE	6	10	E	5		VRB		9		SE		138	97	140	119	65
1000	4	6	S	6		SSE	5	11	ESE	9		ENE		11		ESE		83	57	109	62	46
1100	5	7	S	9		S	4	9	SE	5		E		7		ESE		42	49	51	48	47
1200	2	4	SW	6			4	11	S	9		ENE		6		VRB		48	41	47	45	55
1300	5	9	WSW	7		SW	5	13	S	3		VRB		5		NE		51	38	40	56	60
1400	3	4	NW	6		SW	6	11	S	7		N		6		NNE		36		36	53	47
1500	8	12	SW	6		SW	4	13	SW	5		VRB		6		N		38		38	56	53
1600	2	5	SW	0		N	6	13	SSW	7		N		5		VRB		50	127	39	67	54
1700	1	2	SW	5		S	4	10	SSW	6		NE		7		ENE		43	49	36	65	51
1800	5	7	WSW	14		SW	4	8	SE	6		ESE		5		ESE		60	66	37	72	59
1900	25	35	E	43	58	ENE	3	8	SSW	6		E		5		E		114	72	43	116	36
2000	28	34	E				25	40	ENE	16		SE		11		SE		77	62	60	50	40
2100	15	24	ESE				22	40	ENE	25	34	ESE	Hz	23	43	E	Hz	974	816	629	995	1428
2200	8	11	SE				18	30	ENE	17		SE	Hz	18		SE	Hz	264	323	102	995	1584
2300	6	8	SSW				8	21	E	16		SE	Hz	16		SE	Hz	437	451	53	995	680

*__Blue__ dates represent July 8, 2018. Wind data for Yuma (E5462), Yuma Auxiliary Airfield (KNOZ), and Buttercup Ranger Station (BTTC1) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Wind data for El Centro NAF (KNJK) and Imperial County Airport (KIPL) from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/. Air quality data from the EPA's AQS repository. Wind speeds = mph; Direction = degrees. **Hz**=Haze. 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. Missing PM_{10} data due to inlets reaching critical limits causing pressures to lower below federally allowed criteria levels

As mentioned above, a Preliminary Storm Report issued by the NWS showed an image of a wall of dust near Dateland, Arizona heading west toward Imperial County. Numerous Blowing Dust Warnings and Dust Advisories also discussed dust being transported by the winds across Imperial County. The gusty east to southeast to south winds affected all regional air monitors in Riverside County, Imperial County and southwestern Arizona during the early morning and late evening hours of July 9, 2018 (**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.[18] As transported windblown dust entered Imperial County on July 9, 2018, the air quality in Imperial County degraded. Overall, the gusty east-to-southeast-to south winds produced by the unstable monsoonal air affected air quality in Imperial County.

FIGURE 3-6
IMPERIAL VALLEY AIR QUALITY INDEX FOR BRAWLEY
JULY 9, 2018

Fig 3-6: The degradation, or affect upon air quality, maybe determined when the AQI changes to an Unhealthy level for Sensitive Groups

[18] 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 3-7
IMPERIAL VALLEY AIR QUALITY INDEX FOR CALEXICO
JULY 9, 2018

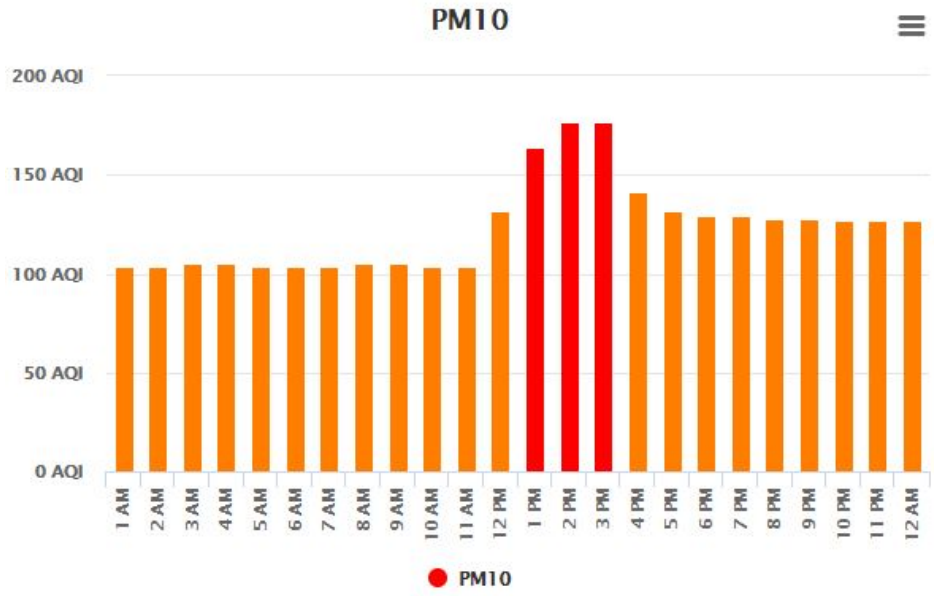


Fig 3-7: The degradation, or affect upon air quality, maybe determined when the AQI changes to an Unhealthy level for Sensitive Groups

FIGURE 3-8
IMPERIAL VALLEY AIR QUALITY INDEX FOR EL CENTRO
JULY 9, 2018

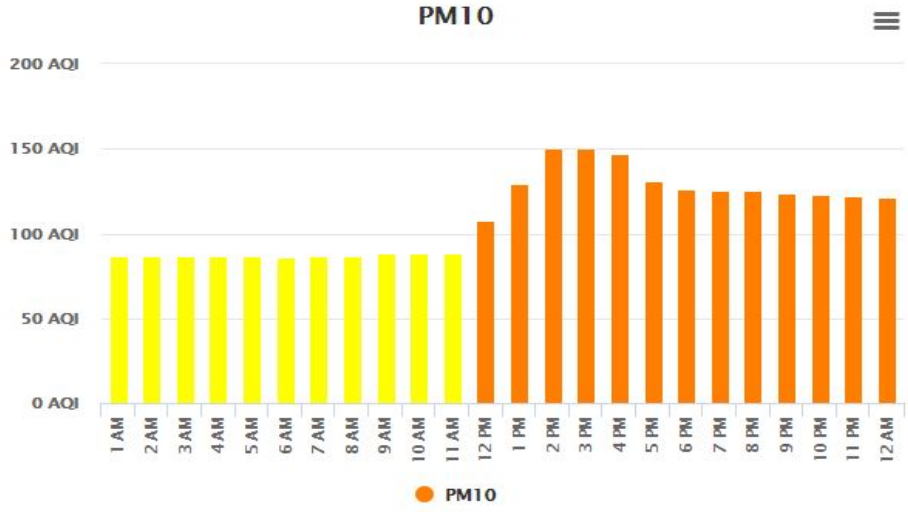


Fig 3-8: The degradation, or affect upon air quality, maybe determined when the AQI changes to an Unhealthy level for Sensitive Groups

FIGURE 3-9
IMPERIAL VALLEY AIR QUALITY INDEX FOR NILAND
JULY 9, 2018

Fig 3-9: The degradation, or affect upon air quality, maybe determined when the AQI changes to an Unhealthy level for Sensitive Groups.

FIGURE 3-10
IMPERIAL VALLEY AIR QUALITY INDEX FOR WESTMORLAND
JULY 9, 2018

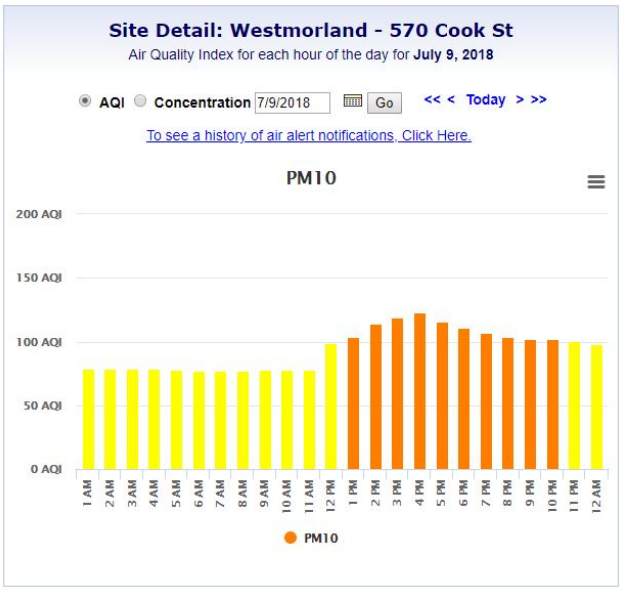


Fig 3-10: The degradation, or affect upon air quality, maybe determined when the AQI changes to an Unhealthy level for Sensitive Groups

III.1 Summary of Forecasts and Warnings

Both the San Diego and Phoenix NWS offices discussed in the days prior to and during July 9, 2018 the strong, gusty winds and the anticipated dust effects from the intrusion of a surge of monsoonal moisture into the region. Numerous advisories including Blowing Dust Warnings and Dust Storm Warnings were issued during the wind event. **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 July 9, 2018 different sites measured wind speeds at or above, in some instance in far excess of 25mph. For example, the Yuma MCAS measured a single hour at 40 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 the Brawley, Calexico, El Centro, Niland, and Westmorland stations for the period of January 1, 2010 through July 9, 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).[19] 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 July 9, 2018, as measured by the Brawley, Calexico, El Centro, Niland, and Westmorland monitor, were used to establish the historical and seasonal variability over time.[20] All figures illustrate that the exceedance, which occurred on July 9, 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.

[19] 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.

[20] FRM sampling ended December 2016.

FIGURE 4-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO JULY 9, 2018

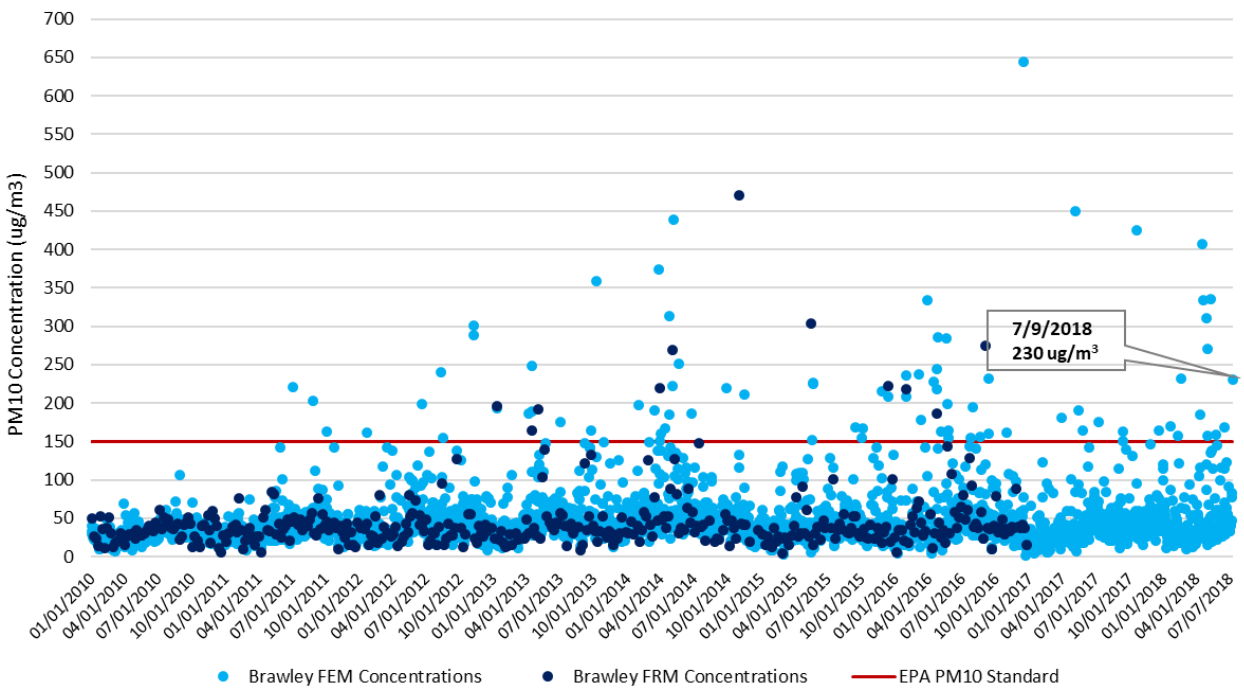


Fig 4-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 230 µg/m^3 on July 9, 2018 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-1,** for Brawley includes 3,112 sampling days (January 1, 2010 through July 9, 2018). During the January 1, 2010 through July 9, 2018 period, the Brawley monitor measured 80 exceedance days out of 3,112 sampling days, which translates into an occurrence rate less than 3%. Historically, there fourteen (14) exceedance days measured during the first quarter; thirty-six (36) exceedance days measured during the second quarter; seventeen (17) 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 JULY 9, 2018

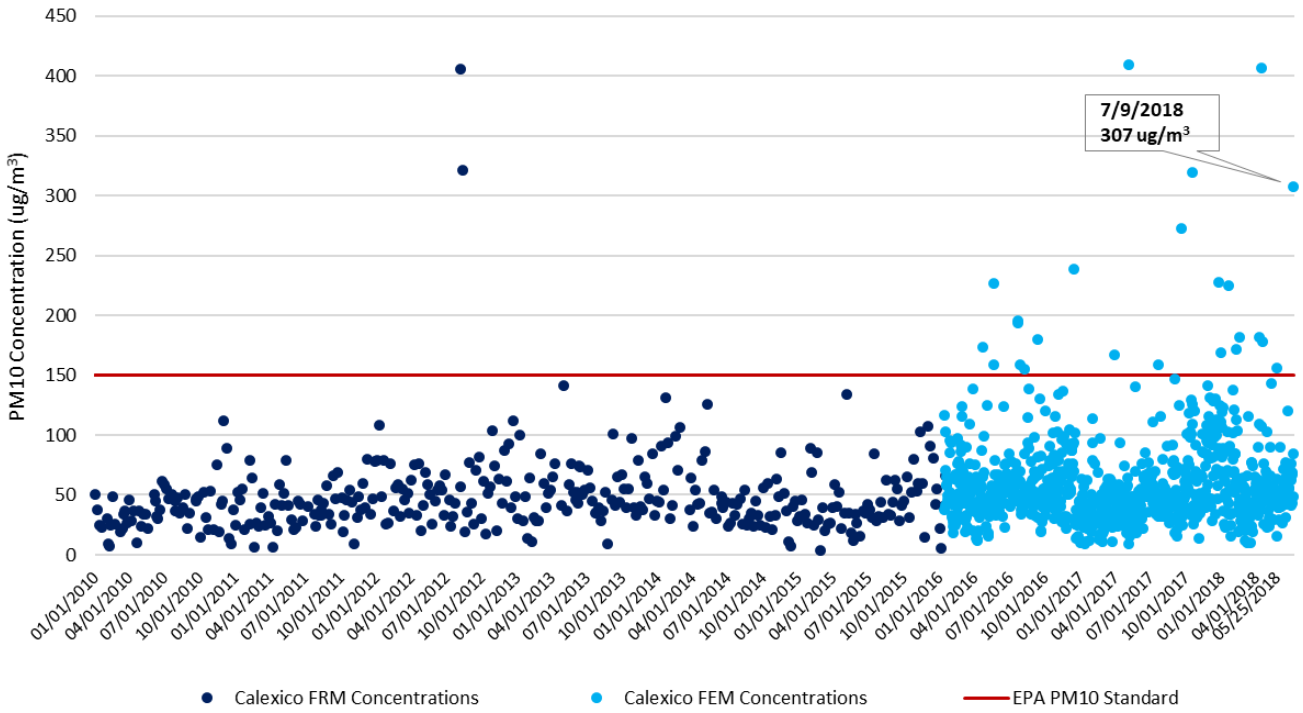


Fig 4-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 307 µg/m^3 on July 9, 2018 by the Calexico monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-2,** for Calexico includes 1,223 sampling days (January 1, 2010 through July 9, 2018). During the January 1, 2010 through July 9, 2018 period, the Calexico monitor measured 26 exceedance days out of 1,223 sampling days, which translates into an occurrence rate less than 2.5%. Historically, there were five (5) exceedance days measured during the first quarter; eight (8) exceedance days measured during the second quarter; ten (10) 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 JULY 9, 2018

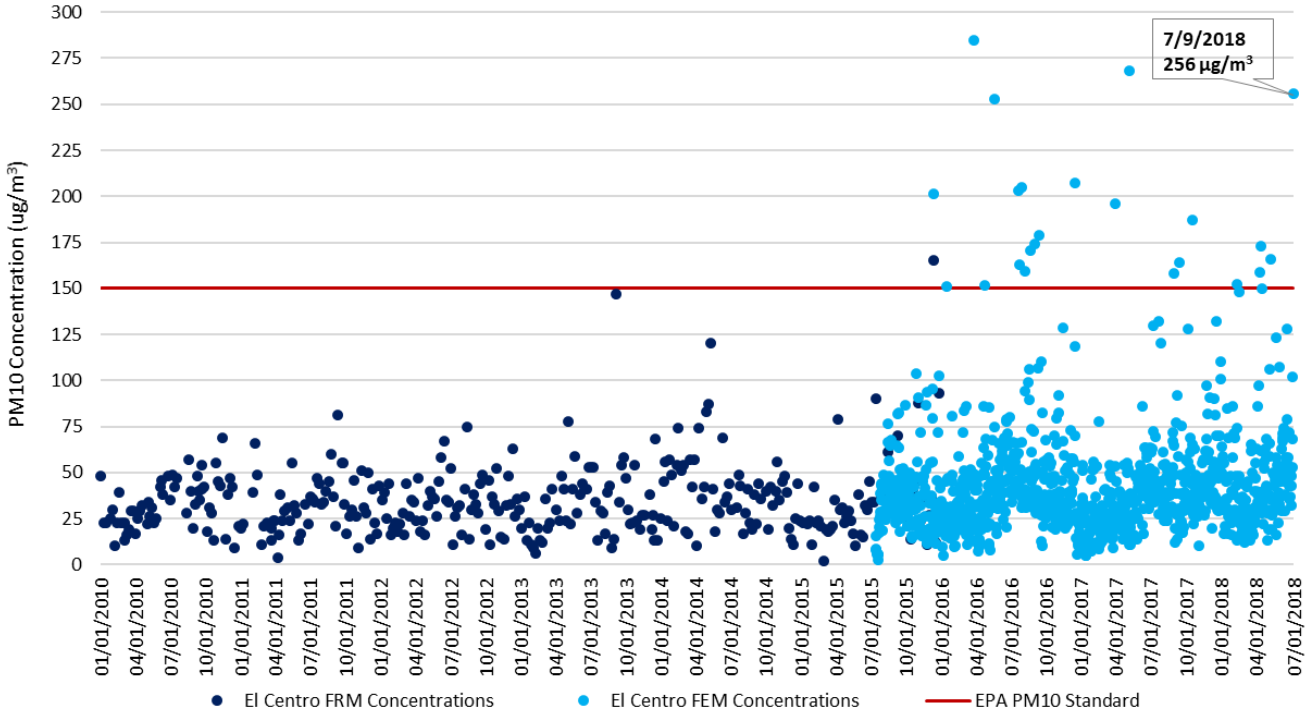


Fig 4-3: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 256 µg/m³ on July 9, 2018 by the El Centro monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-3,** for El Centro includes 1,449 sampling days (January 1, 2010 through July 9, 2018). During the January 1, 2010 through July 9, 2018 period, the El Centro monitor measured 20 exceedance days out of 1,449 sampling days, which translates into an occurrence rate less than 1.5%. Historically, there were two (2) exceedance days measured during the first quarter; five (5) exceedance days measured during the second quarter; ten (10) 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 JULY 9, 2018

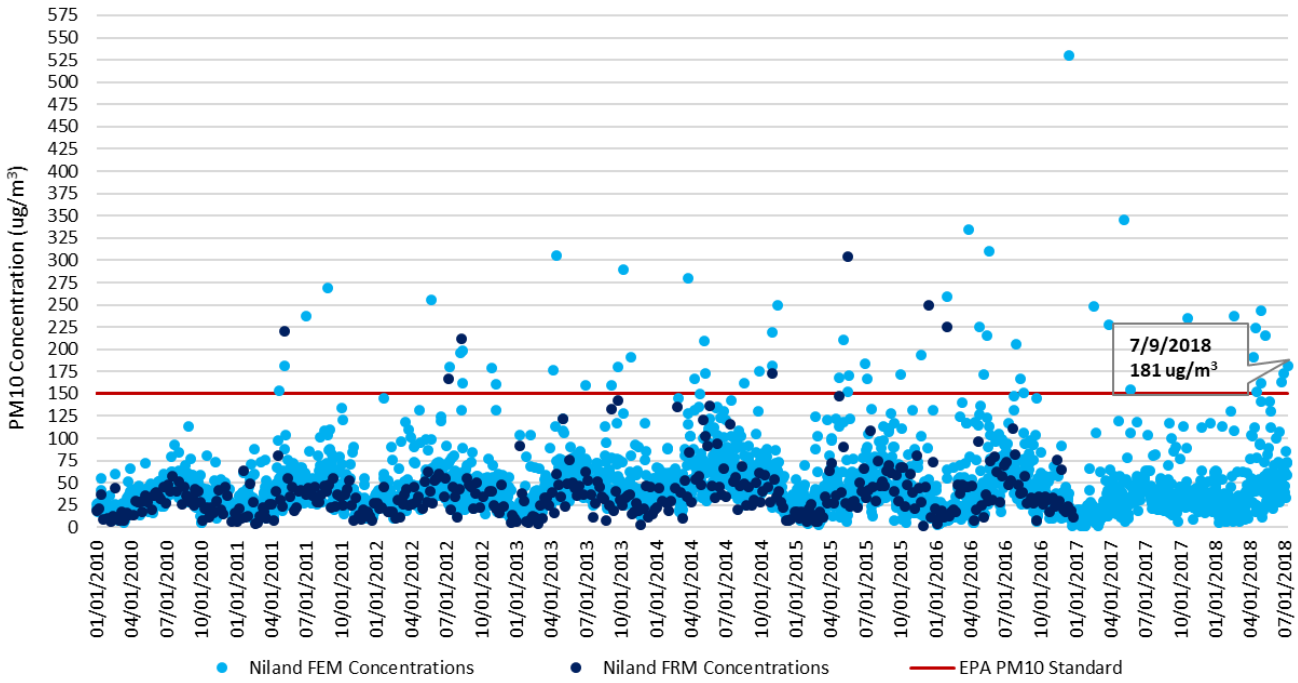


Fig 4-4: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 181 µg/m^3 on July 9, 2018 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-4,** for Niland includes 3,112 sampling days (January 1, 2010 through July 9, 2018). During the January 1, 2010 through July 9, 2018 period, the Niland monitor measured 59 exceedance days out of 3,112 sampling days, which translates into an occurrence rate less than 2%. Historically, there were six (6) exceedance days measured during the first quarter; twenty-five (25) exceedance days measured during the second quarter; sixteen (16) 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 JULY 9, 2018

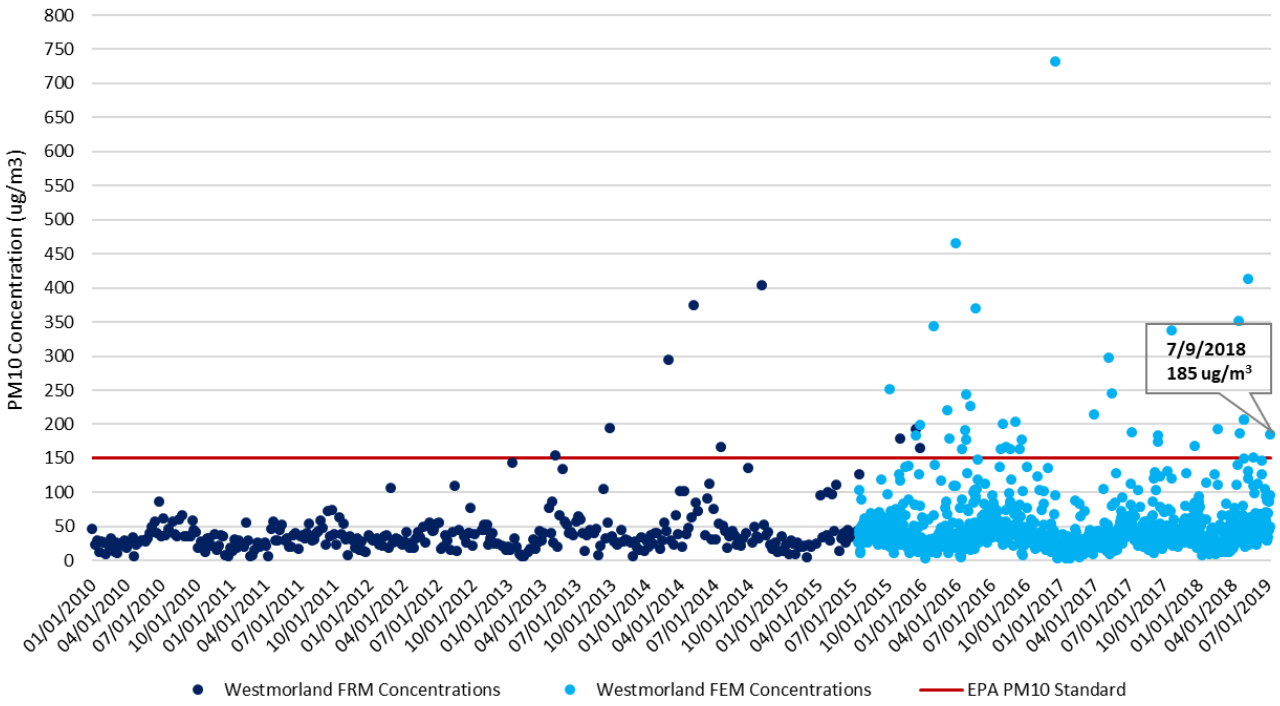
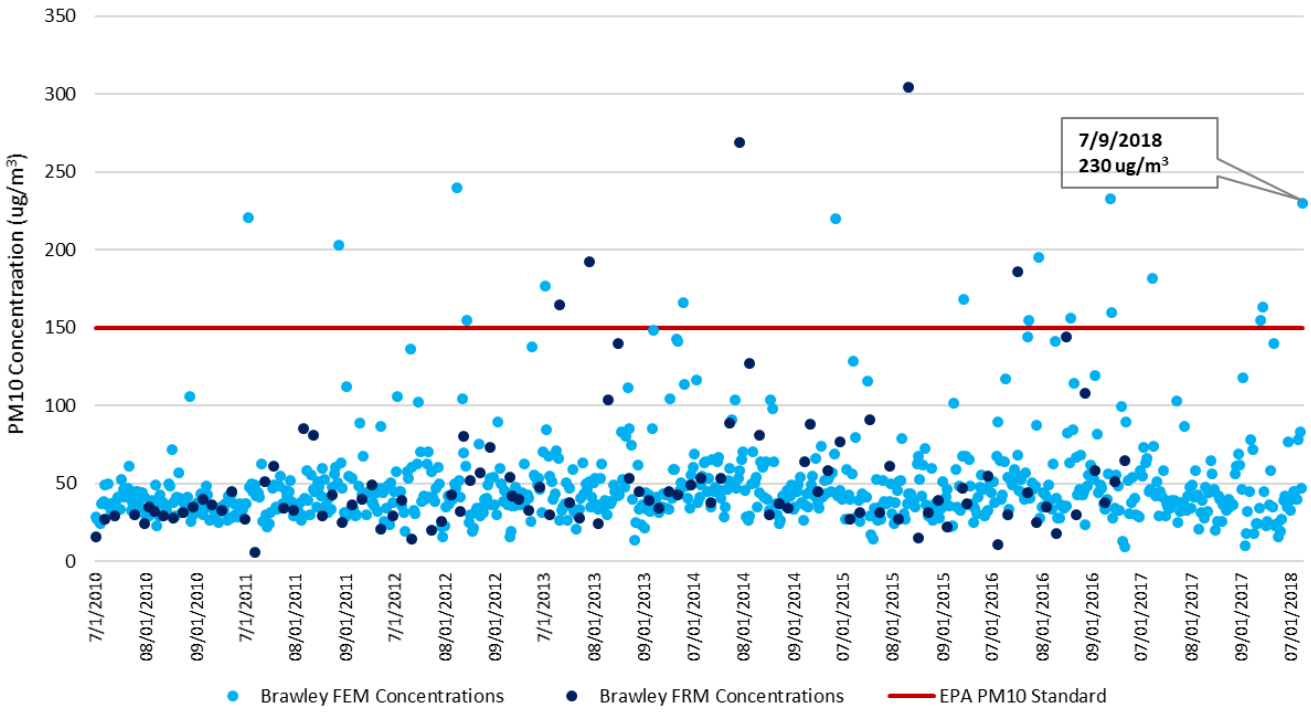


Fig 4-5: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 185 µg/m^3 on July 9, 2018 by the Westmorland monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-5,** for Westmorland includes 1,441 sampling days (January 1, 2010 through July 9, 2018). During the January 1, 2010 through July 9, 2018 period, the Niland monitor measured 43 exceedance days out of 1,441 sampling days, which translates into an occurrence rate less than 3%. Historically, there were seven (7) exceedance days measured during the first quarter; fifteen (15) exceedance days measured during the second quarter; thirteen (13) 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
***JULY 1, 2010 TO JULY 9, 2018**

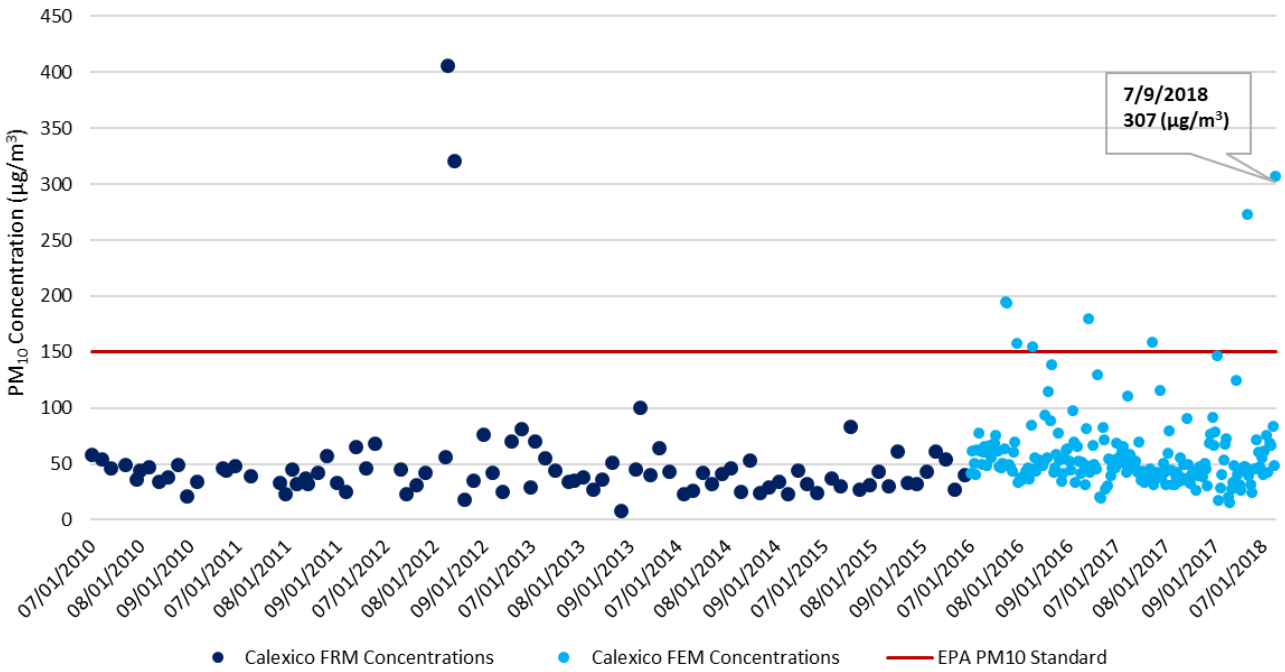


***Quarterly: July 1, 2010 to September 30, 2017 and July 1, 2018 to July 9, 2018**

Fig 4-6: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 230 µg/m^3 by the Brawley monitor on July 9, 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 745 sampling days, 847 credible samples and seventeen (17) exceedance days. This translates to less than a 2.0% seasonal exceedance occurrence rate.

FIGURE 4-7
CALEXICO SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***JULY 1, 2010 TO JULY 9, 2018**

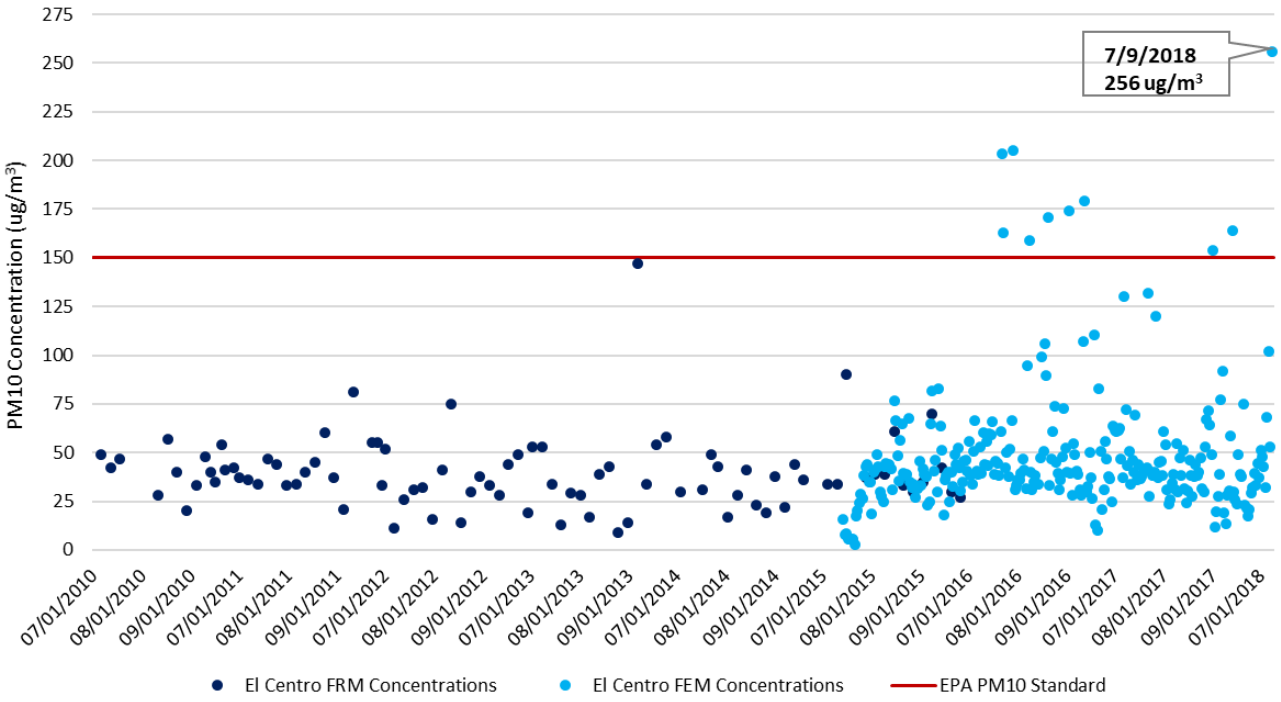


***Quarterly: July 1, 2010 to September 30, 2017 and July 1, 2018 to July 9, 2018**

Fig 4-7: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 303 µg/m^3 by the Calexico monitor on July 9, 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 300 sampling days, 282 credible samples and ten (10) exceedance days. This translates to less than a 3.5% seasonal exceedance occurrence rate.

FIGURE 4-8
EL CENTRO SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***JULY 1, 2010 TO JULY 9, 2018**

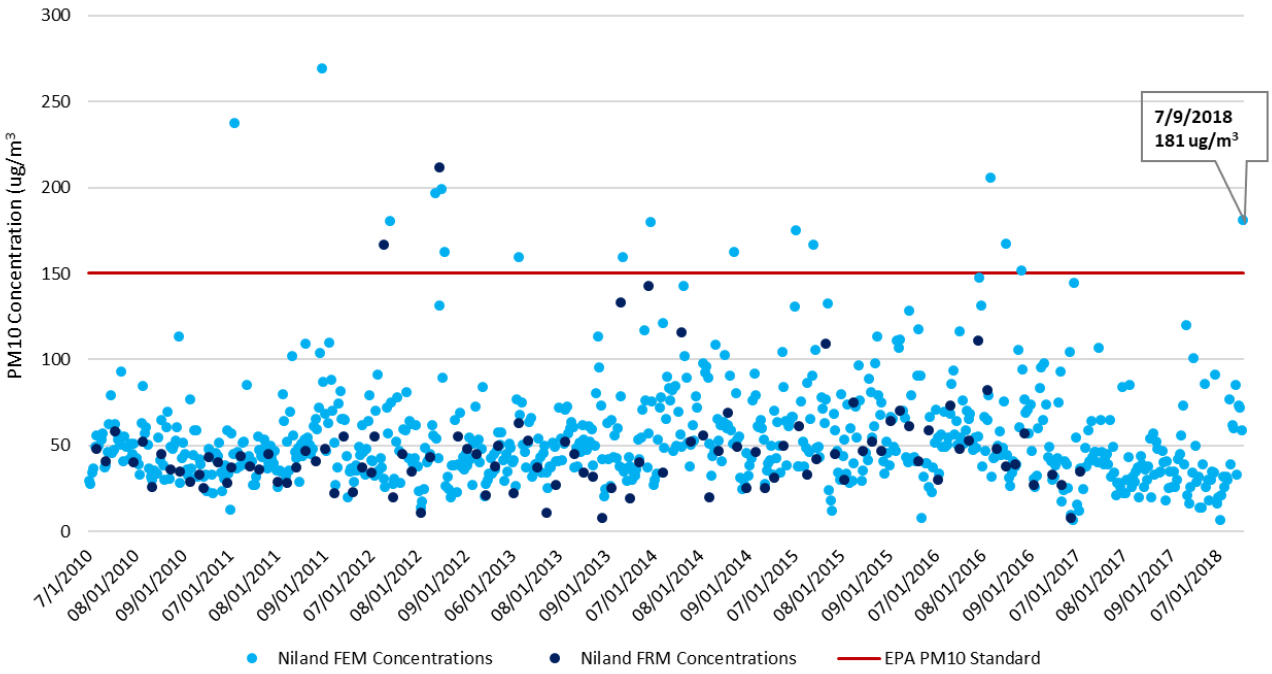


***Quarterly: July 1, 2010 to September 30, 2017 and July 1, 2018 to July 9, 2018**

Fig 4-8: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 256 µg/m^3 by the El Centro monitor on July 9, 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 357 sampling days, 360 credible samples and ten (10) exceedance days. This translates to less than a 2.7% seasonal exceedance occurrence rate.

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

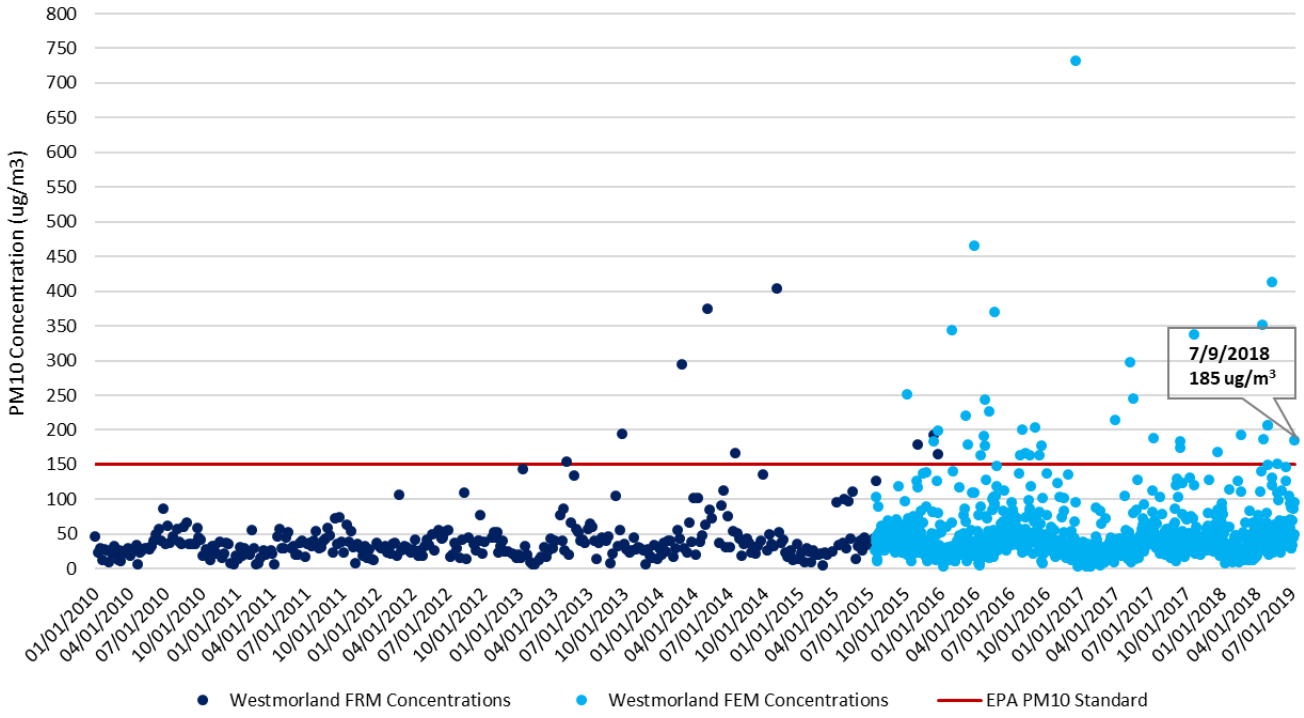


***Quarterly: July 1, 2010 to September 30, 2017 and July 1, 2018 to July 9, 2018**

Fig 4-9: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 181 µg/m^3 by the Niland monitor on July 9, 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 745 sampling days, 845 credible samples and sixteen (16) exceedance days. This translates to less than a 1.8% seasonal exceedance occurrence rate.

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



***Quarterly: July 1, 2010 to September 30, 2017 and July 1, 2018 to July 9, 2018**

Fig 4-10: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 185 µg/m^3 by the Westmorland monitor on July 9, 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 353 sampling days, 360 credible samples and thirteen (13) exceedance days. This translates to less than a 3.6% seasonal exceedance occurrence rate.

Examining the historical and seasonal time series concentrations as they relate to the July 9, 2018 measured exceedance, the exceedance measured on July 9, 2018 is 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 deserts of western Arizona and northern Mexico. The origination of these emissions from these areas affected all the air quality monitors on July 9, 2018. Since Imperial County does not have jurisdiction over emissions emanating from Arizona or Mexico 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

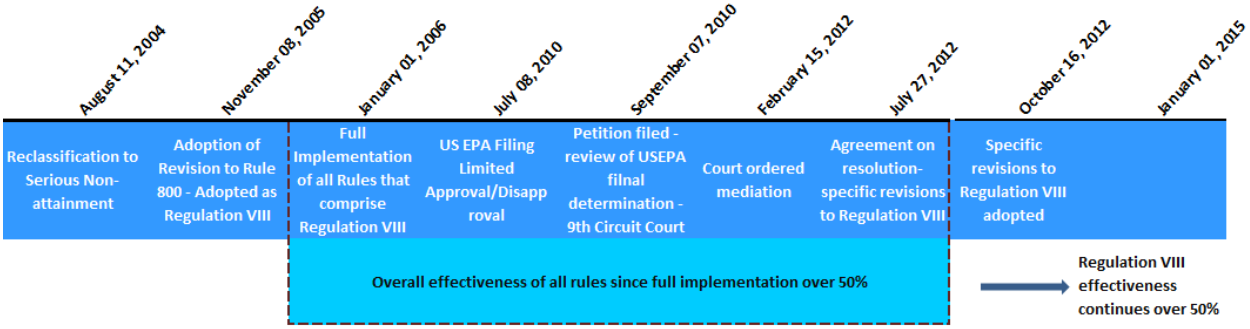


Fig 5-1: Regulation VIII Graphic Timeline

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 July 9, 2018 different sites measured wind speeds at or above 25 mph. Wind speeds of 25 mph are normally sufficient to overcome most PM_{10} control measures. During the July 9, 2018 event, wind speeds were above the 25 mph threshold, overcoming reasonably controls 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 July 9, 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, officially declared as a No Burn Day, related to agricultural burning, waste burning or dust.

FIGURE 5-2
PERMITTED SOURCES

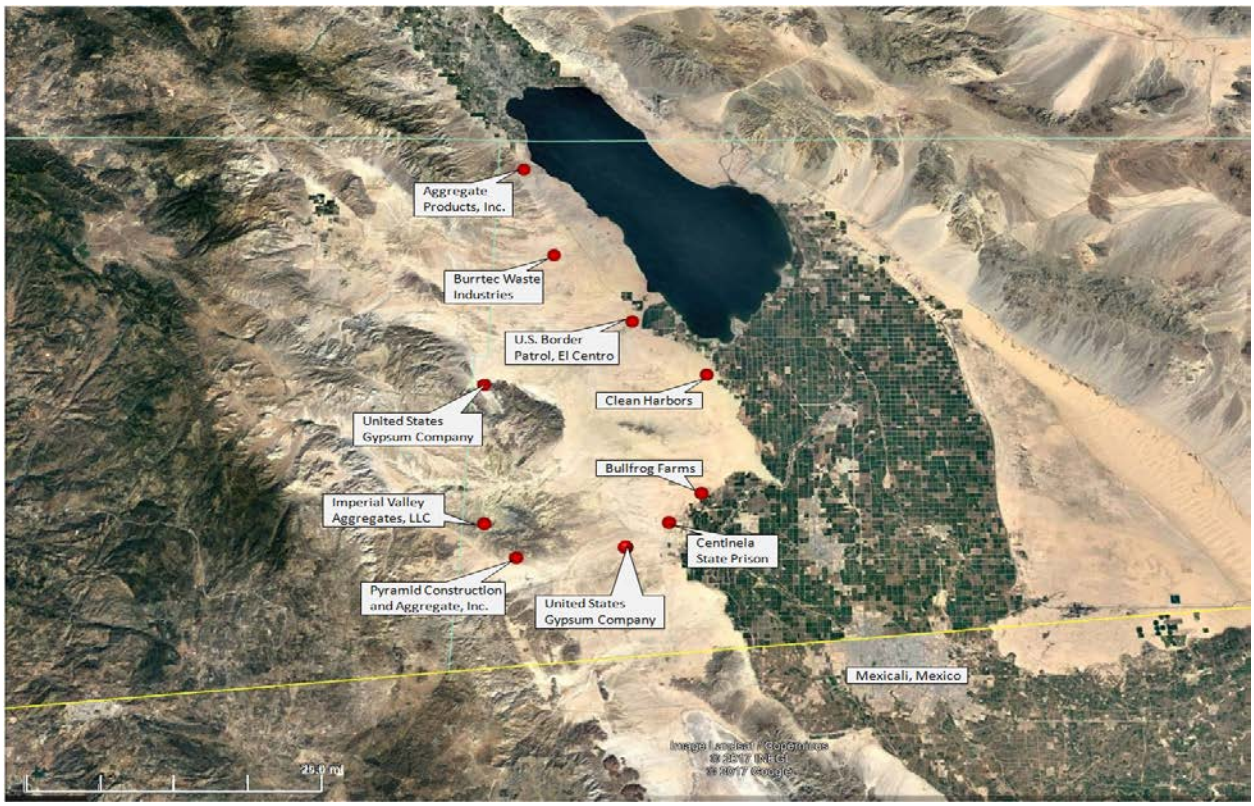


Fig 5-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley, Calexico, El Centro, Niland, and Westmorland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the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

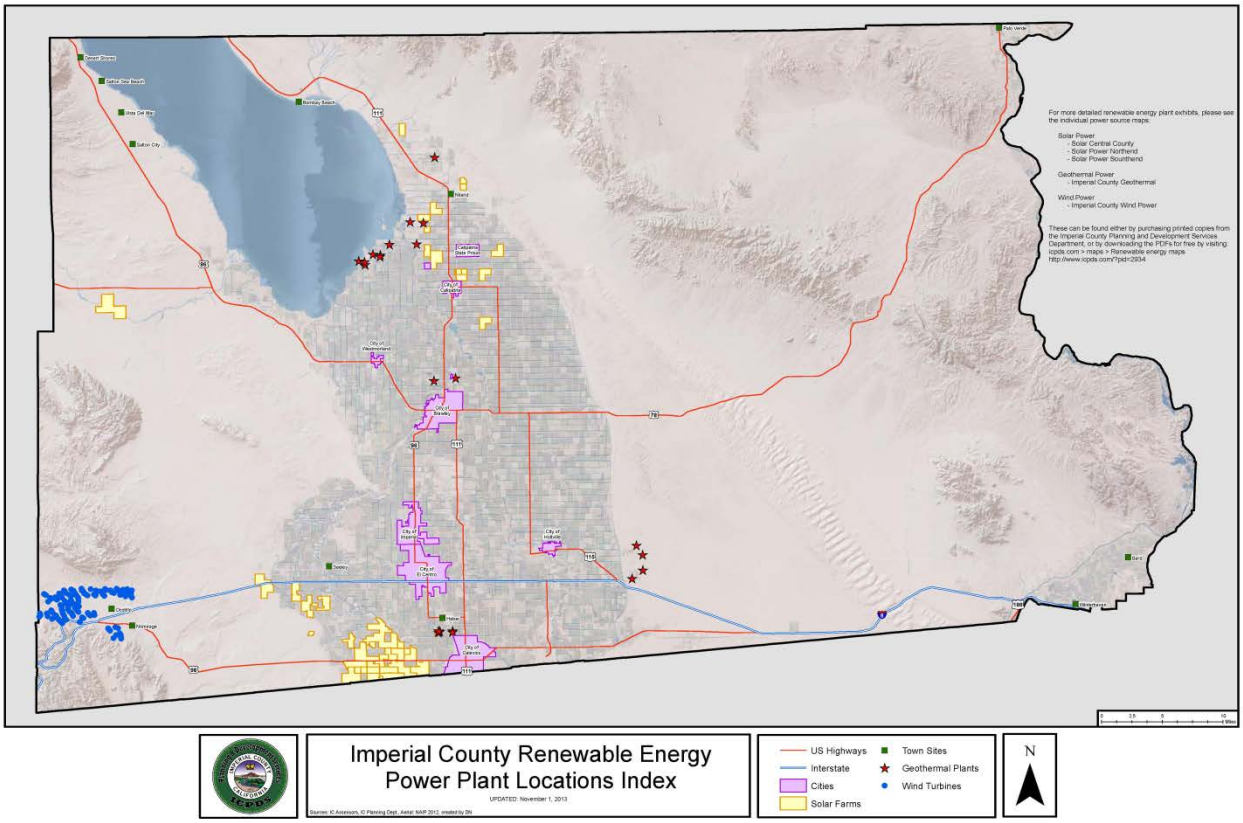


Fig 5-3: The above map identifies those power sources located west, northwest and southwest of the Brawley, Calexico, El Centro, Niland, and Westmorland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

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.

Typical monsoonal gulf surges can cause weather disturbances that bring thunderstorm activity and associated outflow boundary winds into the region. Because of a surge of monsoonal moisture from northern Mexico, atmosphere conditions became sufficiently unstable so as to allow the development of thunderstorms which produced strong and gusty east to southeast to southerly outflow winds. The outflow winds came in two waves; the first during the early morning hours right around midnight on July 9, 2018, and the second wave later that evening. The combined effect of both waves increased emissions sufficiently so as to cause an exceedance of the PM_{10} NAAQS at all Imperial County monitors.

A well-conditioned monsoonal environment capable of producing widespread storms occurred on July 9, 2018.[21] In response to the intensity of the instability and by the very nature of the erupting thunderstorms numerous weather notices ranging from Blowing Dust Advisories, Dust Storm Warnings, Severe Thunderstorms Warnings, and Special Weather Statements were issued advising the public of dust storms and associated elevated winds. A wall of dust was photographed near Dateland, Arizona, about 60 miles east of the CA-AZ border, heading west toward Imperial County.[22] Another "wall of dust" was spotted near the Algodones Dunes moving west at 40 mph (**Figure 1-1**).[23]

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 July 9, 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

[21] National Weather Service, Area Forecast Discussion, July 9, 2018, Phoenix office, 305pm MST
[22] National Weather Service, Preliminary Storm Report, July 9, 2018 (updated July 14, 2018), Phoenix office, Various Times MST
[23] National Weather Service, Dust Storm Warning, July 9, 2018, Phoenix office, 851pm MST

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 entrain dust from desert areas, whose sources are reasonably controlled, 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 the natural open desert areas of western Arizona and northern Mexico where Imperial County has no jurisdiction. In any event, despite reasonable controls in place within Imperial County, high winds overwhelmed all reasonable controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Brawley, Calexico, El Centro, Niland, and Westmorland monitors resulted from naturally occurring strong gusty east to southeast to south winds that transported windblown dust into Imperial County and other parts of southern California from areas located within the natural open desert regions within western Arizona and northern Mexico. These facts provide strong evidence that the PM_{10} exceedance at the Brawley, Calexico, El Centro, Niland, and Westmorland monitors on July 9, 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 July 9, 2018, was caused by the transport of windblown dust into Imperial County by strong gusty east to southeast to south winds produced by thunderstorm outflows caused by a surge of unstable moist air from northern Mexico into the region. At the time of the event, anthropogenic sources, within Imperial County were reasonably controlled. 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 all the air quality monitors in Imperial County demonstrates a consistency of elevated gusty southerly winds with elevated concentrations of PM_{10} on July 9, 2018. In addition, temporal analysis indicates that the elevated PM_{10} concentrations and the gusty southerly 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 July 9, 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, and 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 southerly winds produced by thunderstorm outflows. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Brawley, Calexico, El Centro, Niland and Westmorland monitors on July 9, 2018.

In particular, the clear causal relationship and not reasonably controllable or preventable sections provide evidence that high gusty outflow boundary winds transported fugitive emissions from natural open desert areas, located within northern Mexico, southwestern Arizona, 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.[24]

[24] 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.