# IMPERIAL COUNTY
# AIR POLLUTION CONTROL DISTRICT

Imperial Valley Press Gallery: Snow in Imperial County Mountains (Courtesy photo): https://www.ivpressonline.com/gallery-snow-in-imperial-county-mountains/collection_493dd6fa-914e-11e4-a572-778332260ac4.html#1

# October 6, 2018
# Exceptional Event Documentation
## For the Imperial County $PM_{10}$ Nonattainment Area

An exceedance of the National Ambient Air Quality Standard (NAAQS) for $PM_{10}$ at the Brawley monitor in Imperial County, California on October 6, 2018

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| ACRONYM | DESCRIPTIONS |
|---|---|
| AOD | Aerosol Optical Depth |
| AQI | Air Quality Index |
| AQS | Air Quality System |
| BACM | Best Available Control Measures |
| BAM 1020 | Beta Attenuation Monitor Model 1020 |
| BLM | United States Bureau of Land Management |
| BP | United States Border Patrol |
| CAA | Clean Air Act |
| CARB | California Air Resources Board |
| CMP | Conservation Management Practice |
| DCP | Dust Control Plan |
| DPR | California Department of Parks and Recreation |
| EER | Exceptional Events Rule |
| EPA | Environmental Protection Agency |
| FEM | Federal Equivalent Method |
| FRM | Federal Reference Method |
| GOES-W/E | Geostationary Operational Environmental Satellite (West/East) |
| HC | Historical Concentrations |
| HYSPLIT | Hybrid Single Particle Lagrangian Integrated Trajectory Model |
| ICAPCD | Imperial County Air Pollution Control District |
| INPEE | Initial Notification of a Potential Exceptional Event |
| ITCZ | Inter Tropical Convergence Zone |
| KBLH | Blythe Airport |
| KCZZ | Campo Airport |
| KIPL | Imperial County Airport |
| KNJK | El Centro Naval Air Station |
| KNYL/MCAS | Yuma Marine Corps Air Station |
| KPSP | Palm Springs International Airport |
| KTRM | Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport) |
| PST | Local Standard Time |
| MMML/MXL | Mexicali, Mexico Airport |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| MPH | Miles Per Hour |
| MST | Mountain Standard Time |
| NAAQS | National Ambient Air Quality Standard |
| NCAR | National Center for Atmospheric Research |
| NCEI | National Centers for Environmental Information |
| NEAP | Natural Events Action Plan |
| NEXRAD | Next-Generation Radar |

| | |
|---|---|
| NOAA | National Oceanic and Atmospheric Administration |
| nRCP | Not Reasonably Controllable or Preventable |
| NWS | National Weather Service |
| PDT | Pacific Daylight Time |
| $PM_{10}$ | Particulate Matter less than 10 microns |
| $PM_{2.5}$ | Particulate Matter less than 2.5 microns |
| PST | Pacific Standard Time |
| QA/QC | Quality Assured and Quality Controlled |
| QCLCD | Quality Controlled Local Climatology Data |
| RACM | Reasonable Available Control Measure |
| RAWS | Remote Automated Weather Station |
| SIP | State Implementation Plan |
| SLAMS | State Local Ambient Air Monitoring Station |
| SMP | Smoke Management Plan |
| SSI | Size-Selective Inlet |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| UTC | Coordinated Universal Time |
| WRCC | Western Regional Climate Center |

# I Introduction

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

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

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

| TABLE 1-1<br>TITLE 40 CFR §50.14(c)(3)(iv) CHECKLIST<br>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. 24 |
| 4 | A demonstration that the event was both not reasonably controllable and not reasonably preventable | Pg. 27 |
| 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. 34 |

[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<br>PROCEDURAL CHECKLIST<br>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, October 6, 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 Wednesday, October 3, 2018, the ICAPCD published an advisory notice on its webpage notifying the public of gusty westerly winds during the upcoming weekend. On October 4, the ICAPCD published an advisory notice on its webpage notifying the public of gusty westerly winds for most of the County during Saturday, October 6. On Friday, October 5, 2018, the ICAPCD published a weekend advisory notice on its webpage notifying the public of westerly wind gusts of 40-50 mph along the mountain slopes and into adjacent deserts on Saturday. **Appendix C** contains copies of notices pertinent to the October 6, 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, October 6, 2018, a naturally occurring event elevated particulate matter within San Diego, Riverside and Imperial Counties, causing an exceedance at the Brawley (06-025-0007) 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 Brawley monitor on October 6, 2018. After review, CARB submitted the INPEE, for the October 6, 2018 event in July of 2019. The submitted request included a brief description of the meteorological conditions for October 6, 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 October 6, 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 181 µg/m$^3$ measured by the Brawley monitor on October 6, 2018.

**(B)** Concurrently with the Public Review period for the October 6, 2018 exceptional event, the ICAPCD is formally submitting to CARB for remittance to USEPA the Final October 6, 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**

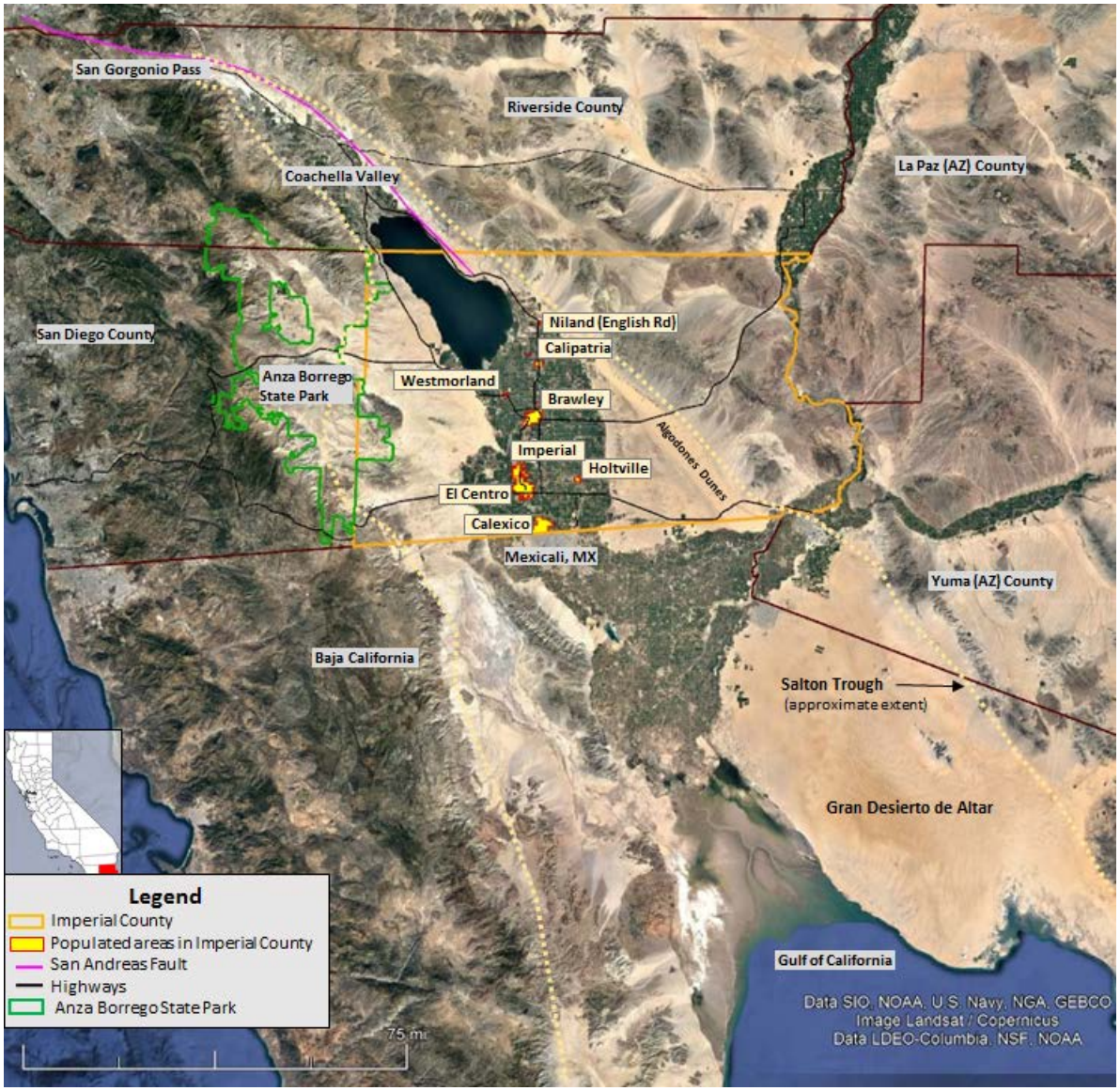



**Fig 1-1**: Imperial County a Southern California border region, within far southeast California bordering Arizona and Mexico has a small economically diverse region with a population of 174,528

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 Saturday, October 6, 2018 the National Weather Service (NWS) offices in San Diego and Phoenix issued Area Forecast Discussions describing an unseasonably strong and cold Pacific low pressure system and its movement into this weekend.[4,5] Onshore surface pressure gradients were forecast to strengthen and generate westerly wind gusts of 40-50 mph and local gusts to 55 mph within the San Diego County Mountains and deserts Saturday afternoon through Saturday night.[6] Multiple Urgent Weather Messages were issued for southwest Imperial County and the San Diego County mountains and deserts.

The Phoenix office issued a forecast that discussed the meteorological conditions resulting from the approaching low-pressure system:

> "…The aforementioned upper level trough will continue to dive southward towards our CWA this afternoon and tighten surface pressure gradients as it does so. This should bring a noticeable uptick in winds in SE California this afternoon with gusts 20-30 mph over much of the area. Even stronger winds are forecast over elevated terrain tonight as the trough deepens. This has prompted a wind advisory over Joshua Tree National Park and far southwest Imperial County where gusts could approach 45 mph."[7]

**Appendix A** contains all pertinent NWS notices.

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

On Saturday, October 6, 2018, the air monitors in Imperial, Riverside and Yuma counties measured elevated concentrations of particulate matter when an unseasonably strong Pacific weather system moved over southern California, southern Nevada, and western Arizona. The strong gusty westerly winds preceding the system generated emissions from within the open mountain ranges and surrounding open natural deserts within San Diego and Imperial counties. These windblown dust emissions were transported to all the

[4] National Weather Service, Area Forecast Discussion, October 3, 2018, San Diego office, 247am PST
[5] National Weather Service, Area Forecast Discussion, October 2, 2018, Phoenix office 339am MST
[6] National Weather Service, Area Forecast Discussion, October 5, 2018, San Diego office, 957am PST
[7] National Weather Service, Area Forecast Discussion, October 6, 2018, San Diego office, 306am PST

Imperial County regional air quality monitors causing an exceedance of the $PM_{10}$ NAAQS at Brawley (**Table 2-1**).

**FIGURE 2-1**
**MONITORING AND METEOROLOGICAL SITES**

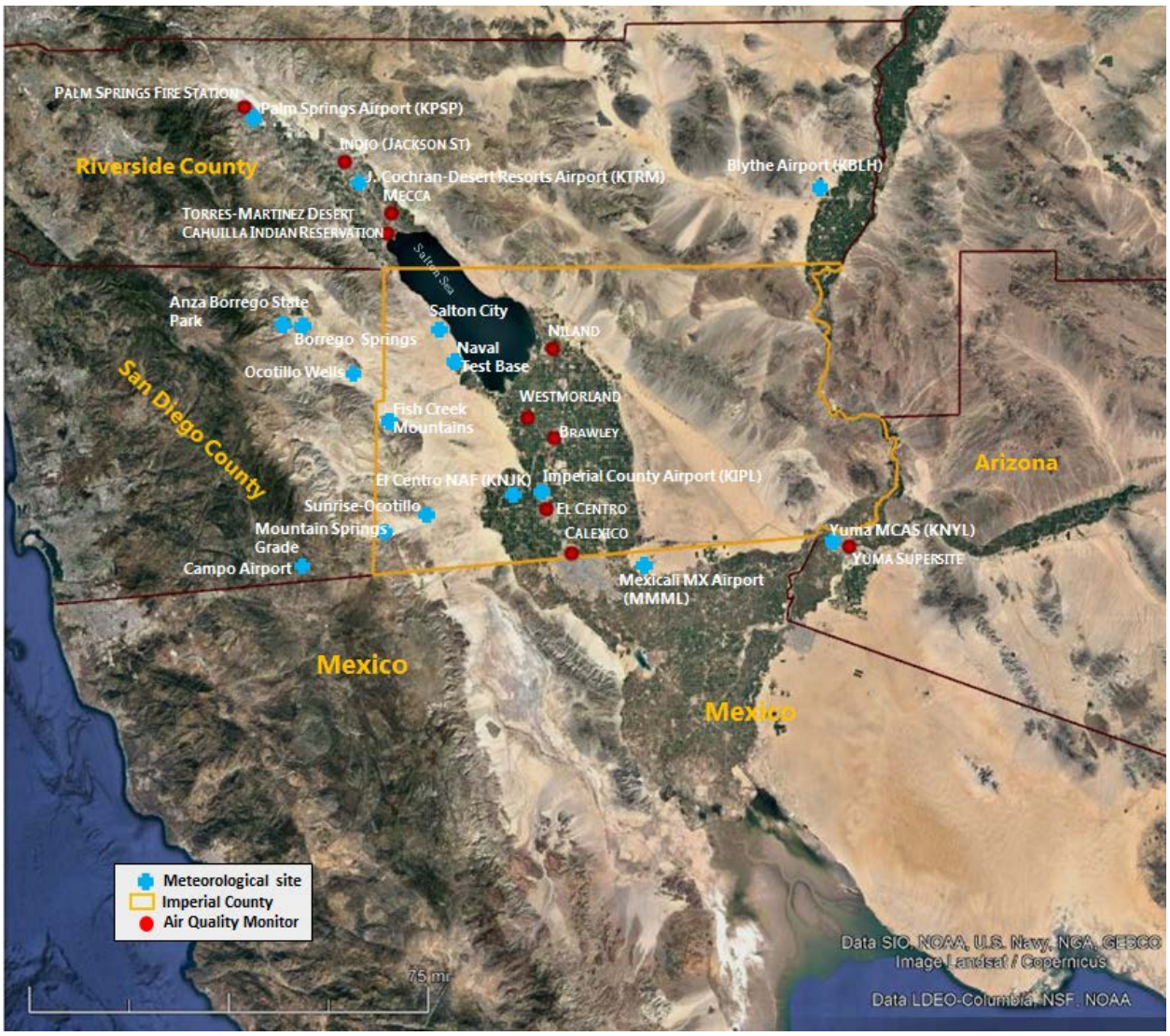



**Fig 2-1**: Includes a general location of the sites used in this analysis. The site furthest south is in Mexicali, Mexico and the site furthest north is the Palm Springs Fire Station

# TABLE 2-1
# HOURLY CONCENTRATIONS OF PARTICULATE MATTER

| SITE | DATE | 000 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 | HRLY MAX | 24-HR AVERAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PALM SPRINGS FIRE STATION | 20181005 | 11 | 7 | 10 | 8 | 9 | 8 | 12 | 13 | 17 | 9 | 9 | 7 | 5 | 6 | 5 | 9 | 15 | 39 | 32 | 28 | 25 | 21 | 17 | 14 | 39 | 14 |
| | **20181006** | 19 | 14 | 15 | 17 | 15 | 21 | 12 | 22 | 15 | 14 | 15 | 14 | 6 | 30 | 16 | 32 | 20 | 20 | 37 | 32 | 26 | 20 | 18 | 17 | **37** | 19 |
| | 20181007 | 15 | 11 | 10 | 15 | 16 | 17 | 13 | 14 | 13 | 14 | 10 | 11 | 12 | 12 | 9 | 9 | 15 | 24 | 30 | 31 | 26 | 20 | 20 | 20 | 31 | 16 |
| INDIO | 20181005 | 23 | 27 | 20 | 14 | 9 | 16 | 24 | 20 | 18 | 11 | 13 | 11 | 9 | 9 | 10 | 13 | 12 | 22 | 33 | 31 | 32 | 28 | 25 | 20 | 33 | 18 |
| | **20181006** | 22 | 17 | 16 | 16 | 20 | 26 | 37 | 36 | 27 | 24 | 19 | 23 | 16 | 14 | 37 | 126 | 47 | 46 | 89 | 80 | 42 | 239 | 61 | 25 | **239** | 46 |
| | 20181007 | 22 | 15 | 13 | 13 | 17 | 20 | 18 | 18 | 17 | 7 | 10 | 11 | 9 | 8 | 7 | 11 | 28 | 10 | 22 | 36 | 38 | 26 | 22 | 22 | 38 | 17 |
| MECCA | 20181005 | 128 | 224 | 37 | 11 | 13 | 26 | 33 | 39 | 33 | 33 | 17 | 28 | 29 | 16 | 18 | 12 | 12 | 39 | 48 | 25 | 34 | 28 | 43 | 28 | 224 | 39 |
| | **20181006** | 27 | 23 | 17 | 26 | 15 | 23 | 38 | 37 | 28 | 30 | 17 | 20 | 23 | 13 | 24 | 130 | 233 | 76 | 604 | 228 | 118 | 234 | 618 | 162 | **618** | 115 |
| | 20181007 | 22 | 17 | 12 | 15 | 16 | 18 | 21 | 25 | 28 | 40 | 17 | 40 | 33 | 33 | 14 | 19 | 13 | 23 | 20 | 32 | 56 | 42 | 26 | 21 | 56 | 25 |
| TORRES-MARTINEZ TRIBAL | 20181005 | 21 | 26 | 7 | 4 | 3 | 3 | 19 | 26 | 15 | 34 | 6 | 9 | 10 | 7 | 5 | 3 | 4 | 17 | 28 | 26 | 19 | 17 | 22 | 17 | 34 | 14 |
| | **20181006** | 16 | 12 | 18 | 11 | 11 | 26 | 52 | 22 | 7 | 11 | 10 | 16 | 23 | 19 | 19 | 109 | 163 | 48 | 54 | 79 | 106 | 355 | 235 | 45 | **355** | 61 |
| | 20181007 | 15 | 14 | 11 | 10 | 12 | 9 | 17 | 15 | 18 | 11 | 14 | 10 | 13 | 10 | 9 | 6 | 5 | 19 | 26 | 23 | 29 | 20 | 17 | 18 | 29 | 14 |
| WESTMORLAND | 20181005 | 33 | 35 | 11 | 11 | 11 | 17 | 18 | 12 | 9 | 20 | 15 | 11 | 13 | 10 | 7 | 9 | 12 | 43 | 33 | 22 | 18 | 14 | 17 | 28 | 43 | 17 |
| | **20181006** | 24 | 15 | 16 | 12 | 16 | 30 | 35 | 37 | 41 | 35 | 12 | 14 | 20 | 35 | 57 | 663 | 995 | 396 | 111 | 210 | 79 | 128 | 124 | 28 | **995** | 130 |
| | 20181007 | 16 | 14 | 22 | 19 | 13 | 10 | 19 | 16 | 26 | 44 | 12 | 29 | 10 | 11 | 14 | 130 | 20 | 26 | 58 | 80 | 28 | 23 | 14 | 14 | 130 | 27 |
| BRAWLEY | 20181005 | 18 | -1 | 1 | 12 | 18 | 16 | 24 | 27 | 23 | 18 | 11 | 19 | 15 | 11 | 8 | 11 | 11 | 19 | 27 | 30 | 21 | 16 | 18 | 27 | 30 | 16 |
| | **20181006** | 22 | 31 | 23 | 12 | 15 | 16 | 47 | 29 | 35 | 38 | 28 | 23 | 19 | 30 | 29 | 329 | 1264 | 443 | 674 | 1005 | 68 | 88 | 37 | 50 | **1264** | 181 |
| | 20181007 | 11 | 48 | 17 | 15 | 12 | 18 | 18 | 23 | 24 | 18 | 17 | 17 | 7 | 8 | 8 | 165 | 45 | 21 | 72 | 21 | 21 | 17 | 13 | 10 | 165 | 26 |
| NILAND | 20181005 | 18 | 11 | 13 | 17 | 14 | 26 | 31 | 28 | 19 | 18 | 14 | 15 | 15 | 10 | 7 | 13 | 11 | 24 | 49 | 77 | 25 | 39 | 14 | 11 | 77 | 21 |
| | **20181006** | 23 | 24 | 16 | 24 | 24 | 28 | 39 | 48 | 34 | 45 | 32 | 55 | 18 | 20 | 15 | 116 | 162 | 764 | 591 | 131 | 54 | 29 | 46 | 70 | **764** | 100 |
| | 20181007 | 41 | 73 | 28 | 16 | 15 | 14 | 14 | 16 | 19 | 14 | 122 | 15 | 10 | 15 | 12 | 18 | 31 | 21 | 7 | 13 | 17 | 13 | 26 | 12 | 122 | 24 |
| EL CENTRO | 20181005 | 12 | 14 | 10 | 14 | 8 | 12 | 20 | 31 | 20 | 15 | 19 | 15 | 13 | 16 | 13 | 10 | 11 | 19 | 29 | 195 | 154 | 41 | 19 | 20 | 195 | 30 |
| | **20181006** | 23 | 18 | 11 | 18 | 14 | 32 | 49 | 39 | 45 | 53 | 54 | 35 | 29 | 28 | 34 | 48 | 32 | 67 | 112 | 62 | 73 | 48 | 62 | 31 | **112** | 42 |
| | 20181007 | 19 | 21 | 20 | 18 | 18 | 19 | 26 | 23 | 19 | 16 | 20 | 11 | 13 | 10 | 13 | 16 | 57 | 17 | 22 | 21 | 29 | 23 | 25 | 17 | 57 | 20 |
| CALEXICO | 20181005 | 10 | 9 | 12 | 8 | 8 | 9 | 111 | 118 | 28 | 24 | 14 | 18 | 72 | 12 | 25 | 13 | 14 | 26 | 109 | 99 | 215 | 219 | 116 | 48 | 219 | 55 |
| | **20181006** | 27 | 21 | 33 | 30 | 61 | 79 | 90 | 197 | 179 | 86 | 56 | 20 | 23 | 37 | 35 | 35 | 24 | 43 | 70 | 373 | 285 | 52 | 36 | 26 | **373** | 79 |
| | 20181007 | 30 | 17 | 17 | 18 | 17 | 17 | 20 | 27 | 19 | 13 | 15 | 37 | 13 | 8 | 6 | 10 | 43 | 25 | 20 | 17 | 9 | 21 | 25 | 24 | 43 | 19 |
| YUMA AZ SUPERSITE (PST) | 20181005 | 19 | 22 | 19 | 13 | 23 | 20 | 23 | 20 | 25 | 16 | 17 | 16 | 17 | 14 | 13 | 14 | 16 | 18 | 34 | 46 | 46 | 55 | 46 | 46 | 55 | 24 |
| | **20181006** | 38 | 44 | 47 | 44 | 30 | 27 | 38 | 35 | 23 | 22 | 25 | 20 | 16 | 13 | 12 | 13 | 18 | 56 | 88 | 102 | 101 | 90 | 84 | 39 | **102** | 42 |
| | 20181007 | 27 | 28 | 46 | 33 | 22 | 27 | 24 | 24 | 24 | 36 | 19 | 7 | 11 | 11 | 14 | 20 | 40 | 58 | 45 | 16 | 19 | 19 | 19 | 30 | 58 | 25 |
| YUMA AZ SUPERSITE (MST) | 20181005 | 12 | 19 | 22 | 19 | 13 | 23 | 20 | 23 | 20 | 25 | 16 | 17 | 16 | 17 | 14 | 13 | 14 | 16 | 18 | 34 | 46 | 46 | 55 | 46 | 55 | 23 |
| | **20181006** | 46 | 38 | 44 | 47 | 44 | 30 | 27 | 38 | 35 | 23 | 22 | 25 | 20 | 16 | 13 | 12 | 13 | 18 | 56 | 88 | 102 | 101 | 90 | 84 | **102** | 43 |
| | 20181007 | 39 | 27 | 28 | 46 | 33 | 22 | 27 | 24 | 24 | 24 | 36 | 19 | 7 | 11 | 11 | 14 | 20 | 40 | 58 | 45 | 16 | 19 | 19 | 19 | 58 | 26 |

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**

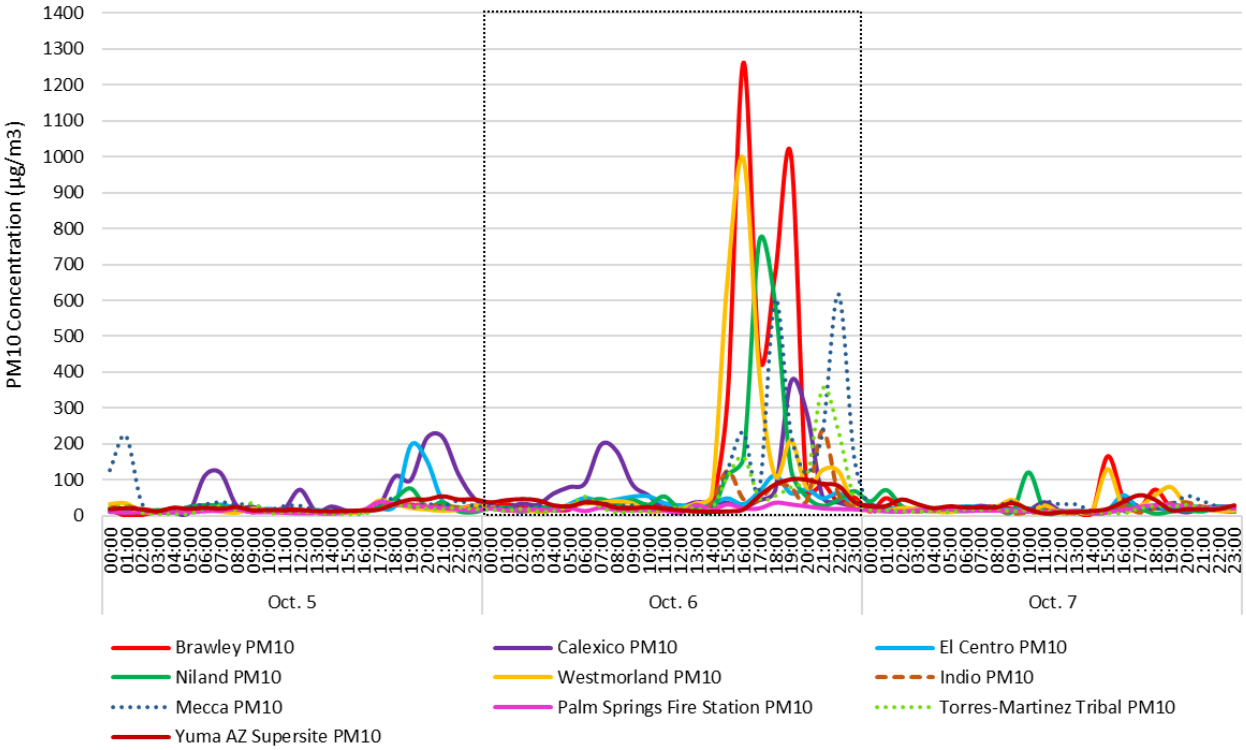



**Fig 2-2**: is a three-day graphical representation of the $PM_{10}$ concentrations measured at the sites identified in **Table 2-1**. Note the consistency among monitors

Wind speed, wind direction and the airflow patterns combined all help explain how windblown emissions resulting from the gusty westerly winds affected all of the monitors in Imperial County on Saturday, October 6, 2018.

As mentioned above, the early weather forecast notices issued by both the San Diego and Phoenix NWS offices indicated that an approaching low-pressure system would increase the onshore pressure gradient and produce strong gusty westerly winds across southern California. Multiple Urgent Weather Message were issued advising of advisory level westerly winds within the San Diego Mountains and Imperial County (**Appendix A**).

**Figures 2-3 and 2-4** depict the compiled wind data for regional and neighboring airports and upstream sites. Airports within Imperial and Riverside counties measured wind speeds at or above 25 mph or measured wind gusts at or above 25 mph. Sites farther west of Imperial County measured elevated wind speeds sooner than the air quality monitoring stations within Imperial County, coincident with measured elevated concentrations.

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

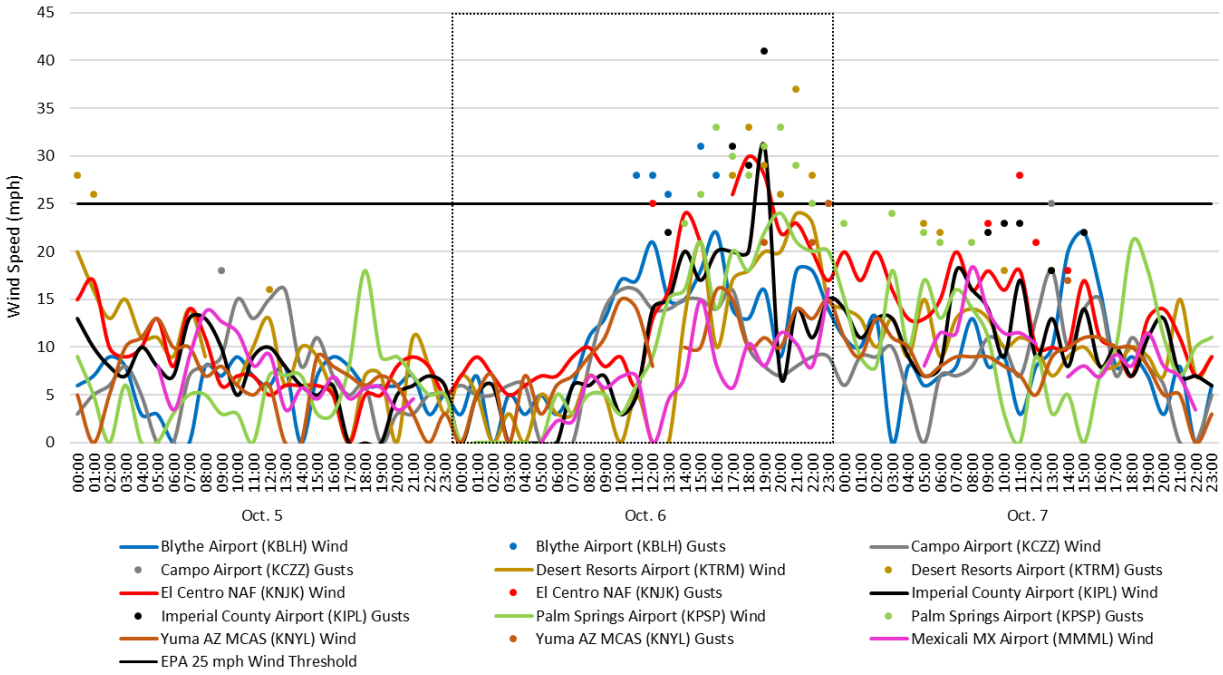



**Fig 2-3**: is a three-day graphical representation of the measured wind speed and wind gusts (if available) from local and neighboring airports. All data derived from the Local Climatological Data Hourly Observations (LCDHO) reports released by the NOAA https://www.ncdc.noaa.gov/. MMML is from the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

**FIGURE 2-4**
**WIND SPEEDS AND GUST UPSTREAM SITES**

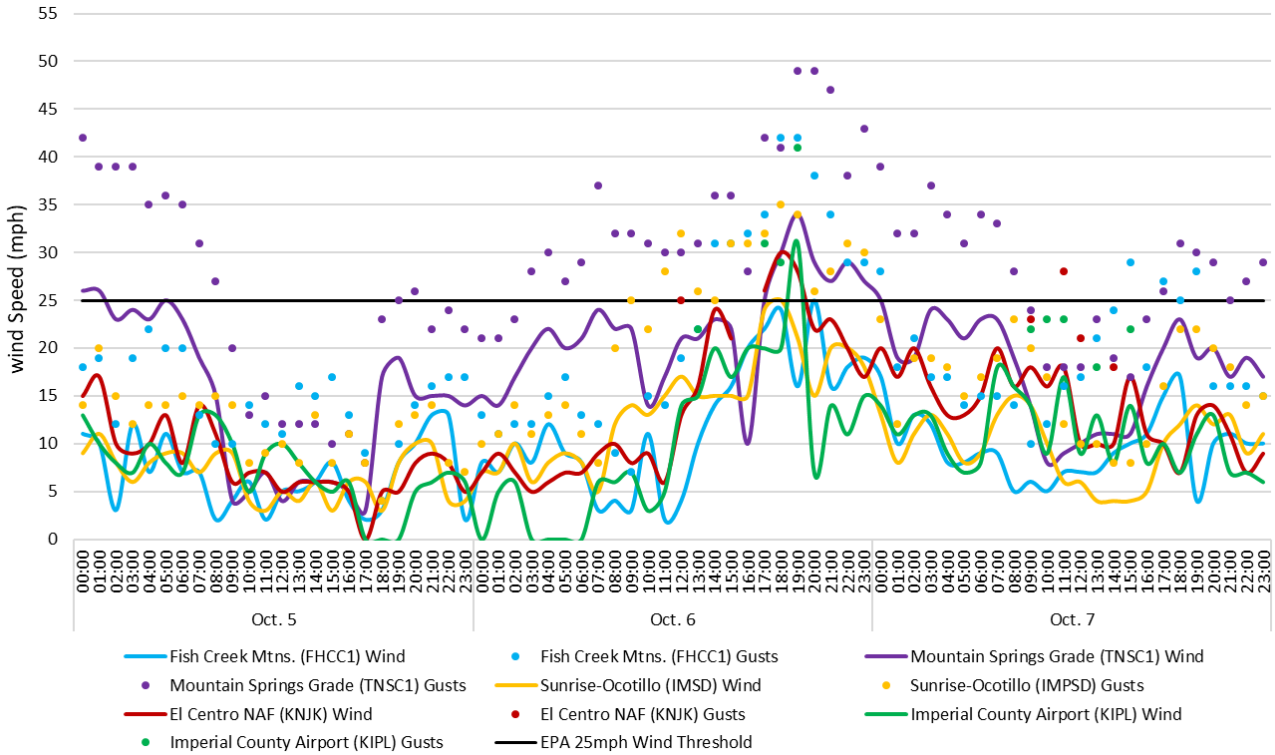



**Fig 2-4**: is a three-day graphical representation of the measured wind speed and wind gust (if available) from sites located upstream from the Imperial County monitors. All data derived from the University of Utah's MesoWest https://mesowest.utah.edu/index.html

The National Oceanic and Atmospheric Administration (NOAA) Laboratory HYSPLIT back-trajectory models[8] provide supporting evidence of the westerly airflow within Imperial County on October 6, 2018. As an afternoon event, the HYSPLIT back-trajectory models in **Figures 2-5 and 2-6** depict the airflow during the 1500 PST and 1600 PST hour to help illustrate the westerly airflow in Imperial County.

**Figure 2-5** depicts the westerly airflow coincident with elevated concentrations above 100 µg/m$^3$ at the Westmorland, Brawley and Niland monitors. **Figure 2-6** depicts the westerly airflow coincident with peak hourly measured concentrations at the Westmorland and Brawley monitors.

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

**FIGURE 2-5**
**HYSPLIT MODEL All SITES OCTOBER 6, 2018 1500 PST**

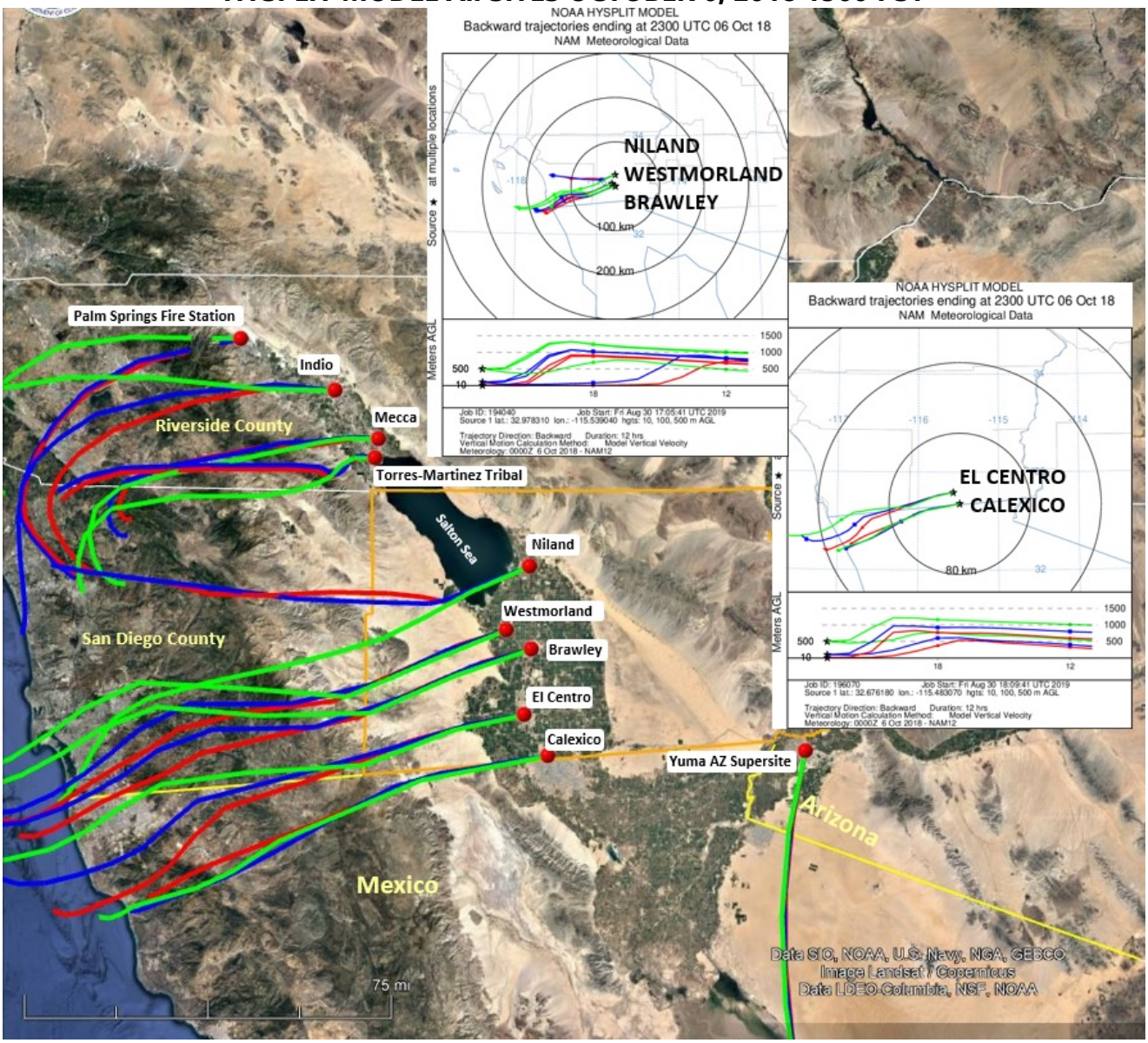



**Fig 2-5**: A 12-hour HYSPLIT back-trajectory ending at 1500 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically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

**FIGURE 2-6**
**HYSPLIT MODEL All SITES OCTOBER 6, 2018 1600 PST**

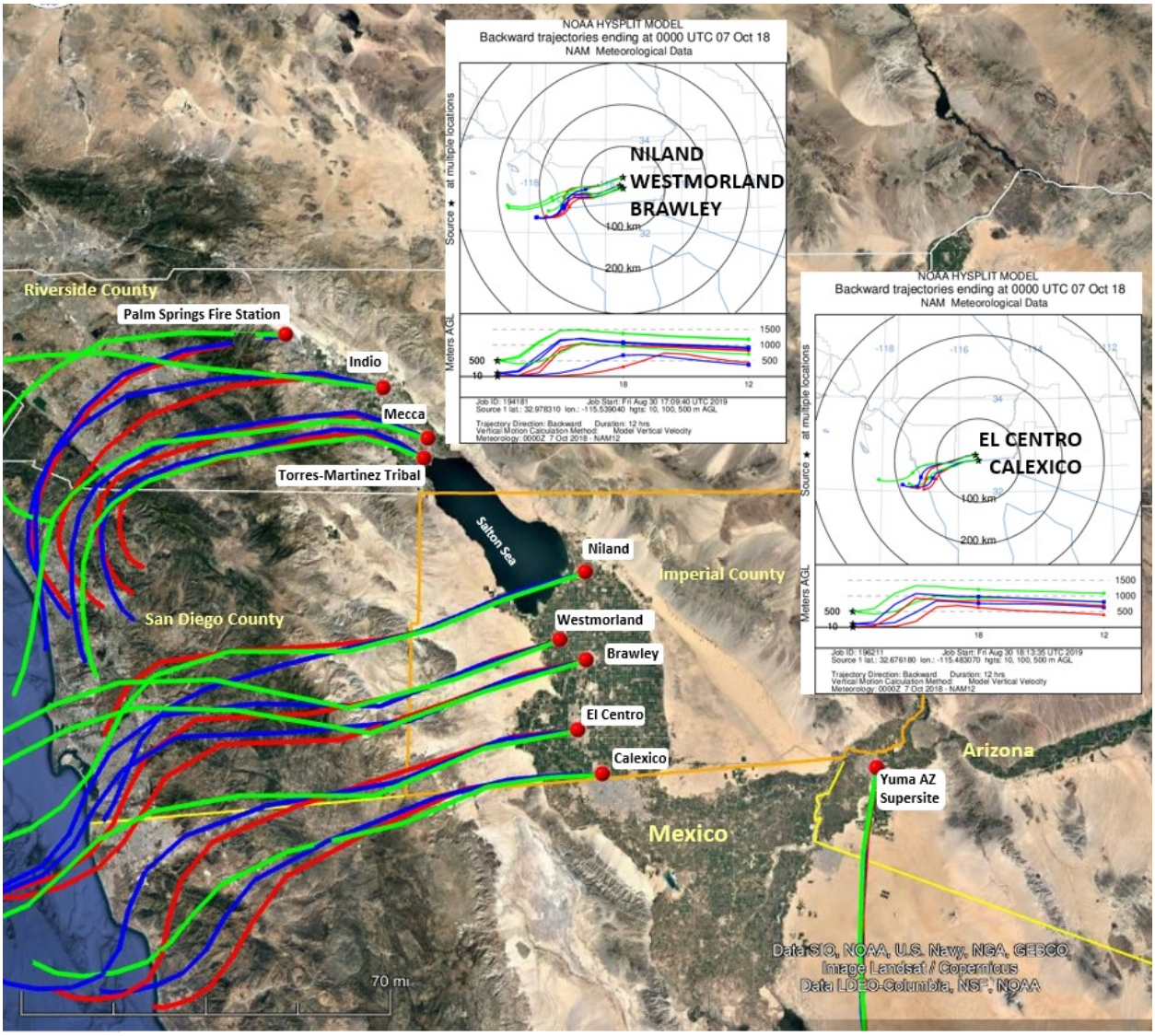



**Fig 2-6**: A 12-hour back-trajectory HYSPLIT ending at 1600 PST for all sites identified in **Table 2-1**. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

As strong gusty westerly winds blew over open natural mountains and desert areas west of Imperial County, fugitive windblown dust primarily affected air quality monitors within the northern portion of Imperial County. As mentioned above, several Urgent Weather Messages were issued advising of westerly winds 20 to 30 mph with gust to 50 mph within the San Diego Mountains and deserts. The El Centro NAF (KNJK) and the Imperial County Airport (KIPL) measured winds at or above 25 mph. KIPL measured peak gust of 41 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, an unseasonably strong Pacific low-pressure system moved inland and into the region strengthening the onshore surface pressure gradient generating strong and gusty westerly winds within the San Diego County Mountains and deserts. [9,10] Both NWS offices issued multiple Wind Advisories for the San Diego County Mountains and deserts and the southwestern portion of Imperial County advising of advisory level westerly winds 20 to 30 mph with gusts to 50 mph.[11,12]

Although forecast discussions allowed for possible precipitation the precipitation was northeast of Imperial County and within the San Diego mountains. The San Diego NWS office offered the best description of the event on October 6, 2018.

> "At 8 PM PDT...satellite imagery showed a cold trough digging sharply over SE CA. The cold air and strong vorticity associated with the trough had fired off considerable thunderstorm activity during the heat of the afternoon over NE San Bernardino County. Outflow from this activity was just entering our high desert areas and may create enough upslope onto the San Bernardinos to fire off some showers overnight. This is depicted on several of the latest hires models, but amounts are very light.
>
> Meanwhile farther to the west, a moderate eddy was cranking in the CA Bight and the marine layer had deepened to about 3800 FT MSL according to the NKX 00Z sounding. This deep of a moist layer can easily leak some drizzle or light rain showers into Sunday morning, and onto the mtn slopes through the day. The sfc pressure gradients to the deserts had been trending higher until this evening. Now the trend is offshore [from] the high deserts and maintaining about 7 MBS onshore KSAN to the lower deserts. Westerly winds have been gusting over 40 MPH on a few wind-prone slopes and near passes, otherwise mostly 25-35 MPH gusts. A Wind Advisory remains in effect for the deserts through 8 AM PDT Sunday. ...."[13]

Precipitation days prior from Tropical Storm Rosa combined with sufficient precipitation within and along the San Diego Mountains allowed for less saltation and deposition of transported windblown dust into Imperial County. An indicator of precipitation levels upstream of Imperial County can be easily discerned by the elevated levels of humidity. Both KIPL and KNJK reported elevated humidity of 50 percent during the early morning hours of October 6, 2018 coincident with negligible measured concentrations of

[9] National Weather Service, Area Forecast Discussion, Oct., 5, 2018, Phoenix office, 339am MST
[10] National Weather Service, Area Forecast Discussion, Oct., 5, 2018, San Diego office, 957am PST
[11] National Weather Service, Urgent Weather Message, Oct., 6, 2018, San Diego office, 113pm PST
[12] National Weather Service, Urgent Weather Message, Oct., 6, 2018, Phoenix office, 206pm MST
[13] National Weather Service, Area Forecast Discussion, Oct., 6, 2018, San Diego office, 837pm PST

particulates. However, with the heating of the day along all of southern California, humidity levels reduced during the early evening hours coincident with elevated concentrations above 100 µg/m$^3$ at the Brawley monitor. However, as the evening progressed and the heating effect cooled humidity increased during the late evening hours indicating precipitation was sufficient at upwind sites to allow for the reduction of transported emissions onto the Brawley and Westmorland monitors. Here, the location of the Brawley monitor as opposed to the Westmorland monitor, Westmorland located slightly further north, played a role in the amount and level of the deposition of particulates onto the monitor. Those sites further north, further east or south were less affected than the Brawley monitor centered directly west of the open natural San Diego mountains and deserts to the west of Imperial County.

While elevated wind speeds play a significant and important role in the transportation of dust, gusts and precipitation play an equally significant role in deposition of particulates onto a monitor and the overall affect onto ambient air.[14] As precipitation dried and winds and gusts increased, on October 6, 2018 and transported windblown dust from open natural mountains and 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. In addition, the NWS service issued Area Forecast Discussions and Urgent Weather Messages advising of the potential for advisory level winds along the San Diego Mountains and deserts upwind of Imperial County.

**Figure 3-1** below provides an illustration of meteorological conditions, as described above and demonstrated in the HYSPLITs, for October 6, 2018, which affected air quality in Imperial County causing an exceedance at the Brawley monitor.

[14] Gust is a rapid fluctuation of wind speed with variations of 10 knots or more between peaks and lulls; National Weather Service Glossary https://w1.weather.gov/glossary/index.php?letter=g

**FIGURE 3-1**
**VISUAL RAMP-UP ANALYSIS AS DISCUSSED FOR OCTOBER 6, 2018**

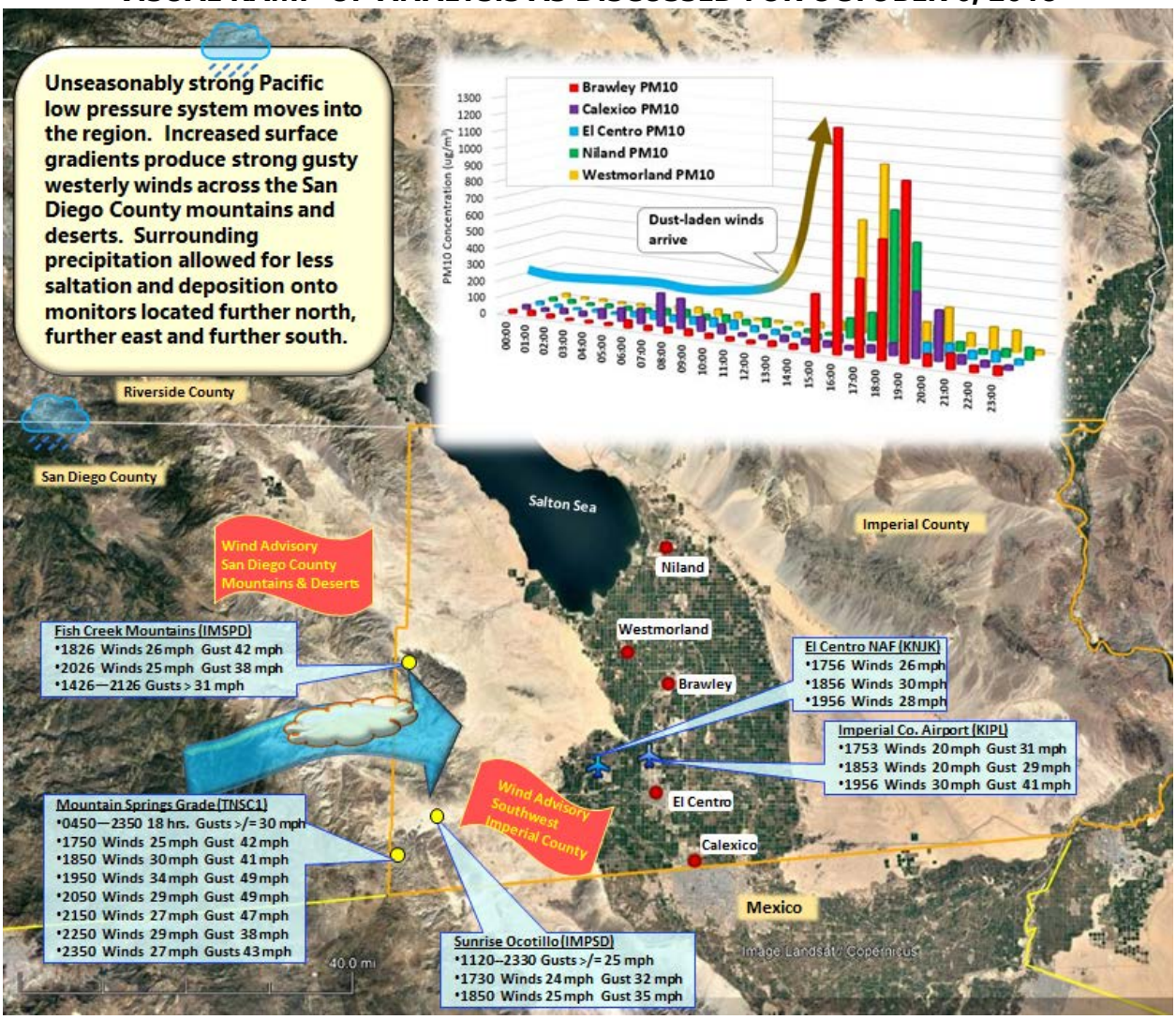



**Fig 3-1**: On October 6 2018, an unseasonably strong Pacific low-pressure system moved into the region. The onshore surface pressure gradient strengthened creating strong gusty westerly winds within the San Diego Mountains and deserts. Precipitation north and northwest of Imperial County allowed for less saltation and deposition of particulates on air quality monitors in 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.[15] The Imperial County Airport (KIPL),

[15] 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

reported reduced visibility coincident with elevated wind speeds, wind gusts and elevated hourly concentrations of particulates at all air quality 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 through 3-2** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and $PM_{10}$ concentrations at the Brawley 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 the Imperial County Airport (KIPL) on October 6, 2018 coincident with elevated hourly concentrations at the air quality monitors in Imperial County.

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

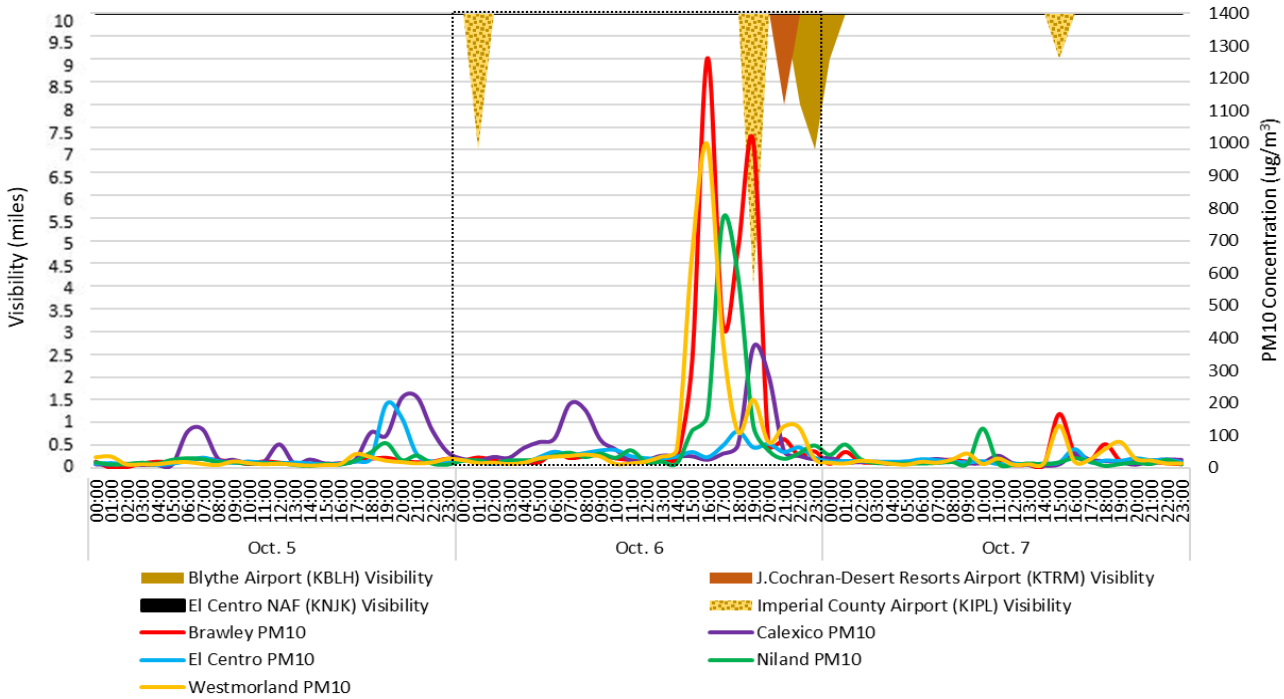



**Fig 3-2:** is a graphical representation of the compiled data from the Imperial County Airport (KIPL), the El Centro NAF (KNJK), Jacqueline Cochran-Desert Resorts Airport (KTRM) and Blythe Airport. Reported reduced visibility is coincident with elevated winds and hourly levels of concentrations either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

Because the EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states[16] 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 monitor.

**TABLE 3-1**
**WIND SPEED AND $PM_{10}$ CONCENTRATIONS OCTOBER 6, 2018**

| | MOUNTAIN SPRINGS GRADE (TNSC1) | | | SUNRISE-OCOTILLO (IMPSD) | | | EL CENTRO NAF (KNJK) | | | IMPERIAL COUNTY AIRPORT (KIPL) | | | FISH CREEK MOUNTAINS (FHCC1) | | | BRAWLEY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | $PM_{10}$ (µg/m³) |
| 0000 | 15 | 21 | 204 | 7 | 10 | 247 | 7 | | 220 | 0 | | 0 | 8 | 13 | 204 | 22 |
| 0100 | 14 | 21 | 213 | 7 | 11 | 251 | 9 | | 230 | 5 | | 240 | 7 | 11 | 201 | 31 |
| 0200 | 17 | 23 | 211 | 10 | 14 | 233 | 7 | | 260 | 6 | | 250 | 10 | 12 | 190 | 23 |
| 0300 | 20 | 28 | 210 | 6 | 11 | 252 | 5 | | 240 | 0 | | 0 | 8 | 12 | 200 | 12 |
| 0400 | 22 | 30 | 203 | 8 | 13 | 247 | 6 | | 240 | 0 | | 0 | 12 | 15 | 205 | 15 |
| 0500 | 20 | 27 | 215 | 9 | 14 | 253 | 7 | | 250 | 0 | | 0 | 9 | 17 | 204 | 16 |
| 0600 | 21 | 29 | 225 | 8 | 11 | 247 | 7 | | 220 | 0 | | 0 | 8 | 13 | 195 | 47 |
| 0700 | 24 | 37 | 212 | 5 | 8 | 255 | 9 | | 210 | 6 | | 200 | 3 | 12 | 233 | 29 |
| 0800 | 22 | 32 | 205 | 12 | 20 | 276 | 10 | | VRB | 6 | | 190 | 4 | 9 | 194 | 35 |
| 0900 | 22 | 32 | 206 | 14 | 25 | 247 | 8 | | 160 | 7 | | 190 | 3 | 7 | 174 | 38 |
| 1000 | 14 | 31 | 228 | 13 | 22 | 237 | 9 | | 140 | 3 | | VRB | 11 | 15 | 28 | 28 |
| 1100 | 17 | 30 | 232 | 15 | 28 | 254 | 6 | | VRB | 5 | | VRB | 2 | 14 | 107 | 23 |
| 1200 | 21 | 30 | 224 | 17 | 32 | 245 | 13 | 25 | 240 | 14 | | 230 | 4 | 19 | 338 | 19 |
| 1300 | 21 | 31 | 228 | 15 | 26 | 251 | 16 | | 240 | 15 | 22 | 250 | 10 | 22 | 279 | 30 |
| 1400 | 23 | 36 | 229 | 15 | 25 | 249 | 24 | | 250 | 20 | | 250 | 14 | 31 | 255 | 29 |
| 1500 | 22 | 36 | 216 | 15 | 31 | 244 | 21 | | 250 | 17 | | 260 | 16 | 31 | 252 | 329 |
| 1600 | 10 | 28 | 155 | 15 | 31 | 255 | | | | 20 | | 260 | 20 | 32 | 257 | 1264 |
| 1700 | 25 | 42 | 220 | 24 | 32 | 281 | 26 | | 260 | 20 | 31 | 260 | 22 | 34 | 259 | 443 |
| 1800 | 30 | 41 | 220 | 25 | 35 | 275 | 30 | | 260 | 20 | 29 | 260 | 24 | 42 | 254 | 674 |
| 1900 | 34 | 49 | 211 | 21 | 34 | 241 | 28 | | 260 | 31 | 41 | 280 | 16 | 42 | 232 | 1005 |
| 2000 | 29 | 49 | 215 | 15 | 26 | 250 | 22 | | 270 | 7 | | 230 | 25 | 38 | 244 | 68 |
| 2100 | 27 | 47 | 220 | 20 | 28 | 235 | 23 | | 260 | 14 | | 240 | 16 | 34 | 236 | 88 |
| 2200 | 29 | 38 | 202 | 20 | 31 | 244 | 20 | | 270 | 11 | | 260 | 18 | 29 | 243 | 37 |
| 2300 | 27 | 43 | 207 | 18 | 30 | 251 | 17 | | 260 | 15 | | 270 | 19 | 29 | 248 | 50 |

Wind data for Fish Creek Mountains (FHCC1), Mountain Springs Grade (TNSC1) and Sunrise-Ocotillo (IMPSD) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Wind data for El Centro NAF (KNJK) and Imperial County Airport (KIPL) from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/. Air quality data from the EPA's AQS repository. Wind speeds = mph; Direction = degrees. 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

[16] "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 OCTOBER 6, 2018**

| | MOUNTAIN SPRINGS GRADE (TNSC1) | | | SUNRISE-OCOTILLO (IMPSD) | | | EL CENTRO NAF (KNJK) | | | IMPERIAL COUNTY AIRPORT (KIPL) | | | FISH CREEK MOUNTAINS (FHCC1) | | | BRAWLEY | WESTMORLAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | $PM_{10}$ (µg/m³) | PM10 (µg/m3) |
| 0000 | 15 | 21 | 204 | 7 | 10 | 247 | 7 | | 220 | 0 | | 0 | 8 | 13 | 204 | 22 | 24 |
| 0100 | 14 | 21 | 213 | 7 | 11 | 251 | 9 | | 230 | 5 | | 240 | 7 | 11 | 201 | 31 | 15 |
| 0200 | 17 | 23 | 211 | 10 | 14 | 233 | 7 | | 260 | 6 | | 250 | 10 | 12 | 190 | 23 | 16 |
| 0300 | 20 | 28 | 210 | 6 | 11 | 252 | 5 | | 240 | 0 | | 0 | 8 | 12 | 200 | 12 | 12 |
| 0400 | 22 | 30 | 203 | 8 | 13 | 247 | 6 | | 240 | 0 | | 0 | 12 | 15 | 205 | 15 | 16 |
| 0500 | 20 | 27 | 215 | 9 | 14 | 253 | 7 | | 250 | 0 | | 0 | 9 | 17 | 204 | 16 | 30 |
| 0600 | 21 | 29 | 225 | 8 | 11 | 247 | 7 | | 220 | 0 | | 0 | 8 | 13 | 195 | 47 | 35 |
| 0700 | 24 | 37 | 212 | 5 | 8 | 255 | 9 | | 210 | 6 | | 200 | 3 | 12 | 233 | 29 | 37 |
| 0800 | 22 | 32 | 205 | 12 | 20 | 276 | 10 | | VRB | 6 | | 190 | 4 | 9 | 194 | 35 | 41 |
| 0900 | 22 | 32 | 206 | 14 | 25 | 247 | 8 | | 160 | 7 | | 190 | 3 | 7 | 174 | 38 | 35 |
| 1000 | 14 | 31 | 228 | 13 | 22 | 237 | 9 | | 140 | 3 | | VRB | 11 | 15 | 28 | 28 | 12 |
| 1100 | 17 | 30 | 232 | 15 | 28 | 254 | 6 | | VRB | 5 | | VRB | 2 | 14 | 107 | 23 | 14 |
| 1200 | 21 | 30 | 224 | 17 | 32 | 245 | 13 | 25 | 240 | 14 | | 230 | 4 | 19 | 338 | 19 | 20 |
| 1300 | 21 | 31 | 228 | 15 | 26 | 251 | 16 | | 240 | 15 | 22 | 250 | 10 | 22 | 279 | 30 | 35 |
| 1400 | 23 | 36 | 229 | 15 | 25 | 249 | 24 | | 250 | 20 | | 250 | 14 | 31 | 255 | 29 | 57 |
| 1500 | 22 | 36 | 216 | 15 | 31 | 244 | 21 | | 250 | 17 | | 260 | 16 | 31 | 252 | 329 | 663 |
| 1600 | 10 | 28 | 155 | 15 | 31 | 255 | | | | 20 | | 260 | 20 | 32 | 257 | 1264 | 995 |
| 1700 | 25 | 42 | 220 | 24 | 32 | 281 | 26 | | 260 | 20 | 31 | 260 | 22 | 34 | 259 | 443 | 396 |
| 1800 | 30 | 41 | 220 | 25 | 35 | 275 | 30 | | 260 | 20 | 29 | 260 | 24 | 42 | 254 | 674 | 111 |
| 1900 | 34 | 49 | 211 | 21 | 34 | 241 | 28 | | 260 | 31 | 41 | 280 | 16 | 42 | 232 | 1005 | 210 |
| 2000 | 29 | 49 | 215 | 15 | 26 | 250 | 22 | | 270 | 7 | | 230 | 25 | 38 | 244 | 68 | 79 |
| 2100 | 27 | 47 | 220 | 20 | 28 | 235 | 23 | | 260 | 14 | | 240 | 16 | 34 | 236 | 88 | 128 |
| 2200 | 29 | 38 | 202 | 20 | 31 | 244 | 20 | | 270 | 11 | | 260 | 18 | 29 | 243 | 37 | 124 |
| 2300 | 27 | 43 | 207 | 18 | 30 | 251 | 17 | | 260 | 15 | | 270 | 19 | 29 | 248 | 50 | 28 |

Wind data for Fish Creek Mountains (FHCC1), Mountain Springs Grade (TNSC1) and Sunrise-Ocotillo (IMPSD) from the University of Utah's MesoWest system https://mesowest.utah.edu/index.html. Wind data for El Centro NAF (KNJK) and Imperial County Airport (KIPL) from the NCEI's QCLCD data bank https://www.ncdc.noaa.gov/. Air quality data from the EPA's AQS repository. Wind speeds = mph; Direction = degrees. 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 Urgent Weather Messages containing a Wind Advisory described the gusty westerly winds for the region extending from the San Diego County Mountains and deserts. The strong Pacific trough strengthened the pressure gradient and produced strong gusty westerly winds that affected different regional air monitors in Riverside County, Imperial County and Arizona (**Table 2-1**).

The ICAPCD monitors air quality for each of its stations and issues web-based Air Quality Indices in response to changes in air quality.[17] As transported windblown dust entered Imperial County on October 6, 2018 air quality degraded in Imperial County. Overall, the gusty westerly winds associated with the strong Pacific trough affected air quality in Imperial County.

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

**FIGURE 3-3**
**IMPERIAL VALLEY AIR QUALITY INDEX FOR BRAWLEY**
**OCTOBER 6, 2018**

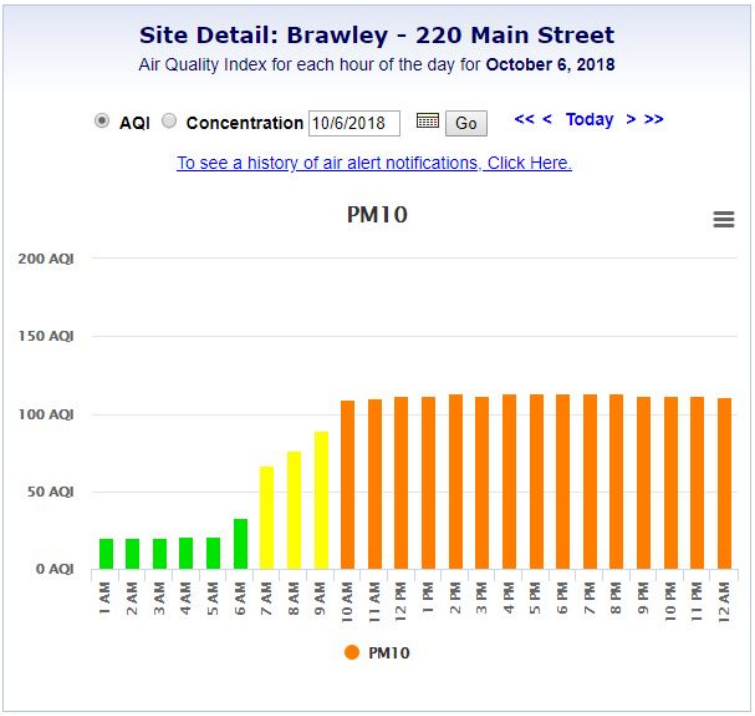



**Fig 3-3:** The degradation, or affect upon air quality, maybe determined when the AQI changes from a "Green" or Good level to an "Orange" or Unhealthy level for sensitive groups

## III.1 Summary of Forecasts and Warnings

Area Forecast Discussions issued by the NWS offices in Phoenix and San Diego described an unseasonably strong Pacific low-pressure system that moved into the region October 6, 2018, strengthening the onshore pressure gradient producing gusty westerly winds within the San Diego Mountains and deserts. Several Urgent Weather Messages were issued for southwestern Imperial County and the San Diego County mountains and deserts. **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), and Imperial County as well as from other automated meteorological instruments upwind from the monitors. Data analysis indicates that on October 6, 2018 both local airports measured winds at or above 25 mph and wind gusts at or above 25mph.

# 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 Brawley air quality monitor for the period of January 1, 2010 through October 6, 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).[18] 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 October 6, 2018, as measured by the Brawley monitor, was used to establish the historical and seasonal variability over time.[19] All figures illustrate that the exceedance, which occurred on October 6, 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.

[18] 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.

[19] FRM sampling ended December 2016.

**FIGURE 4-1**
**BRAWLEY HISTORICAL COMPARISON**
**FRM AND FEM $PM_{10}$ 24-HR AVG CONCENTRATIONS**
**JANUARY 1, 2010 TO OCTOBER 6, 2018**

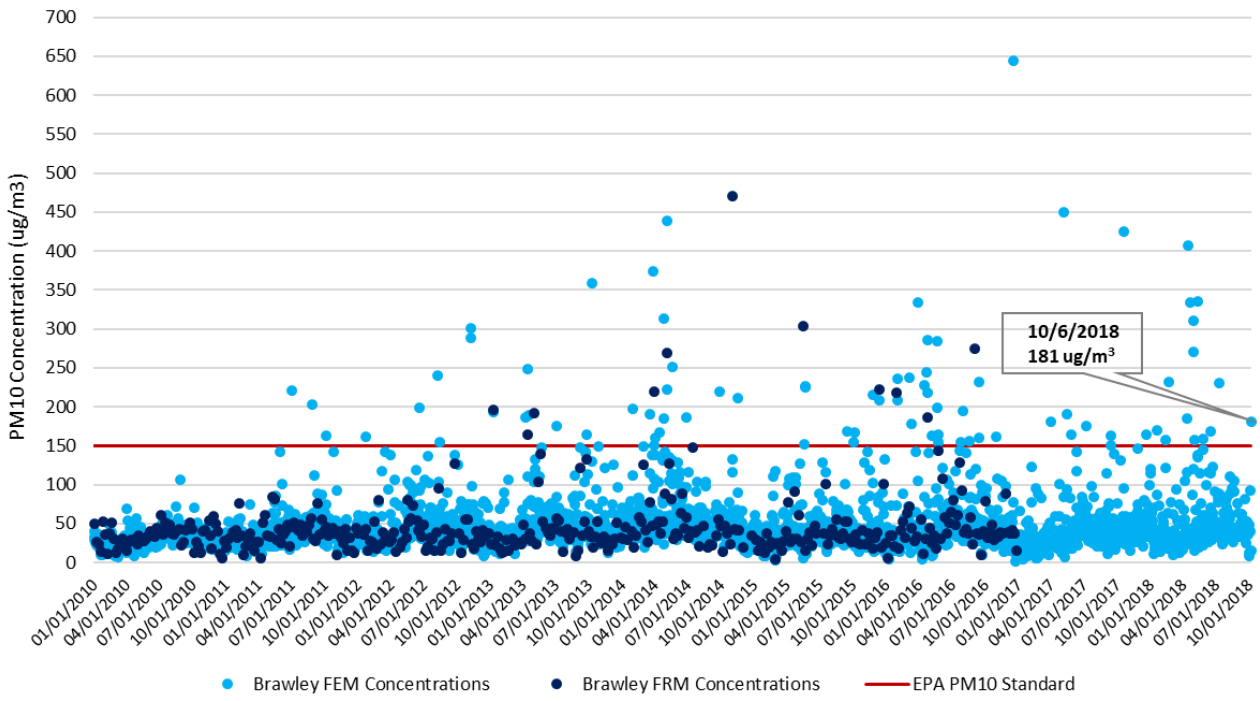
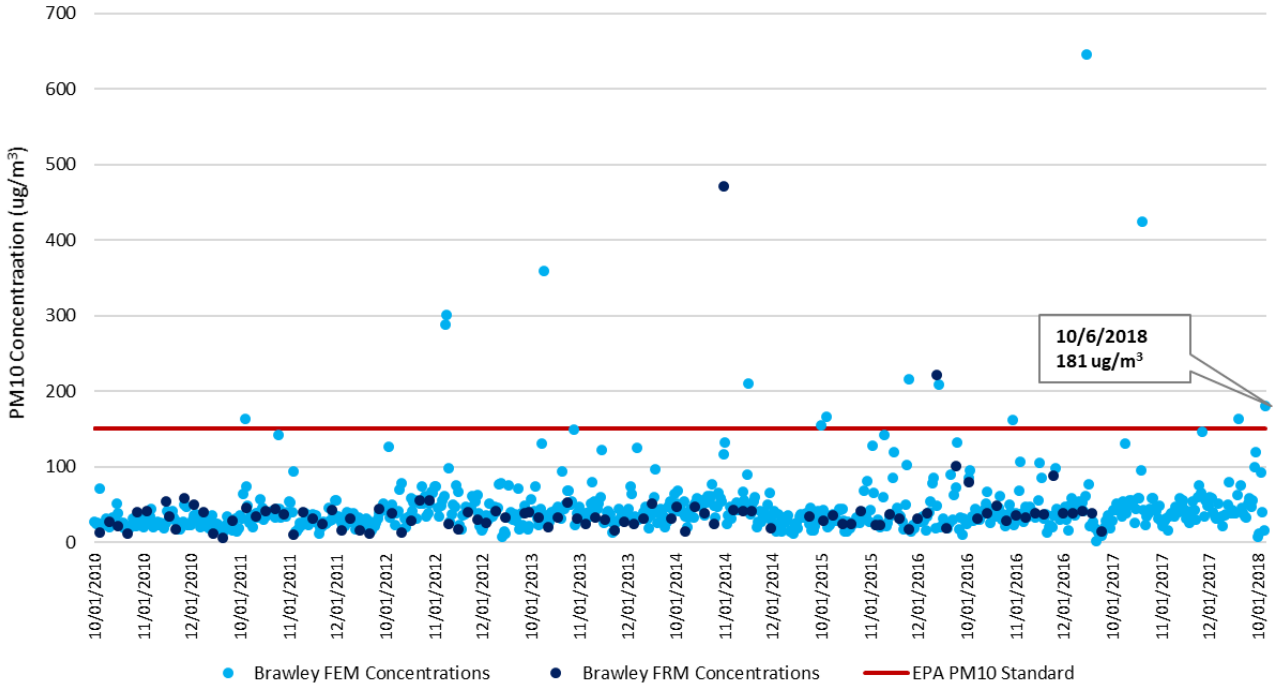



**Fig 4-1:** A comparison of $PM_{10}$ historical concentrations demonstrates that the measured concentration of 181 µg/m$^3$ on October 6, 2018 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days

The time series, **Figure 4-1,** for Brawley includes 3,201 sampling days (January 1, 2010 through October 6, 2018). During the January 1, 2010 through October 6, 2018 period, the Brawley monitor measured 81 exceedance days out of 3,201 sampling days, which translates into an occurrence rate less than 3%. Historically, there were fourteen (14) exceedance days measured during the first quarter; thirty-six (36) exceedance days measured during the second quarter; seventeen (17) exceedance days measured during the third quarter; and fourteen (14) exceedance days measured during the fourth quarter.

**FIGURE 4-2**
**BRAWLEY SEASONAL COMPARISON**
**FRM AND FEM $PM_{10}$ 24-HR AVG CONCENTRATIONS**
***OCTOBER 1, 2010 TO OCTOBER 6, 2018**




***Quarterly: October 1, 2010 to December 31, 2017 and October 1, 2018 to October 6, 2018**
**Fig 4-2:** A comparison of $PM_{10}$ seasonal concentrations demonstrate that the measured concentration of 181 µg/m$^3$ by the Brawley monitor on October 6, 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 742 sampling days, 841 credible samples and fourteen (14) exceedance days. This translates to less than a 1.6% seasonal exceedance occurrence rate.

Examining the historical and seasonal time series concentrations as they relate to the October 6, 2018 measured exceedances, the exceedances measured on October 6, 2018 are clearly outside the normal concentration levels when comparing to similar event days and non-event days.

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

The analysis above, under the Clear Causal Relationship, indicates that the primary sources affecting air quality in Imperial County originated within the natural open areas of the San Diego Mountains and the natural open deserts to the west and northwest of Imperial County. The origination of these emissions from these areas affected all the air quality monitors on October 6, 2018. Since Imperial County does not have jurisdiction over emissions emanating from San Diego County, it is not reasonably controllable or preventable by Imperial County. For a brief description of the controls implemented by sources beyond the control of Imperial County see section V.1 below.

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

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

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

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

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

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

**FIGURE 5-1**
**REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT**

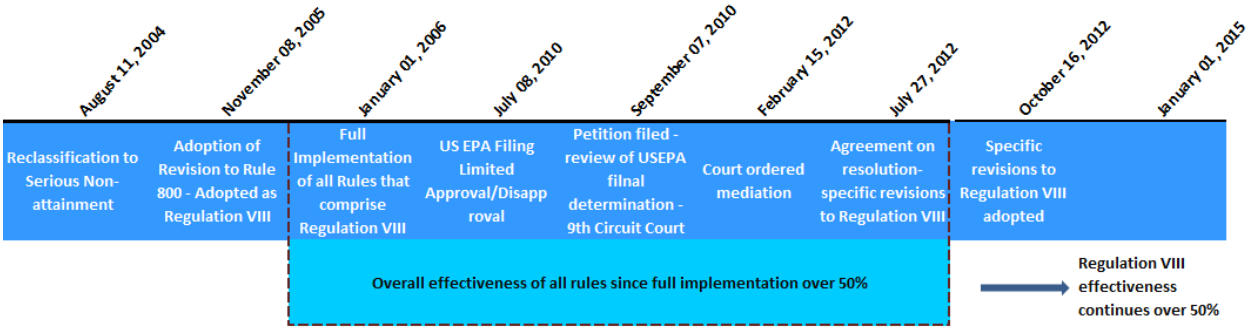



**Fig 5-1**: Regulation VIII Graphic Timeline

## V.1 Other $PM_{10}$ Control Measures

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

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

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

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

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

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

**TABLE 5-3**
**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)**

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

## V.2 Wind Observations

As previously discussed, wind data analysis indicates that on October 6, 2018 multiple 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 October 6, 2018 event, wind speeds were above the 25 mph threshold, overcoming the 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 Brawley monitor during the October 6, 2018 $PM_{10}$ exceedances. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based $PM_{10}$ emissions, officially declared as a No Burn Day, related to agricultural burning, waste burning or dust.

**FIGURE 5-2**
**PERMITTED SOURCES**

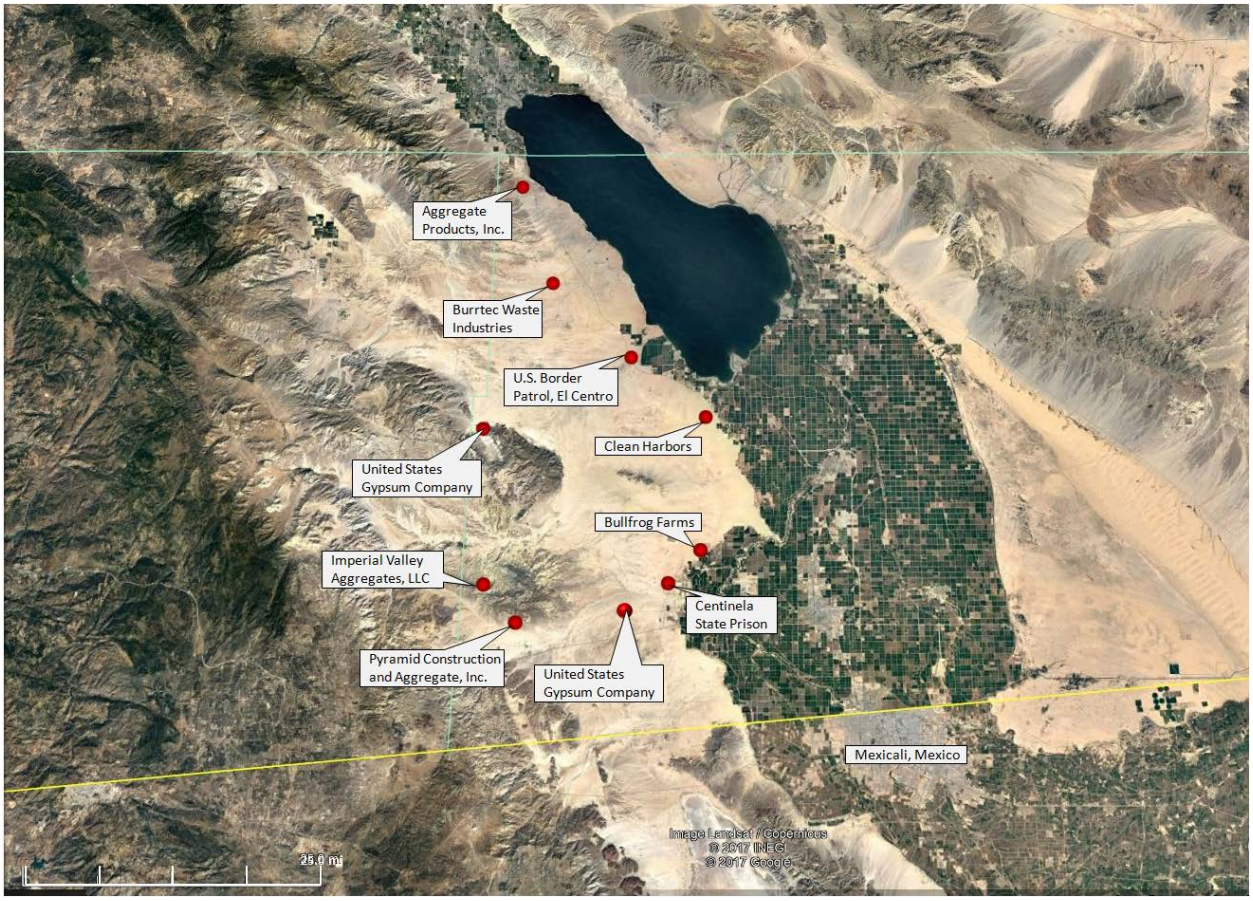



**Fig 5-2:** The above map identifies those permitted sources located west, northwest and southwest of the Brawley monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States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

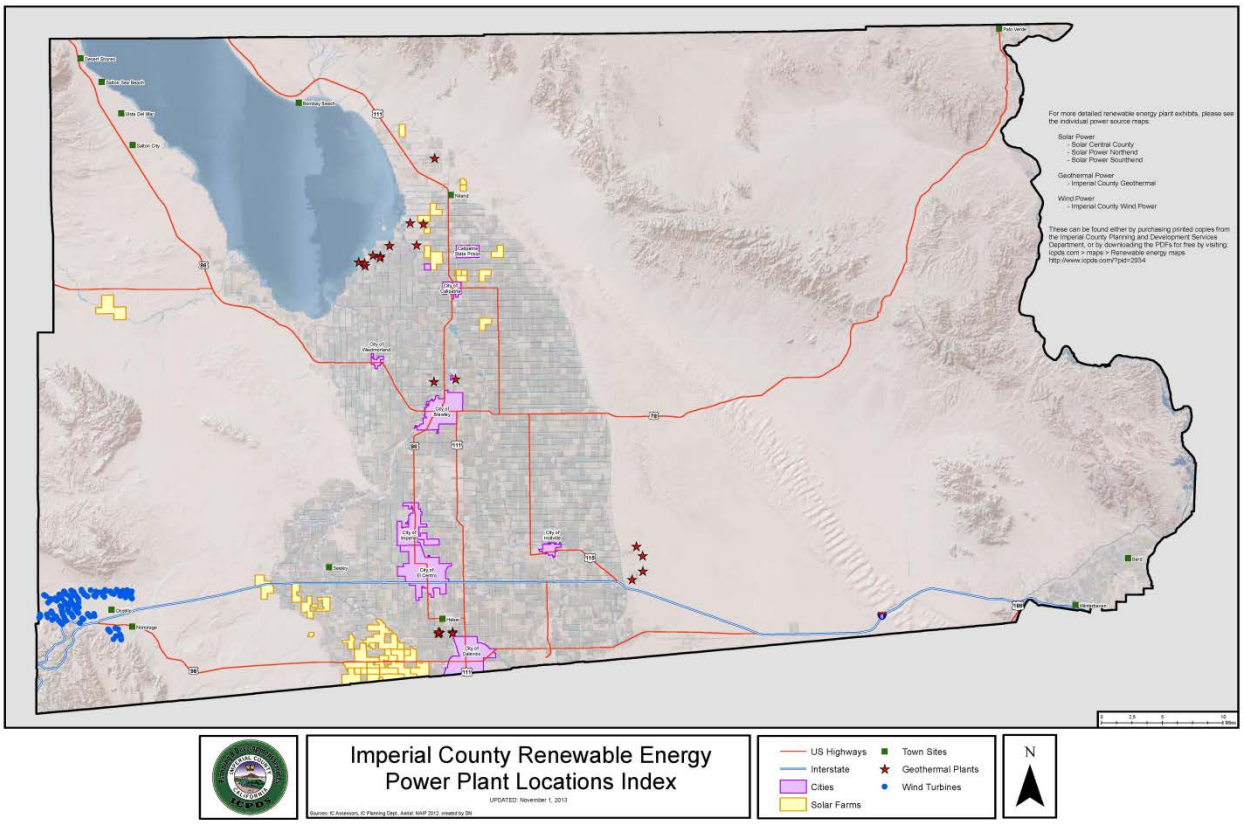



**Fig 5-3:** The above map identifies those power sources located west, northwest and southwest of the Brawley monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

# 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, Pacific weather disturbances during this time of year will bring westerly winds into the region. The gusty westerly winds on October 6, 2018 resulted from what the NWS identified as a strong Pacific low-pressure weather system that strengthened the onshore surface pressure gradient and generated strong gusty westerly winds across southeastern California. These gusty westerly winds blew through the region prompting the NWS offices in San Diego and Phoenix to issue Urgent Weather Messages. Gusty westerly winds blew over and through the San Diego Mountains generating and transporting dust emissions down slopes onto the open natural desert floor west of Imperial County during the evening hours of October 6, 2018.

As discussed within the Clear Causal section and which is worth repeating here, precipitation days prior from Tropical Storm Rosa combined with sufficient precipitation within and along the San Diego Mountains allowing for less saltation and deposition of transported windblown dust into Imperial County. Both KIPL and KNJK reported elevated humidity of 50 percent during the early morning hours of October 6, 2018 coincident with negligible measured concentrations of particulates. However, with the heating of the day along all of southern California, humidity levels reduced during the early evening hours coincident with elevated concentrations above 100 $\mu g/m^3$ at the Brawley monitor. However, as the evening progressed and the heating effect cooled humidity increased during the late evening hours indicating precipitation was sufficient at upwind sites to allow for the reduction of transported emissions onto the Brawley and Westmorland monitors. Here, the location of the Brawley monitor as opposed to the Westmorland monitor, Westmorland located slightly further north, played a role in the amount and level of the deposition of particulates onto the monitor. Those sites further north, further east or south were less affected than the Brawley monitor centered directly west of the open natural San Diego mountains and deserts to the west of 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 October 6, 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 San Diego where Imperial County has no jurisdiction. In any event, despite reasonable controls in place within Imperial County, high winds overwhelmed all reasonable controls where human activity played little to no direct causal role. The $PM_{10}$ exceedance measured at the Brawley monitor was caused by naturally occurring gusty westerly winds that transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west of Imperial County. These facts provide strong evidence that the $PM_{10}$ exceedance at the Brawley monitor on October 6, 2018, was not reasonably controllable or preventable.

### VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50) is an event with its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. Anthropogenic sources that are reasonably controlled are considered not to play a direct role in causing emissions. As discussed within this demonstration, the $PM_{10}$ exceedance that occurred at the Brawley monitor on October 6, 2018, was caused by the transport of windblown dust into Imperial County by gusty westerly winds associated with an unseasonably strong Pacific low-pressure system that moved over 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 Brawley monitor in Imperial County demonstrates a consistency of elevated gusty westerly winds with elevated concentrations of $PM_{10}$ on October 6, 2018. In addition, temporal analysis indicates that the elevated $PM_{10}$ concentrations and the gusty westerly winds were an event that was widespread, regional and not preventable. Days before the high wind event $PM_{10}$ concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation

between the natural event and the transported windblown dust to the exceedance on October 6, 2018.

### VI.5 Concentration to Concentration Analysis

The historical annual and seasonal 24-hr average $PM_{10}$ measured concentrations at the Westmorland 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 gusty westerly winds that preceded the identified strong Pacific low-pressure weather system as it passed through the southern region of California. The information provides a clear causal relationship between the entrained windblown dust and the $PM_{10}$ exceedance measured at the Brawley air quality monitor in Imperial County on October 6, 2018.

In particular, the clear causal relationship and not reasonably controllable or preventable sections provide evidence that high gusty westerly winds transported fugitive emissions from open natural Mountain and desert areas, located within San Diego County and Imperial County (all part of the Sonoran Desert). In addition, because anthropogenic sources in upwind areas were reasonably controlled at the time of the event, this event meets the definition of a Natural Event.[20]

[20] 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.