IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Courtesy Photo: Driving down I-8 heading East in Imperial County towards Dogwood Rd (towards Arizona) on September 13, 2015

August 20, 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 El Centro monitor in Imperial County, California on August 20, 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 18
- III.1 Summary of Forecasts and Warnings 25
- III.2 Summary of Wind Observations 26

IV Concentration to Concentration Analysis – An analyses comparing the event-influenced concentrations to concentrations at the same monitoring site at other times 27

V Both Not Reasonably Controllable and Not Reasonably Preventable – A demonstration that the event was both not reasonably controllable and not reasonably preventable 30
- V.1 Other PM_{10} Control Measures 31
- V.2 Wind Observations 33
- V.3 Review of Source Permitted Inspections and Public Complaints 34

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 37
- VI.1 Affects Air Quality 37
- VI.2 Not Reasonably Controllable or Preventable 37
- VI.3 Natural Event 38

VI.4 Clear Causal Relationship....38
VI.5 Concentration to Concentration Analysis....38
VI.6 Conclusion....38

Appendix A: National Weather Service Notices....40

Appendix B: Wind Data....85

Appendix C: Public Information and other Notices....119

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 August 20, 2018 1500 PST 15

Figure 2-6 HYSPLIT Model Imperial County Sites August 20, 2018 1800 PST 16

Figure 3-1 Wall of Dust Moving Across Imperial County 19

Figure 3-2 Visual Ramp-Up Analysis as Discussed for August 20, 2018 20

Figure 3-3 72-Hour Time Series PM_{10} Concentrations and Visibility 21

Figure 3-4 Imperial Valley Air Quality Index for El Centro August 20, 2018 25

Figure 4-1 El Centro Historical Comparison FRM and FEM PM_{10} 24-Hr Avg Concentrations January 1, 2010 To August 20, 2018 28

Figure 4-2 El Centro Seasonal Comparison FRM and FEM PM_{10} 24-Hr Avg Concentrations July 1, 2010 To August 20, 2018 29

Figure 5-1 Regulation VIII Graphic Timeline Development 31

Figure 5-2 Permitted Sources 35

Figure 5-3 Non-Permitted Sources 36

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 August 20, 2018 22

Table 3-2 Wind Speeds and PM_{10} Concentrations August 20, 2018 23

Table 3-3 Wind Speeds and PM_{10} Concentrations August 20, 2018 24

Table 5-1 San Diego Air Pollution Control District Rules 32

Table 5-2 Mojave Desert Air Quality Management District Rules 32

Table 5-3 South Coast Air Quality Management District Rules 33

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. 27
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	Pg. 30
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. 37

[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, August 20, 2018 which elevated particulate matter within San Diego, Riverside and Imperial Counties and affected air quality. The analyses contained in this report includes regulatory and non-regulatory data that provides support for the elements listed in **Table 1-1** and **Table 1-2**. This demonstration substantiates that this

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

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

The ICAPCD utilizes a web-based public notification process to alert the public of forecasted weather conditions and potential changes in ambient air concentrations that may affect the public. The ICAPCD identifies these public notifications as Advisory Events. On Monday, August 20, 2018, the ICAPCD published advisories concerning the potential for elevated concentrations of particulate matter caused by gusty southerly winds. Later in the day, the ICAPCD updated the advisory in response to changing meteorological circumstances that potentially could affect air quality. The updated notice included changing monsoonal conditions that could create thunderstorms in Imperial Valley. The ICAPCD routinely monitors notices issued by the NWS Phoenix and San Diego offices for weather updates during wind events. **Appendix C** contains copies of notices pertinent to the August 20, 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, August 20, 2018, a naturally occurring event elevated particulate matter within San Diego, Riverside and Imperial Counties, causing an exceedance at the El Centro (06-025-1003) 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 El Centro monitor on August 20, 2018. After review, CARB submitted the INPEE, for the August 20, 2018 event in July of 2019. The submitted request included a brief description of the meteorological conditions for August 20, 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 August 20, 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 162 µg/m^3 measured by the El Centro monitor on August 20, 2018.

(B) Concurrently with the Public Review period for the August 20, 2018 exceptional event, the ICAPCD is formally submitting to CARB for remittance to USEPA the Final August 20, 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

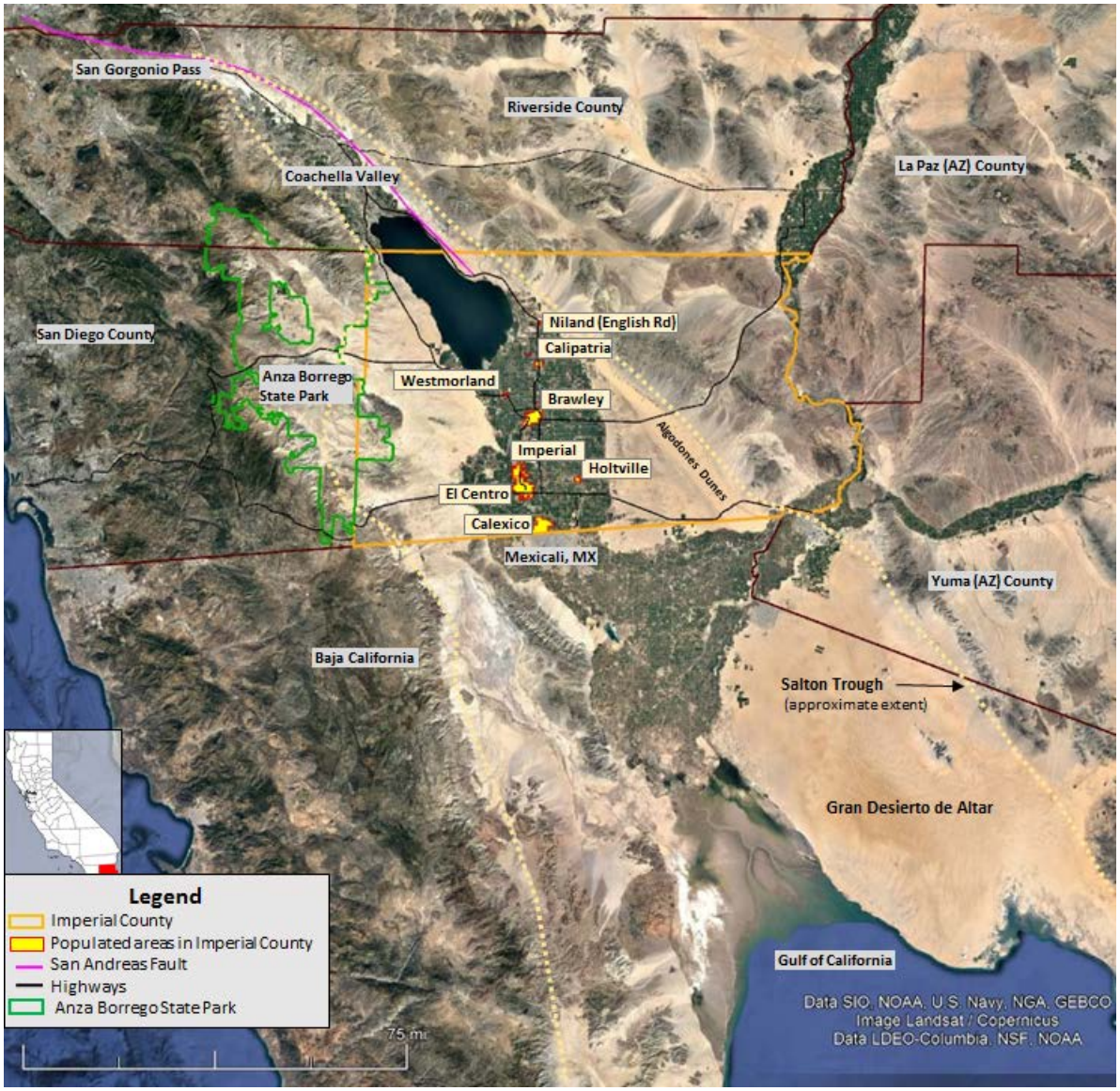

Fig 1-1: Imperial County a Southern California border region, within far southeast California bordering Arizona and Mexico has a small economically diverse region with a population of 174,528

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, August 20, 2018 the San Diego and Phoenix NWS offices issued forecasts discussing a Gulf Surge from northern Mexico that would create thunderstorms and gusty winds in the area. However, neither office forecasted much of an impact. The Phoenix office called Monday, August 20, 2018 a "low grade monsoon day."[4] In fact, the Phoenix office forecast most of the damaging winds and blowing dust impacts to occur on Tuesday or Wednesday.[5] However, San Diego did discuss the likely potential for thunderstorm action in Imperial Valley.[6] No precipitation was reported by El Centro NAF (KNJK) and Imperial County Airport (KIPL) or Yuma MCAS (KNYL) in southwestern Arizona, or Weather Underground stations in northern Mexico. However, KNJK, KIPL, and particularly KNYL measured increased humidity during August 20, 2018 (**Appendix B**). A Public Information Statement issued by the Tucson NWS office gave precipitation amounts over a wide area for south central and southeast Arizona.[7] The following forecast excerpt from San Diego discussed the meteorological setup:

> "…By midday our attention will turn east where an increase in monsoonal moisture and instability will lead to isolated thunderstorms in the mountains and deserts this afternoon. Any thunderstorms are capable of rain intense enough to produce a flash flood, but they will be quite isolated. A thunderstorm complex in Sonora tonight will turn into an easterly wave that moves northward into southwest Arizona Tuesday. Most of the thunderstorm action will stay in Imperial Valley or Arizona, but we're close enough on its western fringes to mention a small chance of thunderstorms over our lower desert and eastern slopes of the mountains.[8]

Almost no advisories or special weather statements of any kind were issued for the Gulf Surge and its impacts. A Local Storm Report issued at 1812 MST on August 20, 2018 came from a Trained NWS Spotter who reported a "dust storm" one mile WNW of Seeley on the western edge of the Imperial Valley. Blowing dust had caused near-zero visibility.[9] A short time later a wall of dust stretching from Ocotillo to Gordon's Well was observed moving north at 35 mph.[10] **Appendix A** contains all pertinent NWS notices.

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[4] National Weather Service, Area Forecast Discussion, August 18, 2018, Phoenix office 115pm MST
[5] National Weather Service, Area Forecast Discussion, August 19, 2018, Phoenix office 348am MST
[6] National Weather Service, Area Forecast Discussion, August 20, 2018, San Diego office, 121pm PST
[7] National Weather Service, Public Information Statement, August 20, 2018, Tucson office 907pm MST
[8] National Weather Service, Area Forecast Discussion, August 20, 2018, San Diego office, 852am PST
[9] National Weather Service, Local Storm Report, August 20, 2018, Phoenix office 612pm MST
[10] National Weather Service, Dust Advisory, August 20, 2018, Phoenix office 620pm MST

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

On Monday, August 20, 2018, the air monitors in Imperial, Riverside and Yuma counties measured elevated concentrations of particulate matter when a Gulf Surge brought unstable moist air into the region and produced gusty southerly winds. These winds generated emissions from within the open natural deserts within northern Mexico, within southwestern Arizona and 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

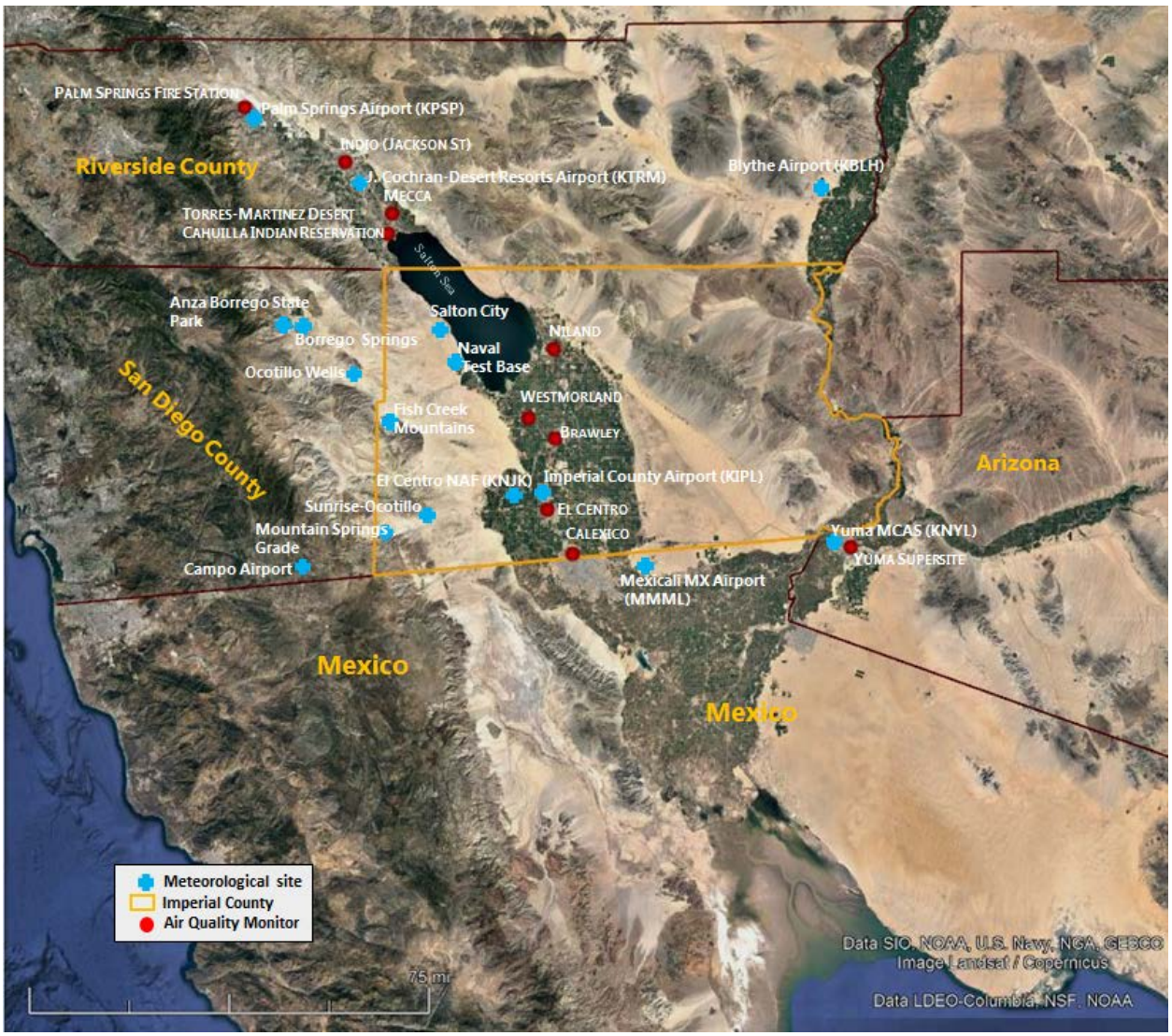


Fig 2-1: Includes a general location of the sites used in this analysis. The site furthest south is in Mexicali, Mexico and the site furthest north is the Palm Springs Fire Station

TABLE 2-1
HOURLY CONCENTRATIONS OF PARTICULATE MATTER

		00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Hrly MAX	24-HR AVERAGE
BRAWLEY	20180819	37	30	35	25	17	19	26	32	26	30	22	43	38	34	32	26	15	39	32	31	55	59	62	25	62	**32**
	20180820	27	18	15	11	22	23	43	39	41	37	47	42		57	103	106	639	397	313	235	73	64	46	31	**639**	**105**
	20180821	35	17	29	24	42	88	202	223	151	126	95	78	67	67	177	155	220	145	70	46	42	38	35	32	223	**91**
CALEXICO	20180819	58	29	25	31	27	40	29	30	33	33	35	41	44	40	28	27	34	30	40	71	152	79	50	39	152	**43**
	20180820	35	22	17	16	14	26	28	41	48	50	45	49	75	97	106	387	325	724	757	384	122	46	41	35	**757**	**145**
	20180821	33	32	31	43	66	50	79	153	148	114	85	84	68	228	144	150	127	201	112	73	56	36	33	32	228	**90**
EL CENTRO	20180819	33	45	27	52	21	30	36	32	29	31	31	34	42	45	41	28	34	38	41	54	110	88	65	44	110	**42**
	20180820	39	29	24	16	30	26	32	44	43	54	50	58	59	76	96	118	571	757	800	535	278	85	43	32	**800**	**162**
	20180821	41	28	23	29	29	43	128		155	141	112	92	96	157	202	190	219	210	214	78	74	51	36	38	219	**103**
NILAND	20180819	41	50	37	33	19	21	45	31	43	38	47	38	34	32	32	35	37	26	79	44	56	48	36	32	79	**38**
	20180820	19	16	19	20	14	51	56	53	54		45	89	51	66	61	128	163	498	325	139	117	39	42	28	**498**	**91**
	20180821	18	15	18	32	31	45	110	180	147	81	169	122	134	58	159	146	169	153	96	52	26	37	20	16	180	**84**
WESTMORLAND	20180819	39	26	28	39	12	24	30	32	26	57	25	32	33	36	30	28	22	29	45	45	34	55	88	49	88	**36**
	20180820	33	32	16	10	18	35	37	51		35	51	65	56	55	60	102	581	348	330	476	424	51	50	33	**581**	**128**
	20180821	28	22	22	23	28	58	181	217	204	146	143	93	84	76	105	173	270	247	105	45	42	47	30	38	270	**101**
INDIO	20180819	27	33	36	35	31	37	35	32	22	39	25	24	63	16	15	27	17	32	35	50	55	44	42	42	63	**33**
	20180820	38	33	29	35	35	51	46	49	54	57	20	18	31	33	18	25	34	28	27	52	54	48	39	32	**57**	**36**
	20180821	30	33	31	36	39	44	45	55	88	27	32	76	47	72	22	71	41	87	143	181	86	94	54	25	181	**60**
MECCA	20180819	34	49	51	36	69	32	54	23	34	22	95	43	3	11	49	24	34	71	53	78	25	39	62	53	95	**43**
	20180820	23	37	32	100	20	25	59	34	14	34	31	31	21	17	13	55	47	50	85	172	37	62	83	53	**172**	**47**
	20180821	57	79	18	71	31	27	106	50	59	47	49	110	76	6	65	78	78	174	167	110	50	22	15	18	174	**65**
PALM SPRINGS FIRE STATION	20180819	29	30	27	27	28	28	25	26	29	28	27	27	21	19	22	38	38	42	46	46	42	40	39	35	46	**31**
	20180820	32	36	29	31	31	34	34	33	36	39	35	33	29	55	33	28	30	48	49	46	44	43	35	30	**55**	**36**
	20180821	33	30	35	32	33	35	35	37	44	39	33	34	27	30	24	25	33	43	46	53	45	39	38	37	53	**35**
TORRES-MARTINEZ TRIBAL	20180819	37	40	47	74	33	39	34	48	38	38	29	31	18	27	28	38	24	32	43	60	46	44	46	34	74	**38**
	20180820	38	36	36	48	43	204	93	66	55	89	109	59	169	156	147	37	31	30	43	90	53	40	42	45	**204**	**73**
	20180821	38	40	34	38	38	97	61	72	59	115	122	120	733	228	713	125	206	191	159	461	185	64	38	43	733	**165**
YUMA AZ SUPERSITE (MST)	20180819	13	20	18	13	11	13	11	14	12	13	18	19	20	25	24	25	22	30	18	22	23	16	24	16	30	**18**
	20180820	16	9	17	8	16	19	33	144	323	178	99	52	47	41	48	42	28	52	72	51	46	20	18	18	**323**	**58**
	20180821	23	107	63	34	130	246	205	124	83	51	36	42	80	64	46	31	38	47	36	25	17	17	14	12	246	**65**
YUMA AZ SUPERSITE (PST)	20180819	20	18	13	11	13	11	14	12	13	18	19	20	25	24	25	22	30	18	22	23	16	24	16	16	30	**18**
	20180820	9	17	8	16	19	33	144	323	178	99	52	47	41	48	42	28	52	72	51	46	20	18	18	23	**323**	**58**
	20180821	107	63	34	130	246	205	124	83	51	36	42	80	64	46	31	38	47	36	25	17	17	14	12	13	246	**65**

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

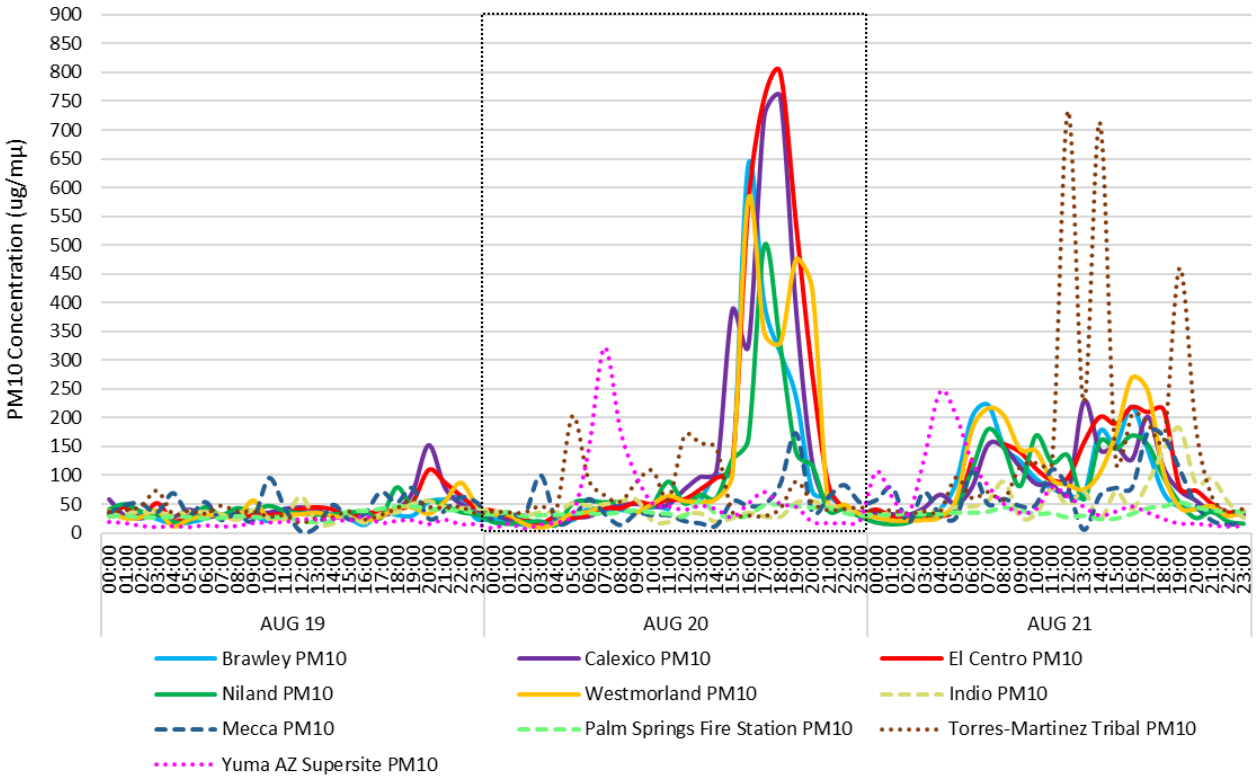


Fig 2-2: is a three-day graphical representation of the PM_{10} concentrations measured at the sites identified in **Table 2-1**. Note measured elevated concentrations are similar among monitors

Wind speed, wind direction and the airflow patterns combined all help explain how windblown emissions resulting from the gusty southerly winds affected all of the monitors in Imperial County on Monday, August 20, 2018.

As mentioned above, neither the San Diego nor the Phoenix NWS office anticipated much impact from the Gulf Surge, and the Phoenix NWS office forecast most impacts to be on Tuesday or Wednesday. Only one Dust Advisory was issued for Imperial County. However, at least two reports of a wall of dust was reported in different areas of Imperial County on August 20, 2018 (**Appendix A**).

Figures 2-3 and 2-4 depict the compiled wind data for regional and neighboring airports and upstream sites. Although airports within Imperial, Riverside, San Diego and Yuma counties measured at least one single hour of winds at or above 25 mph, upwind sites such as the Yuma Auxiliary airport, measured multiple instances of winds and gusts at or above 25 mph, coincident with measured elevated concentrations.

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

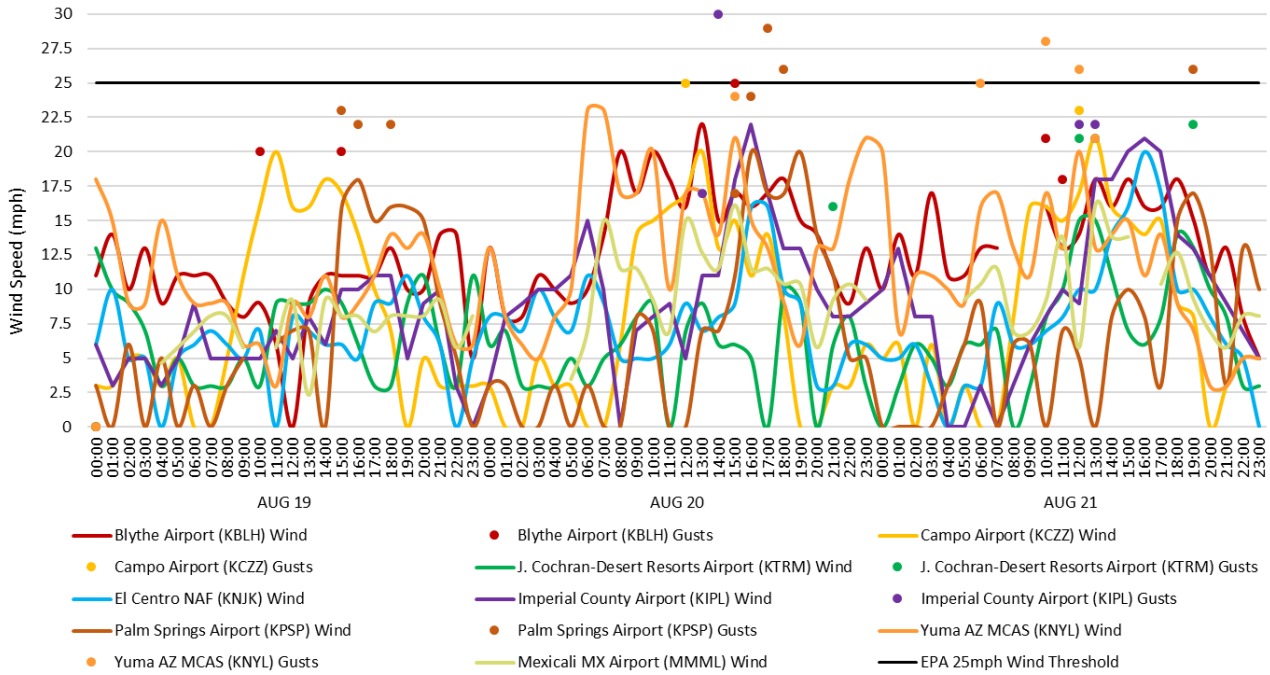


Fig 2-3: is a three-day graphical representation of the measured wind speed and wind gusts (if available) from local and neighboring airports. All data derived from the Local Climatological Data Hourly Observations (LCDHO) reports released by the NOAA https://www.ncdc.noaa.gov/. MMML is from the University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

FIGURE 2-4
WIND SPEEDS AND GUST UPSTREAM SITES

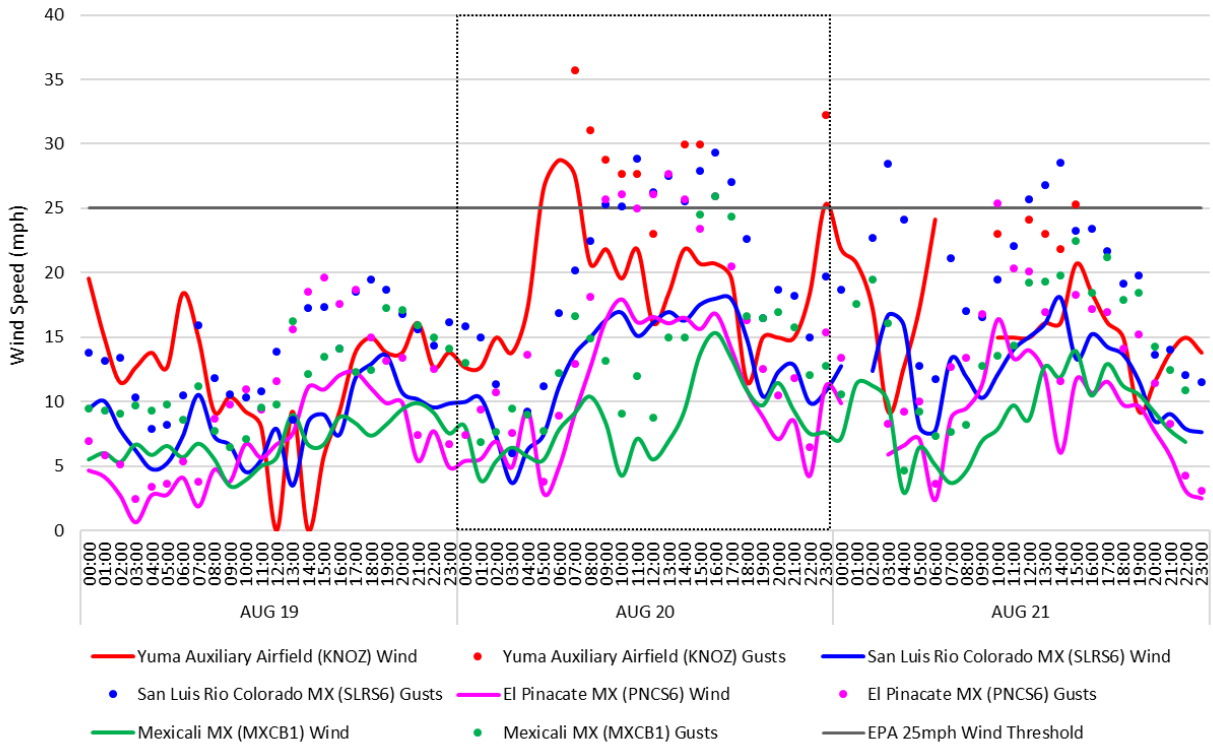


Fig 2-4: is a three-day graphical representation of the measured wind speed and wind gust (if available) from sites located upwind from the Imperial County monitors. The sites depicted represent locations in Imperial County and southwestern Arizona and northern Mexico. All data derived from the University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

The National Oceanic and Atmospheric Administration (NOAA) Laboratory HYSPLIT back-trajectory models[11] provide supporting evidence of the southerly airflow within Imperial County on August 20, 2018. The HYSPLIT back-trajectory models in **Figures 2-5 and 2-6** depict the airflow during the late afternoon (1500 PST) and evening (1800 PST) to help illustrate the southerly airflow.

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

[11] 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 AUGUST 20, 2018 1500 PST

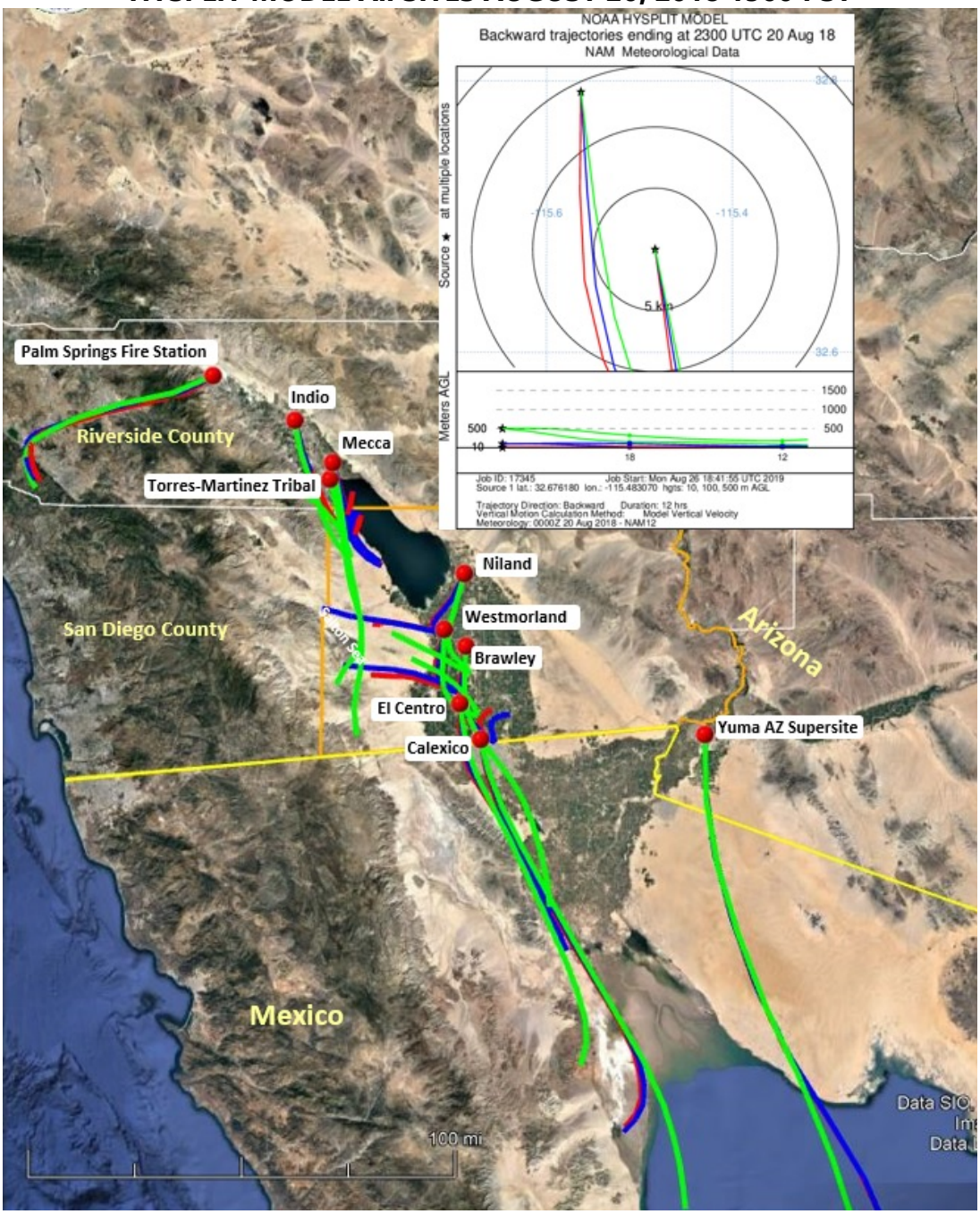


Fig 2-5: A 12-hour HYSPLIT back-trajectory ending at 1500 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

FIGURE 2-6
HYSPLIT MODEL All SITES AUGUST 20, 2018 1800 PST

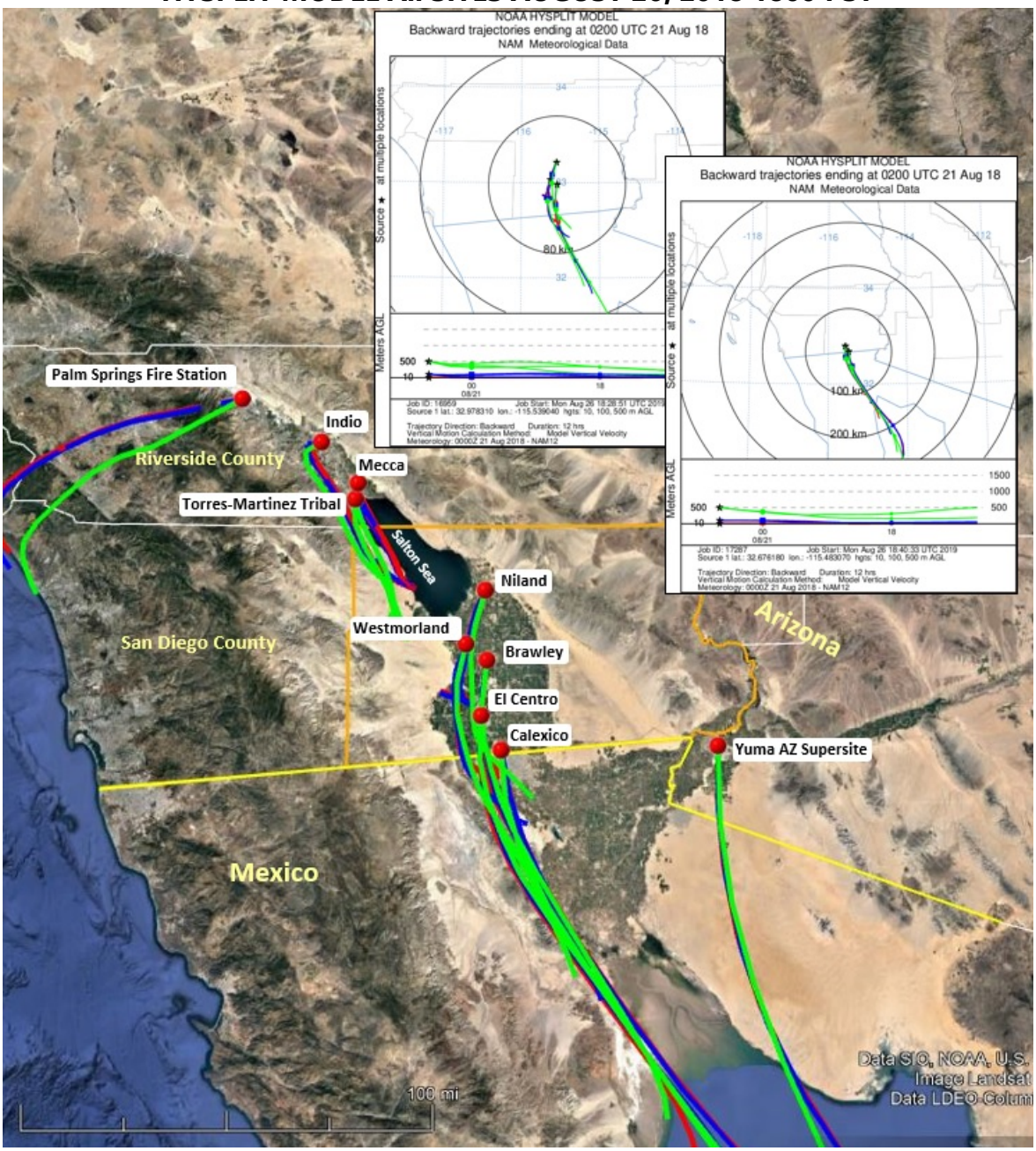


Fig 2-6: A 12-hour back-trajectory HYSPLIT ending at 1800 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

As strong gusty southerly winds blew over open natural desert areas southeast and south of Imperial County, fugitive windblown dust affected all of the monitors. Fugitive dust significantly affected all air quality monitors within Imperial County. Although no meteorological monitors available within Imperial County measured winds at or above 25

mph the Yuma Auxiliary Airport (KNOZ) measured several hours of winds at or above 25 mph during the morning of August 20, 2018 coincidently before the measured peak concentration at the El Centro monitor. However, gusty winds at El Pinacate, San Luis Rio Colorado, and Mexicali, Mexico, kept aiding the entrainment and the transportation of windblown dust northward into Imperial County. This particular event was extremely erratic in nature, producing short lived but impactful burst of thunderstorm activity with resulting outflow boundary winds.

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 of moisture caused unstable monsoonal air to reach the region creating thunderstorms that produced erratic southerly outflow boundary winds that transported emissions from northern Mexico into Imperial County. Neither the Phoenix nor San Diego NWS offices devoted much discussion to the Gulf Surge and its associated dust impacts. The Phoenix office termed Monday a "low grade monsoon day"[12] and anticipated that the main surge of moisture from the Gulf of California would push in Monday night and that the surge on Tuesday and Wednesday would be capable of producing damaging winds and blowing dust impacts.[13] However, by Monday Phoenix said that models were in excellent agreement that deep convection would begin over southern Arizona and northern Sonora, Mexico that afternoon, and generate subsequent outflows, although toward Phoenix.[14] San Diego forecast that the tropical moisture would clip southeast California along with moderate instability which would bring the potential for heavy rain with any thunderstorms that developed.[15] The Tucson NWS office forecast considerably more monsoonal activity, although mostly south of Interstate 10, but that the storms would move west or northwest into the evening.[16]

Almost no advisories or special weather statement of any kind were issued for the Gulf Surge and its impacts. A Trained NWS Spotter reported a "dust storm" one mile WNW of Seeley on the western edge of the Imperial Valley that was causing near-zero visibility.[17] A short time later a wall of dust stretching from Ocotillo to Gordon's Well was observed moving north at 35 mph.[18] El Centro was the only monitor to exceed due to the increased moisture of the monsoonal air which tamped down dust and prevented an exceedance at Calexico and other monitors. Although no precipitation was reported by El Centro NAF (KNJK) and Imperial County Airport (KIPL) or Yuma MCAS (KNYL), humidity was measured during the morning and evening hours of August 20, 2018.

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.[19] As winds and gusts increased on August 20,

[12] National Weather Service, Area Forecast Discussion, August 18, 2018, Phoenix office, 115pm MST
[13] National Weather Service, Area Forecast Discussion, August 19, 2018, Phoenix office, 348am MST
[14] National Weather Service, Area Forecast Discussion, August 20, 2018, Phoenix office, 151pm MST
[15] National Weather Service, Area Forecast Discussion, August 19, 2018, San Diego office, 930pm PST
[16] National Weather Service, Area Forecast Discussion, August 20, 2018, Tucson office, 144pm MST
[17] National Weather Service, Local Storm Report, August 20, 2018, Phoenix office 612pm MST
[18] National Weather Service, Dust Advisory, August 20, 2018, Phoenix office 620pm MST
[19] 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

2018 and transported windblown dust from open natural deserts into Imperial County air quality degraded. 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.

Figures 3-1 and 3-2 below provide illustrations of meteorological conditions, as described above and demonstrated in the HYSPLITs, for August 20, 2018, which affected air quality in Imperial County causing an exceedance at the El Centro monitor.

FIGURE 3-1
WALL OF DUST MOVING ACROSS IMPERIAL COUNTY

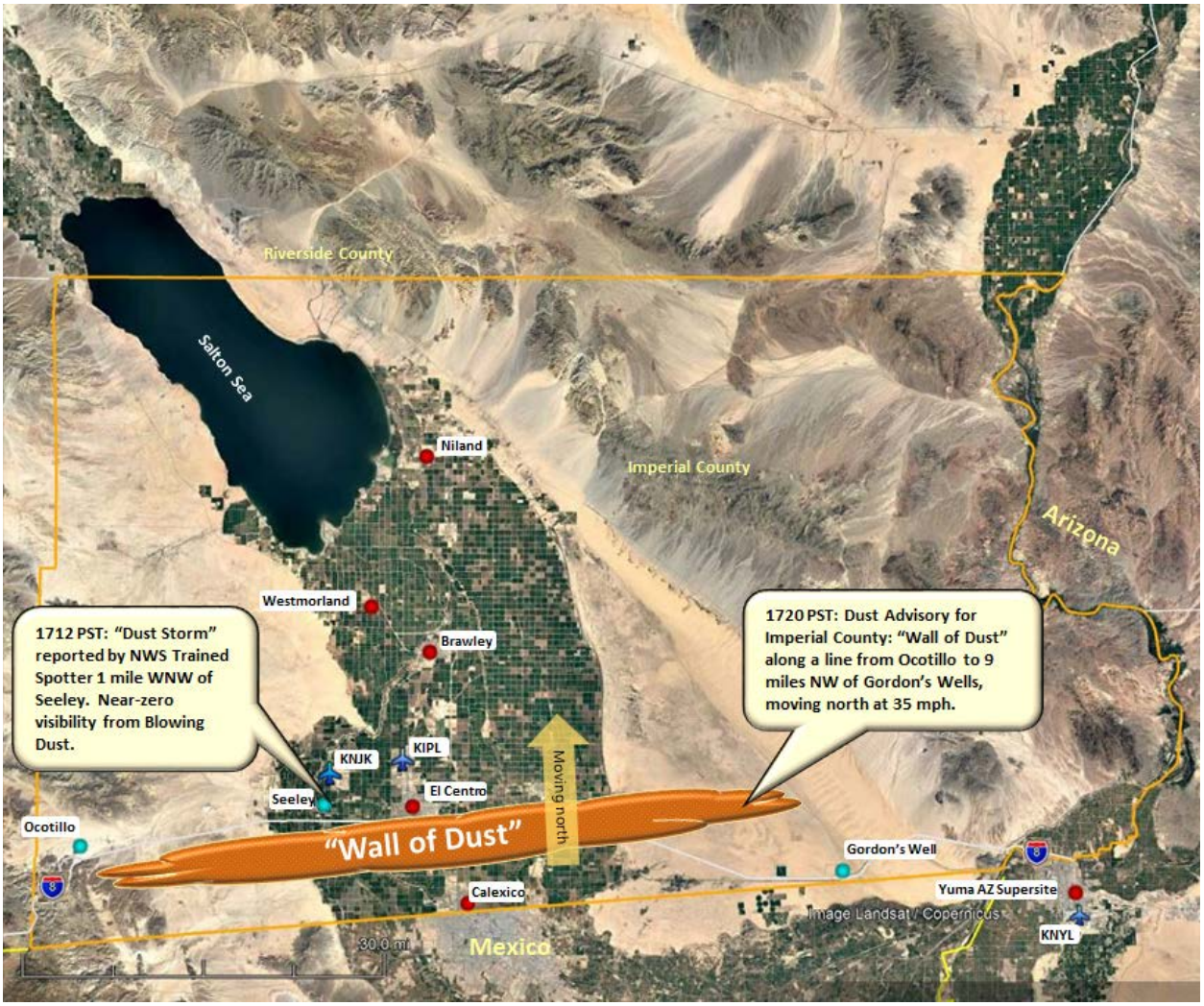


Fig 3-1: A visualized depiction of dust reported in Imperial County on August 20, 2018. An NWS Trained Spotter reported a "dust storm" near Seeley, while the NWS issued a Dust Advisory for Imperial County warning of a "wall of dust" along a line from Ocotillo to Gordon's Well moving northwest at 35 mph. Sources from the NWS (**Appendix A**). Google Earth base map

FIGURE 3-2
VISUAL RAMP-UP ANALYSIS AS DISCUSSED FOR AUGUST 20, 2018

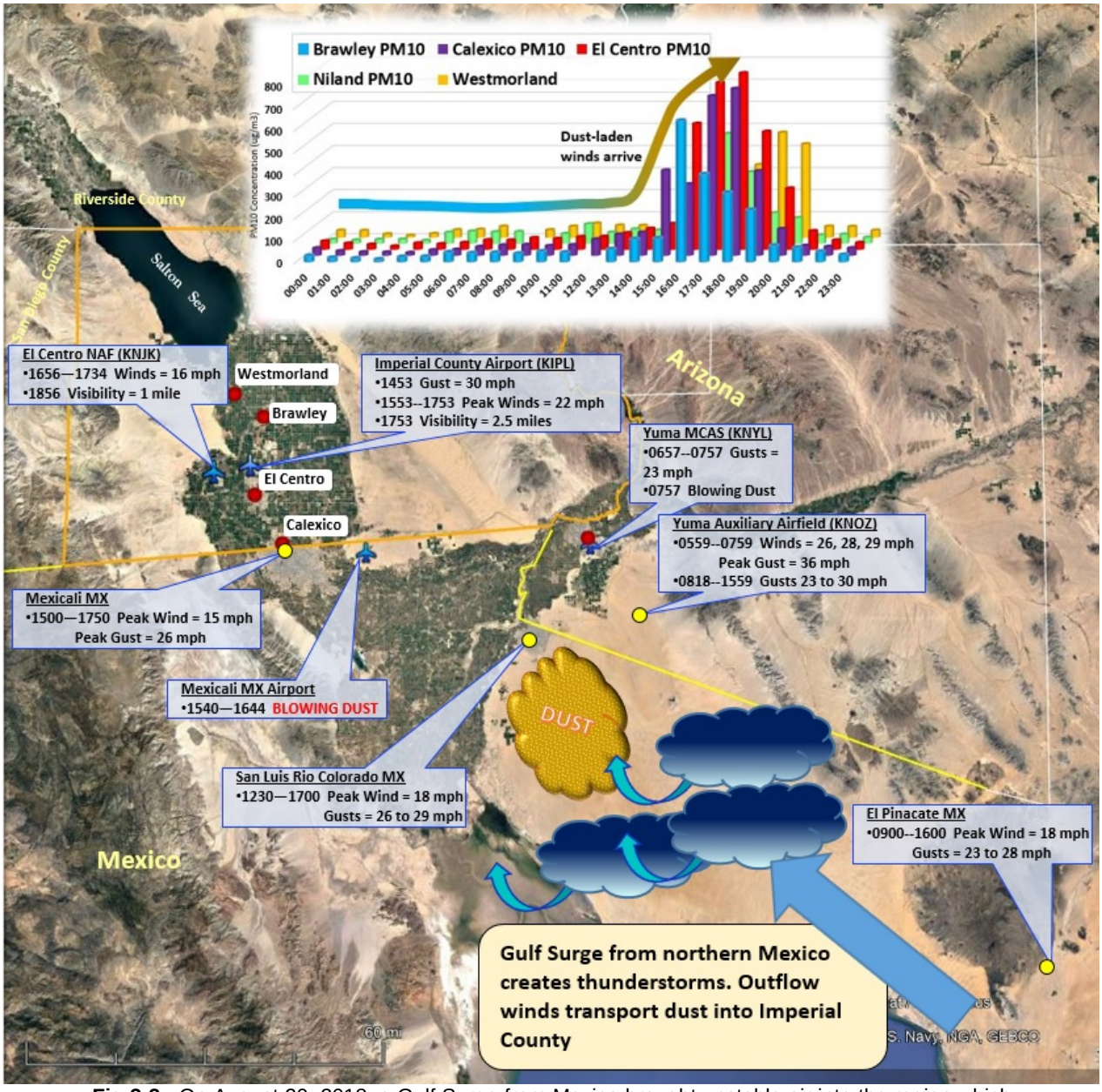


Fig 3-2: On August 20, 2018, a Gulf Surge from Mexico brought unstable air into the region which produced thunderstorms. The gusty southerly outflow winds transported dust into Imperial County. Google Earth base map

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.[20] The Imperial County Airport (KIPL) and

[20] 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

the El Centro NAF (KNJK) in Imperial County along with the Yuma MCAS (KNYL) in southwestern Arizona and the Mexicali Airport (MMML) in Mexico reported reduced visibility coincident with elevated wind speeds, wind gusts and elevated hourly concentrations of particulates at all air quality monitors. In addition, the Mexicali Airport reported blowing dust coincident with elevated concentrations. **Figure 3-3** and **Tables 3-1 through 3-2** provide information regarding the reduced visibility in Imperial County and the relation to hourly concentrations at local air monitors.

While **Figure 3-3** is a graphical representation of the reduced visibility within Imperial County and surrounding areas, **Tables 3-1 through 3-2** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the El Centro 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 3-3,** visibility reduced at four of the major airports, the El Centro NAF (KNJK), the Imperial County Airport (KIPL), the Yuma MCAS (KNYL) and the Mexicali Airport (MMML) in Mexico on August 20, 2018 coincident with elevated hourly concentrations at the air quality monitors in Imperial County.

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

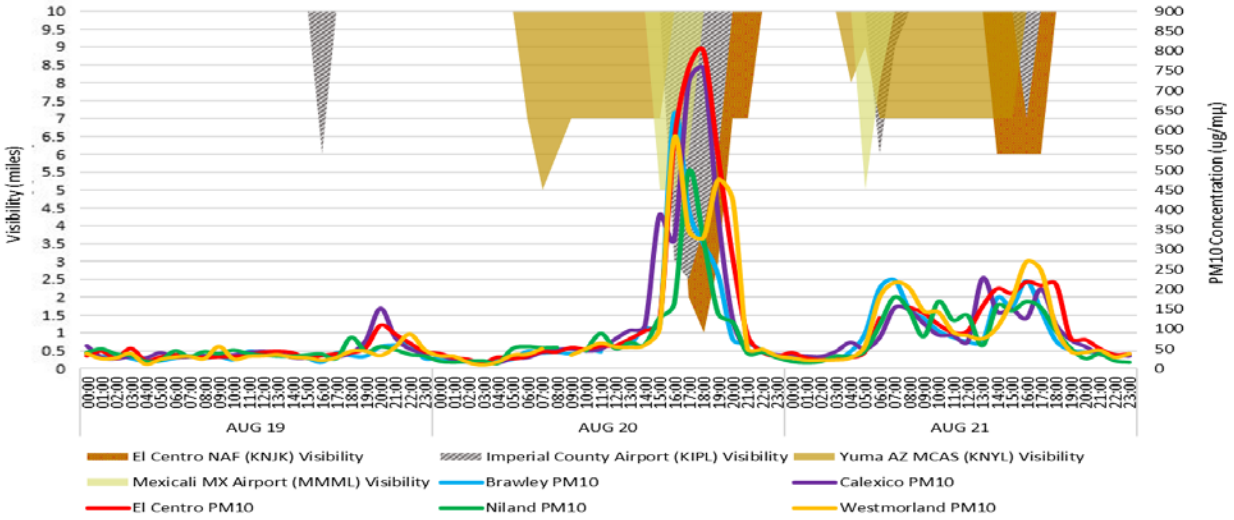


Fig 3-3: is a graphical representation of the compiled data from local and surrounding airports. Reported reduced visibility is coincident with elevated winds and hourly levels of concentrations either just prior to peak concentrations or after. Visibility data from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/

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

Because the EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states[21] the **Tables 3-1 through 3-3** 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 monitor.

TABLE 3-1

WIND SPEED AND PM_{10} CONCENTRATIONS AUGUST 20, 2018

	YUMA AUXILIARY AIRFIELD (KNOZ)				YUMA MCAS (KNYL)				IMPERIAL COUNTY AIRPORT (KIPL)				EL CENTRO NAF (KNJK)				EL CENTRO		EL CENTRO
HR	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/D**	**PM_{10} (µg/m³)**
0000	13		130	10	13		150	10	3		70	10	8		60	10	1	81	39
0100	13		120	10	8		140	10	8		110	10	8		100	10	4	89	29
0200	15		130	10	6		170	10	9		110	10	7		110	10	6	90	24
0300	14		130	10	5		160	10	10		120	10	10		120	10	5	96	16
0400	17		130	10	8		150	10	10		130	10	8		120	10	5	109	30
0500	26		140	5	10		140	10	11		130	10	7		130	10	6	121	26
0600	29		140	4	23		140	7	15		140	10	11		130	10	7	128	32
0700	28	36	140	3	23		160	5	10		150	10	9		130	10	6	138	44
0800	21	31	150	7	17		170	6	0		0	10	5		140	10	3	144	43
0900	22	29	160	6	17		170	7	7		140	10	5		80	10	2	108	54
1000	20	28	180	9	20		170	7	8		140	10	5		100	10	2	163	50
1100	22	28	150	10	10		170	7	9		110	10	6		VRB	10	2	160	58
1200	16	23	170	10	17		170	7	5		VRB	10	9		130	10	2	171	59
1300	18		180	10	17		190	7	11	17	150	10	7		130	10	4	159	76
1400	22	30	150	9	14		180	7	11	30	VRB	10	8		120	10	5	133	96
1500	21	30	160	9	21	24	180	7	18		120	10	9		150	10	7	138	118
1600	21		150	10	15		190	10	22		150	3	16		140	8	10	136	571
1700	20		160	10	13		200	10	17		150	2.5	16		160	2	8	144	757
1800	12		170	10	9		190	10	13		160	4	10		160	1	6	145	800
1900	15		140	10	6		170	10	13		160	6	9		170	3	6	146	535
2000	15		130	10	13		160	10	10		160	10	3		170	7	5	137	278
2100	15		140	10	13		150	10	8		150	10	3		210	7	5	142	85
2200	18		140	10	18		160	10	8		130	10	6		130	10	4	134	43
2300	25	32	140	7	21		160	10	9		110	10	6		100	10	5	120	32

Wind data for Yuma Auxiliary Airfield (KNOZ) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Wind data for El Centro NAF (KNJK), Yuma AZ MCAS (KNYL), 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. VIS = visibility. OBS. = Observations of dust. BLDU = blowing dust. Due to the different times that wind data and air quality data is sampled at various sites, the hour given represents the hour in which the measurement was taken

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

TABLE 3-2
WIND SPEED AND PM_{10} CONCENTRATIONS AUGUST 20, 2018

	EL PINACATE MX (PNCS6)			SAN LUIS RIO COLORADO MX (SLRS6)			MEXICALI MX (MXCB1)			MEXICALI AIRPORT MX (MMML)					EL CENTRO		EL CENTRO
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.**	**VIS.**	**W/S**	**W/D**	**PM_{10} ($\mu g/m^3$)**
0000	5	7	140	10	16	172	8	13	13					10	1	81	39
0100	6	9	151	10	15	162	4	7	7					10	4	89	29
0200	7	11	131	7	11	150	5	8	8					10	6	90	24
0300	5	8	150	4	6	118	6	9	9					10	5	96	16
0400	9	14	138	6	9	128	6	9	9					10	5	109	30
0500	3	4	334	7	11	146	5	8	8	3		120		10	6	121	26
0600	5	9	146	11	17	150	8	12	12	7		120		10	7	128	32
0700	9	13	136	14	20	158	9	17	17	15		150		10	6	138	44
0800	13	18	149	15	22	171	10	15	15	12		140		10	3	144	43
0900	16	26	164	16	25	184	8	13	13	12		150		10	2	108	54
1000	18	26	169	17	25	176	4	9	9	9		120		10	2	163	50
1100	16	25	174	15	29	195	7	12	12	7		120		10	2	160	58
1200	17	26	175	16	26	188	6	9	9	15		130		10	2	171	59
1300	16	28	183	17	28	203	7	15	15	13		150		10	4	159	76
1400	16	26	200	16	26	203	9	15	15	12		130		10	5	133	96
1500	16	23	187	18	28	193	14	25	25	16		140	**BLDU**	5	7	138	118
1600	17	26	195	18	29	192	15	26	26	12		150	**BLDU**	5	10	136	571
1700	14	21	195	18	27	206	13	24	24	12		140		6	8	144	757
1800	11	16	178	15	23	196	11	17	17	10		140		10	6	145	800
1900	9	13	170	10	16	184	10	16	16	10		130		10	6	146	535
2000	7	10	139	12	19	184	11	17	17	6		130		10	5	137	278
2100	9	12	135	13	18	168	9	16	16	9		120		10	5	142	85
2200	4	6	151	10	15	173	8	12	12	10		110		10	4	134	43
2300	11	15	181	11	20	158	8	13	13	9		130		10	5	120	32

Wind data for El Pinacate MX (PNCS6), Mexicali MX (MXCB1), San Luis Rio Colorado MX (SLRS6), and Mexicali Airport (MMML) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Air quality data from the EPA's AQS repository. Wind speeds = mph; Direction = degrees. VIS = visibility. OBS. = Observations of dust. BLDU = blowing dust. Due to the different times that wind data and air quality data is sampled at various sites, the hour given represents the hour in which the measurement was taken

TABLE 3-3
WIND SPEED AND PM_{10} CONCENTRATIONS AUGUST 20, 2018

	YUMA AUXILIARY AIRFIELD (KNOZ)				YUMA MCAS (KNYL)				IMPERIAL COUNTY AIRPORT (KIPL)				MEXICALI AIRPORT MX (MMML)					EL CENTRO	CALEXICO
HR	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/G**	**W/D**	**VIS.**	**W/S**	**W/G**	**W/D**	**OBS.**	**VIS.**	**PM_{10} (µg/m³)**	**PM_{10} (µg/m³)**
0000	13		130	10	13		150	10	3		70	**10**					10	39	35
0100	13		120	10	8		140	10	8		110	**10**					10	29	22
0200	15		130	10	6		170	10	9		110	**10**					10	24	17
0300	14		130	10	5		160	10	10		120	**10**					10	16	16
0400	17		130	10	8		150	10	10		130	**10**					10	30	14
0500	26		140	5	10		140	10	11		130	**10**	3		120		10	26	26
0600	29		140	4	23		140	7	15		140	**10**	7		120		10	32	28
0700	28	36	140	3	23		160	5	10		150	**10**	15		150		10	44	41
0800	21	31	150	7	17		170	6	0		0	**10**	12		140		10	43	48
0900	22	29	160	6	17		170	7	7		140	**10**	12		150		10	54	50
1000	20	28	180	9	20		170	7	8		140	**10**	9		120		10	50	45
1100	22	28	150	10	10		170	7	9		110	**10**	7		120		10	58	49
1200	16	23	170	10	17		170	7	5		VRB	**10**	15		130		10	59	75
1300	18		180	10	17		190	7	11	17	150	**10**	13		150		10	76	97
1400	22	30	150	9	14		180	7	11	30	VRB	**10**	12		130		10	96	106
1500	21	30	160	9	21	24	180	7	18		120	**10**	16		140	**BLDU**	5	118	387
1600	21		150	10	15		190	10	22		150	**3**	12		150	**BLDU**	5	571	325
1700	20		160	10	13		200	10	17		150	**2.5**	12		140		6	757	724
1800	12		170	10	9		190	10	13		160	**4**	10		140		10	800	757
1900	15		140	10	6		170	10	13		160	**6**	10		130		10	535	384
2000	15		130	10	13		160	10	10		160	**10**	6		130		10	278	122
2100	15		140	10	13		150	10	8		150	**10**	9		120		10	85	46
2200	18		140	10	18		160	10	8		130	**10**	10		110		10	43	41
2300	25	32	140	7	21		160	10	9		110	**10**	9		130		10	32	35

Wind data for Yuma (KNOZ) and Mexicali Airport (MMML) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Wind data for El Centro NAF (KNJK), Yuma AZ MCAS (KNYL), 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. VIS = visibility. OBS. = Observations of dust. BLDU = blowing dust. Due to the different times that wind data and air quality data is sampled at various sites, the hour given represents the hour in which the measurement was taken

As mentioned above, a Trained Spotter reported a dust storm with near zero visibility near Seeley. A Dust Advisory notifying the public about a wall of dust was issued by the NWS Phoenix office. As gusty southerly outflow winds moved north they affected different regional air monitors in Riverside County, Imperial County and Arizona August 20, 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.[22] As transported windblown dust entered Imperial County on August 20, 2018 air quality degraded in Imperial County. Overall, the gusty southerly winds produced by the Gulf Surge affected air quality in Imperial County.

FIGURE 3-4
IMPERIAL VALLEY AIR QUALITY INDEX FOR EL CENTRO
AUGUST 20, 2018

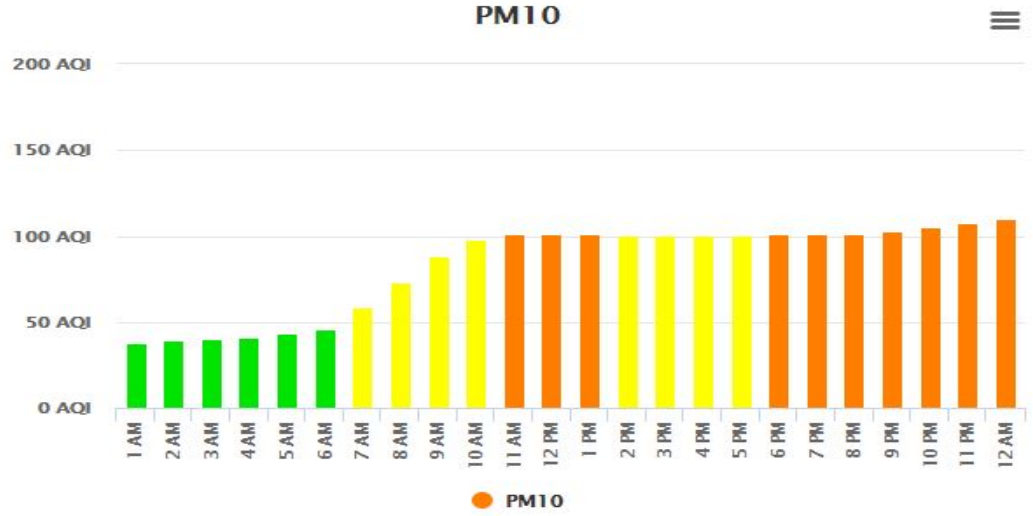


Fig 3-4: The degradation, or affect upon air quality, maybe determined when the AQI changes to an "Orange" level or a level that is Unhealthy for sensitive receptors

III.1 Summary of Forecasts and Warnings

Both of the San Diego and Phoenix NWS offices discussed in the days prior to and during August 20, 2018 the Gulf Surge coming northward out of Mexico. Two important notices and advisories were issued during the August 20, 2018 event. One was for a dust storm that created near zero visibility and the other a Dust Advisory for southwestern Imperial

[22] 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

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 August 20, 2018 one site in southwestern Arizona measured winds at or above 25 mph and different sites measured wind gusts at or above 25 mph.

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

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area.

Figures 4-1 and 4-2 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the El Centro air quality monitor for the period of January 1, 2010 through August 20, 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).[23] 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 August 20, 2018, as measured by the El Centro monitors, were used to establish the historical and seasonal variability over time.[24] All figures illustrate that the exceedance, which occurred on August 20, 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.

[23] 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.

[24] FRM sampling ended December 2016.

FIGURE 4-1
EL CENTRO HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO AUGUST 20, 2018

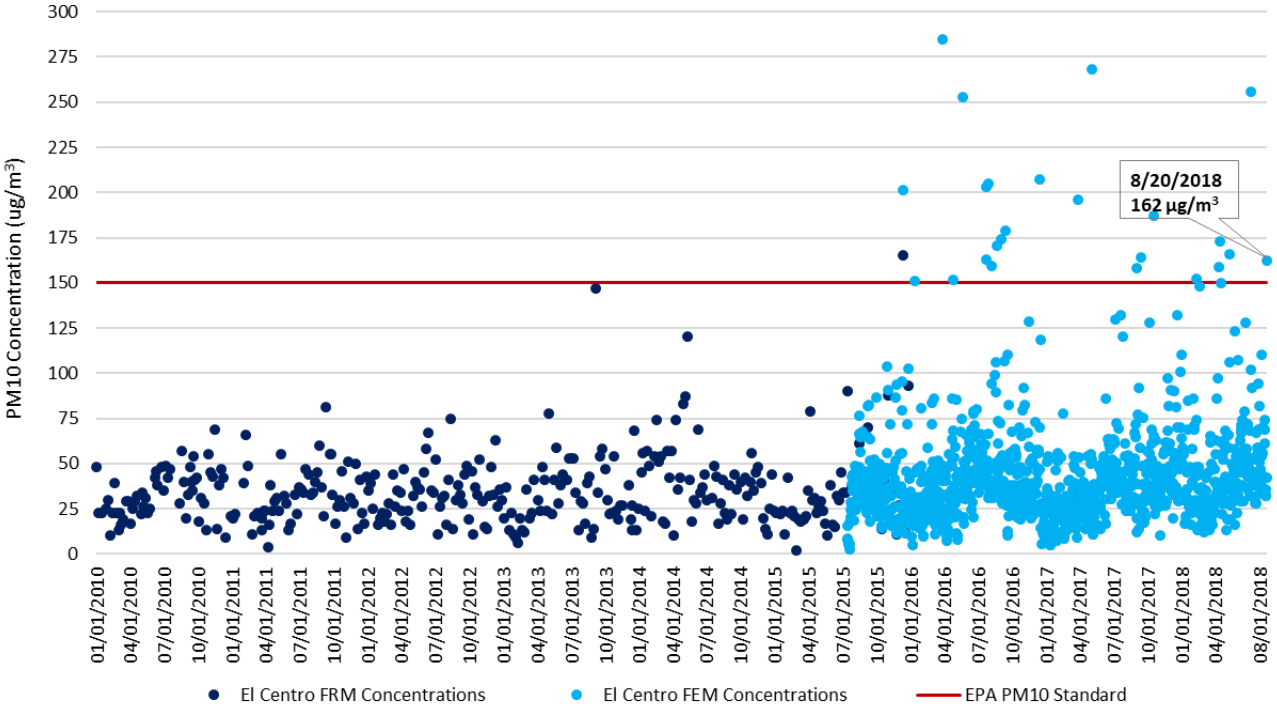
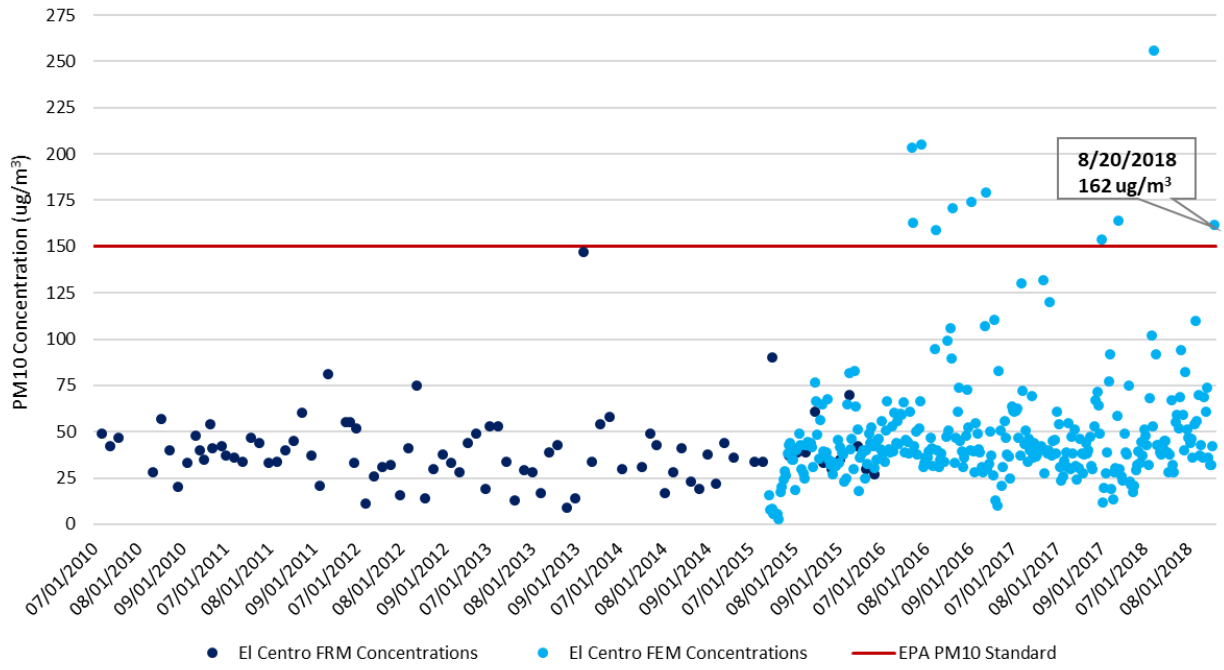


Fig 4-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 162µg/m^3 on August 20, 2018 by the El Centro monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-1,** for El Centro includes 1,491 sampling days (January 1, 2010 through August 20, 2018). During the January 1, 2010 through August 20, 2018 period, the El Centro monitor measured 21 exceedance days out of 1,491 sampling days which translates into an occurrence rate less than 1.5%. Historically, there were two (2) exceedance days during the first quarter; five (5) exceedance days were measured during the second quarter; eleven (11) exceedance days during the third quarter; and three (3) exceedance days during the fourth quarter.

FIGURE 4-2
EL CENTRO SEASONAL COMPARISON
FRM AND FEM PM_{10} 24-HR AVG CONCENTRATIONS
***JULY 1, 2010 TO AUGUST 20, 2018**



***Quarterly: July 1, 2010 to September 30, 2017 and July 1, 2018 to August 20, 2018**

Fig 4-2: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 162 µg/m^3 by the El Centro monitor on August 20, 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 399 sampling days, 402 credible samples and eleven (11) exceedance days. This translates to less than a 2.7% seasonal exceedance occurrence rate.

Examining the historical and seasonal time series concentrations as they relate to the August 20, 2018 measured exceedances, the exceedances measured on August 20, 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 deserts of Baja California and southwestern Arizona. The origination of these emissions from these areas affected all the air quality monitors on August 20, 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

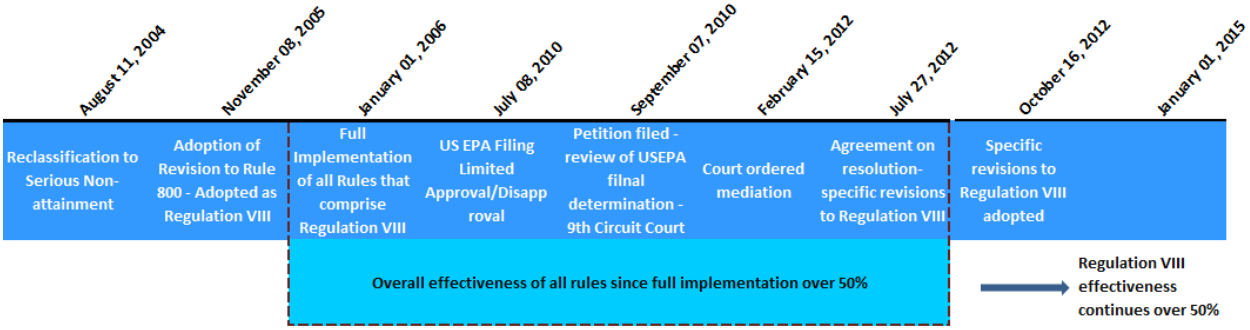


Fig 5-1: Regulation VIII Graphic Timeline

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 August 20, 2018 at least one site 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 August 20, 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 El Centro monitor during the August 20, 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 Limited Burn Day, related to agricultural burning, waste burning or dust.

FIGURE 5-2
PERMITTED SOURCES

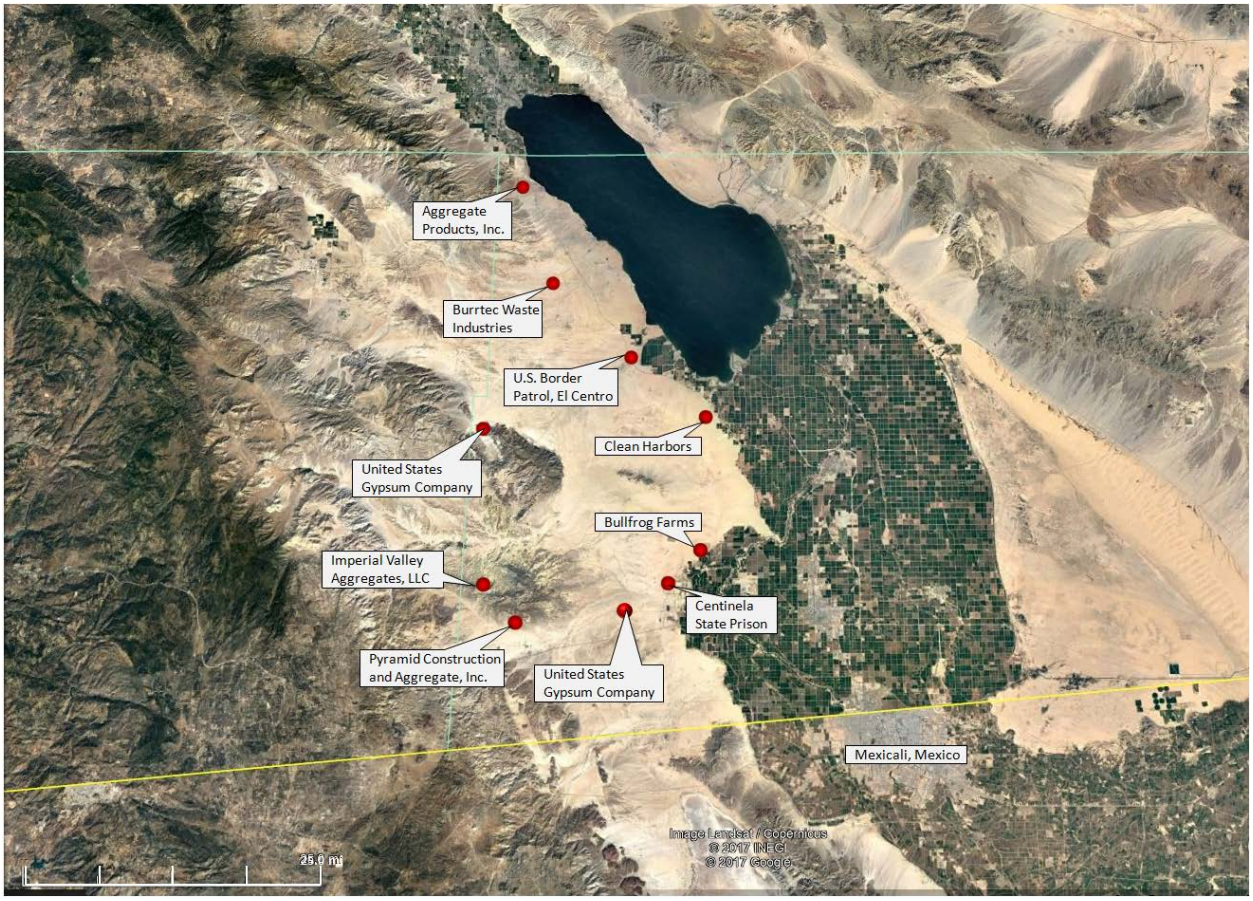


Fig 5-2: The above map identifies those permitted sources located west, northwest and southwest of the El Centro monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States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

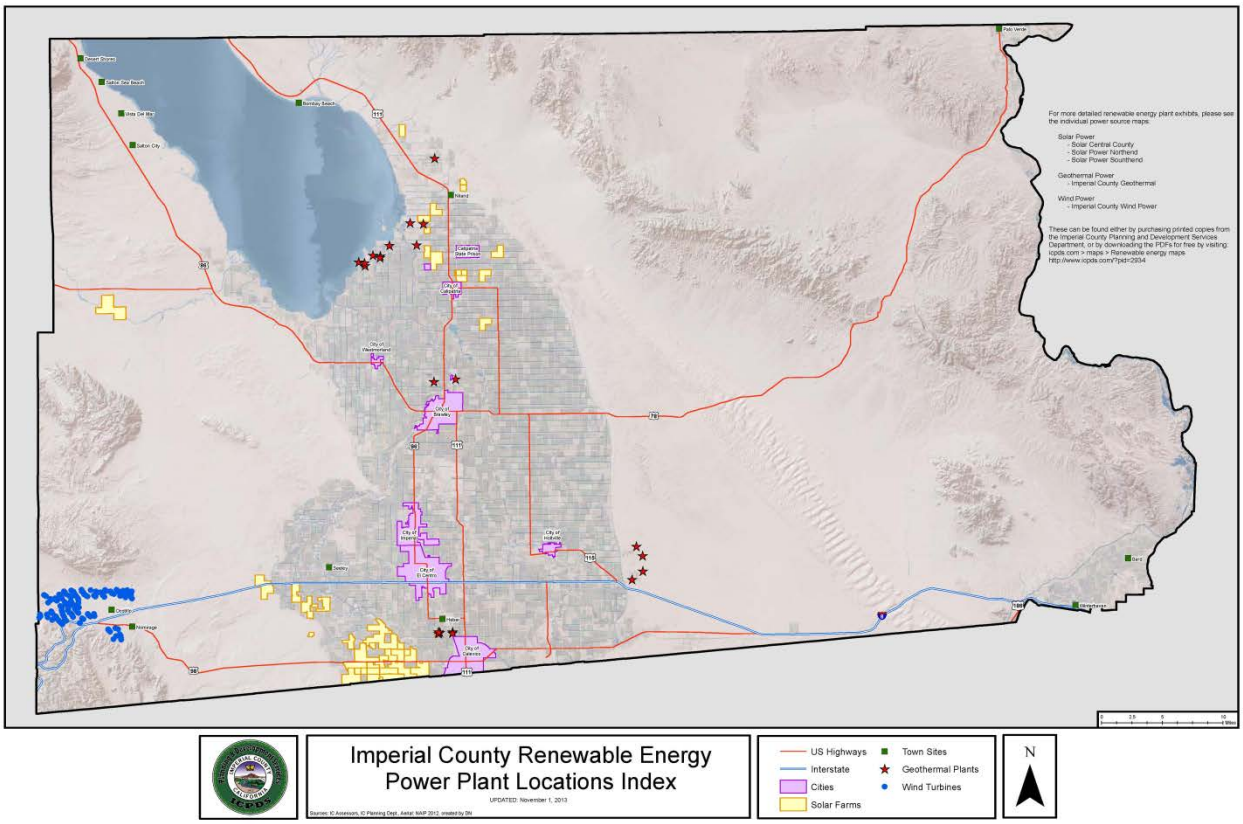


Fig 5-3: The above map identifies those power sources located west, northwest and southwest of the El Centro monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

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 Gulf Surge from northern Mexico that created thunderstorms produced strong and gusty southerly outflow winds that generated and transported emissions from northern Mexico and southwestern Arizona into Imperial County. While actual reportable winds speeds may be lacking in the source area, there are equally substantiated reports of a dust storm and of a wall of dust, both reported in Imperial County near the vicinity of the El Centro monitor on August 20, 2018.

Strong gusty southerly outflow winds from thunderstorms blew over the open natural deserts within northern Mexico and Arizona during August 20, 2018 and onto the air quality monitors in Imperial County.

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 August 20, 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 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 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 El Centro monitor was caused by naturally occurring gusty

southerly 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 El Centro monitor on August 20, 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 El Centro, monitor on August 20, 2018, was caused by the transport of windblown dust into Imperial County by strong southerly winds associated with a Gulf Surge that entered 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 the El Centro monitor in Imperial County demonstrates a consistency of elevated southerly winds with elevated concentrations of PM_{10} on August 20, 2018. In addition, temporal analysis indicates that the elevated PM_{10} concentrations and the 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 August 20, 2018.

VI.5 Concentration to Concentration Analysis

The historical annual and seasonal 24-hr average PM_{10} measured concentrations at the El Centro monitor 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 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 El Centro air quality monitor in Imperial County on August 20, 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.[25]

[25] 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.