IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Dr. Jeff Masters, August 2, 2018, 3:28 PM EDT: Summer rain showers fall over the desert region about 40 miles northeast of Imperial, California, as seen from Belle Mountain in Joshua Tree National Park, at 12:15 pm PDT July 19, 2017, when the temperature was 100° F (38°C). Image Credit: National Park Service: https://www.wunderground.com/cat6/Hottest-Rain-Record-Rain-falls-119F-Imperial-California

June 23, 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 Niland monitor in Imperial County, California on June 23, 2018

TABLE OF CONTENTS

SECTION PAGE

I Introduction 1
- I.1 Public Notification [40 CFR §50.14(c)(1)] 3
- I.2 Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14 (c)(2)) 3
- I.3 Public Comment Process [40 CFR §50.14(c)(3)(v)(A-C)] 4
- I.4 Mitigation of Exceptional Events [40 CFR §51.930] 4

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 monitor 9
- II.1 Description of the event causing the exceedance 9
- II.2 How emissions from the event led to an exceedance 10

III Clear Causal Relationship – A demonstration that the event affected air quality illustrating the relationship between the event and the monitored exceedance 17
- III.1 Summary of Forecasts and Warnings 23
- III.2 Summary of Wind Observations 24

IV Concentration to Concentration Analysis – An analyses comparing the event-influenced concentrations to concentrations at the same monitoring site at other times 25

V Both Not Reasonably Controllable and Not Reasonably Preventable – A demonstration that the event was both not reasonably controllable and not reasonably preventable 28
- V.1 Other PM_{10} Control Measures 29
- V.2 Wind Observations 31
- V.3 Review of Source Permitted Inspections and Public Complaints 32

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 35
- VI.1 Affects Air Quality 35
- VI.2 Not Reasonably Controllable or Preventable 35
- VI.3 Natural Event 36

VI.4 Clear Causal Relationship....36
VI.5 Concentration to Concentration Analysis....37
VI.6 Conclusion....37

Appendix A: National Weather Service Notices....38

Appendix B: Wind Data....

Appendix C: Public Information and other Notices....

LIST OF FIGURES

FIGURE **PAGE**

Figure 1-1 Imperial County 6

Figure 1-2 Monitoring Sites in and Around Imperial County 8

Figure 2-1 Monitoring and Meteorological Sites 10

Figure 2-2 Concentrations for All Sites Listed in Table 2-1 12

Figure 2-3 Local and Vicinity Airport Wind Speeds and Gust 13

Figure 2-4 Wind Speeds and Gust Upstream Sites 14

Figure 2-5 HYSPLIT Model All Sites June 23, 2018 0900 PST 15

Figure 2-6 HYSPLIT Model All Sites June 23, 2018 1100 PST 16

Figure 3-1 Visual Ramp-Up Analysis as Discussed for June 23, 2018 18

Figure 3-2 72-Hour Time Series PM_{10} Concentrations and Visibility 20

Figure 3-3 Imperial Valley Air Quality Index for Niland June 23, 2018 23

Figure 4-1 Niland Historical Comparison FRM and FEM PM_{10} 24-Hr Avg Concentrations January 1, 2010 To June 23, 2018 26

Figure 4-2 Niland Seasonal Comparison FRM and FEM PM_{10} 24-Hr Avg Concentrations April 1, 2010 To June 23, 2018 27

Figure 5-1 Regulation VIII Graphic Timeline Development 29

Figure 5-2 Permitted Sources 33

Figure 5-3 Non-Permitted Sources 34

LIST OF TABLES

TABLE **PAGE**

Table 1-1 Title 40 CFR §50.14(c)(3)(iv) Checklist 1

Table 1-2 Procedural Checklist 2

Table 2-1 Hourly Concentrations of Particulate Matter 11

Table 3-1 Wind Speeds and PM_{10} Concentrations June 23, 2018 21

Table 3-2 Wind Speeds and PM_{10} Concentrations June 23, 2018 33

Table 5-1 San Diego Air Pollution Control District Rules 30

Table 5-2 Mojave Desert Air Quality Management District Rules 30

Table 5-3 South Coast Air Quality Management District Rules 31

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. 25
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	Pg. 28
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. 35

[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 Saturday, June 23, 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 Thursday, June 21, 2018 and a weekend posting dated June 22, 2018 through June 25, 2018, the ICAPCD published advisories concerning the potential for elevated concentrations of particulate matter caused by gusty southerly winds. In addition, the weekend advisory provided a "storm tracker" discussion advising the public that the ICAPCD was keeping track of a late June Pacific Northwest/northern storm with some indication of a seasonably strong upper trough developing. At this time, neither the San Diego or Phoenix NWS offices were forecasting a Gulf Surge. **Appendix C** contains copies of notices pertinent to the June 23, 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 Saturday, June 23, 2018, a naturally occurring event elevated particulate matter within San Diego, Riverside and Imperial Counties, causing an exceedance at the Niland (06-025-4004) air quality monitoring station. 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 Niland monitor on June 23, 2018. After review, CARB submitted the INPEE, for the June 23, 2018 event in July of 2019. The submitted request included a brief description of the meteorological conditions for June 23, 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 June 23, 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 concentration of 163 µg/m^3 measured by the Niland monitor on June 23, 2018.

(B) Concurrently with the Public Review period for the June 23, 2018 exceptional event, the ICAPCD is formally submitting to CARB for remittance to USEPA the Final June 23, 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

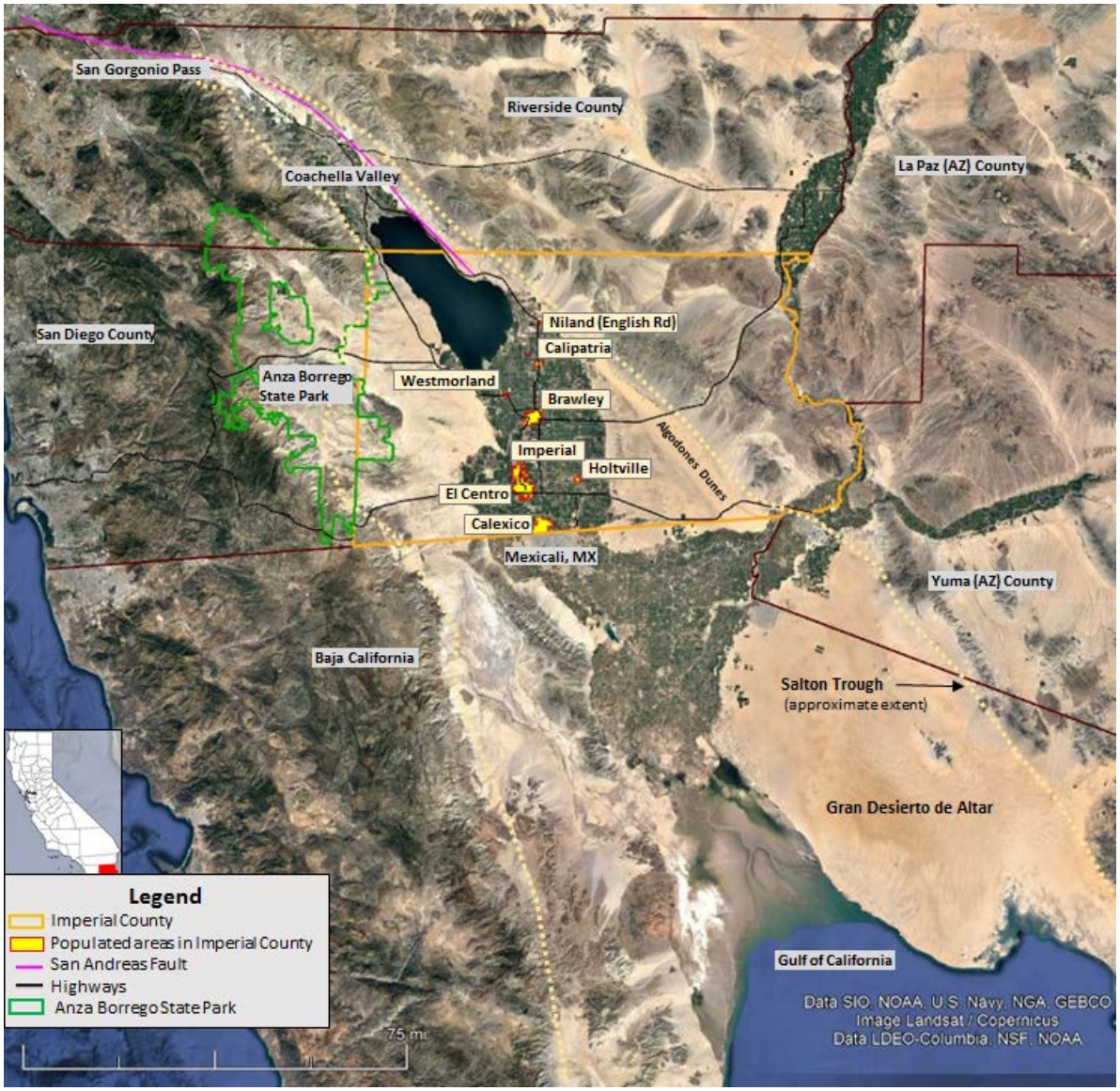


Fig 1-1: Imperial County a Southern California border region, within far southeast California bordering Arizona and Mexico has a small economically diverse region with a population of 174,528

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 June 23, 2018 neither the San Diego nor the Phoenix NWS offices expected the occurrence of a Gulf Surge over the weekend but were in fact forecasting a shortwave upper trough. It wasn't until the afternoon of Friday, June 22, 2018 that the first mention of a Gulf surge was discussed.[4] Still, as late as early morning and through the early afternoon on June 23, 2018 a layer of moist air from the Gulf of California was expected to have "virtually no impact."[5] San Diego called it "a tepid Gulf surge."[6] It was not until mid-afternoon on June 23, 2018 that the Phoenix office confirmed that gusty southerly winds had stirred up dust plumes over northern Mexico due to a "well defined Gulf Surge this morning."[7] Overall, fewer forecast notices regarding the impending Gulf Surge and its effects were issued. The following excerpts from forecast discussions issued by both San Diego and Phoenix summarized the expected impacts of the approaching weather disturbance:

> "…there is very good evidence the combination of a tightening pressure gradient and differential heating will result in a shallow Gulf Surge of moisture through far SW (southwestern) Arizona and SE (southeast) California Saturday morning."[8]

> "…Also of interest, a very shallow layer of richer moisture from the Gulf of California is advecting northward this morning, with 60s dewpoints funneling through the Lower Colorado River Valley and Imperial Valley…while this will have virtually no impact on sensible weather conditions other than to facilitate a slight increase in boundary-layer RH (relative humidity), it is at least evidence that low-level moisture will more easily be able to spread northward once a more typical Monsoonal pattern takes hold." [9]

No Urgent Weather Messages were issued for the San Diego County deserts and mountains or for Imperial County. **Appendix A** contains all pertinent NWS notices.

[4] National Weather Service, Area Forecast Discussion, June 22, 2018, Phoenix office, 200pm MST
[5] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 209am MST
[6] National Weather Service, Area Forecast Discussion, June 22, 2018, San Diego office, 138pm PST
[7] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 255pm MST
[8] National Weather Service, Area Forecast Discussion, June 22, 2018, Phoenix office, 200pm MST
[9] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 209am MST

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

On June 23, 2018, the air monitors in Imperial, Riverside and Yuma counties measured elevated concentrations of particulate matter when a surge of monsoonal air moved into southeast California and southwestern Arizona causing gusty southerly outflow winds to affect the region. These gusty southerly outflow winds generated emissions from within the natural open desert areas within northern Mexico and the surrounding open natural deserts within Imperial County. 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

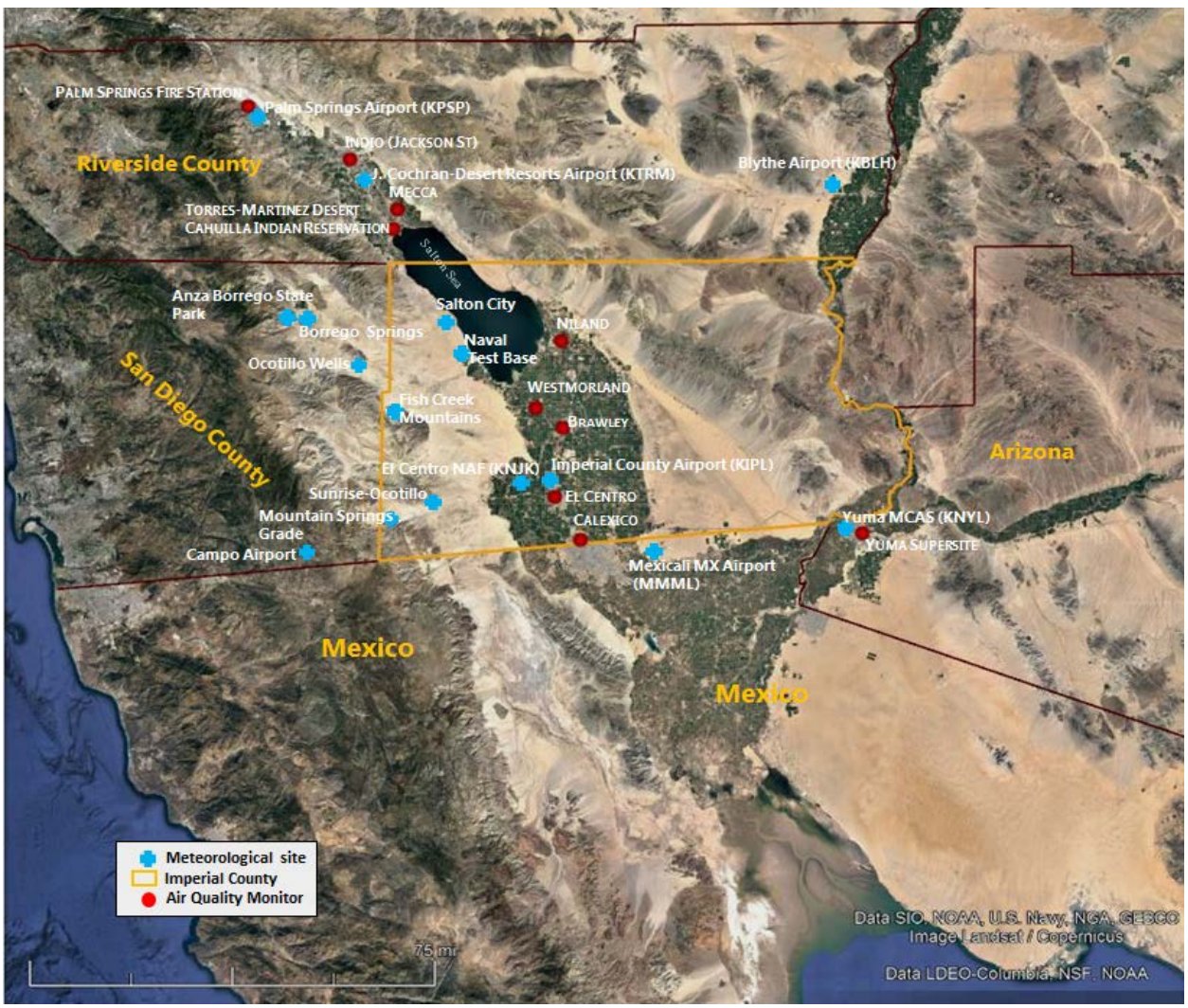


Fig 2-1: Includes a general location of the sites used in this analysis. The site furthest south is in Mexicali, Mexico and the site furthest north is the Palm Springs Fire Station

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
YUMA AZ SUPERSITE (MST)	20180622	11	12	11	13	14	52	150	31	46	40	25	24	22	25	31	16	14	20	18	19	18	18	17	9	150	27
	20180623	12	8	11	14	50	118	81	136	526	289	331	399	357	329	364	223	184	143	91	61	52	42	29	35	**526**	161
	20180624	28	25	28	31	27	28	28	33	40	41	35	33	29	24	22	29	24	27	30	24	17	18	18	16	41	27
YUMA AZ SUPERSITE (PST)	20180622	12	11	13	14	52	150	31	46	40	25	24	22	25	31	16	14	20	18	19	18	18	17	9	11	150	27
	20180623	8	11	14	50	118	81	136	526	289	331	399	357	329	364	223	184	143	91	61	52	42	29	35	12	**526**	161
	20180624	25	28	31	27	28	28	33	40	41	35	33	29	24	22	29	24	27	30	24	17	18	18	16	28	41	27
NILAND	20180622	27	26	37	25	56	60	55	76	43	114		31	47	59	58	52	48	51	65	94	86	46	46	26	114	53
	20180623	28	23	29	29	21	23	40	79	79	180	373	600	593	483	489	253	156	98	101	62	70	37	31	39	**600**	163
	20180624	42	43	28	28	30	25	36	36	39	41	45	34	27	28	26	31	25	32	39	50	70	60	34	29	70	36
CALEXICO	20180622	43	36	42	48	64	61	77	109	66	70	70	70	51	56	58	48	79	107	87	123	137	77	59	49	137	70
	20180623	35	38	27	21	24	26	38	71	96	208	328	392	317	270	238	174	158	111	67	50	49	49	50	48	**392**	120
	20180624	37	39	42	43	50	43	43	49	46	43	31	30	35	30	37	35	33	33	54	49	84	70	60	42	84	44
EL CENTRO	20180622	58	50	47	74	51	44	77	76	90	71	48	57	79	73	74	75	83	97	107	100	150	182	77	61	182	79
	20180623	59	34	31	22	26	35	40	54	86	171	329	371	361	322	252	209	178	135	97	63	59	58	47	45	**371**	128
	20180624	48	36	43	43	45	47	42	49	46	44	30	38	27	31	30	40	32	45	50	74	62	79	77	52	79	46
BRAWLEY	20180622	30	41	35	33	41	60	56	75	102	85	66	45	59	51	53	56	63	71	94	112	84	78	59	65	112	63
	20180623	62	39	26	25	28	41	47	124	87	229	341	418	348	297	216	154	100	82	65	55	42	48	45	37	**418**	123
	20180624	37	30	42	31	34	38	35	39	41	35	34	24	26	24	19	19	32	39	47	71	50	61	53	42	71	37
WESTMORLAND	20180622	41	32	45	36	40	46	54	73	66	83	97	60	62	57	45	49	56	57	81	77	47	71	64	57	97	58
	20180623	53	37	48	31	25	46	52	55	75	146	226	322	323	240	170	156	144	96	77	51	36	34	38	40	**323**	105
	20180624	29	27	34	31	31	39	35	39	41	69	70	34	38	29	23	28	31	35	42	63	67	53	56	49	70	41
TORRES-MARTINEZ TRIBAL	20180622	62	49	155	45	271	76	44	58	60	62	51	54	62	48	56	27	17	33	42	55	94	173	78	44	271	71
	20180623	53	44	36	31	220	398	57	77	60	59	50	72	109	48	54	167	230	203	143	113	81	52	36	38	**398**	101
	20180624	27	31	75	36	35	29	35	38	51	40	52	60	48	45	38	31	24	27	34	45	63	53	56	54	75	42
MECCA	20180622	35	80	70	32	30	72	111	52	34	58	48	46	9	35	10	9	25	32	97	43	41	61	77	91	111	49
	20180623	70	55	40	34	62	58	72	29	43	64	66	81	132	60	130	181	157	214	139	49	32	61	55	28	**214**	79
	20180624	52	16	43	51	40	49	40	47	30	24	34	22	9	9	7	28	12	47	98	31	19	45	44	29	98	34
PALM SPRINGS FIRE STATION	20180622	29	25	25	18	16	46	46	91	28				22	32	33	41	39	45	42	42	47	34	32	32	91	36
	20180623	35	30	33	30	36	42	37	27	26	27	29	31	33	31	32	30	39	39	42	42	40	35	33	27	**42**	33
	20180624	24	23	24	24	22	22	22	29	30	32	36	34	25	21	25	23	25	34	42	37	37	33	30	30	42	28

The Indio monitor failed to measure and was under repair for several days. 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

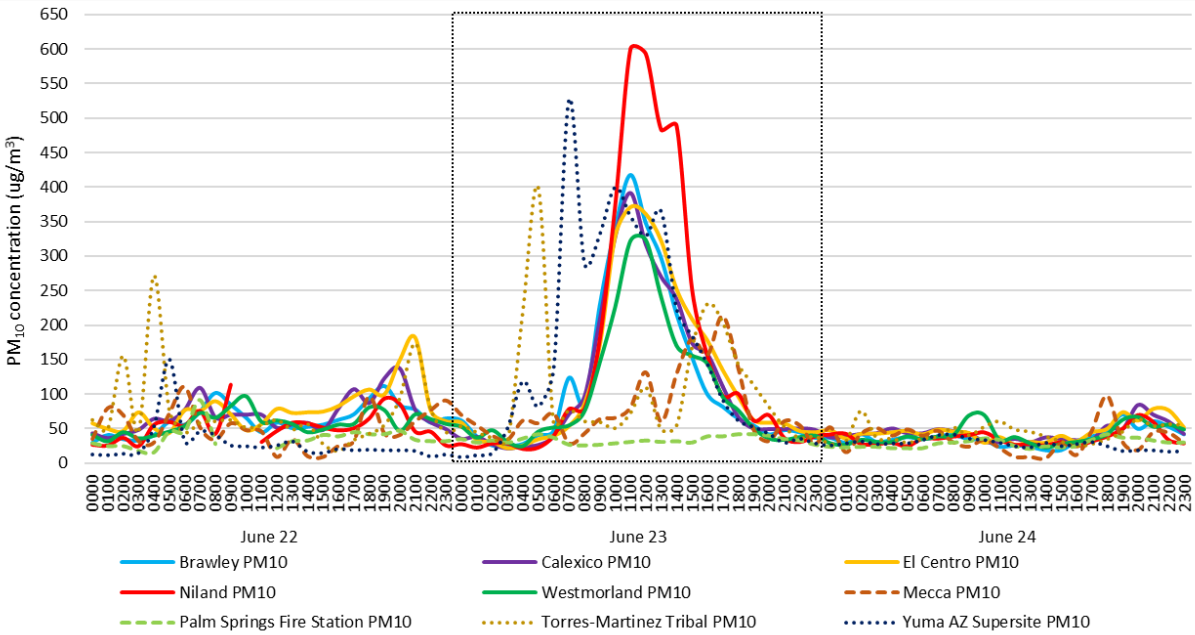


Fig 2-2: is a three-day graphical representation of the PM_{10} concentrations measured at the sites identified in **Table 2-1**. Note the consistency among the measured concentrations

Wind speed, wind direction and the airflow patterns combined all help explain how windblown emissions resulting from the southerly outflow winds associated with a Gulf surge affected all of the monitors in Imperial County on Saturday, June 23, 2018.

As mentioned above, weather forecast notices issued by Phoenix NWS office just a day prior to the June 23, 2018 wind event only briefly mentioned a Gulf Surge that was forecast to have no impact. Despite this, the limited surge of moist air was strong enough to generate unexpected gusty southerly outflow winds that transported 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. The airport within Yuma county, the Yuma MCAS air station 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 GUSTS

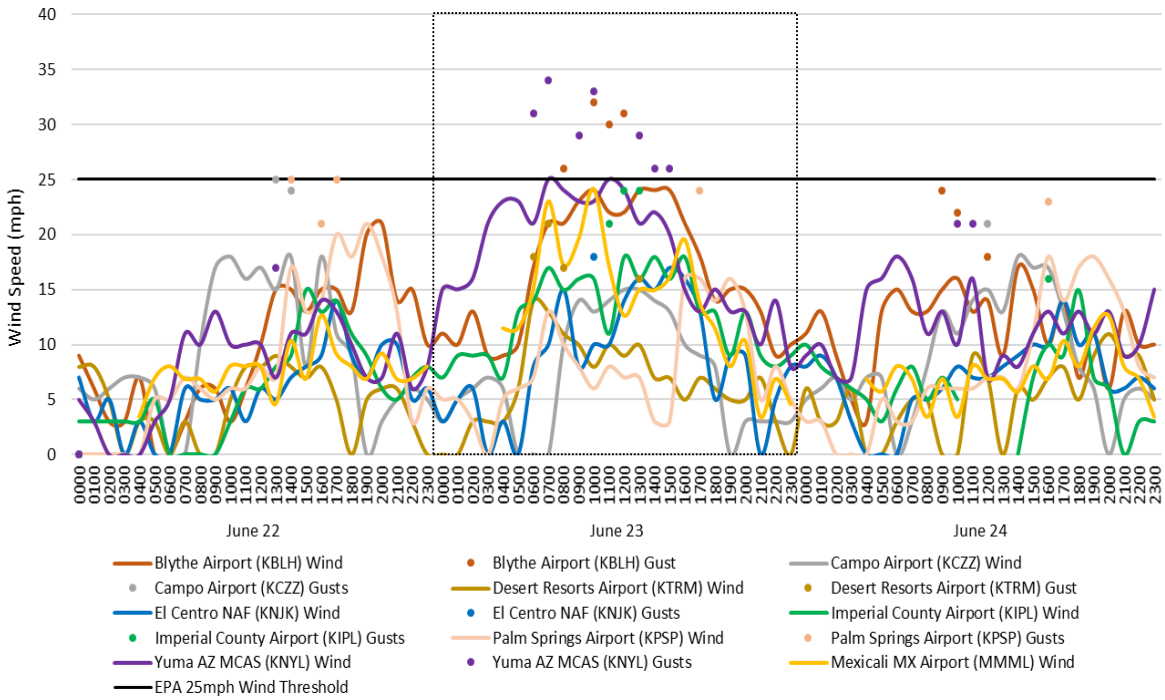


Fig 2-3: is a three-day graphical representation of the measured wind speed and wind gusts (if available) from local and neighboring airports. All data derived from the Local Climatological Data Hourly Observations (LCDHO) reports released by the NOAA https://www.ncdc.noaa.gov/. MMML is from the University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

FIGURE 2-4
WIND SPEEDS AND GUST UPSTREAM SITES

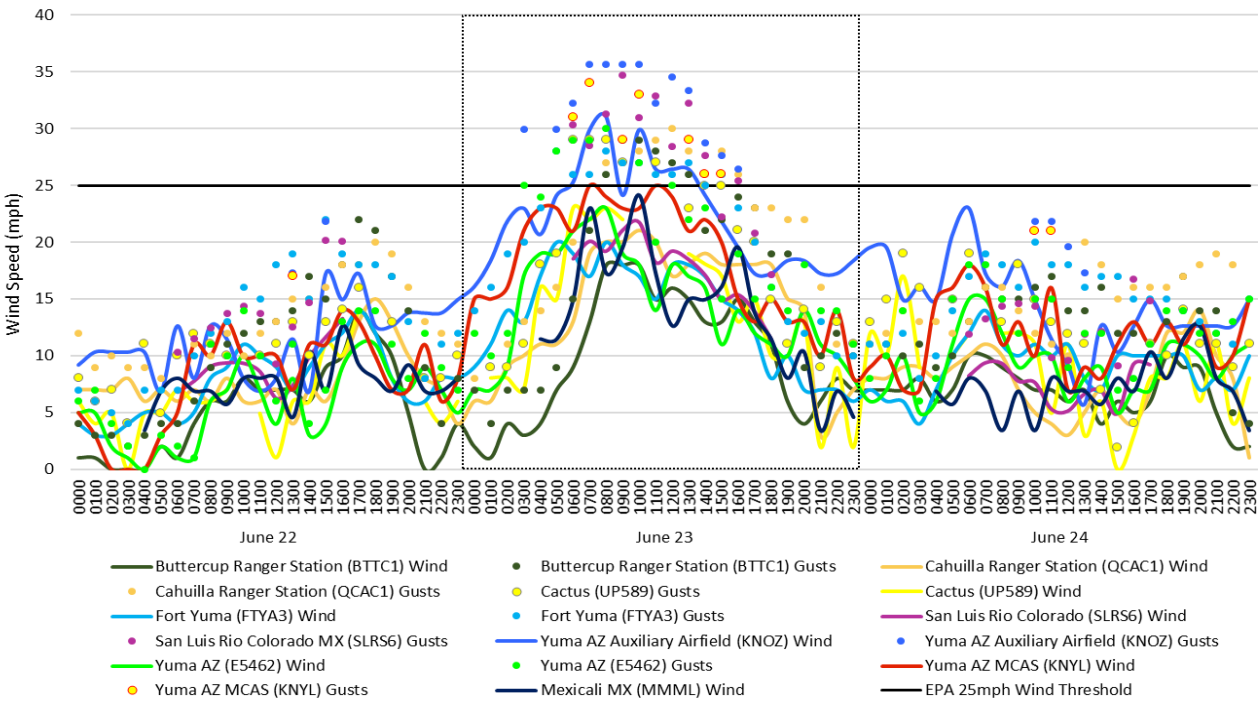


Fig 2-4: is a three-day graphical representation of the measured wind speed and wind gust (if available) from sites located upwind from the Imperial County monitors. All data derived from the University of Utah's Meso West https://mesowest.utah.edu/index.html

The National Oceanic and Atmospheric Administration (NOAA) Laboratory HYSPLIT back-trajectory models[10] provide supporting evidence of the southerly airflow within Imperial County on June 23, 2018. The HYSPLIT back-trajectory models in **Figures 2-5 and 2-6** depict the airflow during the morning (0900 PST) and late morning (1100 PST) to help illustrate the southerly airflow on June 23, 2018.

Figure 2-5 depicts the southerly airflow coincident with elevated concentrations above 100 µg/m^3 at the Niland monitor. **Figure 2-6** depicts the late morning southerly airflow coincident with peak hourly measured concentration at the Niland monitor.

[10] 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 JUNE 23, 2018 0900 PST

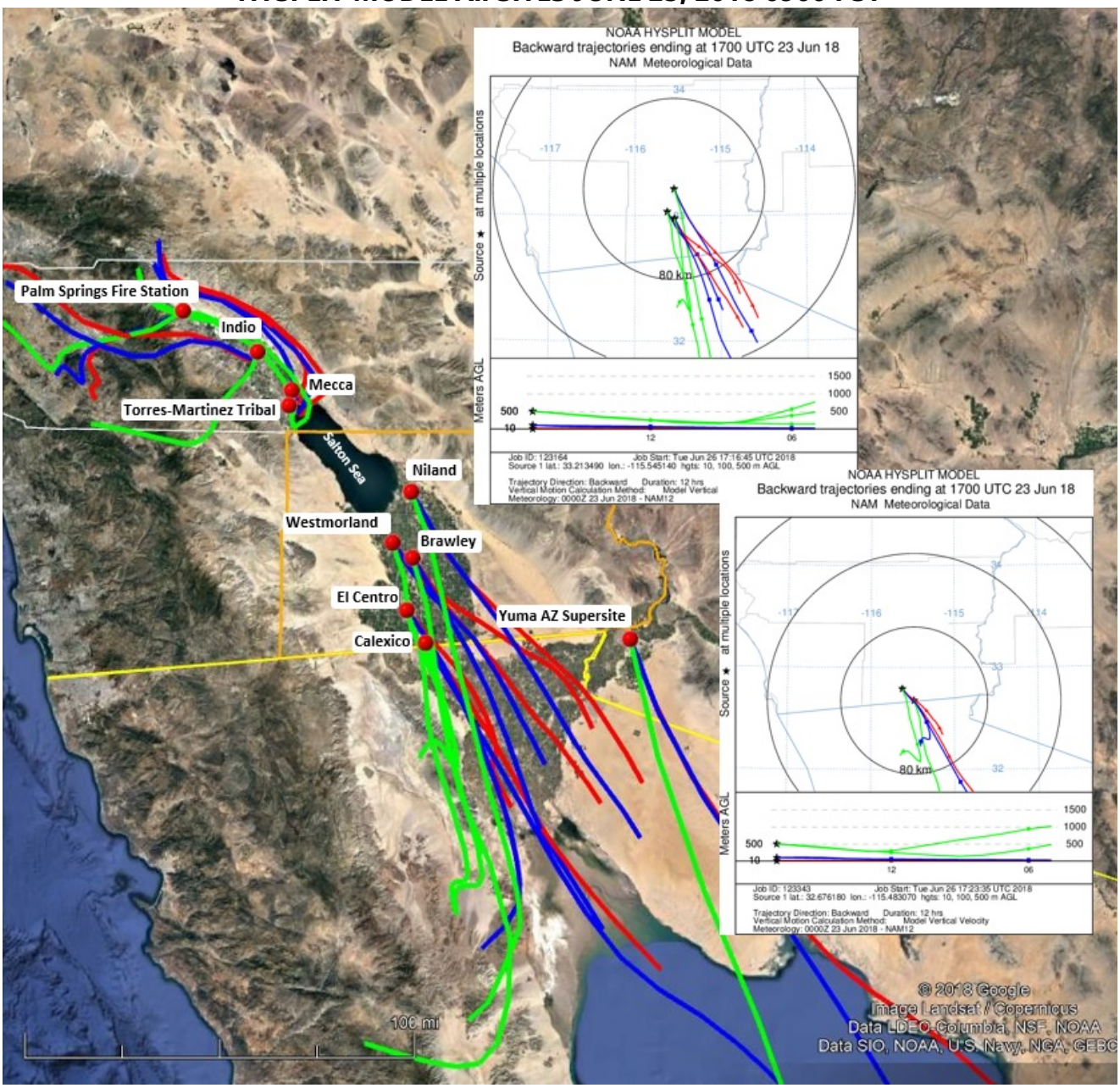


Fig 2-5: A 12-hour HYSPLIT back-trajectory ending at 0900 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

FIGURE 2-6
HYSPLIT MODEL All SITES JUNE 23, 2018 1100 PST

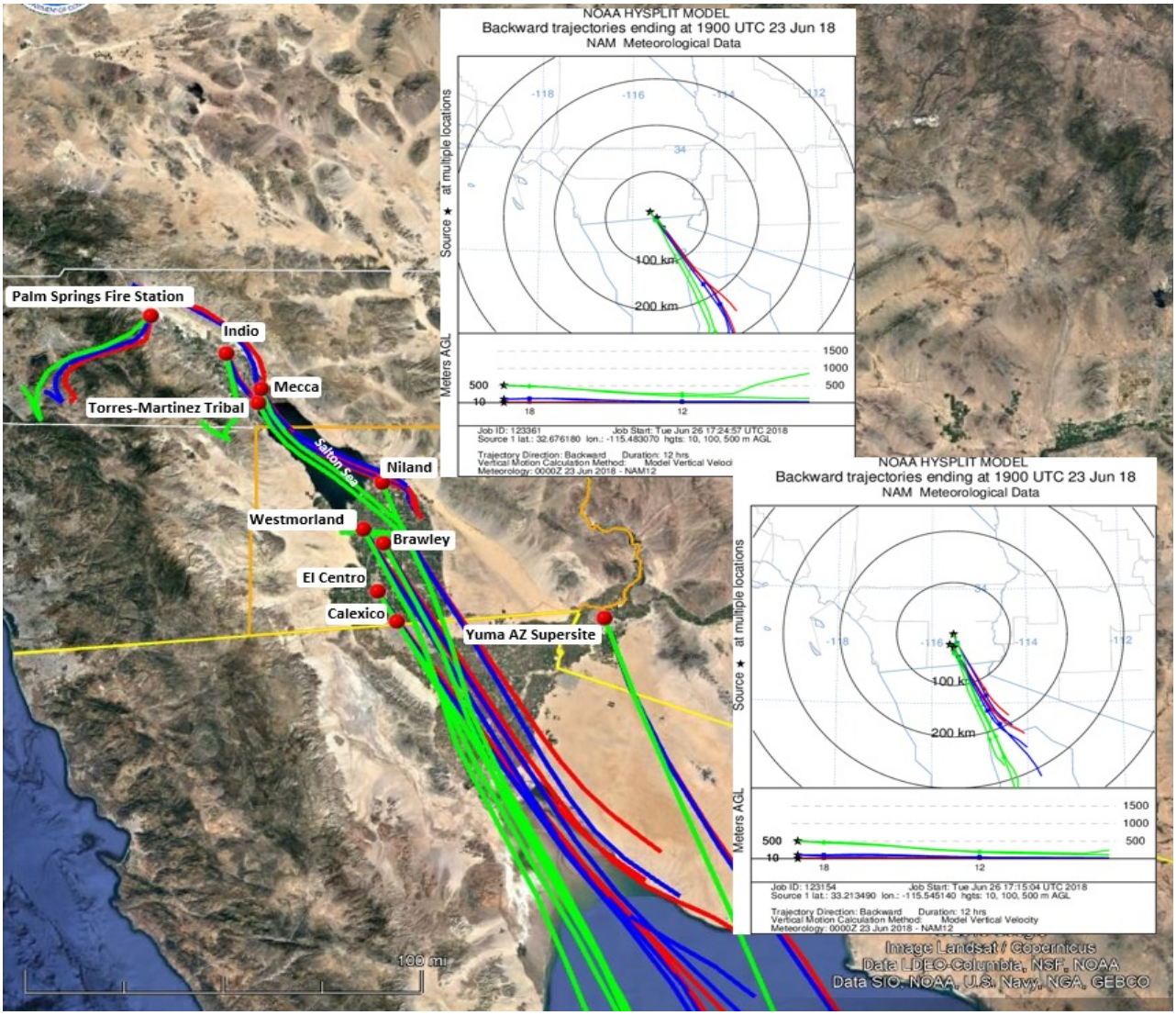


Fig 2-6: A 12-hour back-trajectory HYSPLIT ending at 1100 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

As strong southerly outflow winds blew over open natural desert areas south and southeast of Imperial County, fugitive windblown dust significantly affected all air quality monitors within the region. On June 23, 2018 while the local airports measured moderately high winds, with gusts just under 25 mph the Yuma MCAS (KNYL) downwind of Niland measured winds at 25 mph, with a peak gust of 34 mph. Mexicali Airport in Mexico had one hour of winds just under 25 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 Gulf Surge much stronger than originally forecast by either the San Diego or Phoenix NWS offices caused southerly outflow winds to affect air quality in Imperial County. A "tepid" gulf surge was forecast by San Diego while Phoenix forecast "virtually no impact" from the moist air moving northward from Mexico.[11,12] However, a late June 23, 2018 forecast did confirm that gusty southerly winds had stirred up dust in the area. The following notice, an updated aviation discussion of an earlier notice at 255pm provides support in characterizing the impact from the June 23, 2018 Gulf Surge:

> "…Concurrently, the tightening synoptic pressure gradient has been magnified by inland thermal low pressure facilitating a well defined Gulf surge early this morning. Over SE California and far SW Arizona, shallow mid 60 dewpoints persist and likely are making upper 90 ambient temperatures feel even more miserable. Gusty southerly winds have stirred up a few dust plumes (most evident over Mexico per GOES-16 dust RGB composite difference channels) adding to the magnitude of haze and air quality issues…. AVIATION…The Gulf surge has weakened quite a bit this evening. There could be some lingering lofted dust for decreased slant visibilities but not like what was seen earlier in the day"[13]

Additionally, a NOAA Smoke Text Product similarly identified blowing dust, which reached south central Arizona by sunset, as originating from Sonora, Mexico (**Appendix C**).[14]

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.[15] As winds and gusts increased on June 23, 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 that identified dust plumes in northern Mexico.

Figure 3-1 and Figure 3-2 below provides illustrations of morning meteorological conditions, as described above and demonstrated in the HYSPLITs, for June 23, 2018,

[11] National Weather Service, Area Forecast Discussion, June 22, 2018, San Diego office, 138pm PST
[12] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 209am MST
[13] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 1049pm MST
[14] NOAA Satellite and Information Service, National Environmental Satellite, Data and information Service, 2018 Satellite Smoke Text Product, June 24, 2018, https://www.ssd.noaa.gov/PS/FIRE/DATA/SMOKE/2018/2018F240256.html
[15] 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

which affected air quality in Imperial County causing an exceedance at the Niland monitor. Unfortunately, the absence of meteorological monitors in critical areas in northern Mexico hampers analysis.

FIGURE 3-1
VISUAL RAMP-UP ANALYSIS AS DISCUSSED FOR JUNE 23, 2018

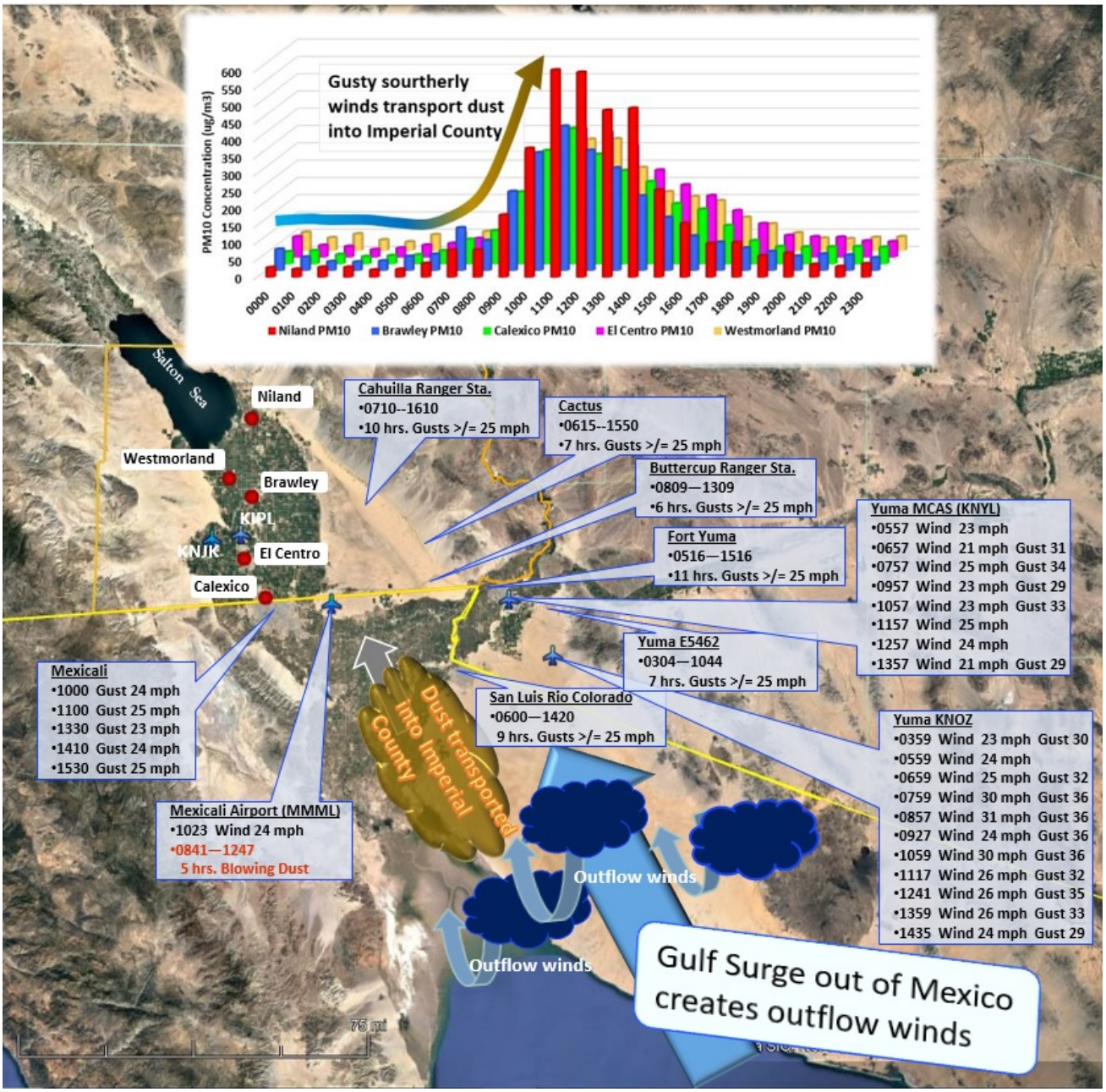


Fig 3-1: On June 23, 2018, a Gulf Surge pushed unstable moist air northward, creating gusty southerly outflow winds that in turn generated and transported emissions from northern Mexico into Imperial County. Google Earth base map

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 El Centro NAF (KNJK), the Imperial County Airport (KIPL) in Imperial County and upwind airports in Yuma and Mexico reported reduced visibility, coincident or just prior to elevated concentrations at 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 Niland monitor. 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 Yuma MCAS (KNYL) airport on June 23, 2018 as did the Yuma AZ Auxiliary Airport and the Mexicali MX Airport, coincident with elevated hourly concentrations at the air quality monitors in Imperial County.

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

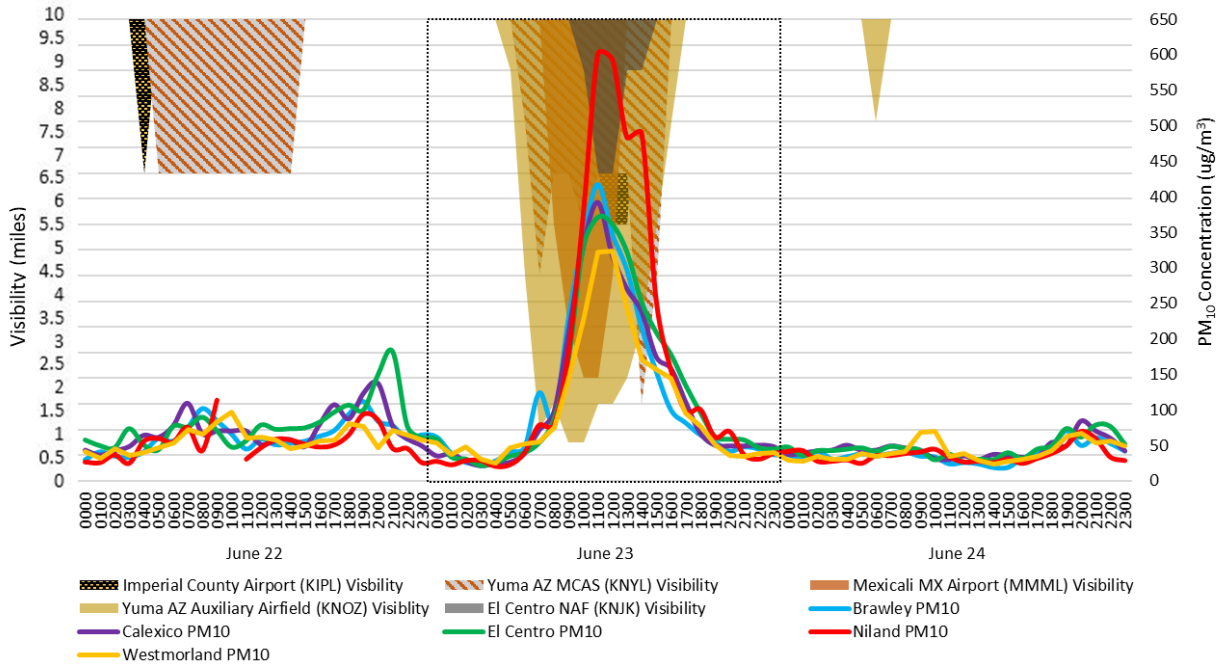


Fig 3-2: is a graphical representation of the compiled data from Imperial County Airport (KIPL), El Centro NAF (KNJK), Mexicali International Airport (MMML), Yuma MCAS (KNYL) and Yuma Auxiliary Airfield (KNOZ). Reported reduced visibility is coincident with elevated winds and hourly levels of concentrations either just prior to peak concentrations or after. Visibility data from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/ and the University of Utah's MesoWest https://mesowest.utah.edu

Because the EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states[17] 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 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 JUNE 23, 2018

	BUTTERCUP RANGER STATION (BTTC1)			CACTUS (UP589)			CAHUILLA RANGER STATION (QCAC1)			YUMA (EW5462)			SAN LUIS RIO COLORADO (SLRS6)			MEXICALI (MXCB1)			NILAND		
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	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/D	PM_{10}
000	2	7	111				6	8	98	7	12	160				5	8	145	8	140	28
100	1	4	100	8	9	202	6	9	114	7	10	171				6	9	135	5	129	23
200	4	7	121	8	9	207	9	11	110	9	12	165				6	9	127	4	115	29
300	3	7	54	7	11	207	10	13	115	17	25	159				7	12	144	5	132	29
400	4	7	101	16	18	190	11	14	114	19	24	154				10	13	146	7	113	21
500	7	9	91	15	19	193	11	16	112	19	28	156				12	20	134	6	105	23
600	9	15	100	23	29	197	13	20	119	21	29	156	19	30	167	11	21	138	8	115	40
700	13	21	122	22	29	200	19	29	140	22	29	158	20	29	173	12	23	136	12	133	79
800	18	26	139	23	29	218	20	27	146	23	30	152	19	31	180	12	22	142	12	138	79
900	18	27	146	22	27	218	20	27	150	19	29	179	21	35	186	14	23	141	12	144	180
1000	18	29	121				21	28	158	18	27	182	22	31	182	14	24	146	12	139	373
1100	15	28	123	15	27	230	20	29	153	14	20	156	18	33	174	13	25	127	13	149	600
1200	16	27	143				17	30	154	18	25	179	19	28	174	12	20	136	13	154	593
1300	15	26	140	19	23	214	18	28	152	17	22	184	18	32	184	14	23	129	13	154	483
1400	13	21	127	18	25	210	19	26	152	16	23	176	17	28	178	15	24	132	13	158	489
1500	13	22	149	17	25	213	18	28	158	11	15	185	15	22	192	14	25	123	12	149	253
1600	15	24	157	13	21	241	18	26	148	14	19	185	15	25	202	14	22	134	13	151	156
1700	13	23	158	15	20	210	18	23	156	12	15	190	14	21	185	14	22	152	11	149	98
1800	11	19	137	10	15	232	18	23	158	11	16	157	11	17	176	14	22	153	9	140	101
1900	6	19	157	10	11	233	15	22	157	10	14	153				12	19	145	8	127	62
2000	4	9	161	13	14	215	14	22	152	14	18	151				9	13	127	8	129	70
2100	6	10	93	2	9	167	3	16	135	11	14	155				8	12	132	7	115	37
2200	8	12	78	9	13	207	5	11	116	10	14	155				7	14	145	6	117	31
2300	7	10	73	2	11	167	7	11	100	8	11	142				8	12	127	6	121	39

Wind data for Buttercup Ranger Station (BTTC1), Cactus (UP589), Cahuilla Ranger Station (QCAC1), Yuma (EW5462), San Luis Rio Colorado (SLRS6), and Mexicali (MXCB1) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Niland wind data from the EPA's AQS repository. Wind speeds = mph; Direction = degrees. 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

TABLE 3-2
WIND SPEED AND PM_{10} CONCENTRATIONS JUNE 23, 2018

	YUMA AUXILIARY AIRFIELD (KNOZ)			YUMA MCAS (KNYL)			FORT YUMA (FTYA3)			MEXICALI AIRPORT (MMML)			NLND	CX	EC	BRAWLEY	WSTMLD
HR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/D	OBS.	PM_{10} (UG/M^3)				
000	16		140	15		160	9	14	139				28	35	59	62	53
100	18		140	15		160	11	16	149				23	38	34	39	37
200	22		140	16		160	14	19	153				29	27	31	26	48
300	23	30	140	21		160	13	20	155				29	21	22	25	31
400	21		140	23		160	17	23	144	12	110		21	24	26	28	25
500	24	30	140	23		150	20	28	140	12	110		23	26	35	41	46
600	25	32	150	21	31	160	19	26	144	15	110		40	38	40	47	52
700	30	36	170	25	34	160	17	26	159	23	150		79	71	54	124	55
800	31	36	150	24		170	20	28	149	17	150	BLDU	79	96	86	87	75
900	24	36	160	23	29	170	18	27	151	20	140	BLDU	180	208	171	229	146
1000	30	36	170	23	33	150	17	27	155	24	140	BLDU	373	328	329	341	226
1100	26	32	160	25		150	15	26	157	17	130	BLDU	600	392	371	418	322
1200	26	35	160	24		160	18	26	156	13	140	BLDU	593	317	361	348	323
1300	26	33	170	21	29	170	18	27	153	15	160		483	270	322	297	240
1400	24	29	160	22	26	180	17	25	152	15	110		489	238	252	216	170
1500	22	28	150	20	26	170	15	26	158	16	130		253	174	209	154	156
1600	20	26	170	15		160	14	23	167	20	130		156	158	178	100	144
1700	17		150	13		160	12	20	182	14	150		98	111	135	82	96
1800	17		150	15		150	8	16	160	12	130		101	67	97	65	77
1900	18		150	13		150	10	13	154	8	130		62	50	63	55	51
2000	18		140	13		150	7	12	143	10	130		70	49	59	42	36
2100	17		140	10		160	7	13	134	3	150		37	49	58	48	34
2200	17		130	14		140	7	10	142	7	130		31	50	47	45	38
2300	18		130	8		160	6	10	132	5	70		39	48	45	37	40

Wind data for Yuma Auxiliary Airfield (KNOZ), Fort Yuma (FTYA#), and Mexicali Airport (MMML) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Yuma MCAS (KNYL) from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/. Wind speeds = mph; Direction = degrees. 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 and the NOAA Smoke Text Product identified dust plumes over northern Mexico caused by the gusty outflow winds. As the Gulf surge intensified, thunderstorms produced southerly outflow winds that transported windblown dust into Imperial County affecting different regional air monitors in Mecca located in Riverside County, Imperial County and Arizona on June 23, 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 the afternoon of June 23, 2018, air quality degraded in Imperial County. Overall, the strong southerly outflow winds associated with the Gulf Surge affected air quality in Imperial County.

FIGURE 3-3
IMPERIAL VALLEY AIR QUALITY INDEX FOR NILAND
JUNE 23, 2018

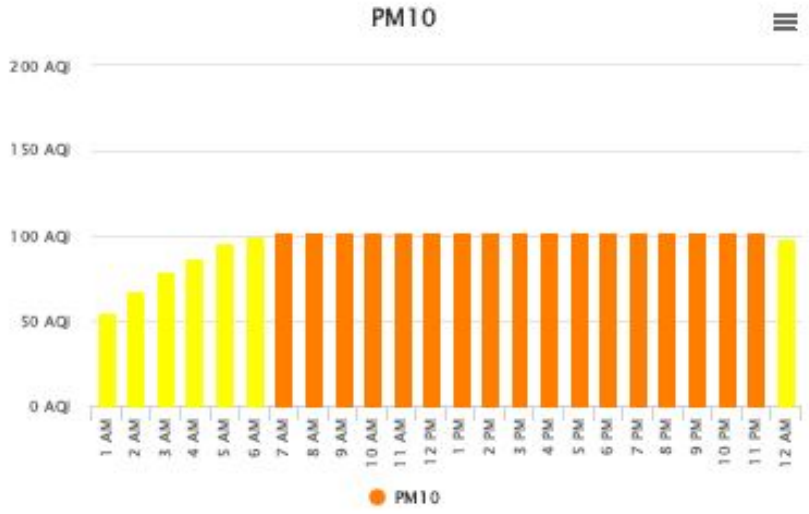


Fig 3-3: The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Yellow" or Moderate level to an "Orange" level or a level that is Unhealthy for sensitive receptors

III.1 Summary of Forecasts and Warnings

Neither the San Diego nor Phoenix NWS offices accurately forecasted the strength of the Gulf Surge that materialized on Saturday, June 23, 2018. The San Diego office described

[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

the Gulf Surge as "tepid" while the Phoenix office forecast "virtually no impact" from the moist air moving north out of Mexico.[19,20] However, by mid-afternoon on June 23, 2018 the Phoenix office acknowledged that a "well defined Gulf Surge" that morning had stirred up dust plumes over northern Mexico.[21] Gusty southerly outflow winds carried the emissions far north into 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 June 23, 2018 different sites measured wind speeds at or above 25 mph.

[19] National Weather Service, Area Forecast Discussion, June 22, 2018, San Diego office, 138pm PST
[20] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 209am MST
[21] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 255pm MST

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 and 4-2 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Niland air quality monitor for the period of January 1, 2010 through June 23, 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).[22] 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 June 23, 2018, as measured by the Niland monitor, were used to establish the historical and seasonal variability over time.[23] All figures illustrate that the exceedance, which occurred on June 23, 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.

[22] 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.
[23] FRM sampling ended December 2016.

FIGURE 4-1
NILAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO JUNE 23, 2018

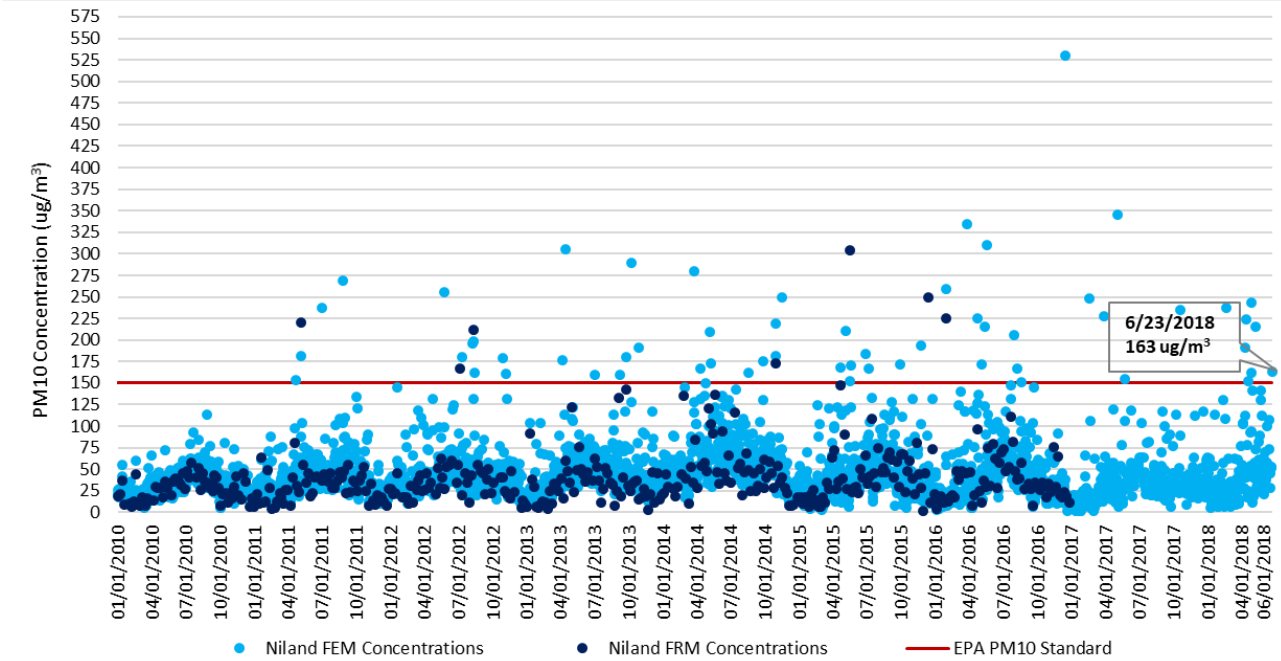
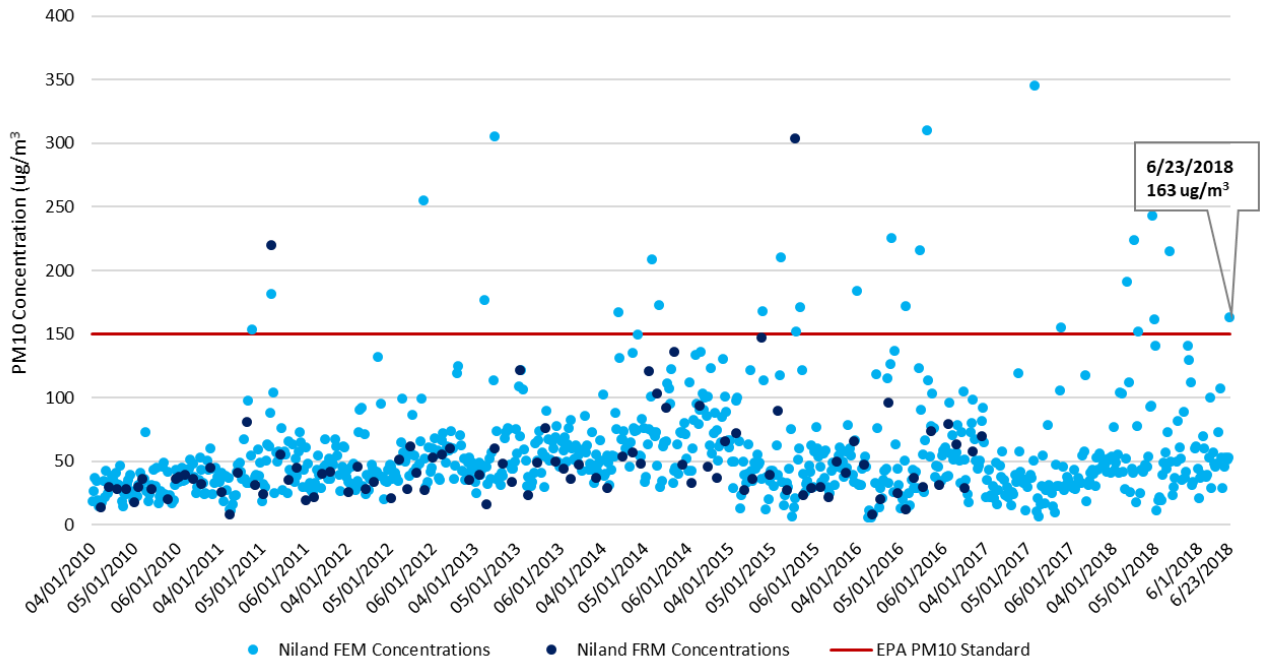


Fig 4-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 163 µg/m³ on June 23, 2018 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-1,** for Niland includes 3,096 sampling days (January 1, 2010 through June 23, 2018). During the January 1, 2010 through June 23, 2018 period, the Niland monitor measured 57 exceedance days out of 3,096 sampling days, which translates into an occurrence rate less than 2%. Historically, there six (6) exceedance days measured during the first quarter; twenty-four (24) exceedance days measured during the second quarter; fifteen (15) exceedance days measured during the third quarter; and twelve (12) measured during the fourth quarter.

FIGURE 4-2
NILAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 TO JUNE 23, 2018**



***Quarterly: April 1, 2010 to June 30, 2017 and April 1, 2018 to June 23, 2018**

Fig 4-2: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 163 µg/m³ by the Niland monitor on June 23, 2018 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 4-2 illustrates the seasonal fluctuations over a period of 812 sampling days, 912 credible samples and twenty-four (24) exceedance days. This translates to less than a 2.6% seasonal exceedance occurrence rate.

Examining the historical and seasonal time series concentrations as they relate to the June 23, 2018 measured exceedances, the exceedances measured on June 23, 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 desert areas within northern Mexico and southwestern Arizona. The origination of these emissions from these areas affected all the air quality monitors on June 23, 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

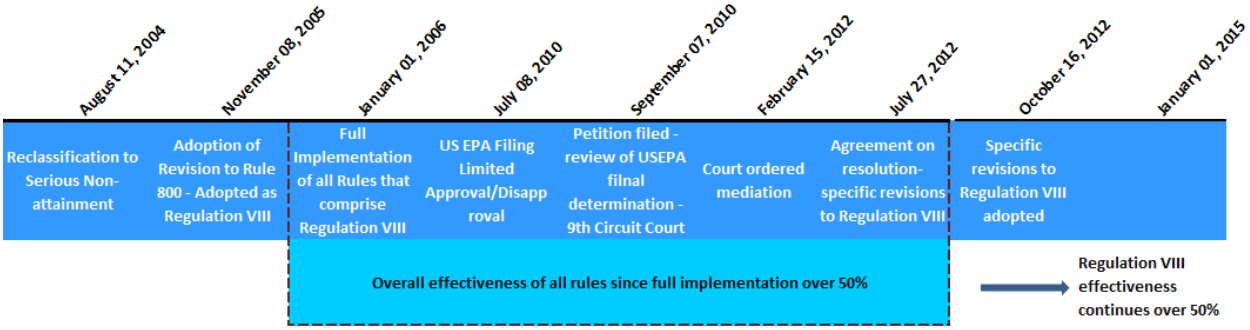


Fig 5-1: Regulation VIII Graphic Timeline

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 June 23, 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 June 23, 2018 event, wind speeds were above the 25 mph threshold, overcoming reasonable 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 Niland monitor during the June 23, 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

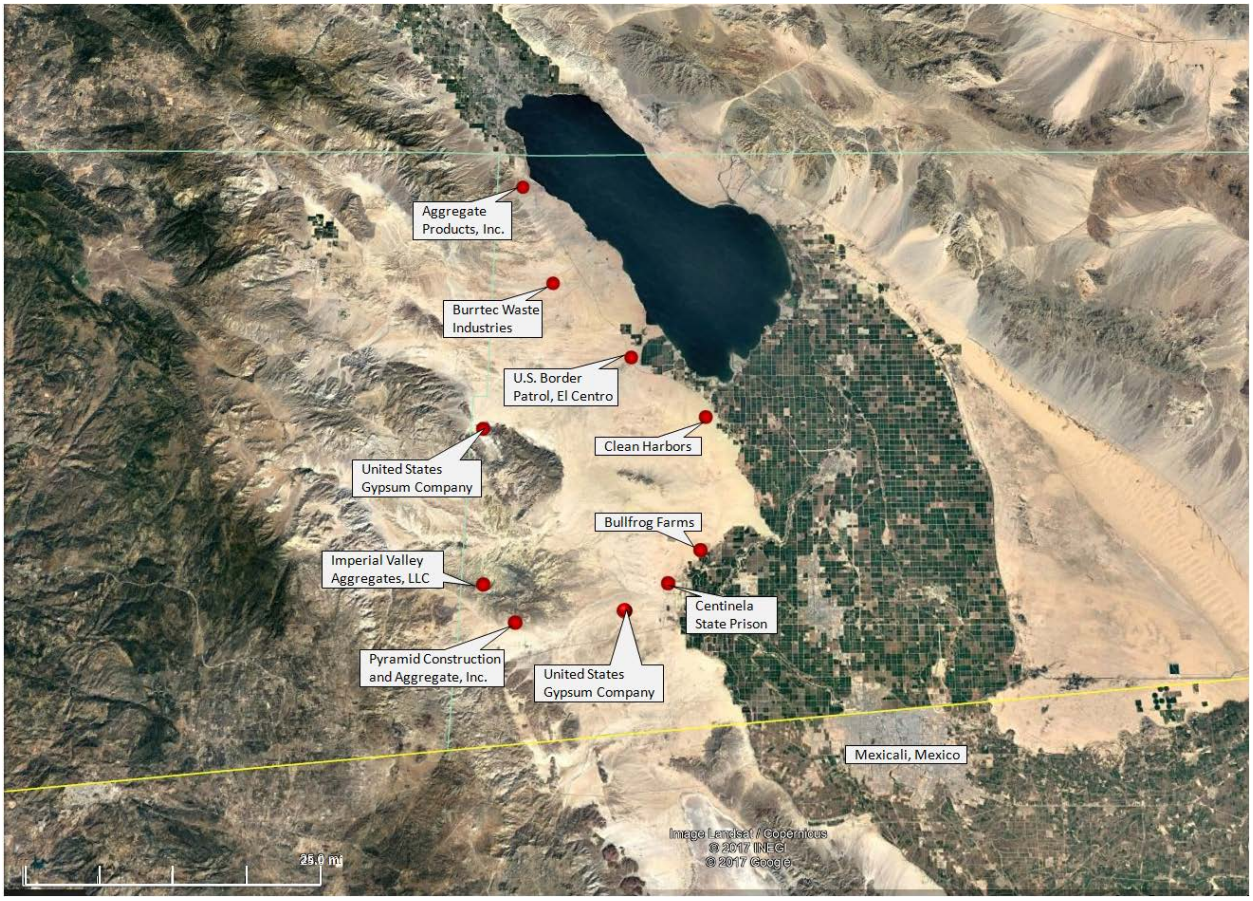


Fig 5-2: The above map identifies those permitted sources located west, northwest and southwest of the Niland monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and 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

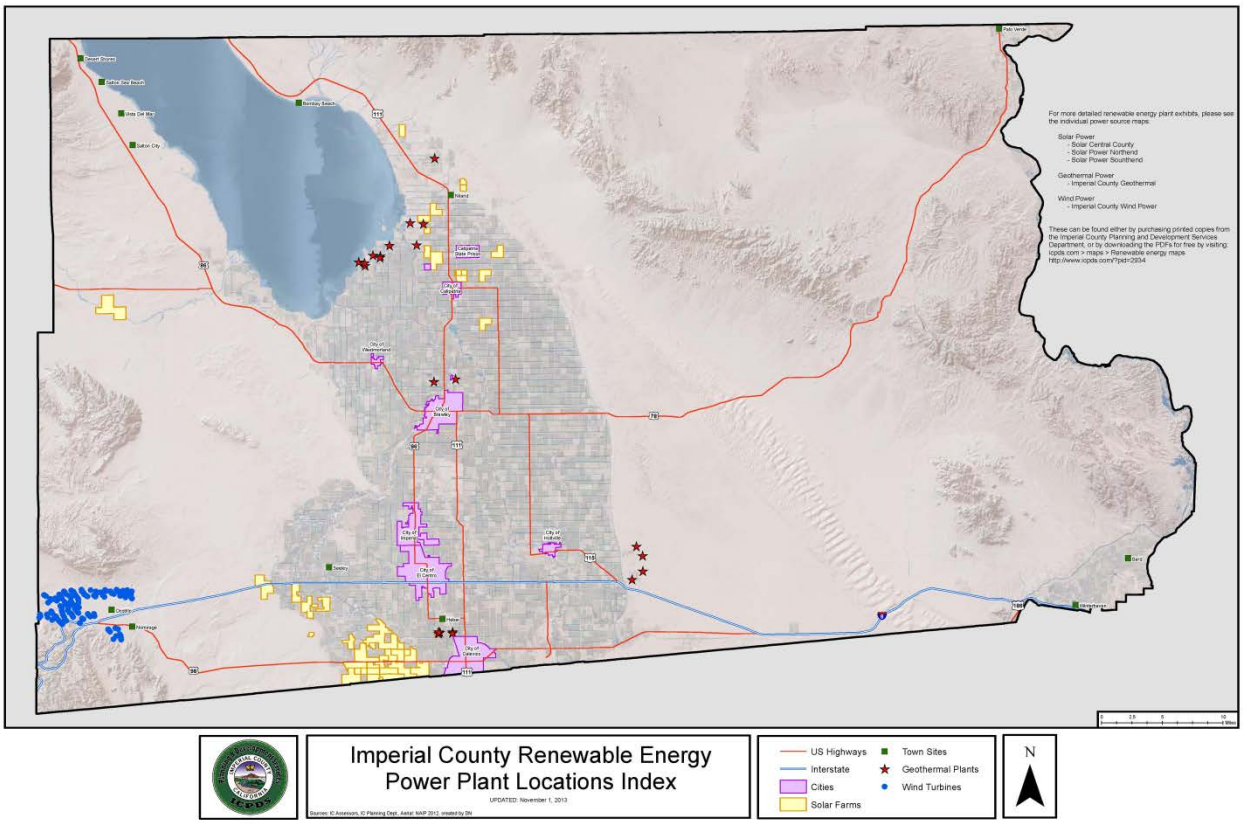


Fig 5-3: The above map identifies those power sources located west, northwest and southwest of the Niland monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

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, monsoonal Gulf Surges from Mexico cause thunderstorm downburst, outflow winds and gust fronts from thunderstorms that affect the region. The "well-defined" Gulf Surge from northern Mexico, on June 23, 2018 produced gusty outflow winds that generated and transported emissions from northern Mexico and extreme southwestern Arizona into Imperial County (**Table 2-1**).[24]

Although all the air quality monitors in Imperial County measured 24-hour averaged concentrations above 100 ug/m^3, on June 23, 2018, the Niland monitor was the only monitor to exceed the NAAQS by 8 ug/m^3. Factors that contributed to the additional 8 ug/m^3 at Niland included the undeveloped and rural nature of the surroundings and Niland's close and unobstructed proximity to the natural open deserts to the east and south. In addition, the rapid nature and intensity of the strong gusty southerly outflow winds was sufficient to overcome reasonable controls in place, in Imperial County. Overall, these strong gusty southerly outflow winds, that quickly and intensely blew over the open natural deserts within northern Mexico and southwestern Arizona transported dust onto the air quality monitors in Imperial County on June 23, 2018 affecting air quality and causing an exceedance of the NAAQS.

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 June 23, 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

[24] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 255pm MST

entrain dust from desert areas, whose sources are controlled by reasonable controls, 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 Mexico and Arizona 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 Niland monitor was caused by naturally occurring gusty southerly outflow winds that transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the south and southeast of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at the Niland monitor on June 23, 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 Niland monitor on July 23, 2018, was caused by the transport of windblown dust into Imperial County by strong southerly outflow winds associated with a "well-defined" Gulf Surge that entered the region.[25] 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 the Niland monitor in Imperial County demonstrates a consistency of elevated southerly outflow winds with elevated concentrations of PM_{10} on June 23, 2018. In addition, temporal analysis indicates that the elevated PM_{10} concentrations and the southerly outflow 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 June 23, 2018.

[25] National Weather Service, Area Forecast Discussion, June 23, 2018, Phoenix office, 255pm MST

VI.5 Concentration to Concentration Analysis

The historical annual and seasonal 24-hr average PM_{10} measured concentrations at the Niland monitor was 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 southerly outflow winds that resulted from the intrusion of a Gulf surge into the region. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Niland air quality monitor in Imperial County on June 23, 2018.

In particular, the clear causal relationship and not reasonably controllable or preventable sections provide evidence that southerly outflow winds transported fugitive emissions from open natural desert areas, located within northern Mexico and southwestern Arizona (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.[26]

[26] 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.