EXCEPTIONAL EVENT DEMONSTRATION FOR PARTICULATE MATTER OF 10 MICRONS OR LESS IN AERODYNAMIC DIAMETER (PM_{10}) FOR THE SOCORRO HUECO AND EL PASO MIMOSA MONITORS ON FEBRUARY 16, 2022, AND THE LAREDO BRIDGE MONITOR ON MARCH 18, 2022

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
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August 19, 2024

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CHAPTER 1: INTRODUCTION

Exceptional events are unusual or naturally occurring events that affect air quality and are not reasonably controllable or preventable. An exceptional event may also be caused by human activity that is unlikely to recur at a particular location. Under Section 319 of the federal Clean Air Act (FCAA), states are responsible for identifying air quality monitoring data affected by an exceptional event and requesting the U.S. Environmental Protection Agency (EPA) exclude the data from consideration when determining whether an area is in attainment or nonattainment of a National Ambient Air Quality Standard (NAAQS). EPA has promulgated an exceptional event rule, 40 Code of Federal Regulations (CFR) §50.14, as well as guidance to implement the requirements of the FCAA regarding exceptional events. States are required to identify air quality monitoring data potentially affected by exceptional events by flagging the data submitted into the EPA Air Quality System (AQS) database. If EPA concurs with this demonstration, the flagged data will not be eligible for consideration when making NAAQS compliance determinations.

This document discusses the Texas Commission on Environmental Quality (TCEQ) proposed exceptional event day flags for particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}), occurring on February 16, 2022, and March 18, 2022, in El Paso and Webb counties, respectively, as listed in Appendix A: *Proposed PM_{10} Exceptional Event Flags and Initial Notification*. The measured PM_{10} concentrations on these dates were not reasonably controllable or preventable, were associated with natural events due to international or domestically transported dust associated with high winds, and were in excess of normal historical fluctuations. The proposed exceptional event flags are for daily average measurements from the Federal Reference Method (FRM) PM_{10} monitors on February 16, 2022, for the Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) monitors in El Paso County; and on March 18, 2022, for the Laredo Bridge (C66) monitor in Webb County.

The data being requested for exclusion have regulatory significance and affect the regulatory determination of the counties in which the monitors are located for the 1987 PM_{10} NAAQS. The Riverside/El Paso Mimosa (C418) monitor falls within the portion of El Paso County officially designated as nonattainment by EPA for the 1987 PM_{10} NAAQS. The remaining monitors referenced are not located within areas officially designated as nonattainment by EPA for the 1987 PM_{10} NAAQS.

The locations of El Paso County PM_{10} and particulate matter of 2.5 microns or less in aerodynamic diameter ($PM_{2.5}$) monitoring sites, are shown in Figure 1-1: *El Paso County PM_{10} Monitoring Sites* and Figure 1-6: *El Paso County $PM_{2.5}$ Monitoring Sites.* Webb County PM_{10} monitoring site locations are presented in Figure 1-3: *Webb County PM_{10} Monitoring Sites,* and Webb County $PM_{2.5}$ monitoring site locations are presented in Figure 1-4: *Webb County $PM_{2.5}$ Monitoring Sites.*

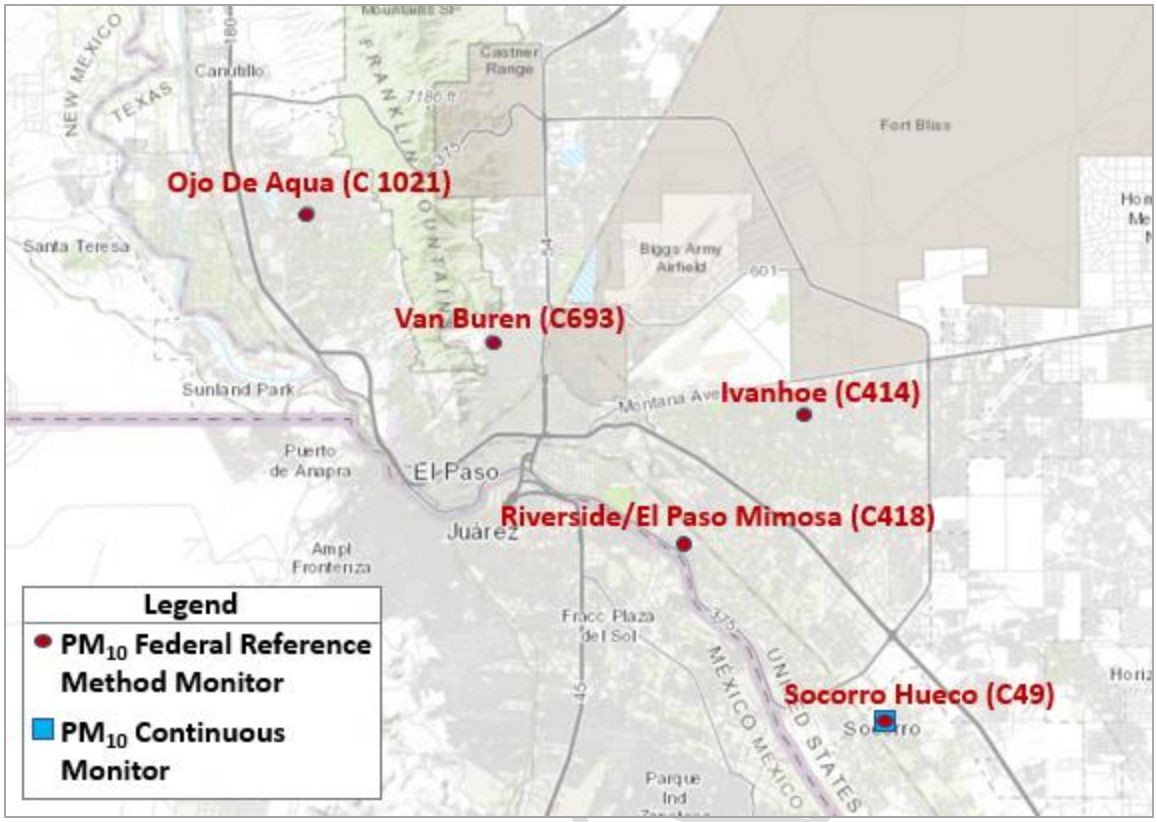

Figure 1-1: El Paso County PM_{10} Monitoring Sites

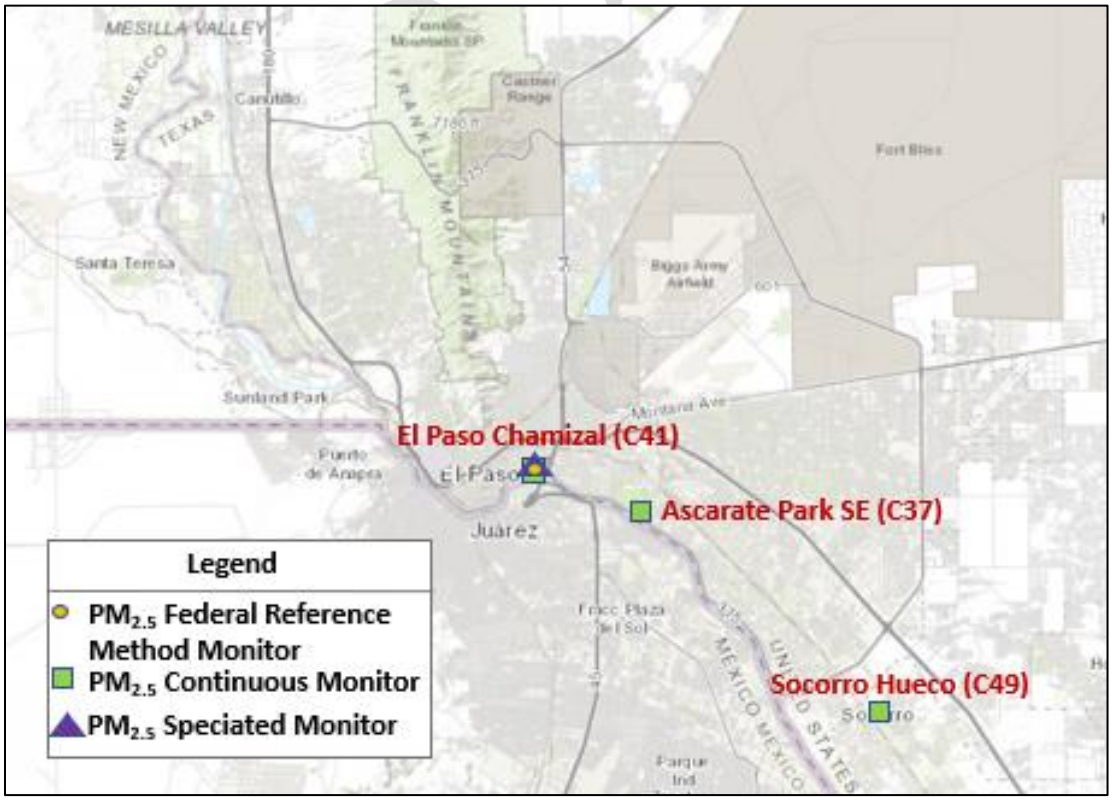

Figure 1-2: El Paso County $PM_{2.5}$ Monitoring Sites

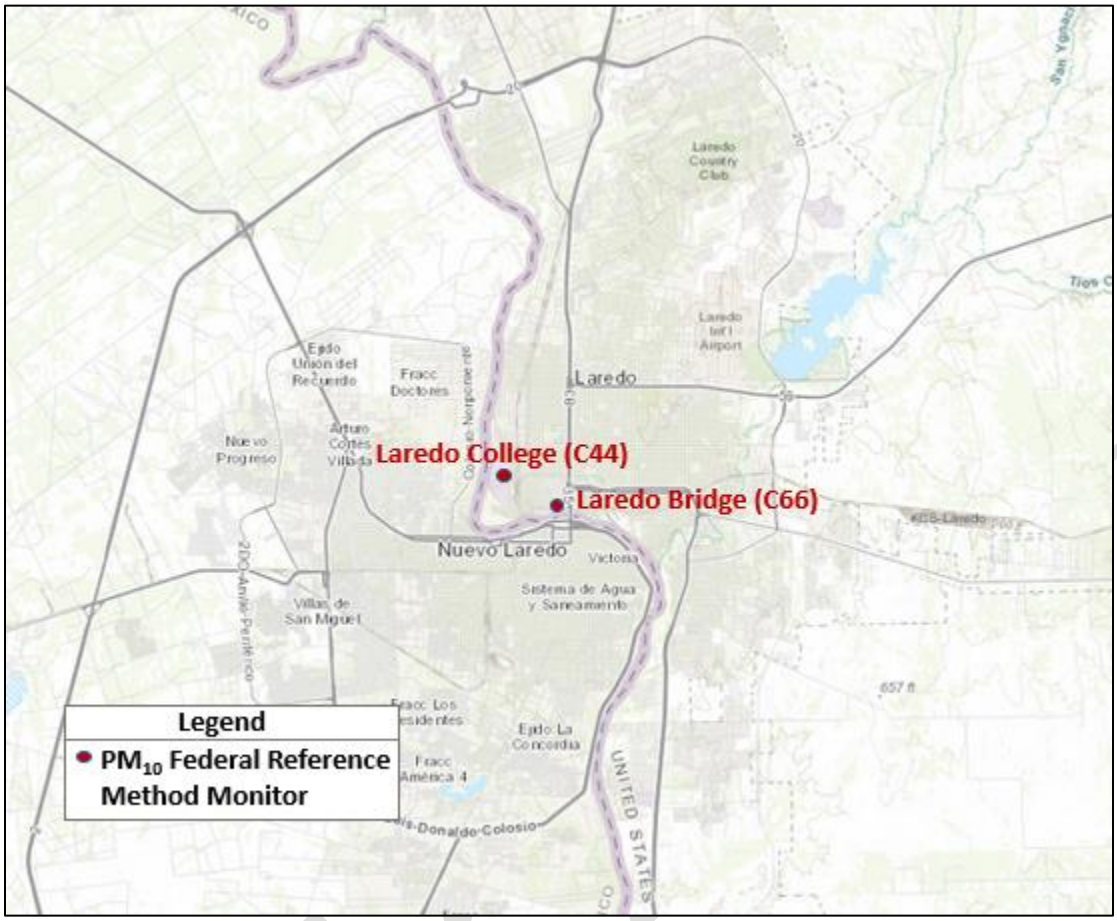

Figure 1-3: Webb County PM_{10} Monitoring Sites

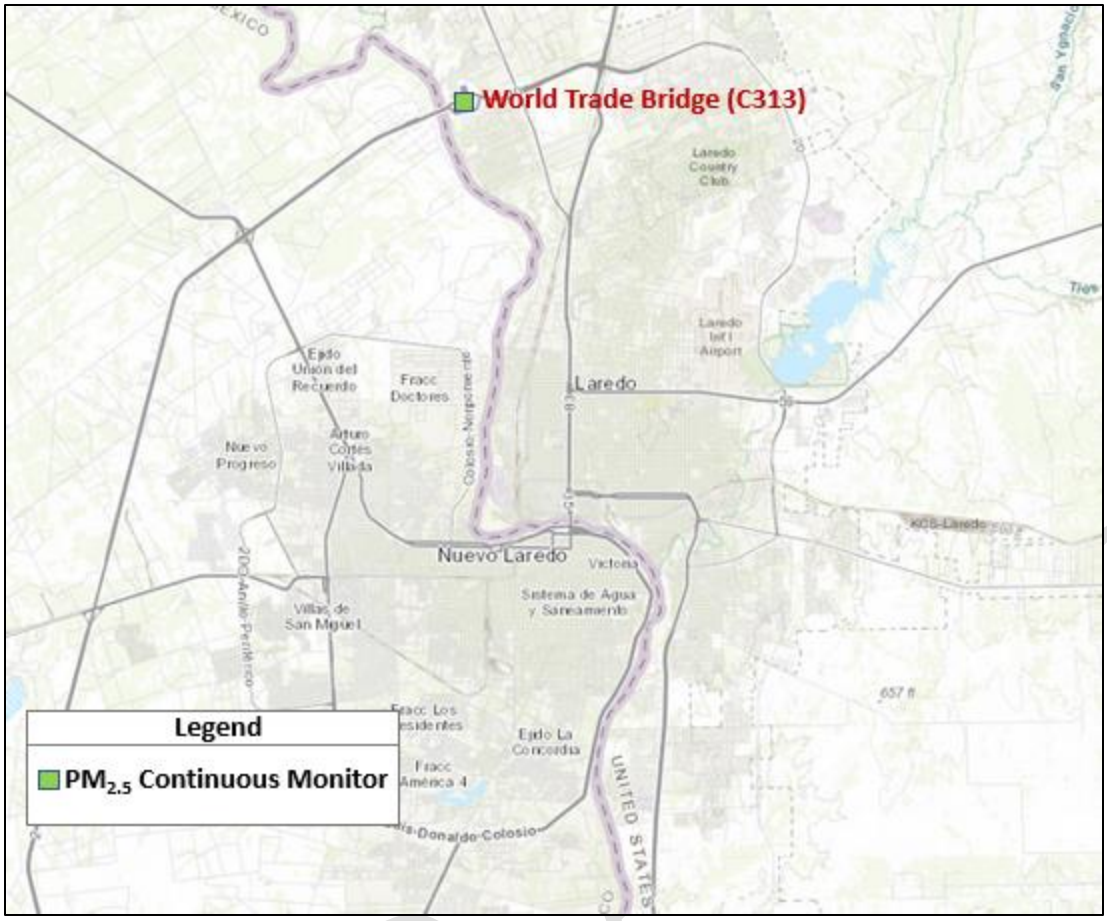

Figure 1-4: Webb County $PM_{2.5}$ Monitoring Sites

With this demonstration, TCEQ is providing detailed evidence to support concurrence by EPA for the PM_{10} exceptional event flags shown in Table A-1: *Proposed 2022 PM_{10} Exceptional Event Flags* of Appendix A: *Proposed PM_{10} Exceptional Event Flags and Initial Notification*. The exceptional event demonstration will be posted on TCEQ's website at https://www.tceq.texas.gov/airquality/monops/pm_flags.html for a 30-day public comment period. All comments received will be addressed and submitted to EPA for consideration.

1.1 EXCEPTIONAL EVENT DEFINITION AND CRITERIA

An exceptional event is defined in 40 CFR §50.1(j) as "an event(s) and its resulting emissions that affect air quality in such a way that there exists a clear causal relationship between the specific event(s) and the monitored exceedance(s) or violation(s), is not reasonably controllable or preventable, is an event(s) caused by human activity that is unlikely to recur at a particular location or a natural event(s), and is determined by the [EPA] Administrator in accordance with 40 CFR 50.14 to be an exceptional event…." Furthermore, 40 CFR §50.14(c)(3)(iv) states that the demonstration to justify data exclusion shall include:

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);

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;
3. analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times;
4. a demonstration that the event was both not reasonably controllable and not reasonably preventable; and
5. a demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event.

Additionally, 40 CFR §50.14(c)(3)(v) requires that the state must:

6. document that the state followed the public comment process and that the comment period was open for a minimum of 30 days;
7. submit the public comments it received along with its demonstration to the Administrator; and
8. address in the submission to the Administrator those comments disputing or contradicting factual evidence provided in the demonstration.

These eight requirements must all be satisfied for data to be excluded from regulatory decisions as an exceptional event. Requirements one through five will be addressed individually in this demonstration document, and documentation for requirements six through eight will be provided as an addendum to the demonstration document upon final submittal to EPA.

Mitigation of exceptional events is also required by 40 CFR §51.930, which provides:

A State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the State must:

- provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
- provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
- provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events.

These requirements will be addressed in Chapter 6: *Mitigation of Exceptional Events* in this demonstration.

1.2 SUMMARY OF APPROACH

TCEQ used several methods for evaluating whether the high PM_{10} measurements in question qualify as exceptional events. Analyses performed by TCEQ included:

- evaluating historical trends in PM_{10} and $PM_{2.5}$ data from long-term FRM monitoring sites for a period of over 10 years;
- identifying dust contributions in observed $PM_{2.5}$ concentrations using $PM_{2.5}$ speciation data from Chemical Speciation Network (CSN) monitors where available;
- tracking blowing dust from source areas using backward-in-time air trajectories and available satellite imagery from the National Oceanic and Atmospheric Administration (NOAA) (NOAA, 2022);
- reviewing media reports for stories on the blowing dust events on the dates of concern; and
- reviewing special weather reports for details on high winds, blowing dust, or reduced visibility.

1.2.1 Data and Imagery Used

For the analyses presented in this document, TCEQ used monitoring data, satellite imagery, and backward-in-time air trajectory information. The particulate data are presented in micrograms per cubic meter ($\mu g/m^3$). Regulatory PM_{10} data are in standard conditions, which are adjusted to a standard temperature of 25 degrees centigrade and atmospheric pressure of 760 millimeters of mercury, and $PM_{2.5}$ data are in local conditions of temperature and pressure measured at the monitor. These parameters, for PM_{10} and $PM_{2.5}$ respectively, are required for reporting to EPA's AQS database.

As detailed in Table 1-1: *El Paso County PM_{10} and $PM_{2.5}$ Sampler Types* and Table 1-2 *Webb County PM_{10} and $PM_{2.5}$ Sampler Types*, the monitoring data include FRM non-continuous PM_{10} and $PM_{2.5}$ daily measurements, non-continuous $PM_{2.5}$ speciated daily measurements, and continuous PM_{10} and $PM_{2.5}$ measurements used for daily reporting of the EPA Air Quality Index (AQI). All the data are available in EPA's AQS database (EPA1, 2022) except for continuous PM_{10} monitors, which are not reported as these data are not collected using a method approved for reporting to EPA's AQS database. These results are for reference purposes only and used to provide additional data

collected on an hourly basis to supplement data from 24-hour samples used for submittal to EPA for regulatory purposes.

Table 1-1: El Paso County PM_{10} and $PM_{2.5}$ Sampler Types

Site Name	AQS Site Identifier	AQS Parameter Identifier	POC	Sampler Type
Ascarate Park SE (C37)	481410055	88502	3	$PM_{2.5}$ continuous
El Paso Chamizal (C41)	481410044	88101	1	$PM_{2.5}$ FRM non-continuous
El Paso Chamizal (C41)	481410044	88502	5	$PM_{2.5}$ non-continuous speciated
El Paso Chamizal (C41)	481410044	86101	6	$PM_{10-2.5}$ continuous
El Paso Chamizal (C41)	481410044	81102	6	PM_{10} continuous (standard conditions)
El Paso Chamizal (C41)	481410044	81102	6	PM_{10} continuous (local conditions)
Ivanhoe (C414)	481410029	81102	1	PM_{10} FRM non-continuous
Ojo De Agua	481411021	81102	1	PM_{10} FRM non-continuous
Ojo De Agua	481411021	81102	2	PM_{10} FRM non-continuous
Riverside/El Paso Mimosa (C418)	481410038	81102	1	PM_{10} FRM non-continuous
Socorro Hueco (C49)	481410057	81102	1	PM_{10} FRM non-continuous
Socorro Hueco (C49)	481410057	81102	2	PM_{10} FRM non-continuous
Socorro Hueco (C49)	481410057	81102	4	PM_{10} continuous
Socorro Hueco (C49)	481410057	88502	3	$PM_{2.5}$ continuous
Van Buren (C693)	481410693	81102	1	PM_{10} FRM non-continuous

Notes:
Abbreviations:
AQS EPA's air quality system database
POC AQS parameter occurrence code to differentiate collocated monitors.
FRM Federal Reference Method

Table 1-2: Webb County PM_{10} and $PM_{2.5}$ Sampler Types

Site Name	AQS Site Identifier	AQS Parameter Identifier	POC	Sampler Type
Laredo College (C44)	484790016	88102	1	PM_{10} FRM non-continuous
Laredo Bridge (C66)	484790017	88102	1	PM_{10} FRM non-continuous
World Trade Bridge (C313)	484790313	88101	1	$PM_{2.5}$ continuous

Abbreviations:
AQS EPA's air quality system database
POC AQS parameter occurrence code to differentiate collocated monitors.
FRM Federal Reference Method

Air parcel trajectories presented in this demonstration were produced using the National Oceanic and Atmospheric Administration (NOAA) Applied Research Laboratory (ARL) HYSPLIT model available on the ARL HYSPLIT webpage (http://www.arl.noaa.gov/hysplit/) (NOAA ARL, 2022). HYSPLIT models simulate the dispersion and trajectory of substances transported and dispersed through the atmosphere over local to global scales. The backward trajectory analyses presented in this document were used to help determine the origin of air masses and establish

source-receptor relationships. These trajectories show the modeled path of the air mass, arriving at hours chosen based on relevance to the event, at a chosen point relevant to the study. Times are most frequently listed in local time, but from some sources, time is listed in Coordinated Universal Time (UTC). Specifically, there are images presented in this demonstration that were obtained from sources that list the time in UTC. To preserve the images in their original form, the time was not altered. Additionally, times throughout the document are presented in 24-hour format.

1.2.2 Analysis Methods

Multiple types of information were used in evaluating whether the proposed events qualify as exceptional events. Information evaluated included time series plots to show trends and events, comparison of data on the dates of the proposed exceptional events to statistical percentiles to show relevance, and review of backward-in-time air trajectories for independent confirmation of transport path of the affected air. In addition, daily averages of hourly PM_{10} and $PM_{2.5}$ continuous data were compiled. Interagency Monitoring of Protected Visual Environments (IMPROVE) particulate matter components (IMPROVE, 2022) (Eldred, 2003) were calculated, when data were available, from $PM_{2.5}$ CSN speciation data to confirm the predominance of the soil component in high wind blowing dust events. The usage of continuous and speciation data assist to confirm that the PM_{10} concentrations recorded on proposed exceptional event days were outside of normal historical fluctuations.

TCEQ also used monitoring data from days with similar wind data as that recorded on proposed exceptional event days to compare data from proposed exceptional event days to days with similar wind conditions where elevated concentrations of PM_{10} were not recorded. Surrogate days were selected based on daily wind speed and direction comparable to proposed exceptional event days.

1.3 SUMMARY OF FINDINGS

Information provided in this demonstration supports the conclusion that the high PM_{10} daily average measurements recorded in 2022 qualify as exceptional events. The measured PM_{10} concentrations on February 16, 2022, and March 18, 2022, were not reasonably controllable or preventable, were associated with a natural event due to transported dust associated with high winds, and were in excess of normal historical fluctuations. TCEQ requests EPA's concurrence on these proposed exceptional events and to have data from the flagged days removed from consideration when making compliance determinations for the 24-hour PM_{10} NAAQS.

1.4 PRESENTATION OF FINDINGS

Information specific to each event day is respectively presented in Appendix B: *Event Analysis for February 16, 2022*, and Appendix C: *Event Analysis for March 18, 2022.*

CHAPTER 2: NARRATIVE CONCEPTUAL MODEL OF EVENTS

2.1 CLIMATE

The proposed exceptional events covered in this demonstration occurred in El Paso County and Webb County. Climate details from each of these counties are presented in the following sections.

2.1.1 El Paso County Climate

El Paso County has hot summers and short, cold winters. The area is dry and mostly clear year-round. Over the course of the year, the temperature typically varies from 34 degrees Fahrenheit (˚F) to 97˚F and is rarely below 24˚F or above 104˚F.

Much of Far West Texas, including El Paso County, is part of the Chihuahuan Desert that extends into Arizona, New Mexico, and the Mexican state of Chihuahua. Rainfall in this area is highly variable from year to year with an average of 8.90 inches per year measured at the National Weather Service (NWS) weather station at the El Paso International Airport (KELP) from 2000 through 2022. Precipitation information is shown in Figure 2-1: *Annual Precipitation Measured at El Paso International Airport from 2000 through 2022*.

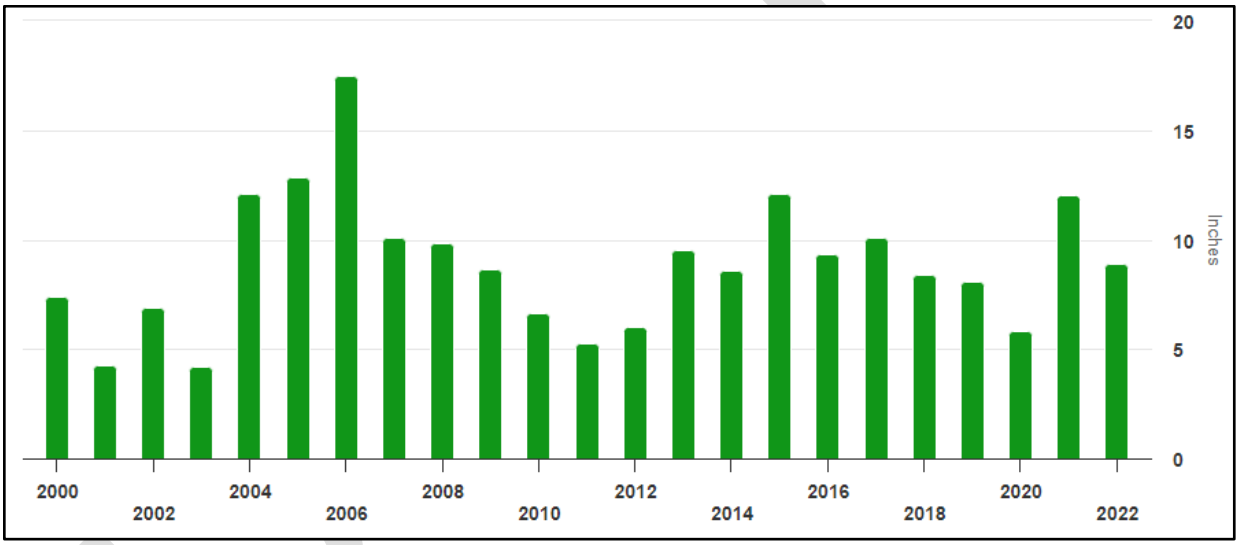

Figure 2-1: Annual Precipitation Measured at El Paso International Airport from 2000 through 2022

A large portion of this sparsely vegetated desert contains dried lakebeds and playas made of loose, fine soils. These soils can easily be picked up and remain in the air by moderate to high wind gusts of 30 miles per hour (mph) or greater (TCEQ1, 2007). The overall frequency and intensity of these dust storms is highly dependent on weather conditions and existing moisture content of the soils.

On, February 16, 2022, the date of the proposed exceptional event in El Paso County, a cold front advanced toward El Paso County from the west. Wind data from weather stations in the area indicated the winds ahead of the cold front were out of the southwest at approximately 23 mph in El Paso County. Behind the front, winds were out of the west at approximately 29 mph.

2.1.2 Webb County Climate

Webb County has hot and humid summers with relatively consistent wind. The winters are short, cool, and typically dry. Partly cloudy skies are prevalent on many days throughout the year. Over the course of the year, the temperature typically varies from 48˚F to 100˚F and is rarely below 36˚F or above 105˚F. The rainy season in Webb County typically ranges from May through early October. Winds are typically highest in Webb County from early March through August.

Precipitation data from the Laredo 2 NWS station are presented in Figure 2-2: *Annual Precipitation Measured at Laredo 2 NWS from 2000 through 2022*.

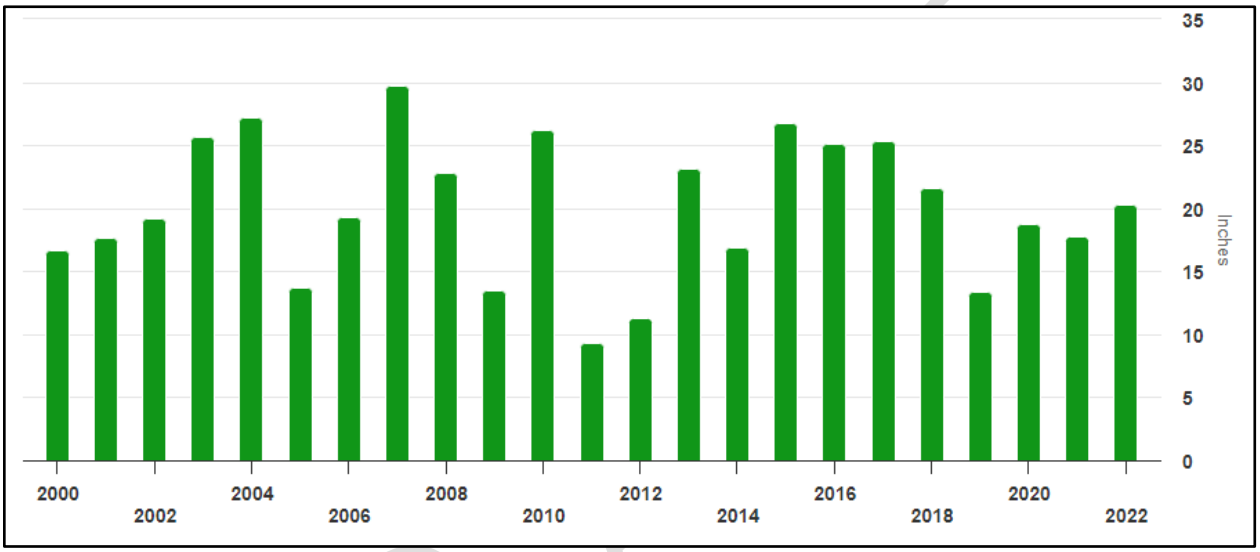

Figure 2-2: Annual Precipitation Measured at Laredo 2 NWS from 2000 through 2022

On, March 18, 2022, the date of the proposed exceptional event in Webb County, a cold front moved through the county from the northwest. Wind data from weather stations in the area indicated the winds behind the cold front were out of the northwest with gusts of up to 32 mph.

2.2 PARTICULATE MATTER AIR QUALITY TRENDS

Trends in annual peak 24-hour averages of particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}) show variability year to year. This variability is influenced by multiple factors, including dust events coinciding with sampling days such as that which occurred on February 16, 2022, and March 18, 2022. Trends from the two counties represented in this demonstration are presented in the following sections.

2.2.1 El Paso County Particulate Matter Trends

PM_{10} trends from Federal Reference Method (FRM) monitors currently in operation or previously in operation for a long period in El Paso County dating back through 2006 are presented in Figure 2-3: *El Paso County PM_{10} Annual Peak 24-hour Averages for FRM Monitoring Sites, Including Exceptional Event Days*. Any proposed exceptional event day at a monitor is included in Figure 2-3 to show the entire range of values from 2006 through 2022. The following data gaps are displayed in Figure 2-3:

- The Tillman (C413) PM_{10} FRM monitor was deactivated effective April 11, 2013.
- The Ivanhoe (C414), Riverside (C418), Van Buren (C693), and Ojo de Agua (C1021) PM_{10} FRM data were retroactively invalidated following a 2016 technical systems audit finding that the laboratory performing the gravimetric analysis on samples collected from October 25, 2013, through October 21, 2016, did not use the federally required method. This caused years 2014, 2015, and 2016 to have less than 75% valid data, which was therefore incomplete. Additionally, the Ojo de Agua (C1021) PM_{10} FRM monitors (both primary and collocated) were officially activated effective April 15, 2013, making the year 2013 incomplete for this site as well.
- The site access agreement for the original Socorro site was unexpectedly terminated by the property owner in early 2012. The site was relocated to the Hueco Elementary School and began operating in late 2012. Consequently, there are no PM_{10} FRM data available at Socorro from January 28 through December 23, 2012. This caused the year 2012 to have less than 75% valid data, which was therefore incomplete. In this document, the monitor is named Socorro Hueco (C49).
- The Riverside (C418) PM_{10} air monitoring site, deployed in 1988, was relocated approximately 0.37 miles and renamed El Paso Mimosa (C418) in December 2019. In this document, the monitor is named Riverside/El Paso Mimosa (C418).

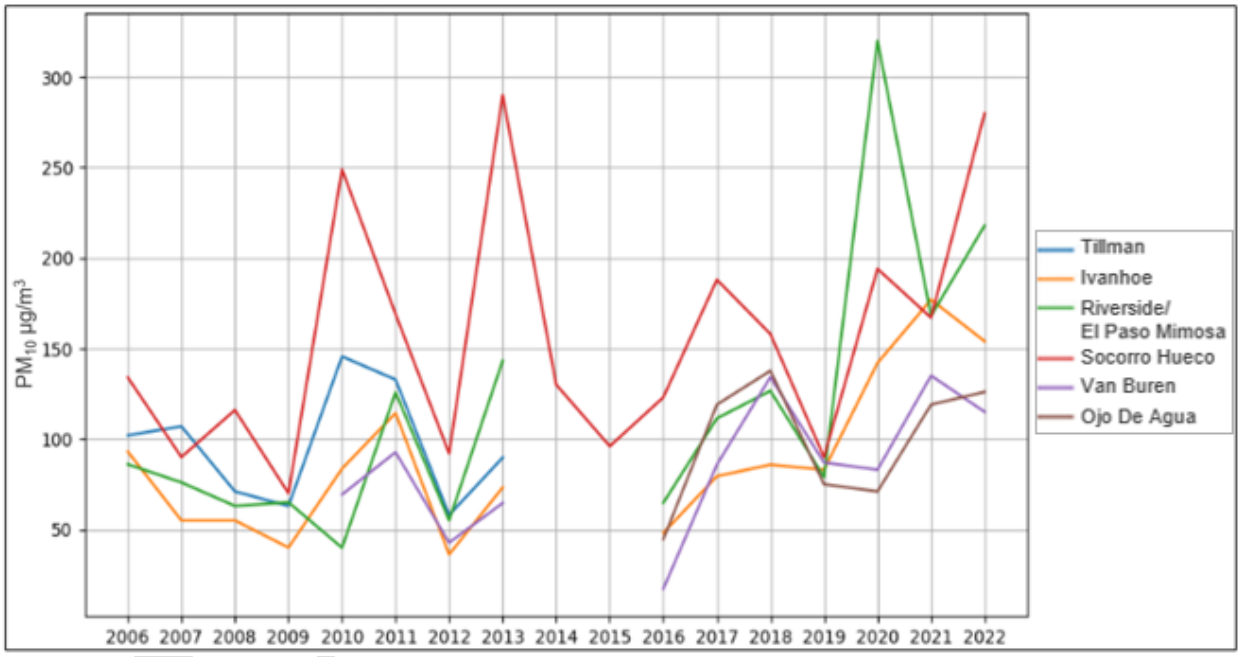

Figure 2-3: El Paso County PM_{10} Annual Peak 24-hour Averages for FRM Monitoring Sites, Including Exceptional Event Days

Overall, annual average $PM_{2.5}$ levels in El Paso County have been relatively stable since 2006, while the 98th percentile of $PM_{2.5}$ 24-hour average measurements have shown more variability from year to year. Because the 98th percentile of the 24-hour average represents the highest 2% of all 24-hour measurements, the presence or absence of dust events on sampling days can greatly influence trend variability. Figure 2-4: *El Paso County $PM_{2.5}$ Annual Averages and Annual 98th Percentile of 24-hour Averages for Long-Term FRM Monitoring Sites, Including Exceptional Event Days* graphically depicts trends in both the annual and 98th percentile of the 24-hour average using FRM $PM_{2.5}$ data.

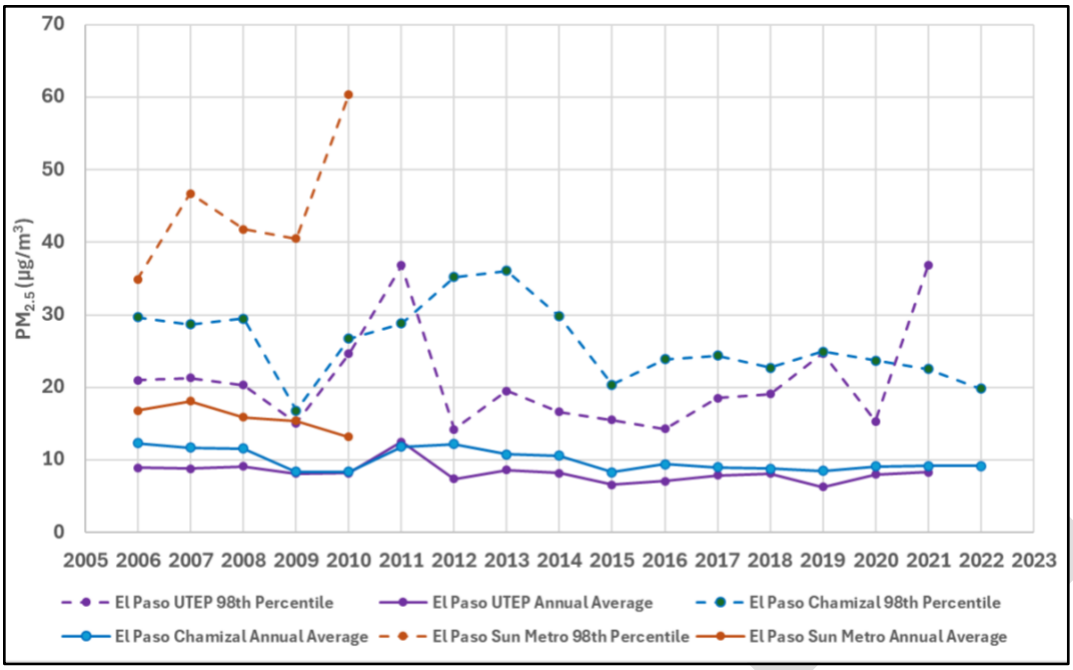

Figure 2-4: El Paso County $PM_{2.5}$ Annual Averages and Annual 98th Percentile of 24-hour Averages for Long-Term FRM Monitoring Sites, Including Exceptional Event Days

2.2.2 Webb County Particulate Matter Trends

PM_{10} trends from FRM monitors currently in Webb County from 2006 through 2022 are presented in Figure 2-5: *Webb County PM_{10} Annual Peak 24-hour Averages for FRM Monitoring Sites, Including Exceptional Event Days*. Concentrations have fluctuated from 2006 through 2022 but have all been below the National Ambient Air Quality Standard (NAAQS). The peak value, recorded in 2022 at the Laredo Bridge monitor, is from the proposed exceptional event day of March 18, 2022.

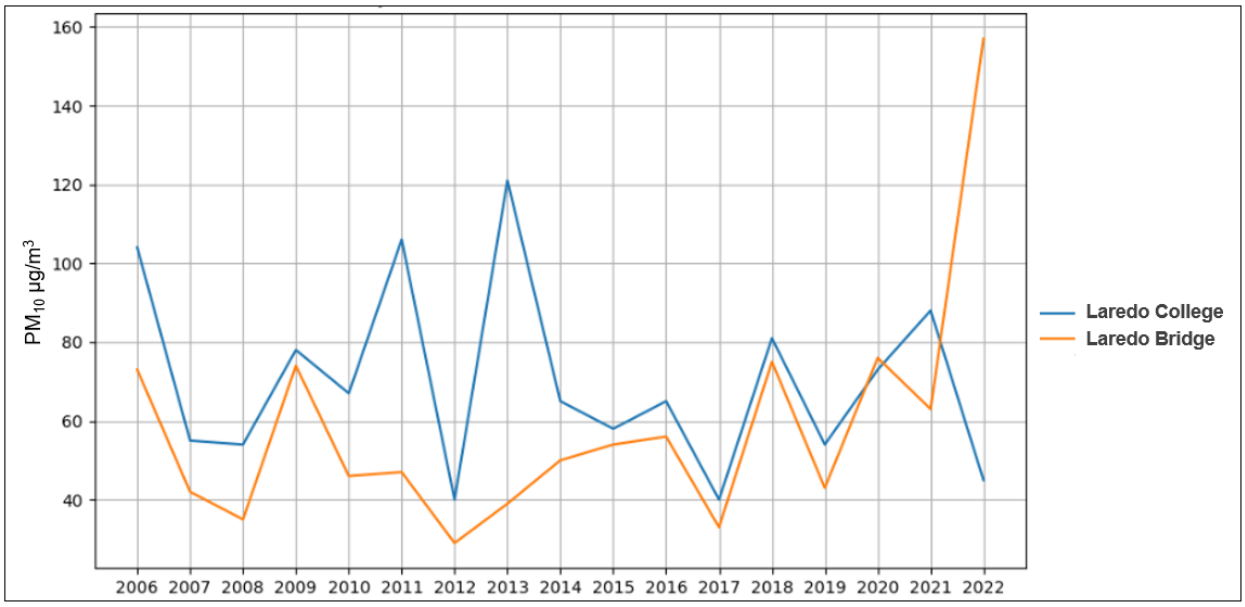

Figure 2-5: Webb County PM_{10} Annual Peak 24-hour Averages for FRM Monitoring Sites, Including Exceptional Event Days

Annual average $PM_{2.5}$ levels in Webb County have been relatively stable since 2018. As was the case in El Paso County, the 98th percentile value of $PM_{2.5}$ 24-hour average measurements has shown more variability from year to year. Figure 2-6: *Webb County $PM_{2.5}$ Annual Averages and Annual 98th Percentile of 24-hour Averages for Long-Term FRM Monitoring Sites, Including Exceptional Event Days* displays the referenced $PM_{2.5}$ trends.

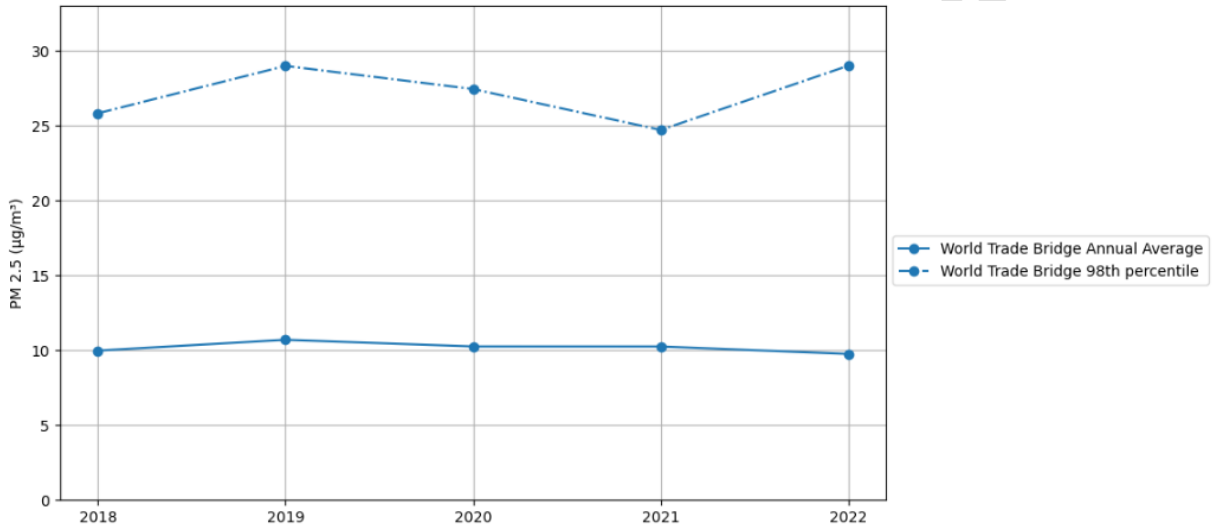

Figure 2-6: Webb County $PM_{2.5}$ Annual Averages and Annual 98th Percentile of 24-hour Averages for Long-Term FRM Monitoring Sites, Including Exceptional Event Days

2.2.3 Blowing Dust and Wind

The EPA High Wind Dust Event Guidance (EPA, 2019) suggests using a peak sustained wind speed of 25 mph as a threshold for determining possible influence from blowing dust.

Higher wind speeds normally result in particulate concentrations that are dominated by incoming background levels, which involve particulate transported from outside of the location in which they are monitored. At higher wind speeds, the impact of local sources becomes substantially diluted. Additionally, high winds cause mechanical mixing. Mechanical mixing is a process that uses the kinetic energy of relative fluid motion at night and weakens the formation of nocturnal inversions (an increase in temperature with increasing height above the earth's surface), thus supporting deeper vertical mixing and lower pollutant concentrations.

2.2.4 El Paso County Blowing Dust and Wind Trends

Figure 2-7: *El Paso County Daily Peak PM_{10} Average for FRM Measurements versus El Paso County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022* shows that the highest PM_{10} concentrations were recorded when peak wind speeds in El Paso County exceeded 25 mph, indicating a potential influence from wind-blown dust. Of particular interest in Figure 2-7 are the daily PM_{10} FRM measurements, which exceeded

the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS). The text labels for El Paso County measurements that are included in this demonstration are underlined and denoted with the date of February 16, 2022. Additionally, labels are provided to display dates that exceeded the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS) for years prior to 2022, beginning in 2006. Of all dates in the table that recorded PM_{10} concentrations that exceeded the PM_{10} NAAQS, only the values from February 09, 2013, March 23, 2013, and April 27, 2020 are not entered in the EPA's Air Quality System (AQS) database with informational flags requesting that the day be treated as a high-wind exceptional event. The two dates in 2013 were not regulatory significant, and the April 27, 2020, measurement that contains the additional label denoting construction was not eligible for an exceptional event demonstration due to the elevated PM_{10} concentrations having resulted from local construction as opposed to high winds. In Figure 2-7, the vertical red line represents EPA's 25 mph high-wind threshold, and the horizontal line represents the PM_{10} concentration above which a sample will be considered an exceedance. When considering rounding conventions associated with the sampling methodology used, a PM_{10} concentration must be greater than or equal to 155 µg/m³ to exceed the standard, and this fact is why concentrations that are at or only slightly above 150 µg/m³ are not considered exceedances.

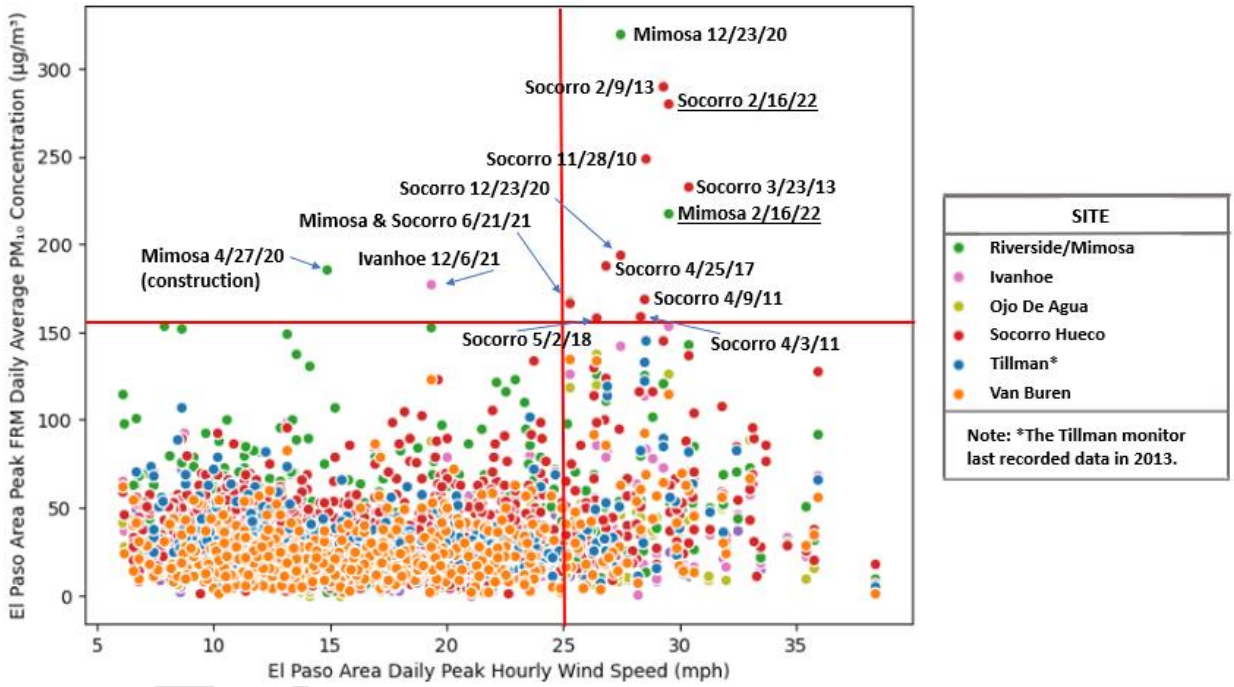

Figure 2-7: El Paso County Daily Peak PM_{10} Average for FRM Measurements versus El Paso County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022

Figure 2-8: *El Paso County Daily Peak $PM_{2.5}$ Average for FRM Measurements versus El Paso County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022* shows that $PM_{2.5}$ concentrations tend to be greatest when peak hourly sustained wind speeds exceed 25 mph.

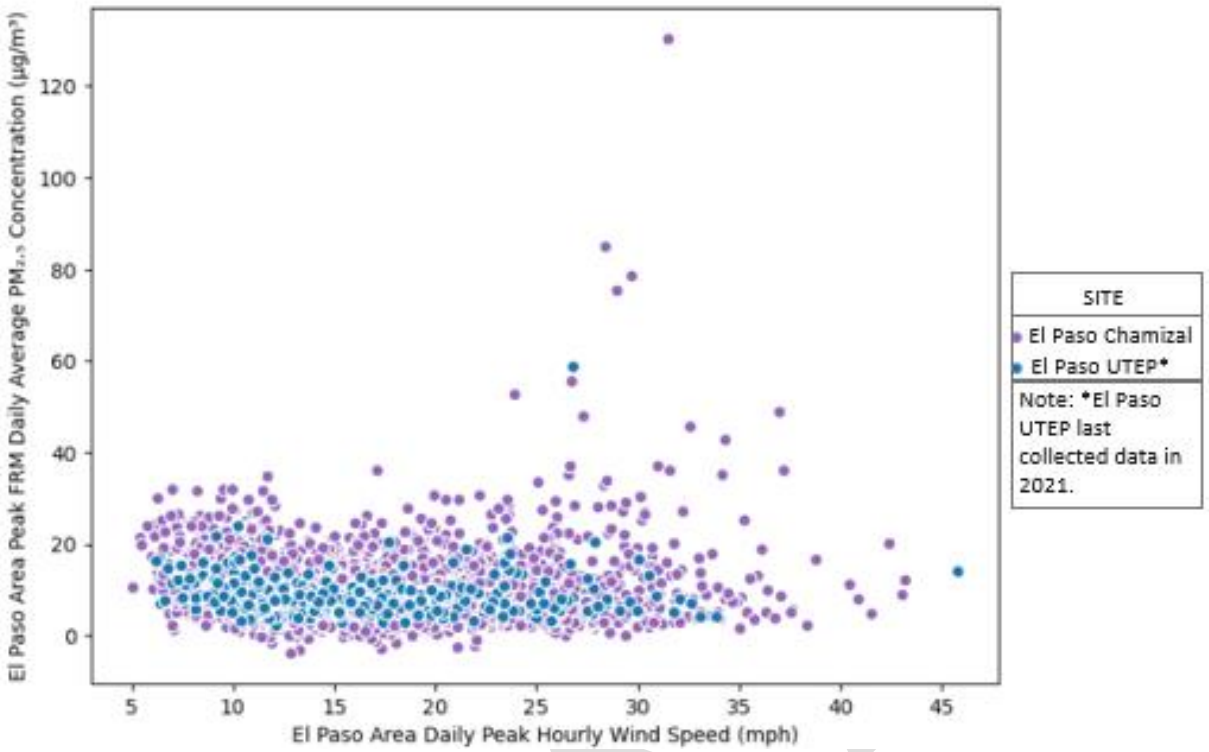

Figure 2-8: El Paso County Daily Peak $PM_{2.5}$ Average for FRM Measurements versus El Paso County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022

Specific to the Socorro Hueco (C49) air monitoring site, Figure 2-9: *Socorro Hueco (C49) Hourly Average Continuous PM_{10} Concentration versus Hourly Wind Speed for 2021 and 2022* shows the decrease in the frequency of hourly PM_{10} measurements in the zero through 200 micrograms per cubic meter ($\mu g/m^3$) range when hourly winds are 20 mph or lower (noticeable even as low as 18 mph). Of the two monitors in El Paso County with proposed 2022 exceptional events, only the Socorro Hueco (C49) monitor measures hourly PM_{10} concentrations. These hourly values are not used to determine compliance at the monitor like the FRM samples, but they are useful to supplement 24-hour data from FRM samples.

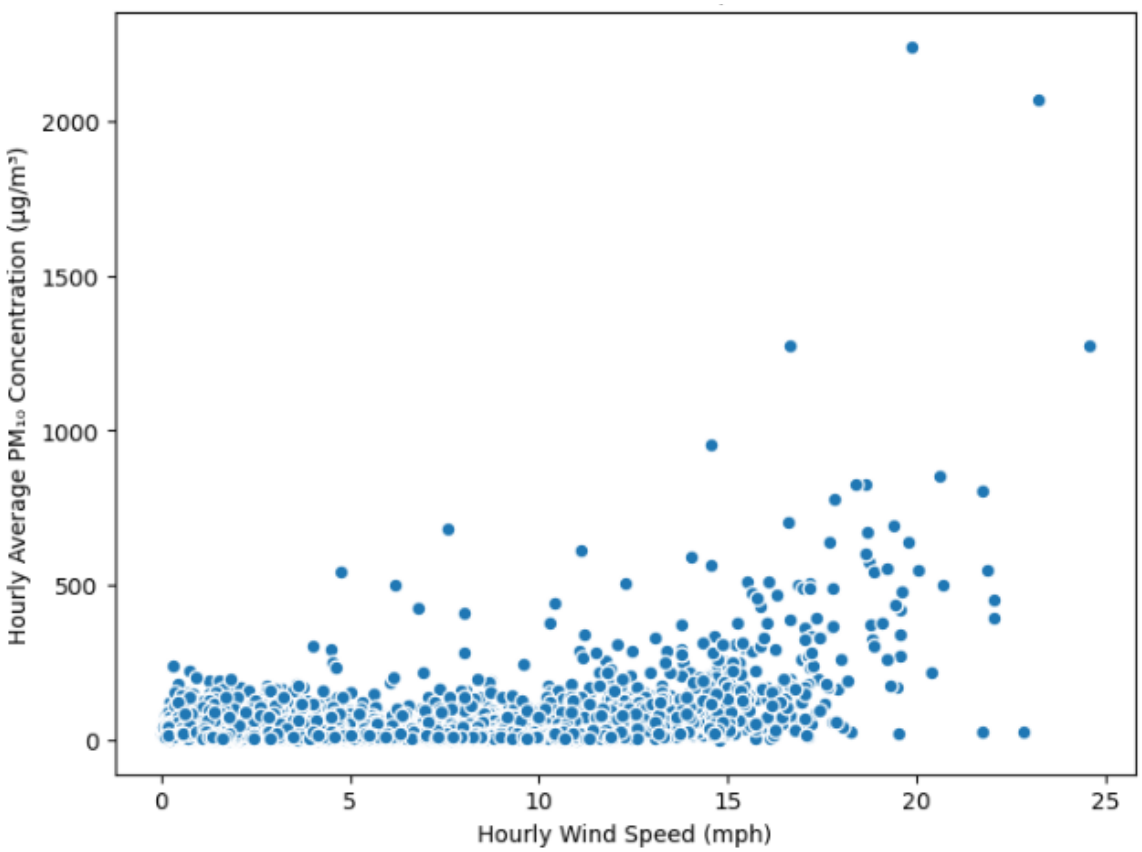

Figure 2-9: Socorro Hueco (C49) Hourly Average Continuous PM_{10} Concentration versus Hourly Wind Speed for 2021 and 2022

Figure 2-10: *El Paso Chamizal (C41) Hourly Average Carbon Monoxide Concentrations versus El Paso Chamizal (C41) Hourly Wind Speeds for 2021 and 2022* shows the impact to concentrations of a more localized pollutant like carbon monoxide that occurs at higher wind speeds. In a large urban area like much of El Paso County, carbon monoxide is generated locally through anthropogenic activity. Figure 2-10 is provided for comparison to Figure 2-9. The difference in the relationship with hourly wind speeds between PM_{10} and carbon monoxide is pronounced at higher wind speeds. Instead of tailing off to incoming background levels from the effects of dilution, as with carbon monoxide, PM_{10} concentrations increase with higher wind speeds, indicating an impact from windblown dust at wind speeds above approximately 18 mph, with the clearest influence at speeds above 20 mph.

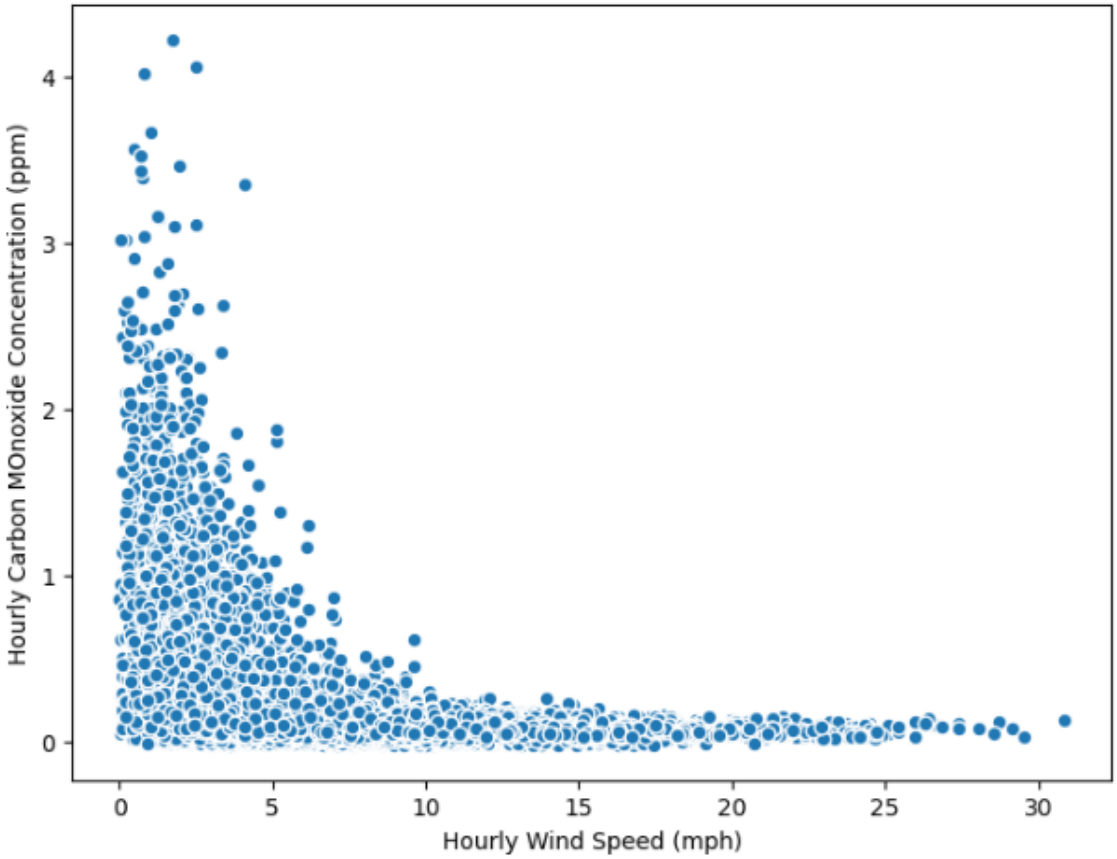

Figure 2-10: El Paso Chamizal (C41) Hourly Average Carbon Monoxide Concentrations versus El Paso UTEP (C12) Hourly Wind Speeds for 2021 and 2022

2.2.5 Webb County Blowing Dust and Wind Trends

Figure 2-11: *Webb County Daily Peak PM_{10} Average for FRM Measurements versus Webb County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022* shows that on dates that data were available, low-concentration PM_{10} days are most frequently recorded in the presence of relatively lower wind speeds in Webb County. Apart from the circled and labeled concentration recorded on the proposed exceptional event day of March 18, 2022, data in Figure 2-11 demonstrate that PM_{10} concentrations in Webb County have not approached the 150 µg/m^3 NAAQS during the entirety of 2006 through 2022. In Figure 2-11, the vertical red line represents EPA's 25 mph high-wind threshold, and the horizontal line represents the PM_{10} concentration above which a sample is considered an exceedance.

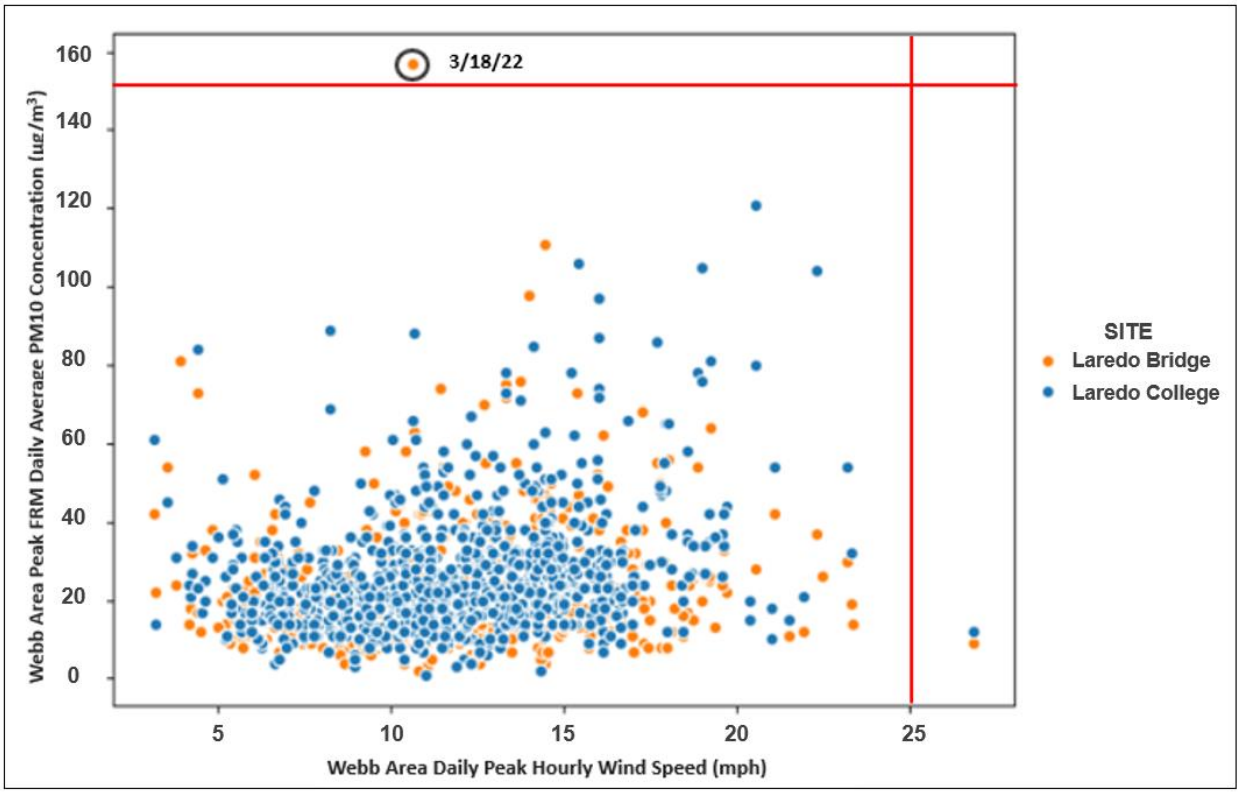

Figure 2-11: Webb County Daily Peak PM_{10} Average for FRM Measurements versus Webb County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022

Figure 2-12: *Webb County Daily Peak $PM_{2.5}$ Average for FRM Measurements versus Webb County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022* shows that $PM_{2.5}$ concentrations in Webb County show a slight increase as wind speeds go up. The greatest $PM_{2.5}$ concentrations were recorded on days that hourly wind speeds reached 13 to 15 mph. $PM_{2.5}$, due to its smaller size and associated ability to be entrained in the air for longer periods of time and therefore greater distances, can be influenced by wind speeds and conditions a greater distance from the sampling monitor than can PM_{10}.

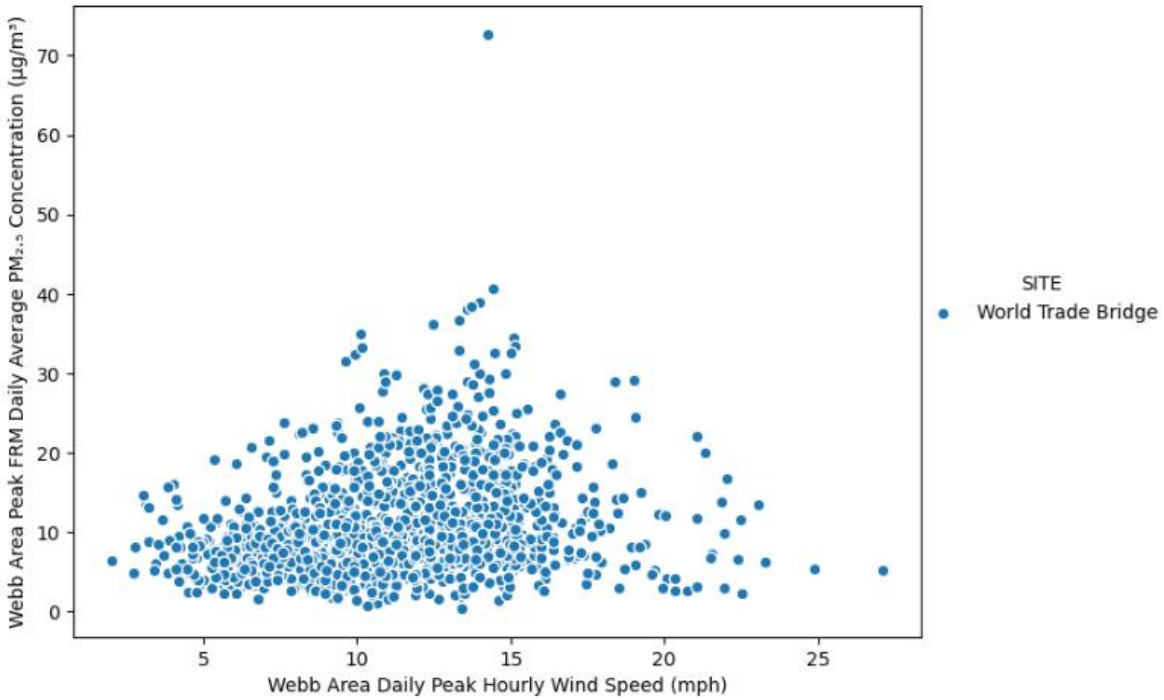

Figure 2-12: Webb County Daily Peak $PM_{2.5}$ Average for FRM Measurements versus Webb County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022

2.3 EVENT DAY SUMMARY INFORMATION

Descriptions of the meteorological conditions on each of the proposed exceptional event dates are provided in this section.

The proposed exceptional event day of February 16, 2022, was characterized by a cold front advancing toward El Paso County from the west. Winds ahead of the cold front were out of the southwest at approximately 23 mph in El Paso County. Behind the front, winds were out of the west at approximately 28 mph. A hazardous weather outlook issued by the National Weather Service referenced the potential for travel hazards and wind damage on this date. An event day analysis is provided in Appendix B: *Event Analysis for February 16, 2022*.

The proposed exceptional event day of March 18, 2022, was characterized by a cold front that moved through Webb County from the northwest. Winds behind the cold front were out of the northwest at about 17 mph in Webb County with gusts reaching 32 mph. An event day analysis is provided in Appendix C: *Event Analysis for March 18, 2022*.

2.3.1 Wind and Particulate Measurements

PM_{10} concentrations at monitors that exceeded the NAAQS and wind measurements on the proposed exceptional event days are provided in the appendices of this document.

EPA's High Wind Dust Event Guidance (EPA, 2019) suggests a minimum sustained wind speed of 25 mph for western states including Texas, or development of an alternate area-specific high wind threshold at which a dust event could occur. The February 16, 2022, event in El Paso County had peak area hourly wind speeds greater than 25 mph,

and the March 18, 2022, event in Webb County had peak hourly wind gusts greater than 25 mph.

TCEQ used National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL) meteorological model results to display wind speed and direction in the source areas of natural, undisturbed land for both the February 16, 2022, and March 18, 2022, proposed exceptional events. Specifically, TCEQ used the 12-kilometer (km) North American Model (NAM) hourly wind speeds and wind vectors at a 10-meter height. These maps are presented in Appendix B: *Event Analysis for February 16, 2022,* and Appendix C: *Event Analysis for March 18, 2022*.

All available continuous and non-continuous daily average particulate measurements from proposed exceptional event days in the relevant areas of concern are provided in Appendix B: *Event Analysis for February 16, 2022* and Appendix C: *Event Analysis for March 18, 2022*.

Comprehensive $PM_{2.5}$ Chemical Speciation Network (CSN) data were available in El Paso County for the proposed exceptional event of February 16, 2022. These data are presented in Appendix B: *Event Analysis for February 16, 2022*. The speciation data show a predominance of the Interagency Monitoring of Protected Visual Environments (IMPROVE) soil component on the proposed exceptional event day of February 16, 2022, indicating transported dust from high winds. These data were not available for March 18, 2022; therefore, the reconstructed $PM_{2.5}$ calculation could not be performed. The IMPROVE soil component is derived using a calculation consisting of speciated $PM_{2.5}$ parameters understood to be the primary constituents in soil that would be representative of transported dust from natural, undisturbed land.

2.3.2 Synoptic Weather Maps

Weather maps are helpful for displaying large-scale observation-based weather features. On the proposed exceptional event days, regional weather maps depict weather systems favorable for producing winds, and by extension, airborne particulate matter. These maps are presented in Appendix B: *Event Analysis for February 16, 2022,* and Appendix C: *Event Analysis for March 18, 2022*.

2.3.3 Backward-in-Time Air Trajectories

Backward-in-time air parcel trajectories were produced using the NOAA HYSPLIT model. For each event date, these trajectories provide an indication of the path an air parcel took en route to the area where elevated PM_{10} concentrations were recorded. This analysis is accomplished by tracking the air arriving at the time detailed on the event day and following the air backward in time to demonstrate both the origin and path of the air parcels. These trajectories are presented in Appendix B: *Event Analysis for February 16, 2022,* and Appendix C: *Event Analysis for March 18, 2022*.

2.3.4 Maps of Daily Average Particulate Matter

Maps of the daily average PM_{10} and $PM_{2.5}$ concentrations show the spatial distribution of measurements on an event day. For the proposed exceptional event day of February 16, 2022, the map demonstrates that although the highest concentrations were recorded at monitors that exceeded the NAAQS, relatively high concentrations were recorded throughout the area. This wide spatial distribution of high readings provides evidence that the elevated PM_{10} concentrations were the result of a non-local source, as a local source would result in a greater inconsistency amongst the monitors. The

Laredo Bridge monitor was the only monitor in Webb County that recorded PM_{10} concentrations on March 18, 2022; therefore, a comparison to PM_{10} concentrations at nearby sites is not possible. Maps of daily average PM_{10} and $PM_{2.5}$ concentrations are presented in the appendices of this document.

2.3.5 Continuous Data Time Series Graphs

Time series graphs with continuous particulate measurements plotted against wind speed measurements illustrate the nature of dust events by showing that particulate matter concentrations increase following sustained high wind speeds. Specifically, these plots show the correlation between an increase in wind speed and the associated PM_{10} concentrations. A graph for the February 16, 2022, event is presented in the appendices of this document. Continuous PM_{10} measurements were not recorded in the vicinity of the event on March 18, 2022; therefore, $PM_{2.5}$ concentrations from the area were used as a surrogate for PM_{10}. Due to their smaller size and ability to be entrained in the air more easily and for greater distances, $PM_{2.5}$ is not a perfect surrogate for PM_{10}, but using $PM_{2.5}$ data was the only option available for continuous particulate matter concentrations for the March 18, 2022, event.

CHAPTER 3: NOT REASONABLY CONTROLLABLE OR PREVENTABLE

The 2016 Exceptional Event Rule, 40 Code of Federal Regulations (CFR) §50.14(c)(3)(iv)(D), requires states to demonstrate that the event was both not reasonably controllable and not reasonably preventable. However, under 40 CFR §50.14(b)(5)(iv), states are not required to provide a case-specific justification for a high wind dust event to address the not reasonably preventable criterion. Therefore, only evidence to meet the not reasonably controllable criterion is presented here.

3.1 NATURAL AND ANTHROPOGENIC SOURCE CONTRIBUTIONS

When assessing the origin of blowing dust, both natural and anthropogenic potential sources must be considered. A review of the natural features in the vicinity of counties for which exceptional events are proposed in this demonstration was conducted. Additionally, particulate matter emissions inventory data were reviewed to identify the location of these sources relative to the PM_{10} monitors that recorded elevated particulate matter concentrations on the proposed exceptional event days. Findings from this research are presented in this section.

3.1.1 Natural Source Particulate Matter

With respect to the proposed exceptional event for El Paso County, a study of blowing dust plume origins in the Chihuahuan Desert area surrounding El Paso County, based on satellite imagery for 26 episodes from 2001 through 2009, indicated that origin locations were primarily in northern Mexico and southwestern New Mexico (Baddock et al., 2011). Dust sources for multiple dust storm events from 2002 through 2006 were studied by Gill et al. (2007). Their work found that a large playa complex within the Lake Palomas region of northern Chihuahua, Mexico frequently contributed to concentrated plumes of particulate matter that spread into the El Paso/Ciudad Juarez area. Particle size analyses of surface sediment samples from these playas revealed very fine clays and silts with grain sizes in the particulate matter of 2.5 microns or less in aerodynamic diameter ($PM_{2.5}$) and particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}) ranges, including particles as small as 0.2 micron.

The El Paso/Ciudad Juarez area is in a bowl-shaped valley where particulate matter gets trapped by strong temperature inversions and down-sloping winds from surrounding mountains during air stagnation events. Anthropogenic sources that contribute to elevated particulate matter concentrations during air stagnation episodes often include local industrial facilities, automobiles, and fires. Although controls on particulate matter sources in Ciudad Juarez cannot be accurately assessed since Texas has no jurisdiction over those sources, El Paso and nearby Sunland Park, New Mexico have comparatively strict controls on pollution sources from various combustion types that are considered reasonably available control technology (RACT) or reasonably available control measures (RACM) (TCEQ1, 2007).

Webb County is located in an area with expanses of natural, undisturbed land including dry lakebeds with minimal vegetation. These features are potential sources of blowing dust.

3.1.2 Anthropogenic Source Particulate Matter

Particulate matter emissions inventories (EI) were reviewed for each county for which an exceptional event for 2022 is proposed. These inventories were reviewed to identify the sources of the largest anthropogenic particulate matter emitters to gain an

understanding of whether these sources could have influenced PM_{10} concentrations on the proposed exceptional event days.

Table 3-1: *El Paso County Particulate Matter Emissions Inventory in Tons per Year* shows the 2020 area source and mobile source particulate matter EI for El Paso County as reported for the 2020 National Emissions Inventory, as well as the 2016 through 2021 point-source EI. These emissions inventories are representative of the entire county and not specific to just those areas upwind of area monitors on the proposed exceptional event day of February 16, 2022. Evaluation of the El Paso County particulate matter EI reveals that the greatest contributions of anthropogenic particulate emissions are from unpaved roads, commercial construction, and paved roads. Given the locations of the Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) monitors, impacts from major road construction or commercial construction projects in El Paso County are unlikely to have been a major contributor to measured concentration values on the flagged, proposed exceptional event day of February 16, 2022. This is true because winds were primarily from the southwest on this date, which is from the direction of Mexico. As such, there were no large El Paso County anthropogenic particulate matter sources upwind of the Riverside/El Paso Mimosa (C418) and Socorro Hueco (C49) monitors.

Table 3-1: El Paso County Particulate Matter Emissions Inventory in Tons per Year

Year	Source Type	Source Category	PM_{10}	$PM_{2.5}$
2020	Area	Road Construction	340	34
2020	Area	Unpaved Roads	9,460	942
2020	Area	Commercial Construction	4,193	419
2020	Area	Paved Roads	1,298	325
2020	Area	Agricultural Tilling	615	123
2020	Area	Residential Construction	294	29
2020	Area	Mining and Quarrying	476	60
2020	Area	Remaining Area Sources	593	371
2020	Mobile	On-road	475	166
2020	Mobile	Non-road	113	107
2016	Point	Point Sources	346	285
2017	Point	Point Sources	305	196
2018	Point	Point Sources	306	218
2019	Point	Point Sources	289	200
2020	Point	Point Sources	286	200
2021	Point	Point Sources	277	194

Figure 3-1: *El Paso County PM_{10} Point Source Locations* displays locations of point sources in El Paso County reporting 2020 particulate matter emissions. On the

proposed exceptional event day of February 16, 2022, primarily southwesterly wind was never from the direction of these sources relative to the Riverside/El Paso Mimosa (C418) and Socorro Hueco (C49) monitors. The number plotted inside each point source circle in Figure 3-1 is the PM_{10} annual emission rate in tons per year from the 2020 TCEQ emissions inventory. The size of the diamond in each point source circle indicates the fraction of the total PM_{10} emitted as $PM_{2.5}$ based on the 2020 $PM_{2.5}$ annual emission rate.

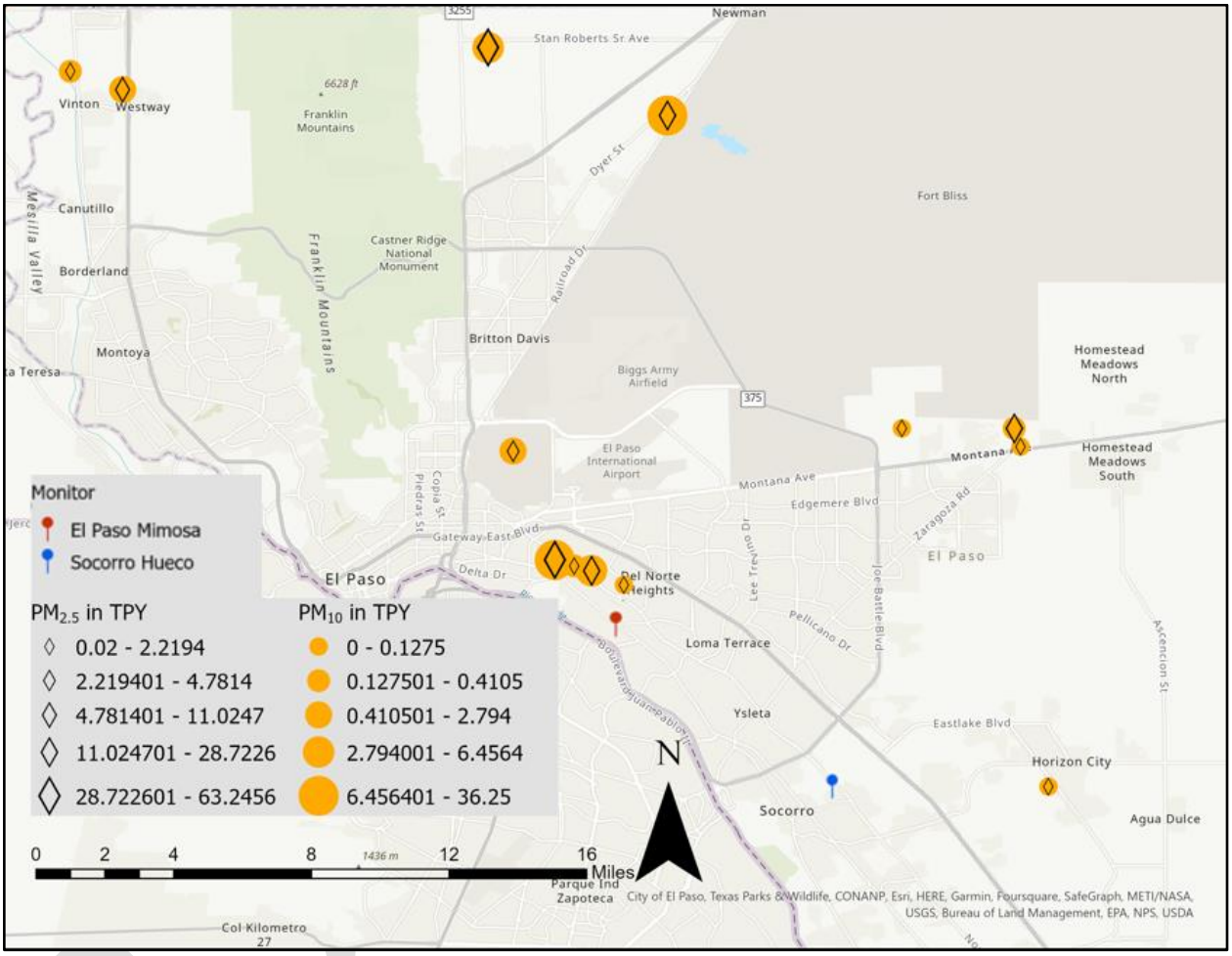

Figure 3-1: El Paso County PM_{10} Point Source Locations

Table 3-2: *Webb County Particulate Matter Emissions Inventory in Tons per Year* shows the 2020 area source and mobile source particulate matter EI for Webb County as reported for the 2020 NEI, as well as the 2016 through 2021 point-source EI. These emissions inventories are annual values representative of the entire county and not specific to just those areas upwind of area monitors on the proposed exceptional event day of March 18, 2022. Evaluation of the Webb County particulate matter EI reveals the most significant contributions of anthropogenic particulate emissions are from unpaved roads, agricultural tilling, and paved roads.

Table 3-2: Webb County Particulate Matter Emissions Inventory in Tons per Year

Year	Source Type	Source Category	PM_{10}	$PM_{2.5}$
2020	Area	Road Construction	148	15
2020	Area	Unpaved Roads	5,089	507
2020	Area	Industrial/Commercial/Institutional Construction	613	61
2020	Area	Paved Roads	691	173
2020	Area	Agricultural Tilling	1,472	294
2020	Area	Residential Construction	105	11
2020	Area	Mining and Quarrying	24	3
2020	Area	Remaining Area Sources	990	326
2020	Mobile	On-road	133	49
2020	Mobile	Non-road	74	71
2016	Point	Point Sources	42	41
2017	Point	Point Sources	38	38
2018	Point	Point Sources	66	56
2019	Point	Point Sources	62	51
2020	Point	Point Sources	50	44
2021	Point	Point Sources	53	45

Figure 3-2: *Webb County PM_{10} Point Source Locations* displays point sources reporting 2020 particulate matter emissions. Please note that the scale fluctuates between Figure 3-1 (presented on page 3-4) and Figure 3-2. On March 18, 2022, winds were primarily from the northwest, and while en route to the Laredo Bridge (C66) monitor, potentially pass south of most of the area source locations presented in Figure 3-2.

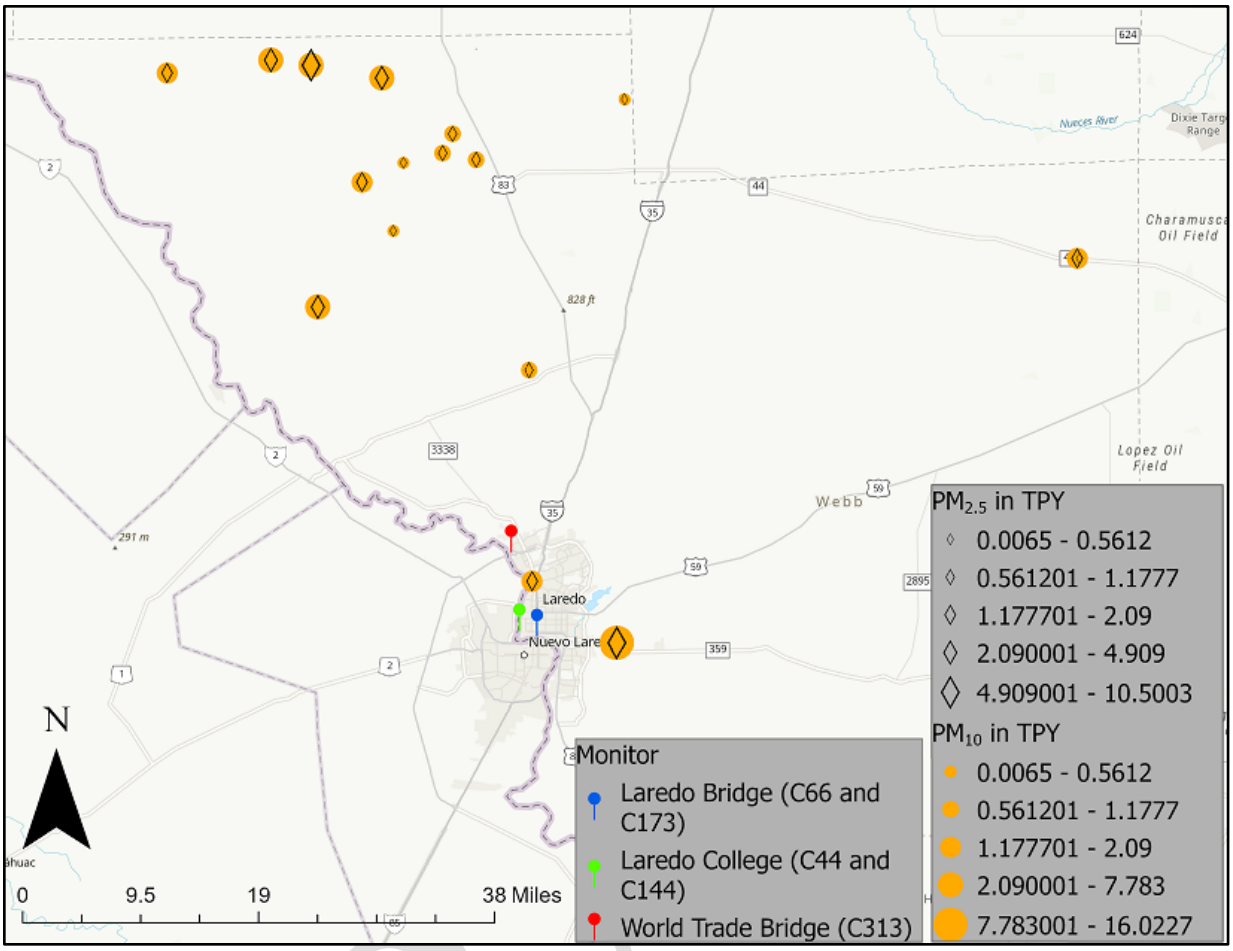

Figure 3-2: Webb County PM_{10} Point Source Locations

$PM_{2.5}$ speciation data were evaluated and provide further indication that particulate matter constituents present in the samples on the proposed exceptional event day of February 16, 2022, were not representative of particulate matter species present in samples on days not influenced by wind-blown dust. Through a series of calculations, this analysis was performed for particulate matter concentrations on February 16, 2022, in El Paso County. Speciation data were (AK) not available for Webb County for the March 18, 2022, event. Results from this study for El Paso County are presented in Appendix B: *Event Analysis for February 16, 2022*.

Wind roses are an effective way to present long-term trends in wind speed and direction. Wind roses were generated from select monitors within both counties for which exceptional events are proposed for 2022. Lengths of the wind rose bars indicate the frequency of hourly winds blowing from the direction of the bar toward a site. The width and color of the bars indicate the hourly wind speeds for the ranges shown in the key. With stronger winds, the direction of the wind will more directly indicate the source of any air pollution present. When reviewing wind roses from a region with mountainous topography, such as El Paso County, the channeling effect of such topography must also be considered relative to a monitor's location. Assistance with reading a wind rose can be found at EPA's How to Read a Wind Rose webpage (https://www.epa.gov/sites/default/files/2019-01/documents/how_to_read_a_wind_rose.pdf).

Figure 3-3: *Wind Rose Plots for the El Paso UTEP (C12), Ascarate Park SE (C37), El Paso Chamizal (C41), and Socorro Hueco (C49) Monitors for 2020 through 2022* illustrates wind patterns in El Paso County on dates data were available. The inconsistencies in wind data observed from monitors within the same geographic area is due to the channeling effect of the mountainous terrain in the area, which results in different wind patterns occurring at different monitors.

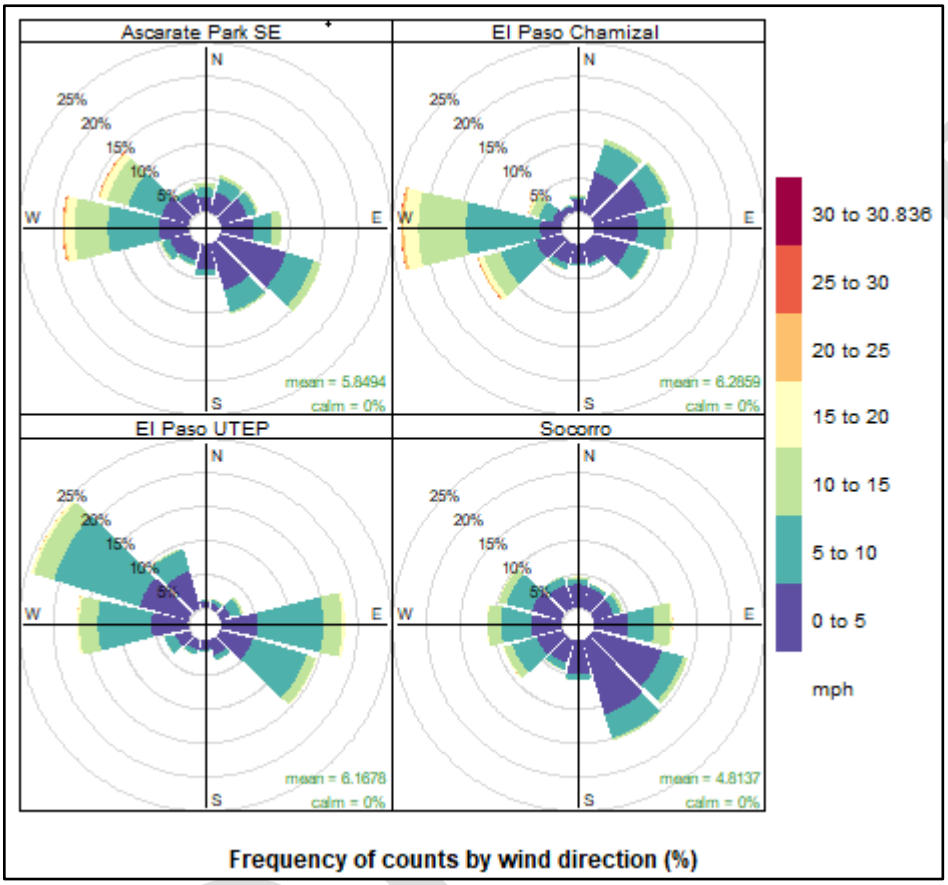

Figure 3-3: Wind Rose Plots for the El Paso UTEP (C12), Ascarate Park SE (C37), El Paso Chamizal (C41), and Socorro Hueco (C49) Monitors for 2020 through 2022

Figure 3-4: *Wind Rose Plots for the Laredo Bridge (C66) and Laredo College (C44) Monitors for 2020 through 2022* illustrates wind patterns in Webb County. As indicated by the wind roses in Figure 3-4, winds are typically from the southeast. On the proposed exceptional event day of March 18, 2022, winds were primarily from the northwest.

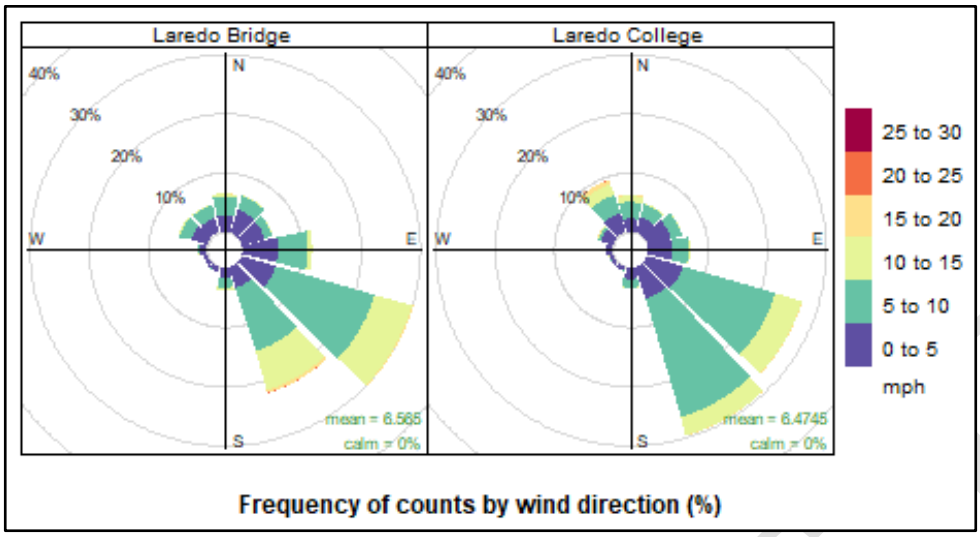

Figure 3-4: Wind Rose Plots for the Laredo Bridge (C66) and Laredo College (C44) Monitors for 2020 through 2022

3.2 ATTAINMENT STATUS AND CONTROL MEASURES

The City of El Paso has been designated as nonattainment for the 1987 24-hour PM_{10} NAAQS since November 15, 1990. The State of Texas adopted state implementation plan (SIP) revisions in November 1991 that include regulations on PM_{10} sources in the El Paso area. EPA published its approval of the El Paso PM_{10} SIP revision on January 18, 1994, effective on February 17, 1994. The approved SIP revision incorporated all nonattainment requirements, including RACT and RACM. Additionally, a Memorandum of Understanding (MOU) between the City of El Paso and the Texas Air Control Board (TACB), a predecessor agency of TCEQ, was incorporated to define the division of responsibility and commitments to carry out provisions of the rules developed in the 1991 El Paso PM_{10} SIP revision.

On January 25, 2012, TCEQ adopted a SIP revision to incorporate updates to the PM_{10} control measures and to incorporate a Memorandum of Agreement (MOA) between TCEQ and the City of El Paso. EPA published its approval of this SIP revision on December 14, 2015, effective January 13, 2016 (80 *Federal Register* 77253). The regulations included are summarized below:

- Title 30 Texas Administrative Code (TAC) §111.111(c) established conditions for the use of solid fuel heating devices during periods of atmospheric stagnation in the City of El Paso, including the Fort Bliss Military Reservation.
- Title 30 TAC §111.141 establishes that §111.143 (relating to Materials Handling), §111.145 (relating to Construction and Demolition), §111.147 (relating to Roads, Streets, and Alleys), and §111.149 (relating to Parking Lots), and associated dates of compliance, shall apply to the City of El Paso and portions of the Fort Bliss Military Reservation.
- Title 30 TAC §111.145 establishes measures to control dust emissions related to land clearing and construction, repair, alteration and demolition of structures, roads, streets, alleys, or parking areas of any size in the city of El Paso.
- Title 30 TAC §111.147 establishes measures to control dust emissions on public, industrial, commercial, or private roads, streets, or alleys including application of asphalt, water, or suitable oil or chemicals and mechanical street sweeping. Specific

requirements are established for alleys and levee roads within the city of El Paso, including paving new alleys and disallowing use of unpaved existing alleys for residential garbage and recycling collection.

The following summarizes other existing regulations applicable to particulate matter control in the El Paso area:

- Title 30 TAC §111.143 establishes measures to control dust emissions related to the handling, transport, or storage of materials which can create airborne particulate matter including the application of water, chemicals, or coverings on materials stockpiles; use of hoods, fans, and filters to enclose, collect, and clean the emissions of dusty materials; and the covering of all open-bodied trucks, trailers, and railroad cars transporting materials in the City of El Paso.
- Title 30 TAC §111.149 establishes measures to control dust emissions, including appropriate application of asphalt, water, or suitable oil or chemicals for temporary parking lots, parking lots having more than five spaces, and paved parking lots having more than one-hundred spaces.
- City of El Paso Municipal Code Chapter 19.15.020, concerning subdivider responsibility, establishes standards for proposed roads serving new developments, including alleys.
- City of El Paso Municipal Code Chapter 19.15.160 establishes standards for the construction and improvement of alleys.
- City of El Paso Municipal Code Chapter 20.14 establishes standards for the provision of off-street parking, loading and storage, including standards for dust-free surfacing.

At the time of the March 18, 2022, potential exceptional event, Webb County had been designated as attainment for the 24-hour PM_{10} NAAQS since November 15, 1990, and it had also been designated as attainment for both the annual and 24-hour $PM_{2.5}$ NAAQS ever since $PM_{2.5}$ designations were first made effective on April 5, 2005.

3.3 NOT REASONABLY CONTROLLABLE

As discussed throughout this document, the proposed event days were characterized by international or domestic transport of blowing dust not indicative of local sources. Backward trajectories presented in the appendices of this document suggested the transport of dust from uncontrollable sources. The transport of this dust was associated with regional high winds, as described throughout this document.

3.4 NOT REASONABLY CONTROLLABLE OR PREVENTABLE DETERMINATION

The documentation and analysis presented in this chapter and within this document's appendices demonstrate that all possible sources other than from international or domestic transport that could have caused or contributed to the exceedances were reasonably controlled, effectively implemented, and enforced at the time of the events; therefore, emissions associated with the high wind dust events were not reasonably controllable or preventable.

CHAPTER 4: NATURAL EVENT

The proposed exceptional event flags for February 16, 2022, and March 18, 2022, are for high wind blowing dust events generated entirely from natural, undisturbed lands, which are natural events. International dust source locations are consistent with a study of blowing dust origin locations in the Chihuahua Desert surrounding El Paso during the period 2001 through 2009 (Baddock et al., 2011). High wind blowing dust events are less common in Webb County.

On the proposed exceptional event day of February 16, 2022, the Interagency Monitoring of Protected Visual Environments (IMPROVE) soil component also provided evidence that elevated particulate concentrations were from natural sources. The El Paso County IMPROVE soil component shown in Appendix B: *Event Analysis for February 16, 2022,* exceeded the 2020 through 2022 average PM_{10} concentration values, as would be expected with natural events caused by blowing dust associated with high winds. The data necessary to conduct this study were not available for March 18, 2022. As such, the IMPROVE soil component could not be calculated for the proposed exceptional event for the Laredo Bridge (C66) monitor in Webb County.

Based on the documentation provided in this demonstration, the events qualify as natural events. The exceedances associated with the events meet the regulatory definition of natural events under 40 Code of Federal Regulations §50.14(b)(5)(ii). The events transported windblown dust from natural, undisturbed lands, as documented throughout this demonstration, and accordingly, the Texas Commission on Environmental Quality has demonstrated that the events were natural events and should be considered for treatment as exceptional events.

CHAPTER 5: CLEAR CAUSAL RELATIONSHIP

Abundant evidence, including wind information, particulate matter of 2.5 microns or less in aerodynamic diameter ($PM_{2.5}$) speciation data (where available), and backward-in-time air parcel trajectories, provides proof that the elevated particulate concentrations on the proposed exceptional event days were caused by blowing dust from natural sources generated by high winds.

A comparison of $PM_{2.5}$ chemical speciation data provided evidence that particulate matter concentrations on the proposed exceptional event day of February 16, 2022, were influenced by particulate matter transported into El Paso County. As presented in Appendix B: *Event Analysis for February 16, 2022,* speciation data confirmed that the IMPROVE soil component was higher than the average IMPROVE soil component for 2020 through 2022. Due to a lack of availability of $PM_{2.5}$ speciated data in Webb County on March 18, 2022, this study could not be conducted for this date.

Backward-in-time air trajectories (NOAA ARL, 2022) confirmed that air arriving during the proposed exceptional event days traveled through natural, undisturbed land prior to arrival in counties that monitored elevated PM_{10} concentrations. Specifically, trajectories for both the February 16, 2022, and March 18, 2022, events traveled through natural, undisturbed land prior to arrival at the respective monitors. Backward-in-time air trajectories are presented in graphic form in the appendices of this document.

5.1 OCCURRENCE AND GEOGRAPHIC EXTENT OF THE EVENT

To contribute additional supporting documentation establishing the occurrence and geographical extent of the proposed exceptional events, descriptions of weather conditions and maps of particulate matter concentrations are presented in the appendices of this document. Additionally, special weather statements and media coverage information, on dates available, are presented in the appendices of this document.

5.1.1 Transport of Event Emissions to the Relevant Particulate Matter Monitor

Evidence to demonstrate that high wind blowing dust events transported particulate matter to the impacted monitors on the proposed exceptional event days, including analysis of continuous particulate matter and meteorological data, HYSPLIT backward trajectories, and maps of particulate matter concentrations, are provided in the appendices of this document.

5.1.2 Spatial Relationship Between the Event, Particulate Matter Sources, Transport of Emissions, and Recorded Concentrations

Information to help establish relevant spatial relationships during the events, including area maps, wind direction, anthropogenic/natural particulate matter source locations, monitor locations, and measured particulate matter concentrations are discussed throughout the demonstration document with supplemental information presented in the appendices of this document.

5.1.3 Temporal Relationship Between the High Wind and Elevated Particulate Matter Concentrations

Continuous data time series plots in the narrative conceptual model generally establish the concurrent relationship between high winds and elevated particulate matter

concentrations for an event. This is the case for the February 16, 2022, event where sustained hourly winds of greater than 25 mph were recorded at El Paso County monitors. Wind speed was more sporadic on the March 18, 2022, proposed exceptional event day with wind gusts greater than 25 mph recorded in Webb County.

5.1.4 Speciation Data: Chemical Composition and/or Size Distribution

Speciation data profiles, available for the February 16, 2022, event, provide supporting evidence that the particulate compositions on this date were different than typical compositions. Specifically, a greater-than-average portion of particulate matter on February 16, 2022, was composed of crustal material that included components consistent with natural soils. Speciation data were not available for analysis for the March 18, 2022 event.

5.1.5 Comparison of Event-Affected Days to Other High Wind Days without Elevated Concentrations

To illustrate the impact a windblown dust event has as compared to the impact of local anthropogenic dust, an analysis comparing the proposed exceptional event days to other days without elevated 24-hour PM_{10} concentrations in 2022 was conducted. Specifically, this comparative analysis focused on identifying days with wind speed and wind direction measurements comparable to the proposed exceptional event days but without elevated 24-hour PM_{10} values. PM_{10} data used for selecting dates in this study were also collected via a tapered element oscillating microbalance (TEOM) sampler. Due to the once-every-six-days sampling schedule for Federal Reference Method (FRM) PM_{10} results, these data can be unavailable on the days that met the wind criteria.

On each of the identified days, daily average PM_{10} measurements were significantly less than the flagged, proposed exceptional event days. These data are provided in the appendices of this document and supply additional supporting evidence that measured concentrations on the flagged, proposed exceptional event days were not the result of local anthropogenic sources but were instead caused by transport of widespread dust.

5.1.6 Assessment of Possible Alternative Causes for the Relevant Particulate Matter Exceedances or Violations

A review of the location of PM_{10} point source locations in counties with proposed exceptional events provided further evidence that the PM_{10} concentrations on the proposed exceptional event dates were the result of particulate matter transported into the areas as opposed to local point sources. Figure 3-1: *El Paso County PM_{10} Point Source Locations* in Section 3.1: *Natural and Anthropogenic Source Contributions*, Chapter 3: *Not Reasonably Controllable or Preventable* shows that because winds were from the southwest, significant non-event particulate matter point sources were not upwind of the monitors that recorded PM_{10} exceedances in El Paso County on February 16, 2022. This is evident when reviewing backward trajectories in Appendix B: *Event Analysis for February 16, 2022*. Collectively, this evidence establishes the unlikelihood of potential anthropogenic causes of the relevant PM_{10} exceedances at Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) on February 16, 2022.

Figure 3-2: *Webb County Significant PM_{10} Point Source Locations* in Section 3.1: *Natural and Anthropogenic Source Contributions*, Chapter 3: *Not Reasonably Controllable or Preventable* also indicates that the significant non-event particulate matter point

sources were likely not upwind of the Laredo Bridge (C66) monitor during the highest winds on March 18, 2022, which were from the northwest. This is evident when reviewing the lowest-altitude backward trajectories in Appendix C: *Event Analysis for March 18, 2022*.

The evidence provided by PM_{10} point source locations relative to wind directions on proposed exceptional event days establishes the unlikelihood of potential anthropogenic causes of the PM_{10} exceedances.

5.2 COMPARISON OF EVENT-RELATED CONCENTRATIONS TO HISTORICAL CONCENTRATIONS

The 2016 Exceptional Event Rule requires that states compare event-related concentrations to historical concentrations. This section was prepared in accordance with the EPA High Wind Dust Event Guidance document (EPA, 2019). The information also serves as an important basis for the clear causal relationship criteria.

5.2.1 Comparison of Concentrations on the Claimed Event Days with Past Historical Data

Figure 5-1: Socorro Hueco (C49) *FRM PM_{10} Daily Measurements from 2018 through 2022* and Figure 5-2: *Riverside/El Paso Mimosa (C418) FRM PM_{10} Daily Measurements from 2018 through 2022* show the valid daily measurements of PM_{10} over the five years referenced at the stated monitors. In both figures, PM_{10} concentrations on the proposed exceptional event day of February 16, 2022, are circled. These figures demonstrate that flagged measurements on February 16, 2022, were well outside of normal historical fluctuations in measured particulate concentrations for El Paso County. It should be noted that above-average concentrations in Figure 5-2 during 2020, including the highest measurement of all during the five years plotted, were influenced by construction activity in the vicinity of the Riverside/El Paso Mimosa (C418) monitor during this period.

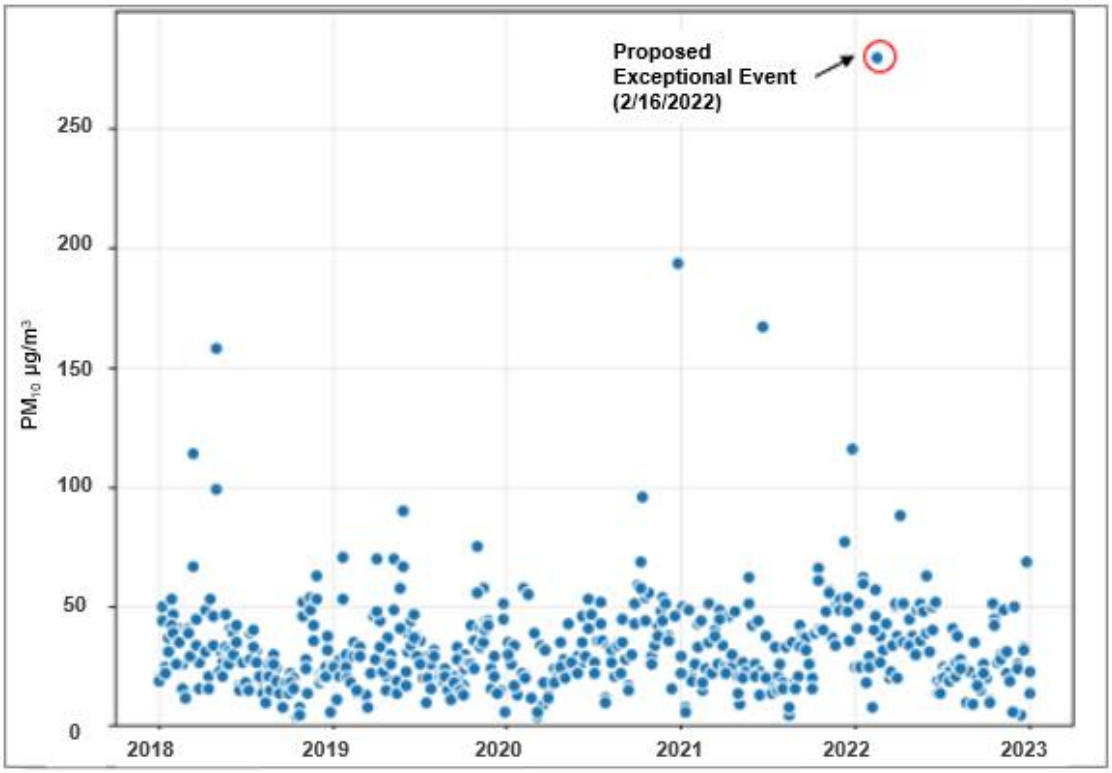

Figure 5-1: Socorro Hueco (C49) FRM PM_{10} Daily Measurements from 2018 through 2022

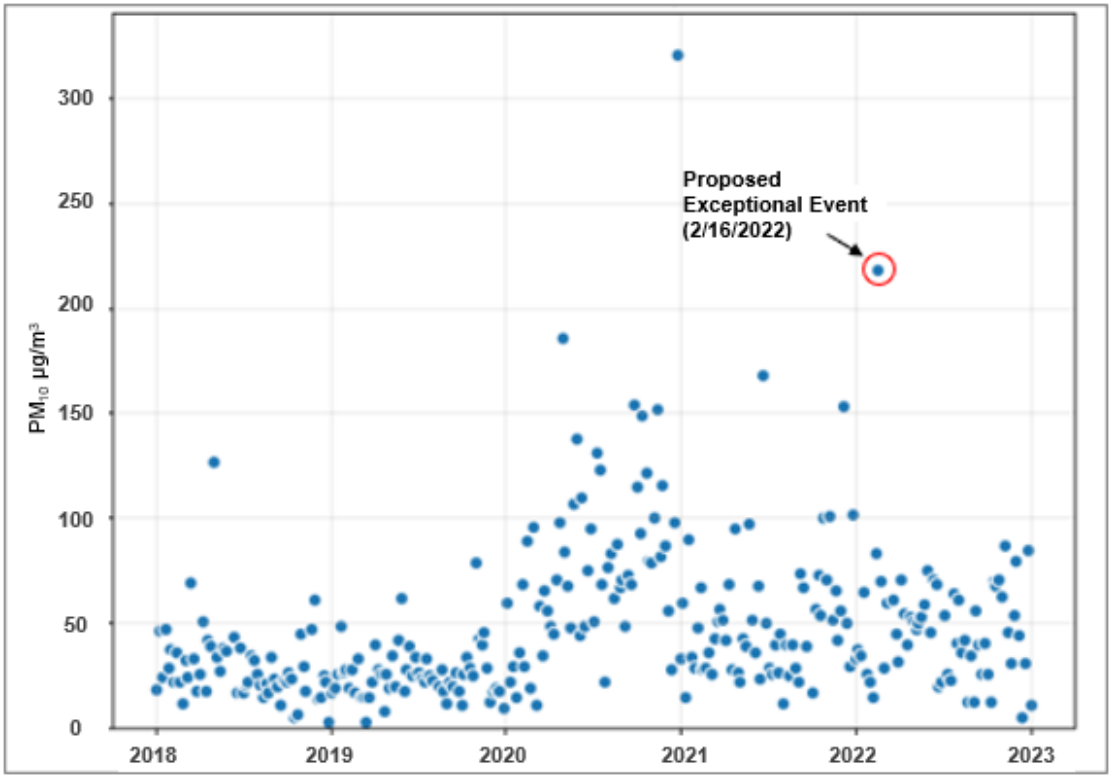

Figure 5-2: Riverside/El Paso Mimosa (C418) FRM PM_{10} Daily Measurements from 2018 through 2022

Figure 5-3: *Laredo Bridge (C66) FRM PM_{10} Daily Measurements from 2018 through 2022* shows the valid daily measurements of PM_{10} at Laredo Bridge (C66). This figure demonstrates that the flagged measurement on March 18, 2022, was outside of normal historical fluctuations in measured particulate concentrations at the Laredo Bridge (C66) monitor. In Figure 5-3, PM_{10} concentrations on the proposed exceptional event day of March 18, 2022, are circled.

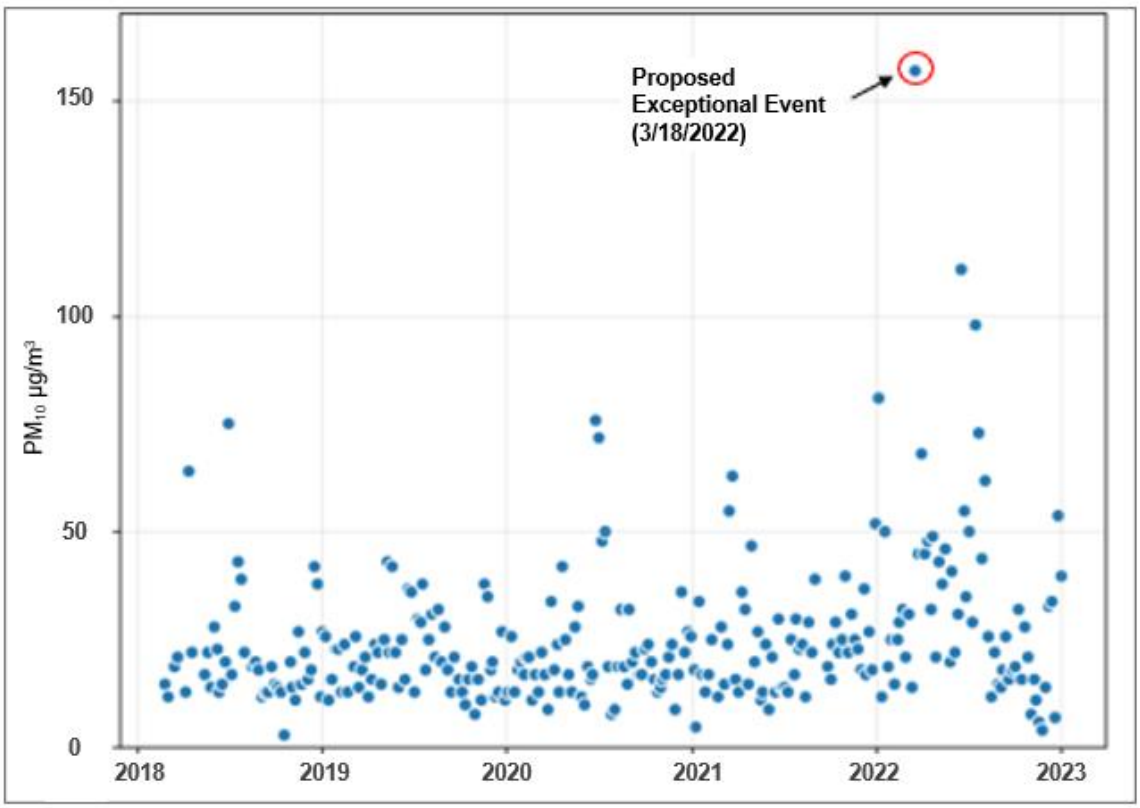

Figure 5-3: Laredo Bridge (C66) FRM PM_{10} Daily Measurements from 2018 through 2022

5.2.2 Spatial and Temporal Variability of PM_{10}

PM_{10} data measured across a county in days preceding and following a proposed exceptional event highlight the impact of a windblown dust event on a flagged event day and demonstrate spatial and temporal variability of PM_{10} in the impacted county. These data, for both proposed exceptional event dates for 2022, are presented in the appendices of this document. In each instance, the respective proposed exceptional event date was an outlier relative to its surrounding dates, which, given a lack of information indicating increased local emissions on the event day, indicates that transport was the most likely cause of increased emissions on the event day.

5.2.3 Percentile Ranking

The flagged PM_{10} concentrations on both proposed exceptional event dates were above the 99th percentile at their respective monitors and demonstrate that the measurements were well above normal historical fluctuations.

5.3 CLEAR CAUSAL RELATIONSHIP DETERMINATION

On February 16, 2022, a high wind dust event occurred and resulted in elevated PM_{10} concentrations at the Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) monitoring sites in El Paso County. The monitored PM_{10} concentrations of 280 µg/m^3 at Socorro Hueco (C49) and that of 218 µg/m^3 at the Riverside/El Paso Mimosa (C418) monitor were, respectively, the highest and second highest concentration recorded at these monitors during the five-year period from 2018 through 2022. The elevated PM_{10} concentrations on February 16, 2022, were the result of widespread blowing dust transported from northern Mexico associated with high winds generated by a cold front.

On March 18, 2022, a high wind dust event occurred and resulted in elevated PM_{10} concentrations at the Laredo Bridge (C66) monitoring site in Webb County. The monitored PM_{10} concentration of 157 µg/m^3 was the highest measurement at this monitor during the five-year period from 2018 through 2022. The elevated PM_{10} concentration on March 18, 2022, was the result of widespread blowing dust transported from natural, undisturbed land northwest of the Laredo Bridge (C66) monitor.

The comparisons and analyses provided in both the narrative conceptual model, clear causal relationship sections, and associated appendices of this demonstration, support the Texas Commission on Environmental Quality's determination that the events affected air quality and there exists a clear causal relationship between the specific events and the monitored PM_{10} exceedances at the Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) monitors on February 16, 2022 and at the Laredo Bridge (C66) monitor on March 18, 2022. This information satisfies the clear causal relationship criterion.

CHAPTER 6: MITIGATION OF EXCEPTIONAL EVENTS

Title 40 Code of Federal Regulations (CFR) § 51.930(a) requires that: "A State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards." Three specific requirements are described in this regulation and are addressed individually below. Examples of each of the webpages identified below can be found in the appendices of this document.

6.1 PROMPT PUBLIC NOTIFICATION

The first requirement, 40 CFR §51.930(a)(1), is to "provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard." TCEQ provides EPA Air Quality Index (AQI) forecasts for the current day and the next three to four days for 17 areas in Texas for ozone, particulate matter of 2.5 microns or less in aerodynamic diameter ($PM_{2.5}$), and particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}). These forecasts are available to the public on the Today's Texas Air Quality Forecast webpage (http://www.tceq.texas.gov/airquality/monops/forecast_today.html) (TCEQ2, 2022) and on the EPA AirNow website (http://airnow.gov/) (EPA3, 2022). The Today's Texas Air Quality webpage forecast discussion for each proposed exceptional event day is presented in the appendices of these documents.

TCEQ also provides near real-time hourly PM_{10} and $PM_{2.5}$ measurements from monitors across the state that are available to the public on the Airborne Particulates webpage (https://www.tceq.texas.gov/cgi-bin/compliance/monops/particulates.pl) (TCEQ3, 2022). Finally, TCEQ publishes an AQI Report on the Air Quality Index Report webpage (https://www.tceq.texas.gov/cgi-bin/compliance/monops/aqi_rpt.pl) (TCEQ4, 2022) that displays the latest and historical daily AQI measurements. These items allow the public to access forecasted, current, and past PM_{10} and $PM_{2.5}$ air quality levels.

6.2 PUBLIC EDUCATION

The second requirement, 40 CFR §51.930(a)(2), is to "provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event." Links to TCEQ and EPA webpages describing recommended actions for individuals to reduce exposure to particulate matter whenever it is high (EPA2, 2021) are included on TCEQ web displays of forecast and measured AQI levels, including TCEQ's Air Pollution from Particulate Matter webpage (http://www.tceq.texas.gov/airquality/sip/criteria-pollutants/sip-pm) and EPA's Air Quality Index (AQI) Basics webpage (https://www.airnow.gov/aqi/aqi-basics/). EPA also provides similar links on the AirNow webpages where TCEQ forecasts and current data are displayed.

6.3 IMPLEMENT MEASURES TO PROTECT PUBLIC HEALTH

The third requirement, 40 CFR §51.930(a)(3), is to "provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events." Since 1991, TCEQ and the City of El Paso have implemented dust control measures as part of the state implementation plan (SIP) and its revisions for the El Paso PM_{10} nonattainment area, as previously described in more detail under Section 3.2: *Attainment Status and Control Measures*, Chapter 3: *Not Reasonably Controllable or Preventable*.

6.4 TCEQ MITIGATION PLAN

On December 28, 2018, EPA determined that TCEQ met the requirement to develop a Mitigation Plan (https://www.tceq.texas.gov/downloads/air-quality/modeling/exceptional/texas-ee-mitigation-plan-final.pdf) for El Paso County for $PM_{2.5}$ due to historic recurrences of exceptional events due to high winds. See Treatment of Data Influenced by Exceptional Events, 81 Fed. Reg. 68216, 68272-73 (Oct. 3, 2016) for a list of areas required to develop Mitigation Plans. While development of this Mitigation Plan was required specifically due to recurrent $PM_{2.5}$ exceptional events, the items included also pertain to PM_{10}. The Mitigation Plan outlines the following components that apply to El Paso County:

- 40 CFR §51.930(a)(1-3) and §51.930(b)(2)(i), public notification and education programs for affected or potentially affected communities;
- 40 CFR §51.930(b)(2)(ii), steps to identify, study and implement mitigating measures; and
- 40 CFR §51.930(b)(2)(iii); provisions for review and evaluation of the mitigation plan and its implementation and effectiveness by the air agency and all interested stakeholders (e.g., public and private landowners/managers, air quality, agriculture and forestry agencies, the public).

CHAPTER 7: CONCLUSION

The information provided in this document demonstrates that the proposed exceptional event flags for particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}) data at the Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) monitors on February 16, 2022, and the Laredo Bridge (C66) monitor on March 18, 2022, meet the requirements for exceptional events. As indicated by backward-in-time air parcel trajectories and measurement statistics, high winds blowing transported dust clearly caused exceedances of the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS) on the aforementioned dates. Elevated levels of PM_{10} were caused by regional high winds, were not reasonably controllable or preventable, and were due to natural events. Measured PM_{10} concentrations on the referenced dates were above the 99th percentile of historical measurements and thus affected air quality in excess of normal historical fluctuations. The Texas Commission on Environmental Quality therefore requests the United States Environmental Protection Agency's concurrence on the exceptional event flags and to have the associated measurements removed from consideration when making compliance determinations for the 24-hour PM_{10} NAAQS.

CHAPTER 8: REFERENCES

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APPENDIX A

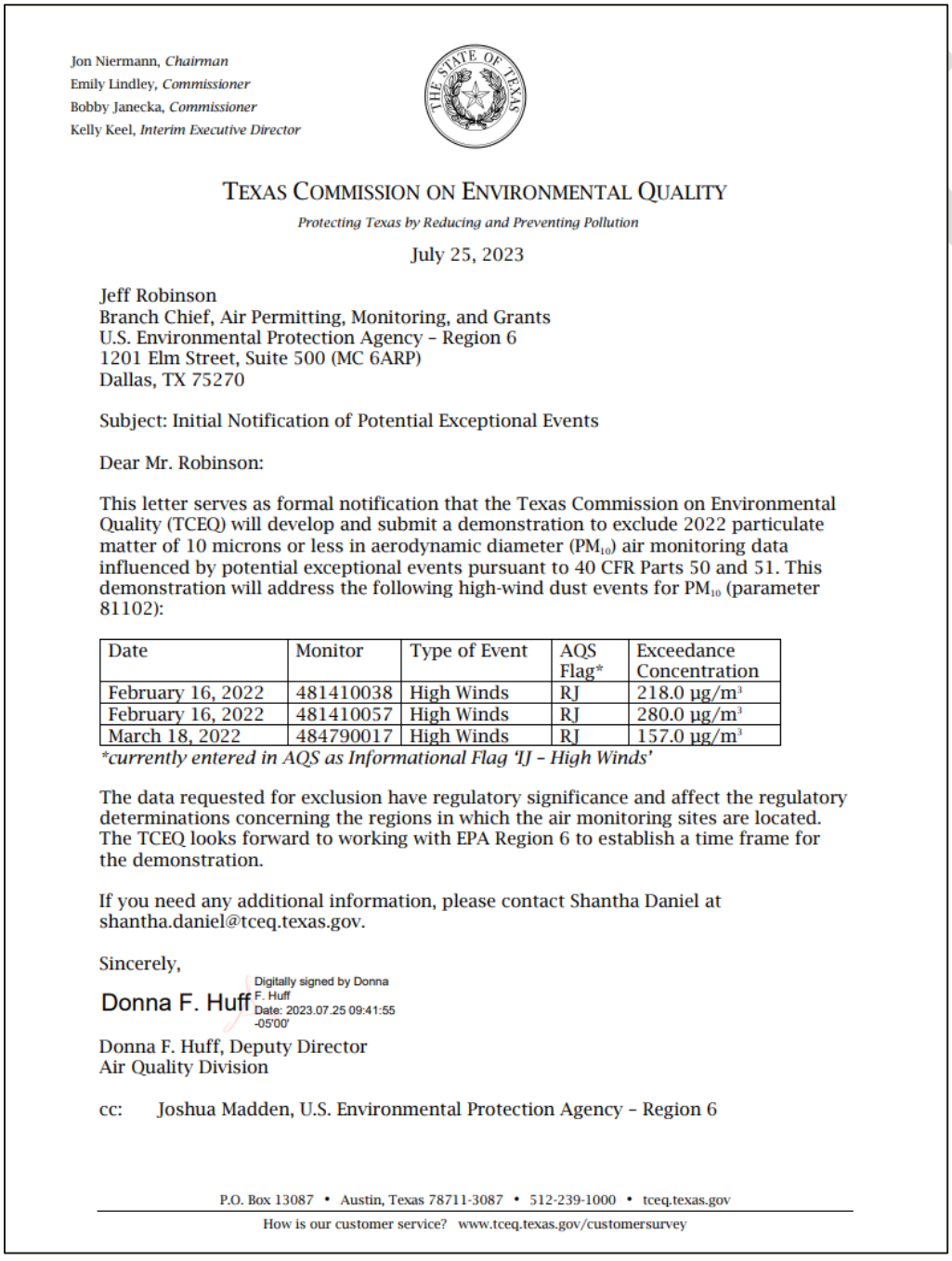
PROPOSED PM_{10} EXCEPTIONAL EVENT FLAGS AND INITIAL NOTIFICATION

EXCEPTIONAL EVENT DEMONSTRATION FOR PARTICULATE MATTER OF 10 MICRONS OR LESS IN AERODYNAMIC DIAMETER (PM_{10}) FOR THE SOCORRO HUECO AND EL PASO MIMOSA MONITORS ON FEBRUARY 16, 2022, AND THE LAREDO BRIDGE MONITOR ON MARCH 18, 2022

1987 PM_{10} STANDARD

A.1 INITIAL NOTIFICATION PROCESS

The Texas Commission on Environmental Quality submitted an initial notification to EPA Region 6 and engaged in discussions with its EPA Regional office regarding the demonstration prior to formal submittal. A copy of the initial notification letter is provided below in Figure A-1: *Initial Notification Letter to EPA Region 6.*



Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Bobby Janecka, *Commissioner*
Kelly Keel, *Interim Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

July 25, 2023

Jeff Robinson
Branch Chief, Air Permitting, Monitoring, and Grants
U.S. Environmental Protection Agency – Region 6
1201 Elm Street, Suite 500 (MC 6ARP)
Dallas, TX 75270

Subject: Initial Notification of Potential Exceptional Events

Dear Mr. Robinson:

This letter serves as formal notification that the Texas Commission on Environmental Quality (TCEQ) will develop and submit a demonstration to exclude 2022 particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}) air monitoring data influenced by potential exceptional events pursuant to 40 CFR Parts 50 and 51. This demonstration will address the following high-wind dust events for PM_{10} (parameter 81102):

Date	Monitor	Type of Event	AQS Flag*	Exceedance Concentration
February 16, 2022	481410038	High Winds	RJ	218.0 µg/m³
February 16, 2022	481410057	High Winds	RJ	280.0 µg/m³
March 18, 2022	484790017	High Winds	RJ	157.0 µg/m³

**currently entered in AQS as Informational Flag 'IJ – High Winds'*

The data requested for exclusion have regulatory significance and affect the regulatory determinations concerning the regions in which the air monitoring sites are located. The TCEQ looks forward to working with EPA Region 6 to establish a time frame for the demonstration.

If you need any additional information, please contact Shantha Daniel at shantha.daniel@tceq.texas.gov.

Sincerely,

Donna F. Huff
Digitally signed by Donna F. Huff
Date: 2023.07.25 09:41:55 -05'00'

Donna F. Huff, Deputy Director
Air Quality Division

cc: Joshua Madden, U.S. Environmental Protection Agency – Region 6

P.O. Box 13087 • Austin, Texas 78711-3087 • 512-239-1000 • tceq.texas.gov
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Figure A-1: Initial Notification Letter to EPA Region 6

A.2 PROPOSED PM_{10} EXCEPTIONAL EVENT FLAGS

Table A-1: Proposed 2022 PM_{10} Exceptional Event Flags

Date	Site ID	Site Name	POC	PM_{10}	Flag	Flag Description
2/16/2022	481410057	Socorro Hueco (C49)	1	280	RJ	High winds – regional blowing dust
2/16/2022	481410038	Riverside/El Paso Mimosa (C418)	1	218	RJ	High winds – regional blowing dust
3/18/2022	484790017	Laredo Bridge (C66)	1	157	RJ	High winds – regional blowing dust

Abbreviations:
Site ID EPA site identification number
POC EPA Parameter Occurrence Code
PM_{10} daily average concentration in micrograms per cubic meter ($\mu g/m^3$) standard conditions
RJ high winds, request exclusion

APPENDIX B

EVENT ANALYSIS FOR FEBRUARY 16, 2022

EL PASO EXCEPTIONAL EVENT DEMONSTRATION FOR PARTICULATE MATTER OF 10 MICRONS OR LESS IN AERODYNAMIC DIAMETER (PM_{10}) FOR THE SOCORRO HUECO AND EL PASO MIMOSA MONITORS ON FEBRUARY 16, 2022

1987 PM_{10} STANDARD

B.1 EVENT SUMMARY

Weather maps are an effective way to display synoptic scale weather features. Figure B-1: *Regional Weather Map for February 16, 2022, at 15:00 MST* depicts a cold front advancing toward El Paso County from the west. The wind barbs from weather stations in the area indicate the winds ahead of the cold front were out of the southwest at approximately 23 miles per hour (mph) in El Paso County. Behind the front, winds were out of the west at approximately 28 mph. The map was generated online using tools from the National Oceanic and Atmospheric Administration Weather Prediction Center webpage (https://www.wpc.ncep.noaa.gov/#page=ovw).

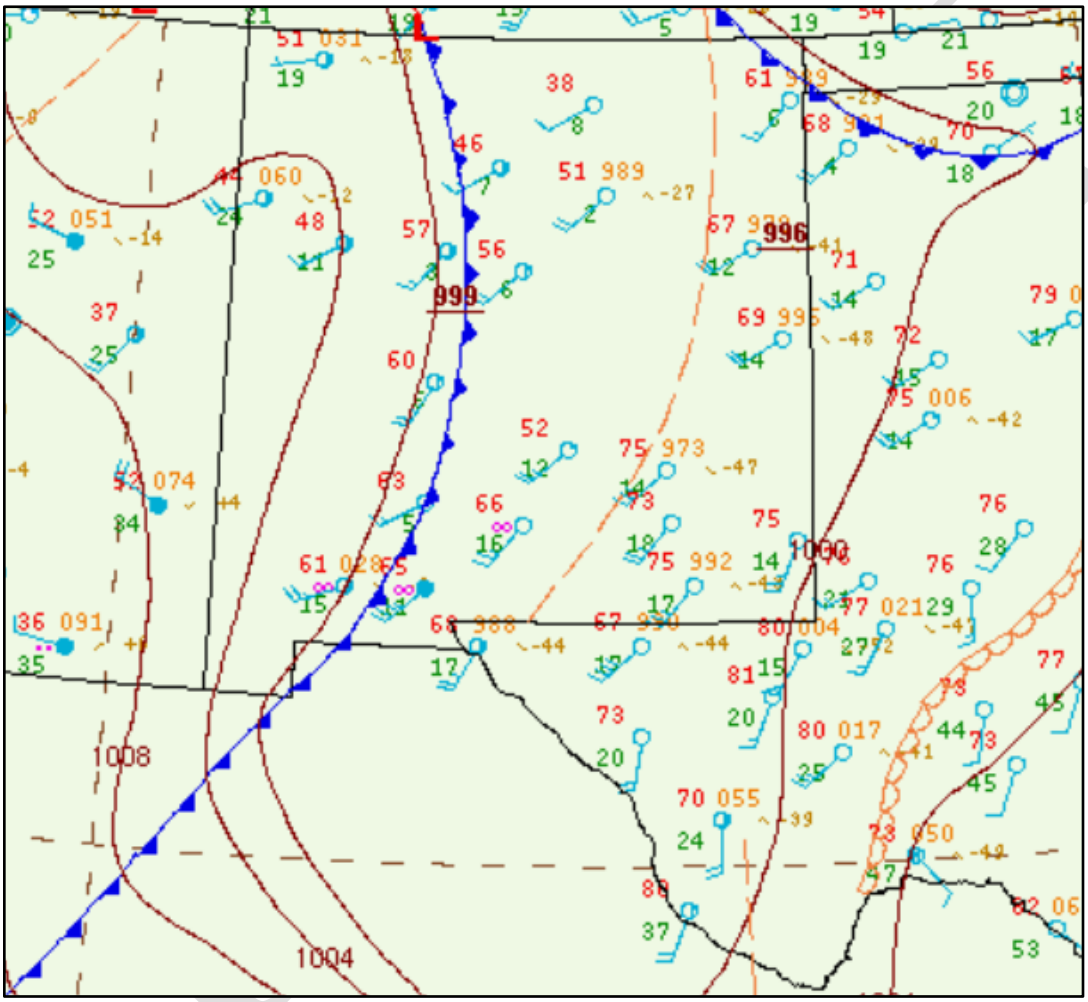

Figure B-1: Regional Weather Map for February 16, 2022, at 15:00 MST

High winds associated with the cold front generated an area of blowing dust in northern Mexico that impacted El Paso County. Area peak wind gusts reached 57 miles per hour (mph), and peak five-minute sustained winds reached 35 mph. Peak area hourly sustained winds reached 30 mph.

An exceptional event flag is proposed for the Socorro Hueco (C49) Federal Reference Method (FRM) PM_{10} measurement of 280 micrograms per cubic meter (µg/m³) on February 16, 2022. The collocated continuous PM_{10} monitor measured a daily average of 198.0 µg/m³ and a peak one-hour average of 670.2 µg/m³ for the hour beginning at

12:00 Mountain Standard Time (MST). The hourly average PM_{10} concentration was above the 24-hour National Ambient Air Quality Standard of 150 µg/m^3 for eight consecutive hours beginning with the 10:00 MST hour. The peak measured wind gust at Socorro Hueco (C49) was 47 mph and the highest hourly wind speed was 20 mph.

Additionally, an exceptional event flag is proposed for the Riverside/El Paso Mimosa (C418) FRM PM_{10} measurement of 218 µg/m^3 on February 16, 2022. A collocated continuous PM_{10} sampler is not present at this site. A monitor to measure wind speed is also not present at this site.

B.2 BACKWARD-IN-TIME AIR TRAJECTORIES

Backward-in-time air parcel trajectories were produced using the National Oceanic and Atmospheric Administration (NOAA) HYSPLIT model for February 16, 2022. The images in Figure B-2: *HYSPLIT Backward Trajectories (February 16, 2022 at 11:00 MST) at 10, 100, and 1,000 m above ground level (AGL)* display trajectories that track the air arriving at the time detailed in Figure B-2 on the proposed exceptional event day and follow the air backward in time for 24 hours to demonstrate both the origin and path of the air parcels. The time of 11:00 MST was selected because it corresponds with the greatest hourly, resultant wind speed at the monitor and the second-highest hourly PM_{10} concentration recorded on February 16, 2022. The PM_{10} value at the Socorro Hueco (C49) monitor at 11:00 MST was 642 µg/m^3. The greatest hourly PM_{10} concentration recorded at the Socorro Hueco (C49) monitor on February 16, 2022, was 670 µg/m^3, and this value was recorded at 12:00 MST. The three colors assigned to each trajectory represent air arriving at the Socorro Hueco (C49) monitor at 10 meters (m) (red), 100 m (blue), and 1,000 m (green) AGL. Wind from the trajectories at the lower altitudes due to their proximity to the surface are likely to disturb the surface and cause dust to be entrained in the air. Trajectories for all three distances AGL are from the southwest and pass directly over Mexico prior to arriving in El Paso County.

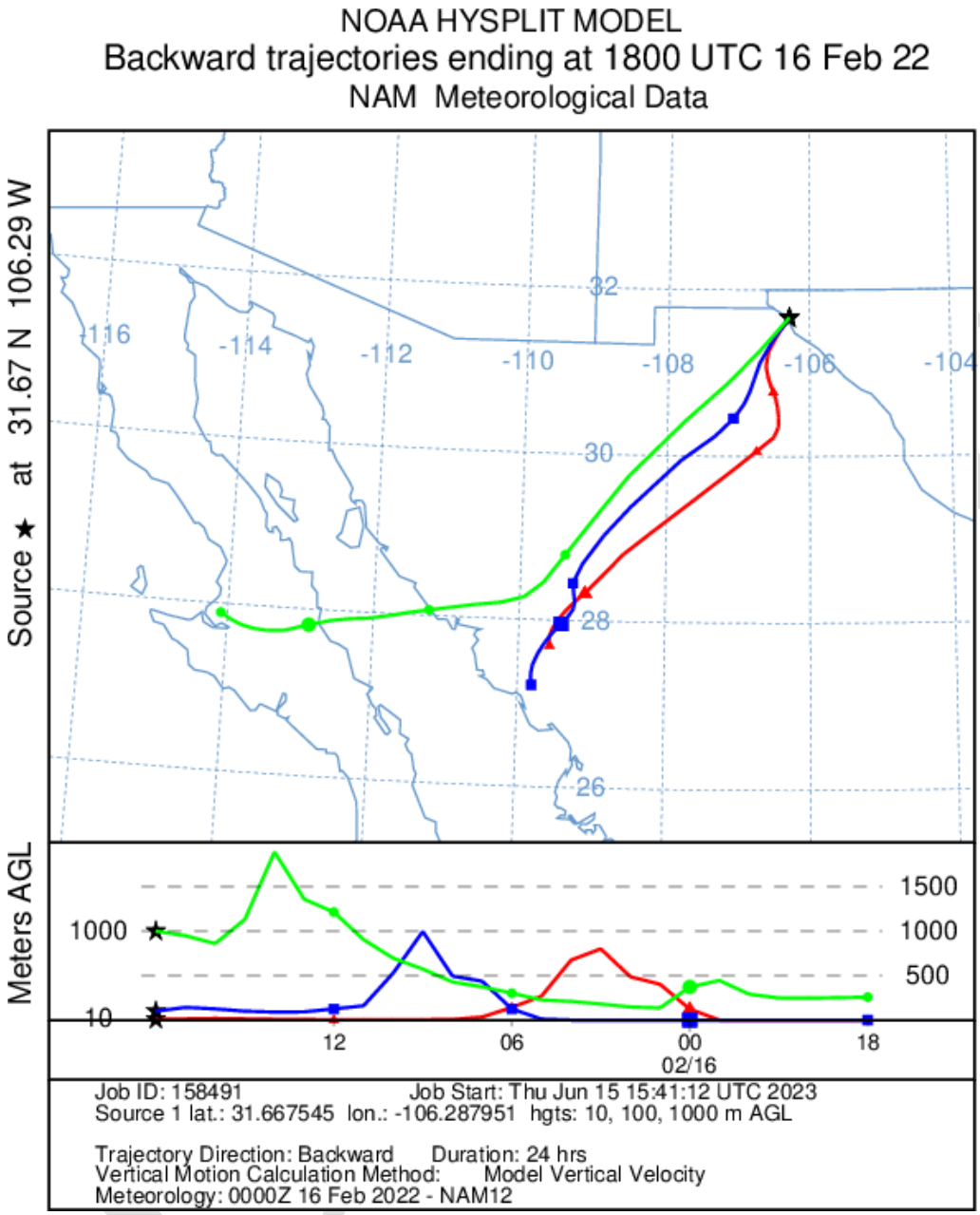

Figure B-0: HYSPLIT Backward Trajectories (February 16, 2022, at 11:00 MST) at 10, 100, and 1,000 m AGL

The Riverside/El Paso Mimosa (C418) monitor is located approximately seven miles northwest of the Socorro Hueco (C49) monitor. As such, due to this close proximity, the trajectories presented in Figures B-2 are also applicable to the Riverside/El Paso Mimosa (C418) monitor.

B.3 MAP PLOTS OF DAILY PARTICULATE MATTER DATA

The following maps display daily average PM_{10} and $PM_{2.5}$ measurements from the February 16, 2022 event. Maps of the daily average PM_{10} and $PM_{2.5}$ concentrations show the spatial distribution of measurements on the proposed exceptional event day, with the flagged measurements identified by site name. Only measurements used for regulatory purposes are included in these maps. PM_{10} concentrations are shown in Figure B-3: *Daily Average PM_{10} Measurements (µg/m³) on February 16, 2022*, and $PM_{2.5}$ concentrations are shown in Figure B-4: *Daily Average $PM_{2.5}$ Measurement (µg/m³) on February 16, 2022*. As shown in Figure B-3, the highest measured PM_{10} values occurred in the eastern portion of the monitoring network. As indicated in Figure B-4, only one monitor, El Paso Chamizal (C41), recorded a regulatory $PM_{2.5}$ concentration on February 16, 2022.

Figure B-3: Daily Average PM_{10} Measurements (µg/m³) on February 16, 2022

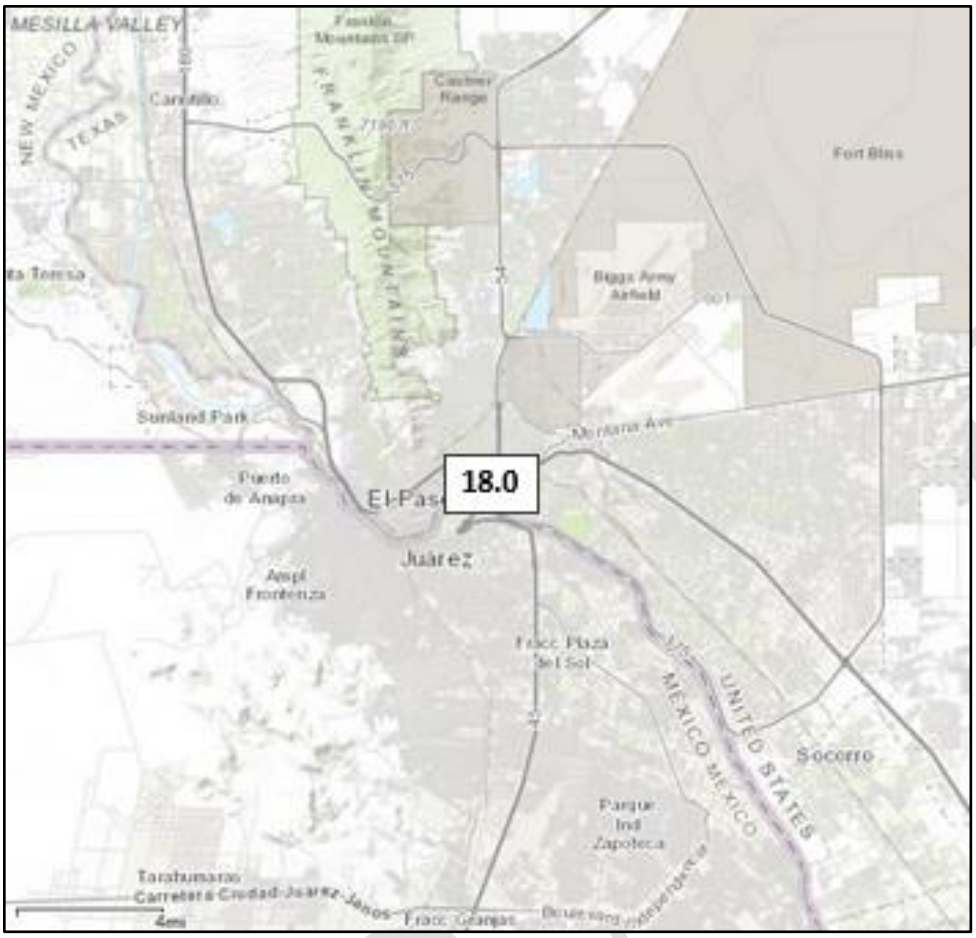

Figure B-4: Daily Average $PM_{2.5}$ Measurement (µg/m³) on February 16, 2022

B.4 CONTINUOUS PARTICULATE MATTER AND WIND GRAPHS

Time series graphs that plot continuous particulate measurements against wind speed measurements, illustrate the nature of dust events with particulate concentrations rising following sustained, high wind speeds. Figure B-5: *Continuous Five-Minute PM_{10} and Peak Area Five-Minute Sustained Wind Speed Measurements on February 16, 2022,* demonstrates that peak sustained wind speed measurements on February 16, 2022, in El Paso County began to increase around 08:00 MST. Within a few hours, peak PM_{10} concentrations were recorded. Due to the minor lag between the increase in local wind speed and the increase in PM_{10} concentrations, this pattern indicates that the source of dust was likely the nearby natural, undisturbed land in the Chihuahuan Desert in Mexico. Although wind speeds in El Paso County steadily rose and remained elevated through the afternoon and into the evening, PM_{10} concentrations remained consistent during this time frame. This pattern, in addition to the fact that PM_{10} concentrations decreased in the evening prior to local wind speeds decreasing, further supports that transport of PM_{10} from sources outside of El Paso County caused elevated PM_{10} concentrations on February 16, 2022. PM_{10} concentrations from local sources would be expected to remain elevated during the time that local winds remained elevated, and as is shown in Figure B-5, this was not the case on February 16, 2022.

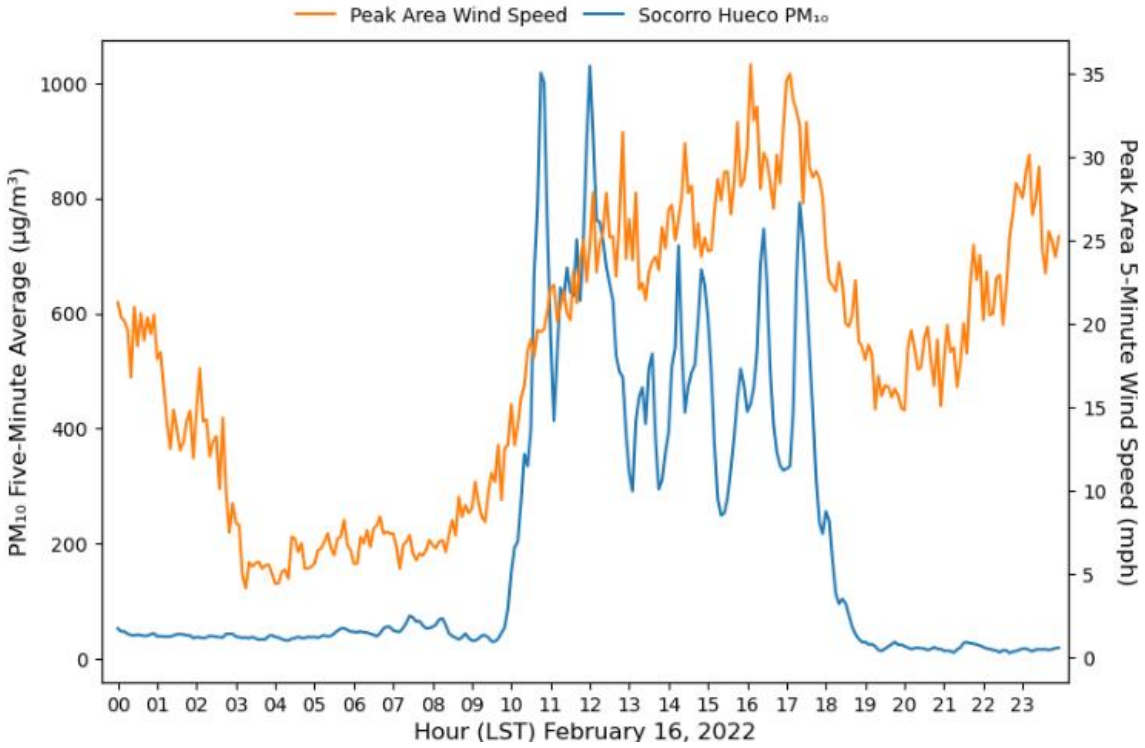

Figure B-5: Continuous Five-Minute PM_{10} and Peak Area Five-Minute Sustained Wind Speed Measurements on February 16, 2022

B.5 SPECIAL WEATHER STATEMENTS

A special weather statement is provided in Figure B-6: *Hazardous Weather Outlook Message Issued by the National Weather Service on February 16, 2022*. Within the message, it is stated that wind speeds and blowing dust will be a hazard in addition to potential travel hazards and wind damage. This weather statement contributes additional supporting documentation establishing the occurrence and geographical extent of this event.

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512
FLUS44 KEPZ 161220
HWOEPZ

Hazardous Weather Outlook
National Weather Service El Paso TX/Santa Teresa NM
520 AM MST Wed Feb 16 2022

NMZ401>417-TXZ418>424-171230-
Upper Gila River Valley-Southern Gila Highlands/Black Range-
Southern Gila Foothills/Mimbres Valley-
Southwest Desert/Lower Gila River Valley-Lowlands of the Bootheel-
Uplands of the Bootheel-Southwest Desert/Mimbres Basin-
Eastern Black Range Foothills-Sierra County Lakes-
Northern Dona Ana County-Southern Dona Ana County/Mesilla Valley-
Central Tularosa Basin-Southern Tularosa Basin-
West Slopes Sacramento Mountains Below 7500 Feet-
Sacramento Mountains Above 7500 Feet-
East Slopes Sacramento Mountains Below 7500 Feet-Otero Mesa-
Western El Paso County-Eastern/Central El Paso County-
Northern Hudspeth Highlands/Hueco Mountains-Salt Basin-
Southern Hudspeth Highlands-
Rio Grande Valley of Eastern El Paso/Western Hudspeth Counties-
Rio Grande Valley of Eastern Hudspeth County-
520 AM MST Wed Feb 16 2022

This Hazardous Weather Outlook is for portions of south central
New Mexico, southwest New Mexico, and southwest Texas.

.DAY ONE...Today and Tonight
Strong winds will continue today as a Pacific storm system
arrives. The system will linger into Thursday. Dynamics and
moisture associated with the storm will increase the potential for
mountain snow and lowland rain. However chances will remain
generally low and amounts generally light. Wind speeds will be the
biggest hazard along with blowing dust and there will be
potential for travel hazards and wind damage. Any mountain snow
could cause additional travel hazards, and lowland rain will make
for isolated and temporary slick road conditions.

.DAYS TWO THROUGH SEVEN...Thursday through Tuesday

None.

.SPOTTER INFORMATION STATEMENT...

Spotter reports are appreciated, however spotter activation will
not be needed.

$$
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Figure B-6: Hazardous Weather Outlook Message Issued by the National Weather Service El Paso Office on February 16, 2022

B.6 DAILY AVERAGE PARTICULATE MATTER MEASUREMENTS

All available continuous and non-continuous El Paso area daily average particulate measurements from February 16, 2022, are provided in Table B-1: *El Paso County Particulate Matter Measurements on the Proposed Exceptional Event Day of February 16, 2022*.

Table B-1: El Paso County Particulate Matter Measurements on the Proposed Exceptional Event Day of February 16, 2022

Site	Type	Method	Concentration (µg/m^3)
Ivanhoe (C414)	PM_{10}	FRM	154
Riverside/El Paso Mimosa (C418)	PM_{10}	FRM	218*
Socorro Hueco (C49)	PM_{10}	FRM	280*
Socorro Hueco (C49)	PM_{10}	FRQ	No data
Socorro Hueco (C49)	PM_{10}	C	198.0
Van Buren (C693)	PM_{10}	FRM	115
Ojo de Agua (C1021)	PM_{10}	FRM	126
Ojo de Agua (C1021)	PM_{10}	FRQ	No data
El Paso Chamizal (C41)	PM_{10}	C (standard conditions)	174.1
El Paso Chamizal (C41)	PM_{10}	C (local conditions)	153.6
El Paso Chamizal (C41)	$PM_{10-2.5}$	C	136.5
El Paso Chamizal (C41)	$PM_{2.5}$	C	17.9
El Paso Chamizal (C41)	$PM_{2.5}$	Beta	18.0
El Paso Chamizal (C41)	$PM_{2.5}$	FRQ	21.4
El Paso Chamizal (C41)	$PM_{2.5}$	CSN	18.9**
Socorro Hueco (C49)	$PM_{2.5}$	C	26.9
Ascarate Park SE (C37)	$PM_{2.5}$	C	31.6

Notes:
*Indicates the measurement is proposed as an exceptional event.
**The reconstructed mass does not include ammonium nitrate, for which data were unavailable.
Abbreviations:
FRM Federal Reference Method non-continuous monitor – used for regulatory purposes
FRQ Federal Reference Method non-continuous quality control (collocated) monitor
C Continuous monitor – not used for regulatory purposes
Beta Beta Attenuation, BAM 1022 (Continuous) – used for regulatory purposes
CSN reconstructed $PM_{2.5}$ mass from speciated non-continuous monitor – not used for regulatory purposes

B.7 CHEMICAL SPECIATION STUDY

$PM_{2.5}$ Chemical Speciation Network (CSN) speciation data were available from the El Paso Chamizal (C41) site for the proposed exceptional event day of February 16, 2022. A summary of El Paso Chamizal (C41) speciation data is provided in Table B-2: *El Paso Chamizal (C41) $PM_{2.5}$ Speciation Summary for February 16, 2022*, including averages for the period from 2020 through 2022 for comparison. The speciation data show a predominance of the Interagency Monitoring of Protected Visual Environments (IMPROVE) soil component on the proposed exceptional event day indicating transported dust from high winds. The IMPROVE soil component is derived using a calculation consisting of speciated $PM_{2.5}$ parameters understood to be the primary constituents in soil that would be representative of transported dust from natural, undisturbed land (IMPROVE, 2022) (Eldred, 2003).

Table B-2: El Paso Chamizal (C41) $PM_{2.5}$ Speciation Summary February 16, 2022

Species	2020-2022*	Feb 16, 2022	Difference	Percent Change	Percent Difference
FRM	9.178	17.983	8.805	96%	65%
RM**	6.127	18.910	12.783	209%	102%
Soil	2.422	11.713	9.291	384%	131%
AS	0.986	0.701	-0.285	-29%	34%
AN	N/A	N/A	N/A	N/A	N/A
OC	1.935	4.933	2.998	155%	87%
SS	0.052	0.098	0.046	89%	61%
EC	0.733	1.465	0.732	100%	67%
Si	0.452	2.412	1.960	434%	137%
Al	0.164	0.840	0.676	412%	135%
Fe	0.140	0.519	0.379	271%	115%
Ca	0.353	1.534	1.181	335%	125%
S	0.239	0.170	-0.069	-29%	34%
Sr	0.002	0.005	0.003	150%	86%
Ti	0.011	0.053	0.042	382%	131%

Notes:
All units are in µg/m^3.
*Average for 2020 through 2022 including February 16, 2022.
**The reconstructed mass (RM) does not include ammonium nitrate, for which data were unavailable.
Abbreviations:
FRM Federal Reference Method $PM_{2.5}$ concentration
RM IMPROVE reconstructed $PM_{2.5}$ mass concentration calculated from speciation data
Soil IMPROVE soil concentration calculated from speciation data
AS IMPROVE ammonium sulfate concentration calculated from speciation data
AN IMPROVE ammonium nitrate concentration calculated from speciation data
OC IMPROVE organic carbon concentration calculated from speciation data using parameter 88355.
SS IMPROVE sea salt concentration calculated from speciation data.
EC Elemental carbon concentration from speciation data.
Si silicon speciation concentration
Al aluminum speciation concentration
Fe iron speciation concentration
Ca calcium speciation concentration
S sulfur speciation concentration
Sr strontium speciation concentration
Ti titanium speciation concentration

Figure B-7: *El Paso Chamizal (C41) $PM_{2.5}$ IMPROVE Organic Carbon Concentration versus El Paso Chamizal (C41) Daily Peak Hourly Wind Speed for 2020 through 2022* shows that the IMPROVE organic carbon component is generally highest with light winds, as would be expected with local contribution during air stagnation. Organic carbon is generally highest with light winds as it can frequently be attributed to anthropogenic sources such as combustion.

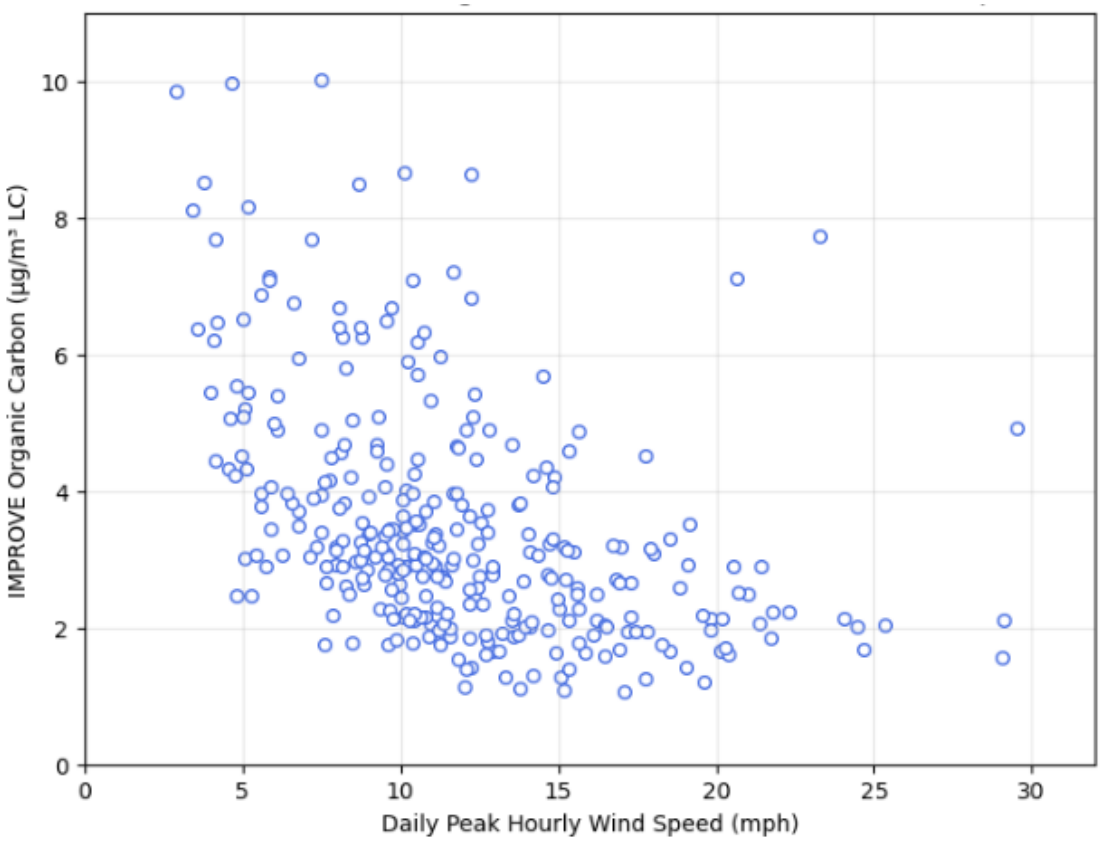

Figure B-7: El Paso Chamizal (C41) $PM_{2.5}$ IMPROVE Organic Carbon Concentration versus El Paso Chamizal (C41) Daily Peak Hourly Wind Speed for 2020 through 2022

Figure B-8: *El Paso Chamizal (C41) $PM_{2.5}$ IMPROVE Soil Concentration versus El Paso Chamizal (C41) Daily Peak Hourly Wind Speed for 2020 through 2022* indicates that the IMPROVE soil component is often highest in the presence of high winds, as is the case for the $PM_{2.5}$ and PM_{10} concentrations previously shown in Figure 2-7: *El Paso County Daily Peak PM_{10} Average for FRM Measurements versus El Paso County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022* and Figure 2-8: *El Paso County Daily Peak $PM_{2.5}$ Average for FRM Measurements versus El Paso County Daily Peak Sustained Hourly Wind Speed for 2006 through 2022* in Chapter 2: *Narrative Conceptual Model of Event*. The IMPROVE soil component does not increase significantly at lower wind speeds, indicating that local dust is not a major contributor to particulate concentrations without high winds.

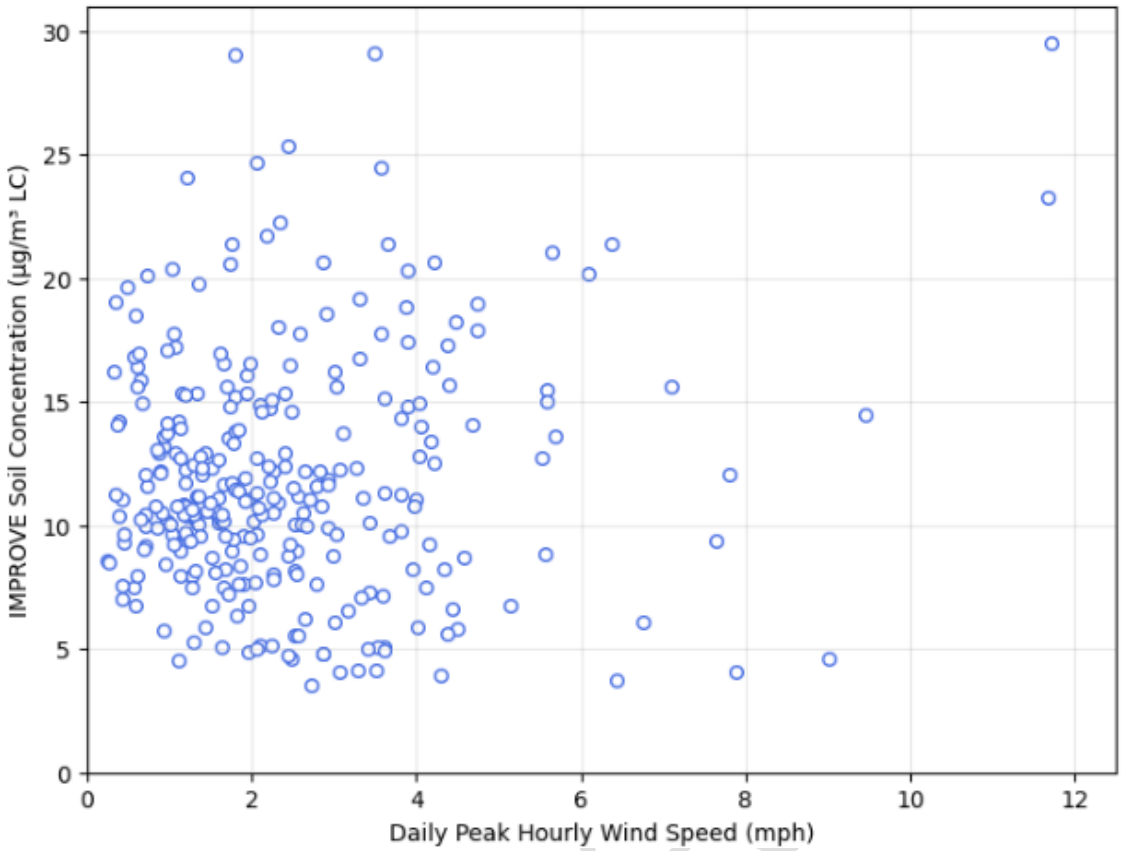

Figure B-8: El Paso Chamizal (C41) $PM_{2.5}$ IMPROVE Soil Concentration versus El Paso Chamizal (C41) Daily Peak Hourly Wind Speed for 2020 through 2022

B.8 COMPARISON OF EVENT-AFFECTED DAYS TO SIMILAR DAYS WITHOUT ELEVATED PM_{10} CONCENTRATIONS

To illustrate the impact a windblown dust event has on El Paso County versus local anthropogenic dust, the Texas Commission on Environmental Quality (TCEQ) conducted an analysis comparing the proposed exceptional event days to other high wind days without elevated 24-hour PM_{10} concentrations in 2022. Specifically, this comparative analysis focused on identifying days with wind speed and, to a lesser extent, wind direction measurements comparable to the proposed exceptional event days but without elevated 24-hour PM_{10} values. PM_{10} data used in this study were also collected via a tapered element oscillating microbalance (TEOM) sampler. Due to the once-every-six-days sampling schedule for Federal Reference Method (FRM) PM_{10} results, these data can be unavailable on the days that met the wind criteria.

Table B-3: *Socorro Hueco (C49) Particulate Matter and El Paso Area Wind Measurements on February 16, 2022, and Days with High Winds but Low Particulate Matter Concentrations* provides four representative days in 2022 where wind speed and wind direction are comparable to the proposed exceptional event day of February 16, 2022. On each of the identified days, daily average PM_{10} measurements were significantly less than the flagged event day when windblown dust plumes were advecting out of northern Mexico on February 16, 2022. This analysis provides additional supporting evidence that measured concentrations on the flagged event day were not the result of local anthropogenic sources but were instead caused by transport of widespread dust.

Table B-3: Socorro Hueco (C49) Particulate Matter and El Paso Area Wind Measurements on February 16, 2022, and Days with High Winds but Low Particulate Matter Concentrations

Day	PM_{10}C	Wnd	PkWnd	WDR	StDev	Pk1HrPM_{10}C	Time	PM_{10}FRM
2/16/22	198.1	23.27	29.51	196.24	20.96	670.23	12:00	280
4/22/22	69.28	22.39	28.82	195.34	19.06	248.24	17:00	N/A
3/9/22	33.41	20.09	24.69	208.28	34.77	49.76	16:00	N/A
12/12/22	94.93	22.92	27.92	210.24	26.31	488.91	14:00	N/A
5/17/222	42.17	18.68	21.38	227.54	29.59	96.68	9:00	43.5

PM_{10} C — continuous daily average in µg/m³ at Socorro Hueco – not used for regulatory purposes
Wnd — area one-hour average wind speed in mph at time listed in table
PkWnd — peak area one-hour average wind speed in mph on the day
WDR — daily wind direction resultant in degrees from north at Socorro Hueco
StDev — wind direction standard deviation at Socorro Hueco
Pk1HrPM_{10}C — peak continuous hourly PM_{10} measurement at Socorro Hueco in µg/m³
Time — time in Mountain Standard Time (MST) of peak continuous hourly PM_{10} measurement
PM_{10} FRM — non-continuous FRM daily average in µg/m³ at Socorro Hueco – used for regulatory purposes

B.9 SPATIAL AND TEMPORAL VARIABILITY OF PM_{10}

PM_{10} data across El Paso County are presented in Table B-4: *El Paso County PM_{10} Daily Measurements (µg/m³) before and after February 16, 2022*. This information highlights the impact of the windblown dust event on the flagged event day and demonstrates spatial and temporal variability of PM_{10} in El Paso County.

Table B-4: El Paso County PM_{10} Daily Measurements (µg/m³) before and after February 16, 2022

Date	Socorro Hueco (C49) FRM	Socorro Hueco (C49) C	Ivanhoe (C414) FRM	El Paso Chamizal (C41) C	Riverside/El Paso Mimosa (C418) FRM	Van Buren (C693) FRM	Ojo de Agua (C1021) FRM
2/10/2022	57	47.3	35	48.7	83	26	21
2/11/2022	--	40.6	--	23.2	--	--	--
2/12/2022	--	33.1	--	37.8	--	--	--
2/13/2022	--	36.1	--	56.3	--	--	--
2/14/2022	--	41.8	--	80.2	--	--	--
2/15/2022	--	47.2	--	62.7	--	--	--
2/16/2022*	280*	198.0	154	174.1	218*	115	126
2/17/2022	--	16.9	--	6.5	--	--	--
2/18/2022	--	32.1	--	44.2	--	--	--
2/19/2022	--	34.3	--	39.9	--	--	--
2/20/2022	--	38.5	--	46.7	--	--	--
2/21/2022	--	140.0	--	84.1	--	--	--
2/22/2022	38	30.4	44	51.1	70	24	31

Notes:
* indicates proposed exceptional event day measurements.
-- sample collection was not scheduled for listed day.
Abbreviations:
FRM Federal Reference Method monitor PM_{10} concentration (µg/m³) – used for regulatory purposes
C continuous monitor PM_{10} concentration (µg/m³) – not used for regulatory purposes

B.10 AIR QUALITY FORECAST ON THE PROPOSED EXCEPTIONAL EVENT DAY

TCEQ provides the EPA Air Quality Index (AQI) forecasts for the current day and the next three to four days for 17 areas in Texas, including the El Paso area, for ozone, particulate matter of 2.5 microns or less in aerodynamic diameter ($PM_{2.5}$), and particulate matter of 10 microns or less in aerodynamic diameter (PM_{10}). These forecasts are available to the public on the Today's Texas Air Quality Forecast webpage (http://www.tceq.texas.gov/airquality/monops/forecast_today.html) (TCEQ2, 2022) and on the EPA AirNow website (http://airnow.gov/) (EPA3, 2022).

> **"Wednesday 02/16/2022**
>
> An upper low pressure system will drag a cold front through the Texas Panhandle and Far West Texas during the day and the Permian Basin overnight. Lingering suspended dust from the previous day combined with dust generated today associated with the passing of the cold front could raise particulate levels in most spots as the front arrives and passes. Depending on the intensity and duration of the blowing dust, the daily PM2.5/PM10 AQIs could reach the lower to middle end of the "Moderate" range in parts of the El Paso area; the lower end of the "Moderate" range in parts of the Big Bend and Lubbock areas; and the upper end of the "Good" range (perhaps with an isolated low "Moderate" or two) in parts of the Amarillo and Midland-Odessa areas.
>
> Light amounts of residual smoke from seasonal fires across the Southeast U.S., (including parts of Eastern Texas) combined with slightly elevated urban fine particulate background levels may raise the daily PM10 AQI into the lower end of the "Moderate" range in parts of the Houston area.
>
> Elsewhere in the state, moderate to strong winds, mild temperatures, and/or lower incoming background levels should help keep air quality in the "Good" range in most spots."

B.11 MAP OF WIND SPEED AND DIRECTION

EPA's High Wind Dust Event Guidance (EPA, 2019) suggests a minimum sustained wind speed of 25 mph for western states including Texas, or development of an alternate area-specific high wind threshold at which a dust event could occur. The event meets the strictest definition of this threshold with peak area hourly wind speeds greater than 25 mph. High, area winds indicate that PM_{10} concentrations recorded were influenced by regional transport from surrounding areas.

TCEQ used National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL) meteorological model results to display wind speeds and direction in the source areas of natural, undisturbed land in Mexico west-southwest of El Paso County for February 16, 2022. Specifically, TCEQ used the 12-kilometer (km) North American Model (NAM) hourly wind speeds and wind vectors at a 10-meter height. Figure B-9: *NOAA ARL Model Wind Field in El Paso County at 11:00 Mountain Standard Time (MST) on February 16, 2022,* illustrates the predicted wind speeds in dust source areas for the proposed exceptional event day. This model supports the occurrence of windblown dust from source areas at wind speed averages in the 15 through 30 nautical mph, or 17 through 35 mph range.

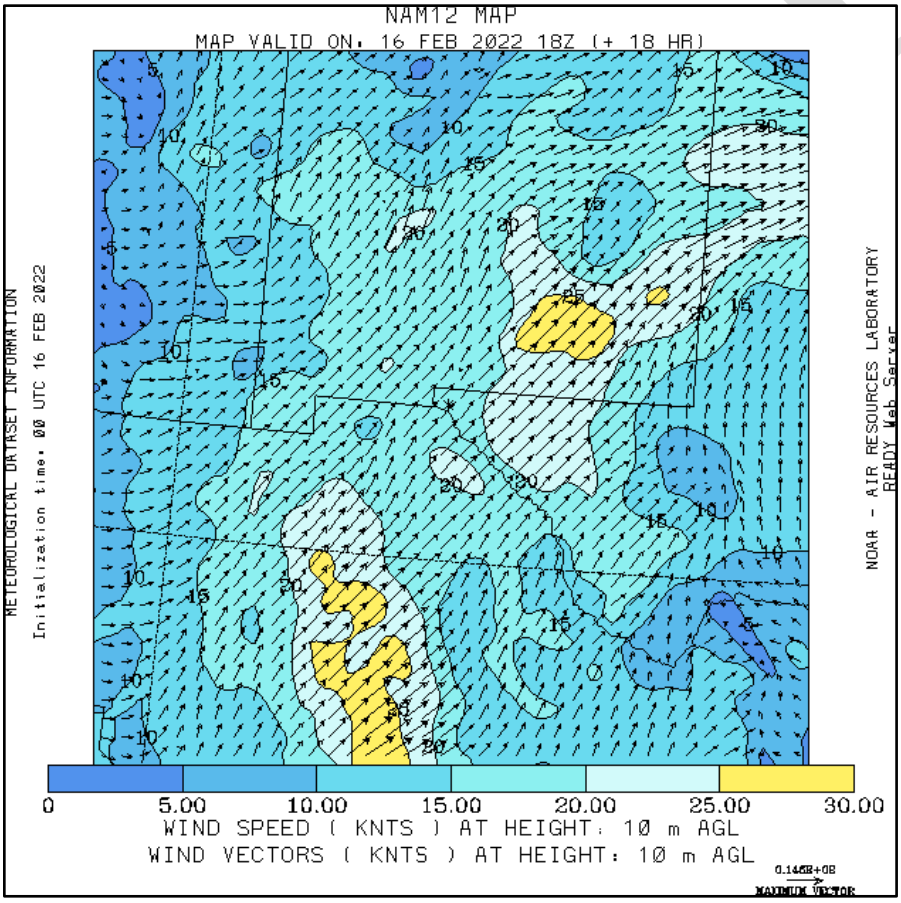

Figure B-9: NOAA ARL Model Wind Field in El Paso County at 11:00 MST on February 16, 2022

As depicted in Figure B-9, the event on February 16, 2022, was characterized by high winds that extended beyond the immediate El Paso area. As documented by Prospero et al. (2002), Gill et al. (2007), Rivera Rivera (2006), and Novlan et al. (2007), natural sources just south of the U.S.-Mexico border have been found to contribute to dust storm events in the El Paso area.

Measurements from El Paso area monitoring sites help confirm the large-scale nature of the high winds and characterize the event impacts on a localized scale immediately surrounding the monitoring sites. These measurements were presented in Figure B-3: *Daily Average PM_{10} Measurements ($\mu g/m^3$) on February 16, 2022,* found on page B-5 in Section B.3 *Map Plots of Daily Particulate Matter Data*.

B.12 WIND AND PARTICULATE MATTER MEASUREMENTS

A list of the PM_{10} concentration at monitors that exceeded the National Ambient Air Quality Standard and wind measurements on the proposed exceptional event day of February 16, 2022, is provided in Table B-5: *El Paso County Wind Measurements and PM_{10} Concentrations*. The proposed exceptional event day had peak sustained winds measured in excess of the suggested 25 mph threshold for blowing dust cited in EPA's High Wind Dust Event Guidance (EPA, 2019).

Table B-5: El Paso County Wind Measurements and PM_{10} Concentrations at the Socorro Hueco (C49) and Riverside/El Paso Mimosa (C418) Monitors

Date	Socorro Hueco (C49) FRM PM_{10} ($\mu g/m^3$)	Riverside/ El Paso Mimosa (C418) FRM PM_{10} ($\mu g/m^3$)	Peak Area Wind Gust (mph)	Peak Area 5-min Wind Speed (mph)	Peak Area Hourly Wind Speed (mph)	Peak Socorro Hueco (C49) Hourly Wind Speed (mph)	Wind Direction at Peak 5-min Speed (degrees)	Wind Direction at Peak Hourly Speed (degrees)
February 16, 2022	280	218	57	35	30	20	264	269

Note: Only the flagged particulate matter concentrations at the Socorro Hueco (C49) and Riverside/El Paso Mimosa monitor (C418) on February 16, 2022, are listed in this table. See Table B-1: *El Paso County Particulate Matter Measurements on the Proposed Exceptional Event Day of February 16, 2022,* for all available particulate matter measurements on this day. Wind measurements are from El Paso area air quality monitoring stations, including the Socorro Hueco (C49) site. The Riverside/El Paso Mimosa monitor (C418) does not record wind information. The peak wind speeds depicted include 2-second measurements (Gust), sustained five-minute averages (5-min Wind Speed), and hourly averages (Hourly Wind Speed). The associated peak wind directions are in degrees clockwise from true north and indicate the direction from which the wind was blowing at the time of peak sustained five-minute and hourly wind speeds.

B.13 SATELLITE IMAGERY

Figure B-10: *Satellite Imagery of Windblown Particulate Matter on February 16, 2022,* shows particulate matter (dust) that is beige in color. Winds were from the southwest on February 16, 2022; therefore, the image shows that the particulate matter was transported into El Paso County from Mexico. In the image, clouds are white and are distinguishable from the windblown particulate matter by color and by the fact that the clouds generate shadows. The satellite image is from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) (NASA 2022).

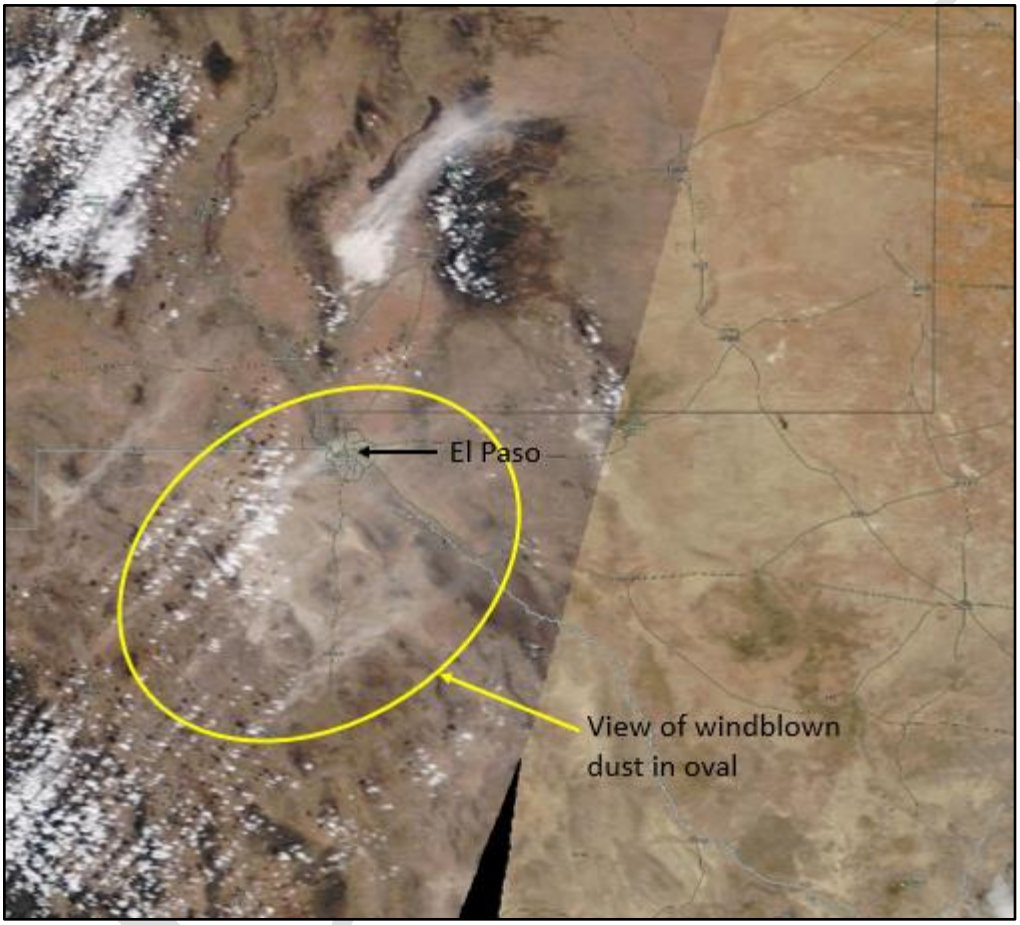

Figure B-10: Satellite Imagery of Windblown Particulate Matter on February 16, 2022

B.14 MEDIA REPORTS

Figure B-11: *Screen Capture One,* Figure B-12: *Screen Capture Two,* and Figure B-11: *Screen Capture Three* present text and images from three separate media reports documenting high winds and airborne particulate matter in El Paso on February 16, 2022. Image sources are provided at the end of this section.

Seen is the Westside of El Paso during a wind and sand storm in El Paso, Texas, Wednesday, February 16, 2022.

Ivan Pierre Aguirre, For El Paso Times

Figure B-11: Screen Capture One

EL PASO, Texas (CBS4) — The Borderland was under a high wind warning and blowing dust advisory from 11 a.m. to 7 p.m. on Wednesday, Feb. 16, 2022.

Below are images of the damage caused by the wind.

Jhovani Carrillo reports on the downed power lines in Clint

Multiple power poles and lines were knocked over and some viewers reported damage at their homes.

Figure B-12: Screen Capture Two

Time-Lapse Video Shows Dust Storm Sweep Through El Paso

The raw power of Mother Nature is on full display in a time-lapse captured by a local news station.

The video, posted below, shows the moment a February cold front arrived, turning the Sun City beige and battering the landscape as it barreled through.

KFOX-TV

KFOX-TV

KFOX-TV

Figure B-13: Screen Capture Three

These reports are, respectively, from Screen Capture One (https://www.elpasotimes.com/picture-gallery/news/2021/03/16/photos-dust-storm-blows-through-el-paso-nws-issues-weather-alert/4723976001/), Screen Capture 2, (https://cbs4local.com/news/local/photos-videos-high-winds-cause-damage-throughout-el-paso-on-feb-16), and Screen Capture Three (https://kisselpaso.com/time-lapse-video-shows-moment-wild-wind-storm-arrives-to-hammer-el-paso/).

APPENDIX C

EVENT ANALYSIS FOR MARCH 18, 2022

WEBB COUNTY EXCEPTIONAL EVENT DEMONSTRATION FOR PARTICULATE MATTER OF 10 MICRONS OR LESS IN AERODYNAMIC DIAMETER (PM_{10}) FOR THE LAREDO BRIDGE MONITOR ON MARCH 18, 2022

1987 PM_{10} STANDARD

C.1 EVENT SUMMARY

Weather maps are helpful for displaying synoptic scale weather features. Figure C-1: *Regional Weather Map for March 18, 2022*, depicts details from 06:00 Central Daylight Time (CDT) showing a cold front that had moved through Webb County from the northwest. The wind barbs from weather stations in the area indicate the winds behind the cold front were out of the northwest at approximately 17 miles per hour (mph) in Webb County. The map was generated online using tools from the National Oceanic and Atmospheric Administration Weather Prediction Center webpage (https://www.wpc.ncep.noaa.gov/#page=ovw).

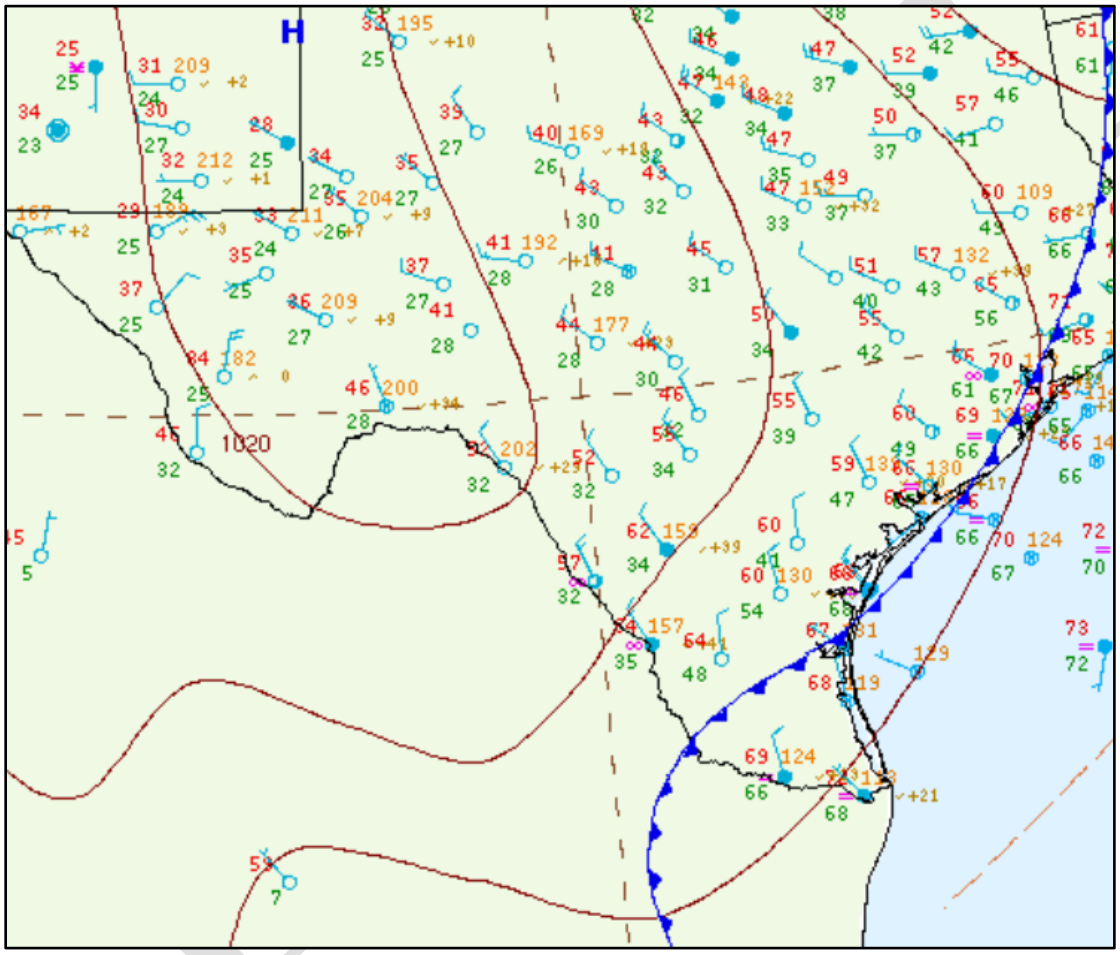

Figure C-1: Regional Weather Map for March 18, 2022

On March 18, 2022, wind gusts as high as 32 mph were recorded at the Laredo Bridge monitor. At this time, winds were from the west-northwest, passing over the location of natural, undisturbed land.

An exceptional event flag is proposed for the Laredo Bridge (C66) Federal Reference Method (FRM) PM_{10} measurement of 157 micrograms per cubic meter ($\mu g/m^3$) on March 18, 2022.

C.2 BACKWARD-IN-TIME AIR TRAJECTORIES

Backward-in-time air parcel trajectories were produced using the National Oceanic and Atmospheric Administration (NOAA) HYSPLIT model for March 18, 2022. The image in Figure C-2: *HYSPLIT Backward Trajectories (March 18, 2022)* displays trajectories that track the air arriving at the time detailed on the proposed exceptional event day and follow the air backward in time for 24 hours to demonstrate both the origin and path of the air parcels. The time of 06:00 CDT was selected as it corresponds with the time that is one hour after the greatest $PM_{2.5}$ concentration was recorded at the World Trade Bridge monitor (C313), located approximately seven miles north-northwest of the Laredo Bridge monitor, and 06:00 CDT is approximately two hours before the peak sustained five-minute wind speed measurements in the area. Because continuous PM_{10} concentrations are not recorded in the area, $PM_{2.5}$ concentrations were used to assess the hour of peak particulate matter concentrations on March 18, 2022. In Figure C-2, the three colors assigned to each trajectory represent air arriving at the Laredo Bridge (C66) monitor at 10 meters (m) (red), 100 m (blue), and 1,000 m (green) above ground level (AGL). Wind from the trajectories at the lower altitudes, due to their proximity to the surface, are likely to disturb the surface and cause dust to be entrained in the air. Trajectories for all three distances AGL are from the northwest.

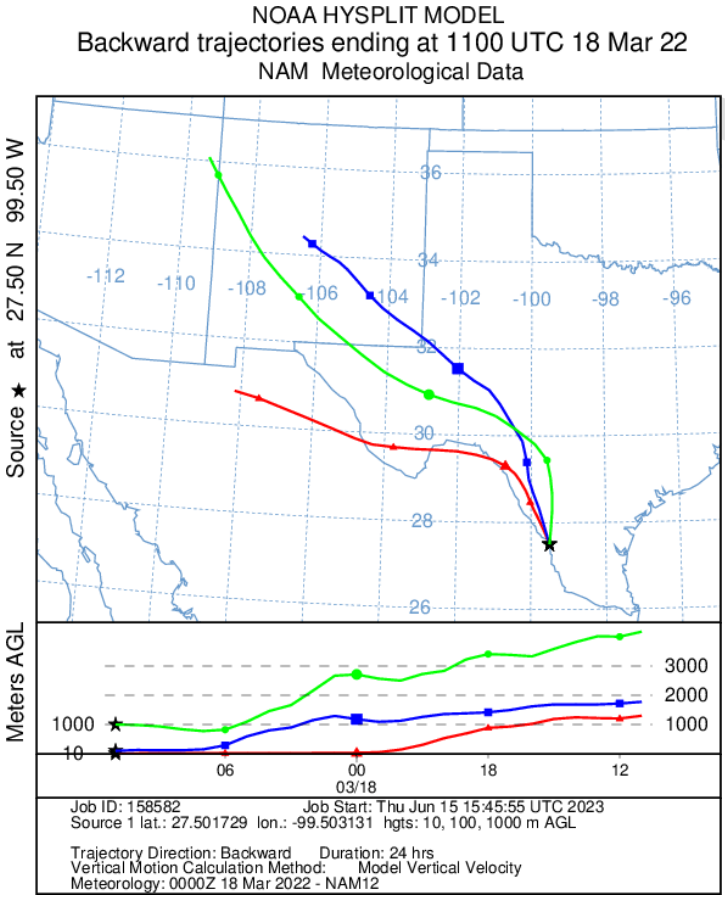

Figure C-2: HYSPLIT Backward Trajectories (March 18, 2022) at 10, 100, and 1,000 m AGL

C.3 MAP PLOTS OF DAILY PARTICULATE MATTER DATA

The following maps display daily average PM_{10} and $PM_{2.5}$ measurements from the March 18, 2022, event. Maps of the daily average PM_{10} and $PM_{2.5}$ concentrations typically show the spatial distribution of measurements on the proposed exceptional event day; however, only the PM_{10} concentration from the Laredo Bridge (C66) monitor is available for the area on March 18, 2022, and only one monitor in the area, the World Trade Bridge (C313) monitor, sampled for $PM_{2.5}$ concentrations on March 18, 2022. PM_{10} concentrations are shown in Figure C-3: *Daily Average PM_{10} Measurements (µg/m³) on March 18, 2022*, and $PM_{2.5}$ concentrations are shown in Figure C-4: *Daily Average $PM_{2.5}$ Measurements (µg/m³) on March 18, 2022*.

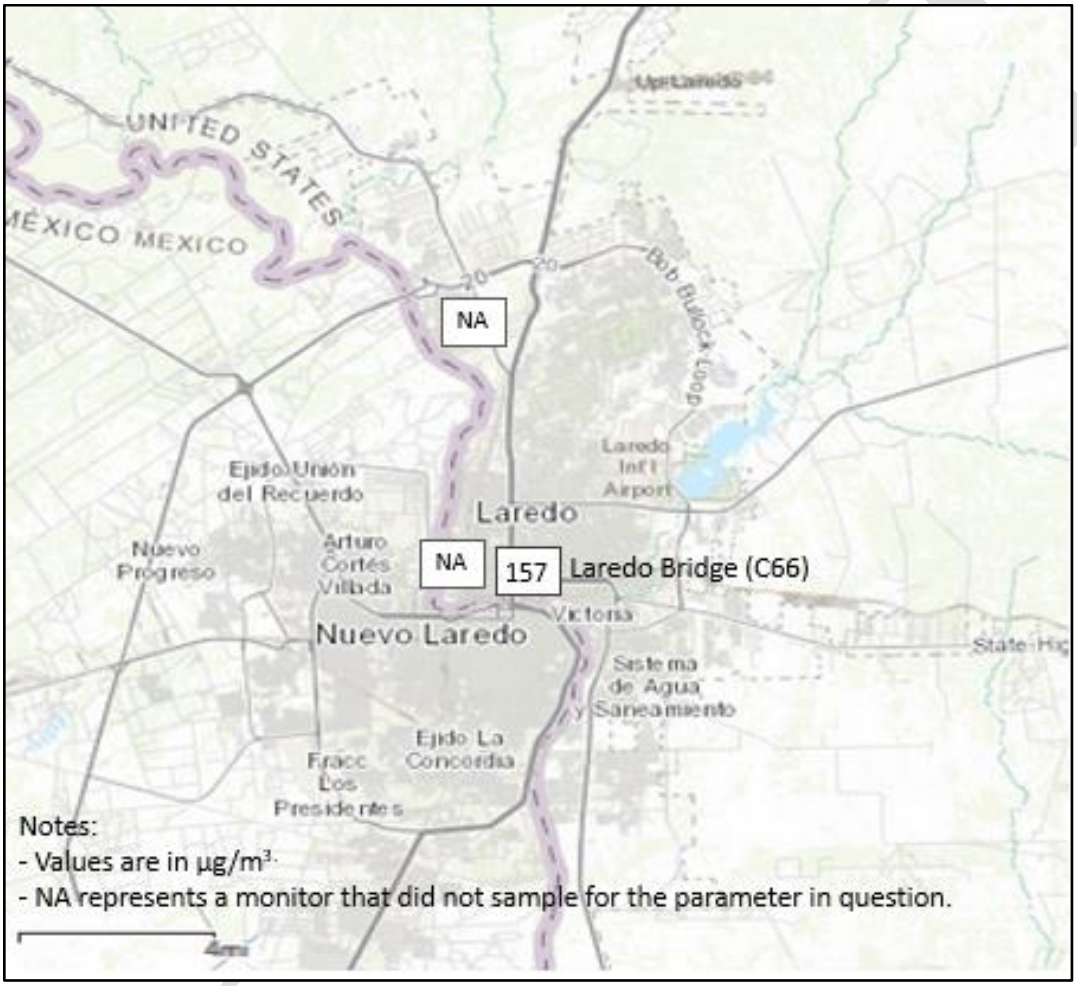

Figure C-3: Daily Average PM_{10} Measurements (µg/m³) on March 18, 2022

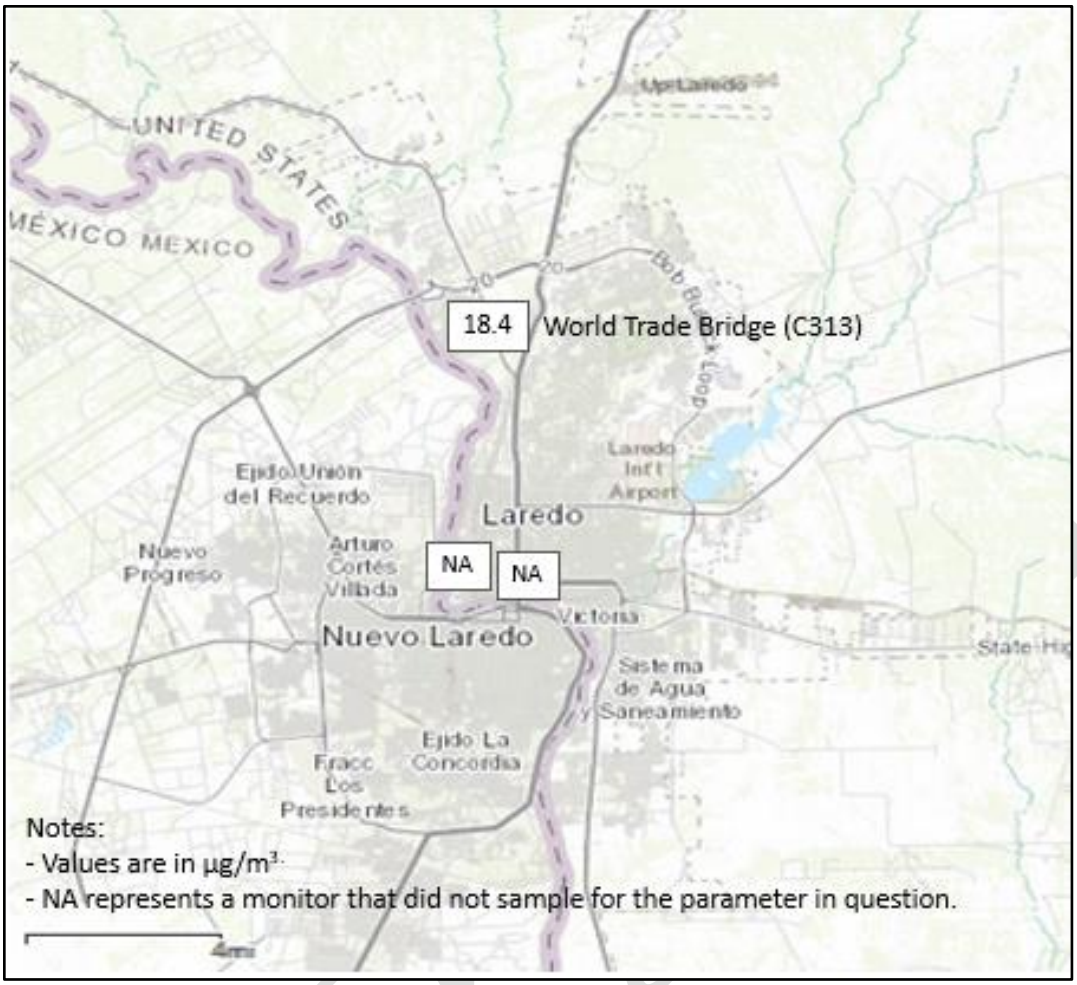

Figure C-4: Daily Average $PM_{2.5}$ Measurements (µg/m³) on March 18, 2022

C.4 CONTINUOUS PARTICULATE MATTER AND WIND GRAPHS

Time series graphs plotting continuous particulate measurements against wind speed measurements illustrate the nature of dust events with particulate concentrations rising following sustained, high wind speeds. In Webb County, there is not a monitor that samples continuous PM_{10} measurements; therefore, $PM_{2.5}$ measurements from the World Trade Bridge (C313) monitor, located approximately seven miles to the north-northwest of the Laredo Bridge (C66) monitor, were used. Figure C-5: *Continuous Five-Minute $PM_{2.5}$ and Peak Area Five-Minute Sustained Wind Speed Measurements on March 18, 2022,* demonstrates that Webb County peak sustained wind speed measurements occurred in the morning hours, peaking around approximately 08:00 CDT. Peak $PM_{2.5}$ concentrations in Webb County were recorded around 05:00 CDT, approximately two hours after local wind speeds began an upward trend at approximately 03:00 CDT. The gap between the increase in wind speed and peak $PM_{2.5}$ concentrations in Figure C-5 suggests that the source of dust was outside of Webb County. Although $PM_{2.5}$ is not a perfect surrogate for PM_{10}, continuous PM_{10} data were not available in Webb County; therefore, using $PM_{2.5}$ data was the only option available for particulate matter concentrations.

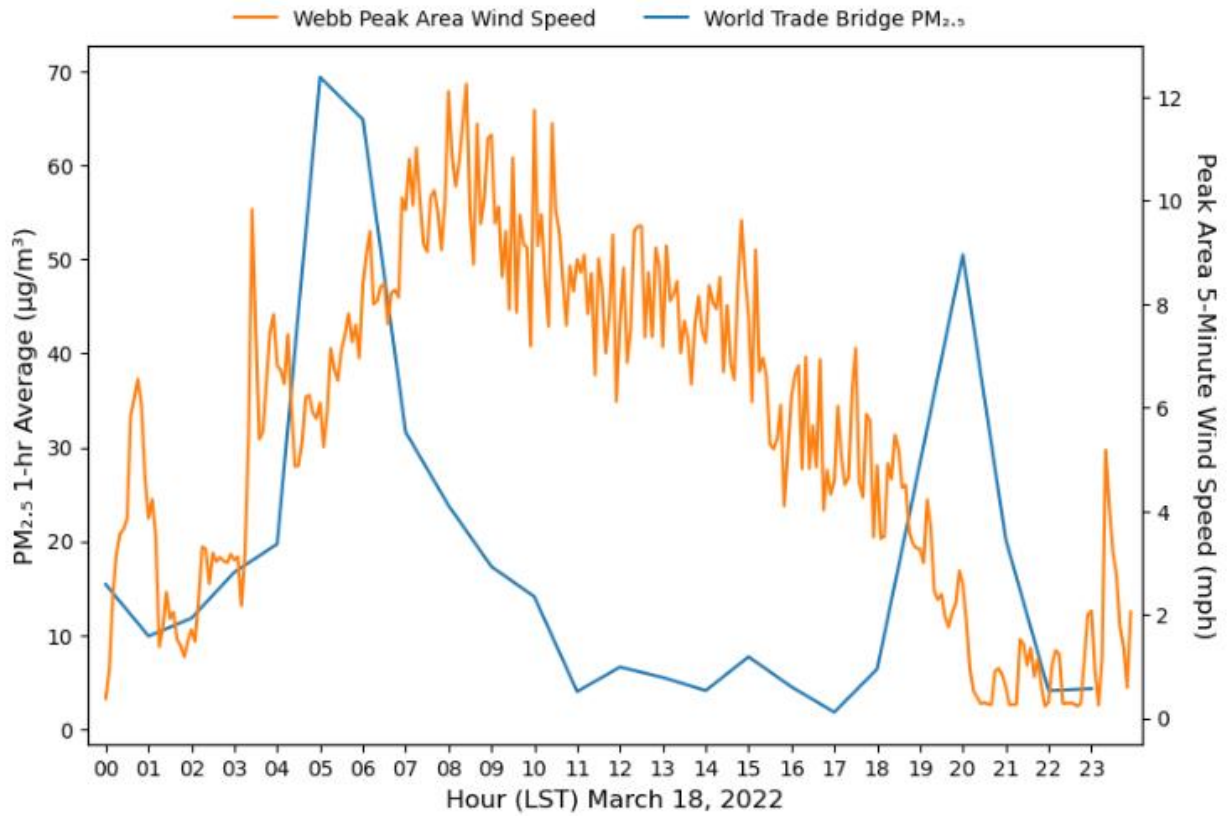

Figure C-5: Continuous Five-Minute $PM_{2.5}$ and Peak Area Five-Minute Sustained Wind Speed Measurements on March 18, 2022

C.5 SPECIAL WEATHER STATEMENTS

A weather statement issued on March 18, 2022, by the National Weather Service for Corpus Christi, the office covering Webb County, states: “The main concern over the short term will be fire weather and the impacts of the gusty northwest winds today behind this morning's cold front. With winds still gusting between 25 and 33 mph as of 2 pm and relative humidity values in the upper teens and low 20 percent range. Critical Fire Weather conditions continue, supporting the Red Flag Warning that will continue through 7 pm this evening.” Additionally, the National Weather Service issued an airport weather warning for the Corpus Christi International Airport on March 18, 2022, due to wind gusts of 35 nautical mph (40 mph) or higher. Although the airport is located approximately 125 miles east of Webb County, the cold front and winds described were from the same weather system that traveled through Webb County. Portions of these weather statements are presented Figure C-6: *Relevant Portions of Forecast Discussion and* Warning *Issued by the National Weather Service Corpus Christi Office on March 18, 2022*.

```
782
FXUS64 KCRP 181940
AFDCRP

Area Forecast Discussion
National Weather Service Corpus Christi TX
Issued by National Weather Service Austin/San Antonio TX
240 PM CDT Fri Mar 18 2022

.SHORT TERM (Tonight through Saturday Night)...

The main concern over the short term will be fire weather and the
impacts of the gusty northwest winds today behind this morning's
cold front. With winds still gusting between 25 and 33 mph as of
2pm and relative humidity values in the upper teens and low 20
percent range Critical Fire Weather conditions continue,
supporting the Red Flag Warning that will continue through 7 pm
this evening. In addition, the Small Craft Advisory continues into
the afternoon hours. Winds will begin to drop off this evening as
the pressure gradient relaxes with the strong upper low pivoting
towards the Great Lakes and weak high pressure building into
Texas. Lows tonight under mostly clear skies will range from the
upper 40s for Victoria and northern areas to the 50s across the
Brush Country and Coastal Plains. Saturday will be sunny, and
despite the light winds as high pressure sits overhead dry air
will once again lead to elevate fire weather conditions. With the
high pressure across east Texas by Saturday night, winds will be
easterly off the Gulf by the overnight hours on Saturday.

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003
WWUS84 KCRP 181458
AWWCRP
TXZ243-343-181800-

Airport Weather Warning
National Weather Service Corpus Christi TX
958 AM CDT Fri Mar 18 2022

...AIRPORT WEATHER WARNING...

The National Weather Service in Corpus Christi has issued an Airport
Weather Warning for...

Corpus Christi International Airport /CRP/ until 100 PM CDT.

The following weather hazards are expected:

Wind gusts 35 knots or higher.

LAT...LON 2785 9760 2780 9741 2771 9743 2775 9762
$$
```

Figure: C-6 Relevant Portions of Forecast Discussion and Warning Issued by the National Weather Service Corpus Christi Office on March 18, 2022

C.6 DAILY AVERAGE PARTICULATE MATTER MEASUREMENTS

All available continuous and non-continuous Webb County daily average particulate measurements from March 18, 2022, are provided in Table C-1: *Webb County Particulate Matter Measurements on the Proposed Exceptional Event Day of March 18, 2022*.

Table C-1: Webb County Particulate Matter Measurements on the Proposed Exceptional Event Day of March 18, 2022

Site	Type	Method	Concentration (µg/m³)
Laredo College (C44)	PM_{10}	FRM	No data *
Laredo Bridge (C66)	PM_{10}	FRM	157*
World Trade Bridge (C313)	$PM_{2.5}$	Beta	18.4

Notes:
*Indicates the measurement is proposed as an exceptional event.
Abbreviations:
FRM Federal Reference Method non-continuous monitor – used for regulatory purposes
Beta Beta Attenuation, BAM 1022 (Continuous) – used for regulatory purposes

C.7 CHEMICAL SPECIATION STUDY

$PM_{2.5}$ Chemical Speciation Network sampling is not done in Webb County; therefore, this study could not be performed.

C.8 COMPARISON OF EVENT-AFFECTED DAYS TO SIMILAR DAYS WITHOUT ELEVATED PM_{10} CONCENTRATIONS

To illustrate the impact a windblown dust event has on Webb County versus local anthropogenic dust, TCEQ compared the event date to other high wind days that did not have elevated 24-hour PM_{10} concentrations in 2022. Specifically, this comparative analysis focused on identifying days with wind speed and, to a lesser extent, wind direction measurements comparable to the proposed exceptional event day but without elevated 24-hour PM_{10} values.

Table C-2: *Laredo Bridge (C66) Particulate Matter and Webb County Wind Measurements on March 18, 2022, and Days with High Winds but Low Particulate Matter Concentrations* provides four representative days in 2022 where wind speed and wind direction are comparable to the proposed exceptional event day of March 18, 2022. On each of the identified days, daily average PM_{10} measurements were significantly less than the flagged event day of March 18, 2022. This analysis provides additional supporting evidence that measured concentrations on the flagged event day were not the result of local anthropogenic sources but were instead caused by transport of widespread dust.

Table: C-2 Laredo Bridge (C66) Particulate Matter and Webb County Wind Measurements on March 18, 2022, and Days with Similar Winds but Low Particulate Matter Concentrations

Day	PkWnd	WDR	StDev	PM_{10} FRM
3/18/2022	10.62	254.17	32.97	157
3/30/2022	17.24	250.49	22.68	68
12/19/2022	6.76	244.78	23.19	7
5/25/2022	14.27	184.53	26.51	20
12/13/2022	10.40	214.36	24.38	34

Abbreviations:
PM_{10} FRM non-continuous FRM daily average in µg/m³ at Laredo Bridge (C66) – used for regulatory purposes
PkWnd peak area one-hour average wind speed in mph
WDR daily wind direction resultant in degrees from north at Laredo Bridge (C66)
StDev wind direction standard deviation at Laredo Bridge (C66)

C.9 SPATIAL AND TEMPORAL VARIABILITY OF PM_{10}

PM_{10} data for Webb County are presented in Table C-3: *Webb County PM_{10} Daily Measurements (µg/m³) before and after March 18, 2022*. Because only the Laredo Bridge monitor was collecting PM_{10} data at the time of the proposed exceptional event, it is the only monitor with listed values in the table.

Table C-3: Webb County PM_{10} Daily Measurements (µg/m³) before and after March 18, 2022

Date	Laredo Bridge (C66) FRM	Laredo College (C44) FRM
3/12/2022	14	NA
3/13/2022	--	--
3/14/2022	--	--
3/15/2022	--	--
3/16/2022	--	--
3/17/2022	--	--
3/18/2022	157*	NA
3/19/2022	--	--
3/20/2022	--	--
3/21/2022		
3/22/2022	--	--
3/23/2022	--	--
3/24/2022	45	NA

Notes:
* indicates proposed exceptional event day measurement.
-- sample collection was not scheduled for listed day.
Abbreviations:
FRM Federal Reference Method monitor PM_{10} concentration (µg/m³) – used for regulatory purposes

C.10 AIR QUALITY FORECAST ON THE PROPOSED EXCEPTIONAL EVENT DAY

TCEQ provides the EPA Air Quality Index (AQI) forecasts for the current day and the next three to four days for 17 areas in Texas, including the Laredo area, for ozone, $PM_{2.5}$, and PM_{10}. These forecasts are available to the public on the Today's Texas Air Quality Forecast webpage (http://www.tceq.texas.gov/airquality/monops/forecast_today.html) (TCEQ2, 2022) and on the EPA AirNow website (http://airnow.gov/) (EPA3, 2022). These notifications are forecasts, and although the forecast does reference suspended dust and moderate to strong winds, the PM_{10} levels were not predicted to be as high as what occurred. The Today's Texas Air Quality webpage forecast discussion for the proposed exceptional event day is presented below:

> **"Friday 03/18/2022**
>
> Depending on the amount of continuing burning activity from multiple wildfires around Eastland County in North Central Texas as well as scattered wildfires across West Central Texas, northerly winds may steer fairly heavy smoke at times over portions of South Central, Southeast Texas, and the coastal bend of Texas, impacting these regions of the state at varying intensities and possibly generating PM2.5 spikes to the lower to middle end of the "Moderate" range. In addition, light amounts of lingering yet weakening suspended dust generated the previous day across the Texas Panhandle and West Texas may linger over portions of North Central, South Central, Southwest, and Southeast Texas. The intensity and coverage of the transported smoke combined with decreasing amounts of dust may be enough to raise the overall daily PM2.5 AQI to the lower to middle end of the "Moderate" range in parts of the Austin, Bryan-College Station, Houston, and San Antonio areas; the lower end of the "Moderate" range in parts of the Laredo and Waco-Killeen areas; and to the upper end of the "Good" range (perhaps with an isolated low "Moderate" or two) in parts of the Beaumont-Port Arthur, Brownsville-McAllen, Corpus Christi, Dallas-Fort Worth, and Victoria areas.
>
> Elsewhere in the state, moderate to strong winds, cool to mild temperatures, and/or lower incoming background levels should help keep air quality in the "Good" range in most spots."

C.11 MAP OF WIND SPEED AND DIRECTION

EPA's High Wind Dust Event Guidance (EPA, 2019) suggests a minimum sustained wind speed of 25 mph for western states, including Texas, or development of an alternate area-specific high wind threshold at which a dust event could occur. The event meets this threshold with peak wind gusts greater than 25 mph. High area winds in surrounding areas indicate that PM_{10} concentrations recorded were influenced by regional transport from surrounding areas.

TCEQ used National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL) meteorological model results to display wind speeds and direction in the source areas west and northwest of the Laredo Bridge (C66) monitor for March 18, 2022, where high winds over natural, undisturbed land transported particulate matter into Webb County. Specifically, TCEQ used the 12-kilometer (km) North American Model (NAM) hourly wind speeds and wind vectors at a 10-meter height. Figure C-7: *NOAA ARL Model Wind Field in Webb County at 07:00 Central Daylight Time (CDT) on March 18, 2022,* illustrates the predicted wind speeds in dust source areas west and northwest of the Laredo Bridge (C66) monitor for the proposed exceptional event day of March 18, 2022. This model supports the occurrence of windblown dust from source areas west and northwest of the Laredo Bridge (C66) monitor at wind speeds depicted in this figure that range to 20 nautical mph or just above 23 mph.

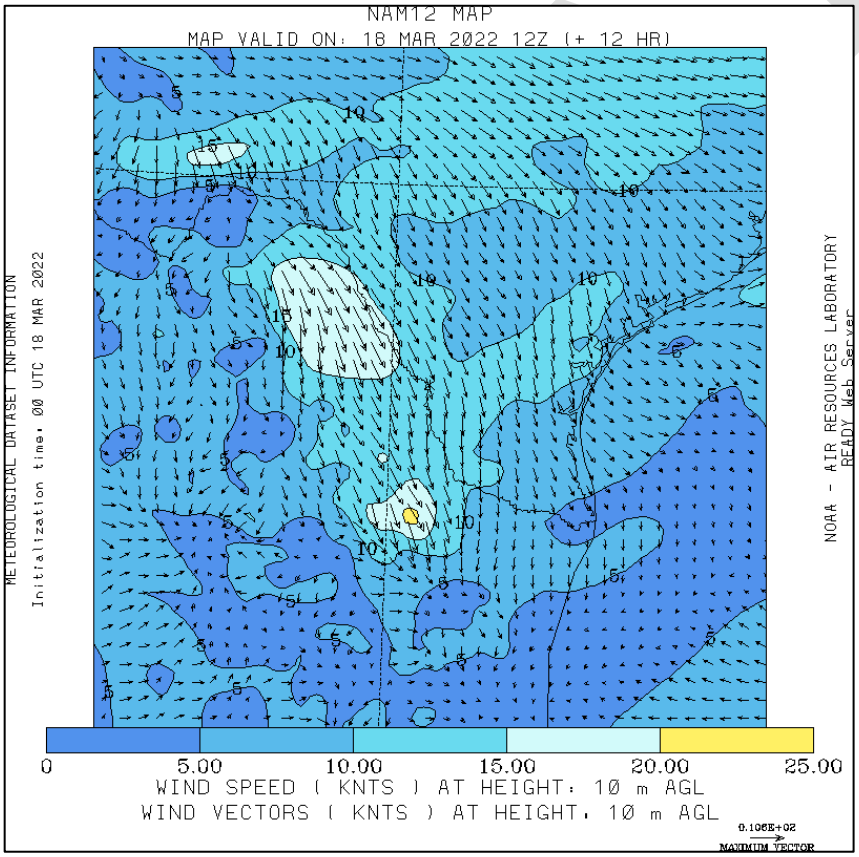


Figure C-7: NOAA ARL Model Wind Field in Webb County at 07:00 Central Daylight Time (CDT) on March 18, 2022

C.12 WIND AND PARTICULATE MATTER MEASUREMENTS

A list of the PM_{10} concentration and wind measurements in Webb County on the proposed exceptional event day of March 18, 2022, is provided in Table D-4: *Webb County Area Wind Measurements and PM_{10} Concentration*. The proposed exceptional event day had peak sustained winds measured in excess of the suggested 25 mph threshold for blowing dust cited in EPA's High Wind Dust Event Guidance (EPA, 2019).

Table D-4: Webb County Area Wind Measurements and PM_{10} Concentrations

Date	Laredo Bridge (C66) FRM PM_{10} ($\mu g/m^3$)	Peak Area[1] Wind Gust (mph)	Peak Area[1] 5-minute Wind Speed (mph)	Peak Area[1] Hourly Wind Speed (mph)	Wind Direction at Peak, Area[1] Wind Gust (degrees)
March 18, 2022	157	32	12	11	307

Note: The peak wind speeds depicted include 2-second measurements (Gust), sustained five-minute averages (5-min Wind Speed), and hourly averages (Hourly Wind Speed). The associated peak wind directions are in degrees clockwise from true north and indicate the direction from which the wind was blowing at the time of peak sustained five-minute and hourly wind speeds.

C.13 SATELLITE IMAGERY

Figure C-8: *Satellite Imagery of Hazy Conditions on March 18, 2022*, shows a general haze in the vicinity of the Laredo Bridge (C66) bridge monitor on the proposed exceptional event day of March 18, 2022. The white objects in the image are clouds. The hazy conditions are indicative of airborne particulate matter. The satellite image is from NASA's Visible Infrared Imaging Radiometer Suite (VIIRS) (NASA 2022).

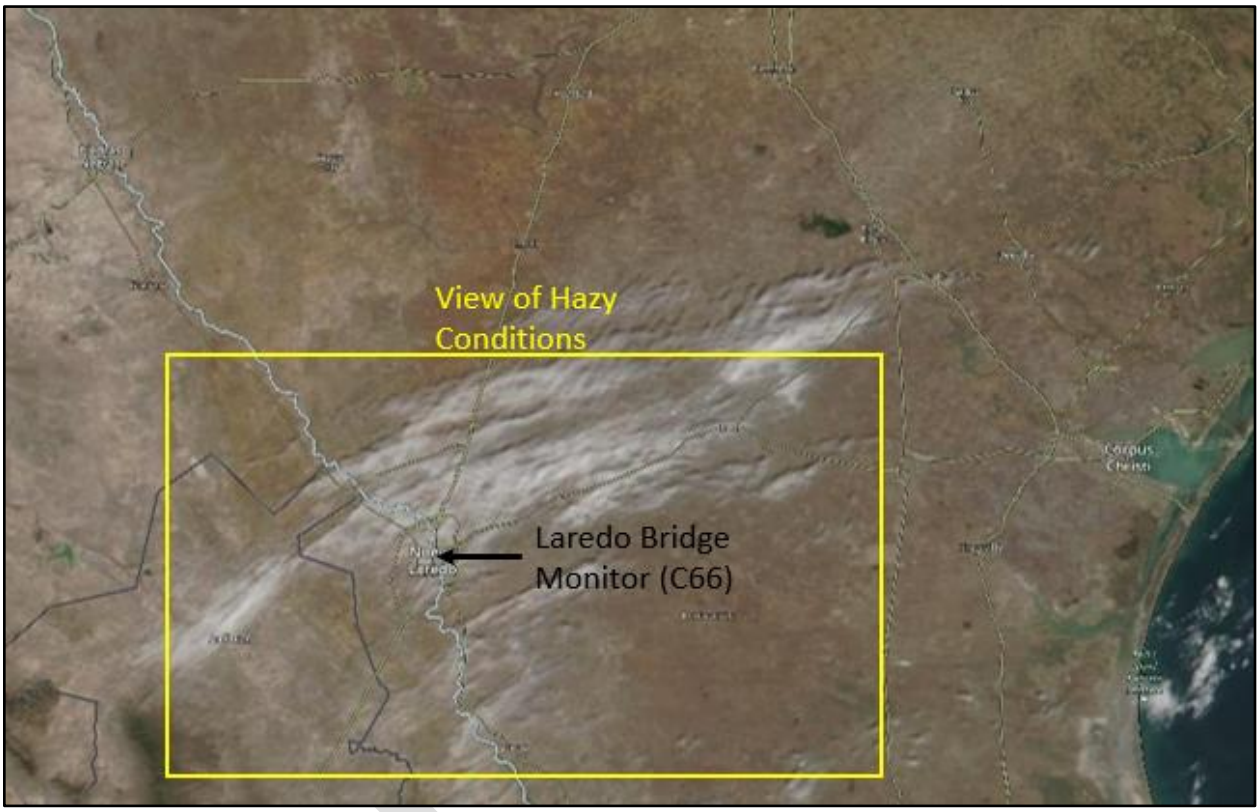


Figure C-8: Satellite Imagery of Hazy Conditions on March 18, 2022

APPENDIX D

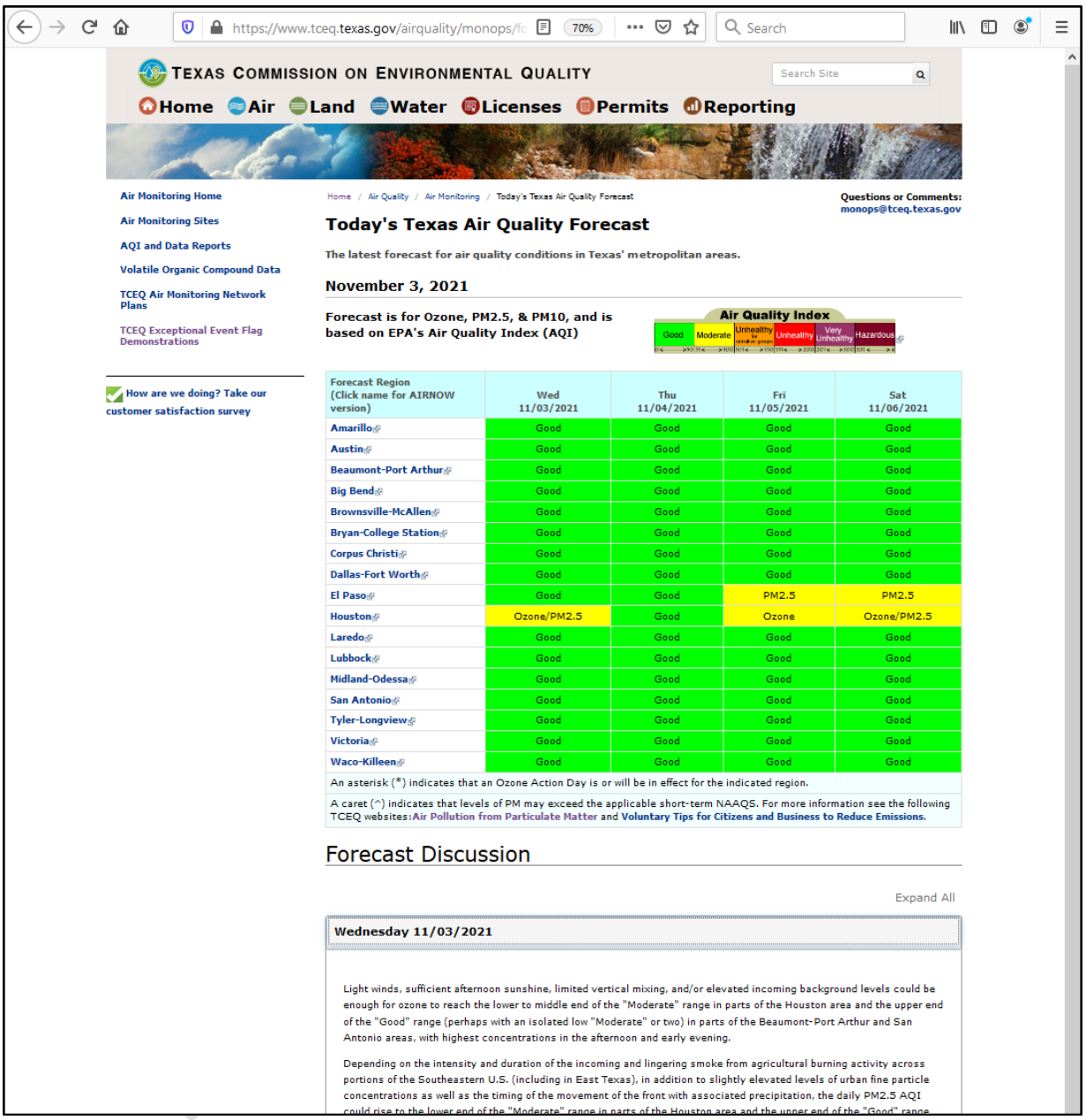
WEBPAGE EXAMPLES

EXCEPTIONAL EVENT DEMONSTRATION FOR PARTICULATE MATTER OF 10 MICRONS OR LESS IN AERODYNAMIC DIAMETER (PM_{10}) FOR THE SOCORRO HUECO AND EL PASO MIMOSA MONITORS ON FEBRUARY 16, 2022, AND THE LAREDO BRIDGE MONITOR ON MARCH 18, 2022

1987 PM_{10} STANDARD

D.1 WEBPAGE EXAMPLES

The Figures in this appendix show examples of webpages cited by links in Chapter 6: *Mitigation of Exceptional Events.*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

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Questions or Comments: monops@tceq.texas.gov

Today's Texas Air Quality Forecast

The latest forecast for air quality conditions in Texas' metropolitan areas.

November 3, 2021

Forecast is for Ozone, PM2.5, & PM10, and is based on EPA's Air Quality Index (AQI)

Air Quality Index: Good | Moderate | Unhealthy for sensitive groups | Unhealthy | Very Unhealthy | Hazardous

Forecast Region (Click name for AIRNOW version)	Wed 11/03/2021	Thu 11/04/2021	Fri 11/05/2021	Sat 11/06/2021
Amarillo	Good	Good	Good	Good
Austin	Good	Good	Good	Good
Beaumont-Port Arthur	Good	Good	Good	Good
Big Bend	Good	Good	Good	Good
Brownsville-McAllen	Good	Good	Good	Good
Bryan-College Station	Good	Good	Good	Good
Corpus Christi	Good	Good	Good	Good
Dallas-Fort Worth	Good	Good	Good	Good
El Paso	Good	Good	PM2.5	PM2.5
Houston	Ozone/PM2.5	Good	Ozone	Ozone/PM2.5
Laredo	Good	Good	Good	Good
Lubbock	Good	Good	Good	Good
Midland-Odessa	Good	Good	Good	Good
San Antonio	Good	Good	Good	Good
Tyler-Longview	Good	Good	Good	Good
Victoria	Good	Good	Good	Good
Waco-Killeen	Good	Good	Good	Good

An asterisk (*) indicates that an Ozone Action Day is or will be in effect for the indicated region.

A caret (^) indicates that levels of PM may exceed the applicable short-term NAAQS. For more information see the following TCEQ websites: Air Pollution from Particulate Matter and Voluntary Tips for Citizens and Business to Reduce Emissions.

Forecast Discussion

Expand All

Wednesday 11/03/2021

Light winds, sufficient afternoon sunshine, limited vertical mixing, and/or elevated incoming background levels could be enough for ozone to reach the lower to middle end of the "Moderate" range in parts of the Houston area and the upper end of the "Good" range (perhaps with an isolated low "Moderate" or two) in parts of the Beaumont-Port Arthur and San Antonio areas, with highest concentrations in the afternoon and early evening.

Depending on the intensity and duration of the incoming and lingering smoke from agricultural burning activity across portions of the Southeastern U.S. (including in East Texas), in addition to slightly elevated levels of urban fine particle concentrations as well as the timing of the movement of the front with associated precipitation, the daily PM2.5 AQI could rise to the lower end of the "Moderate" range in parts of the Houston area and the upper end of the "Good" range

Figure D-1: Sample of a Portion of the TCEQ Today's Texas Air Quality Forecast Webpage

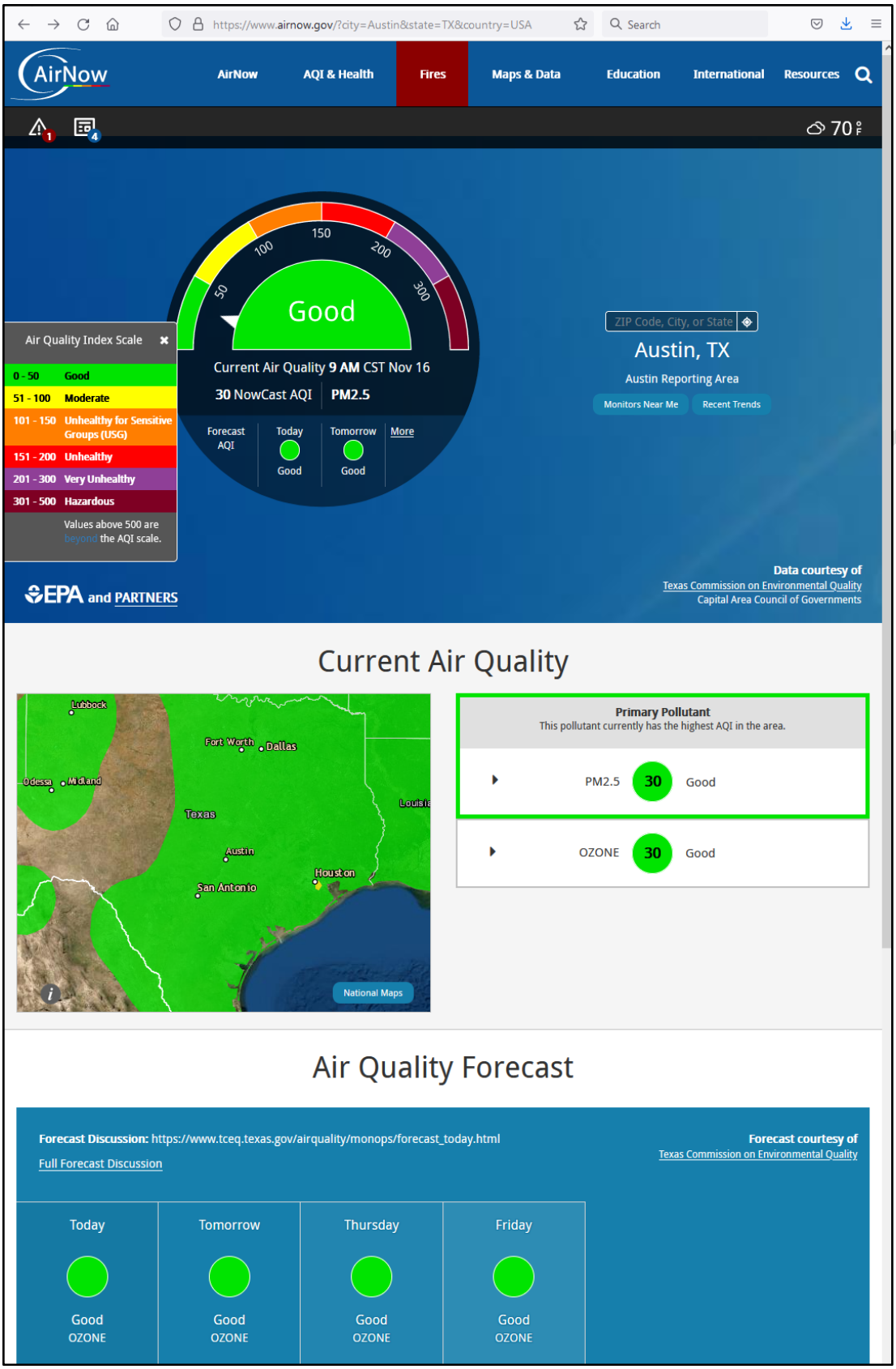


Figure D-2: Sample of the EPA AIRNOW Webpage

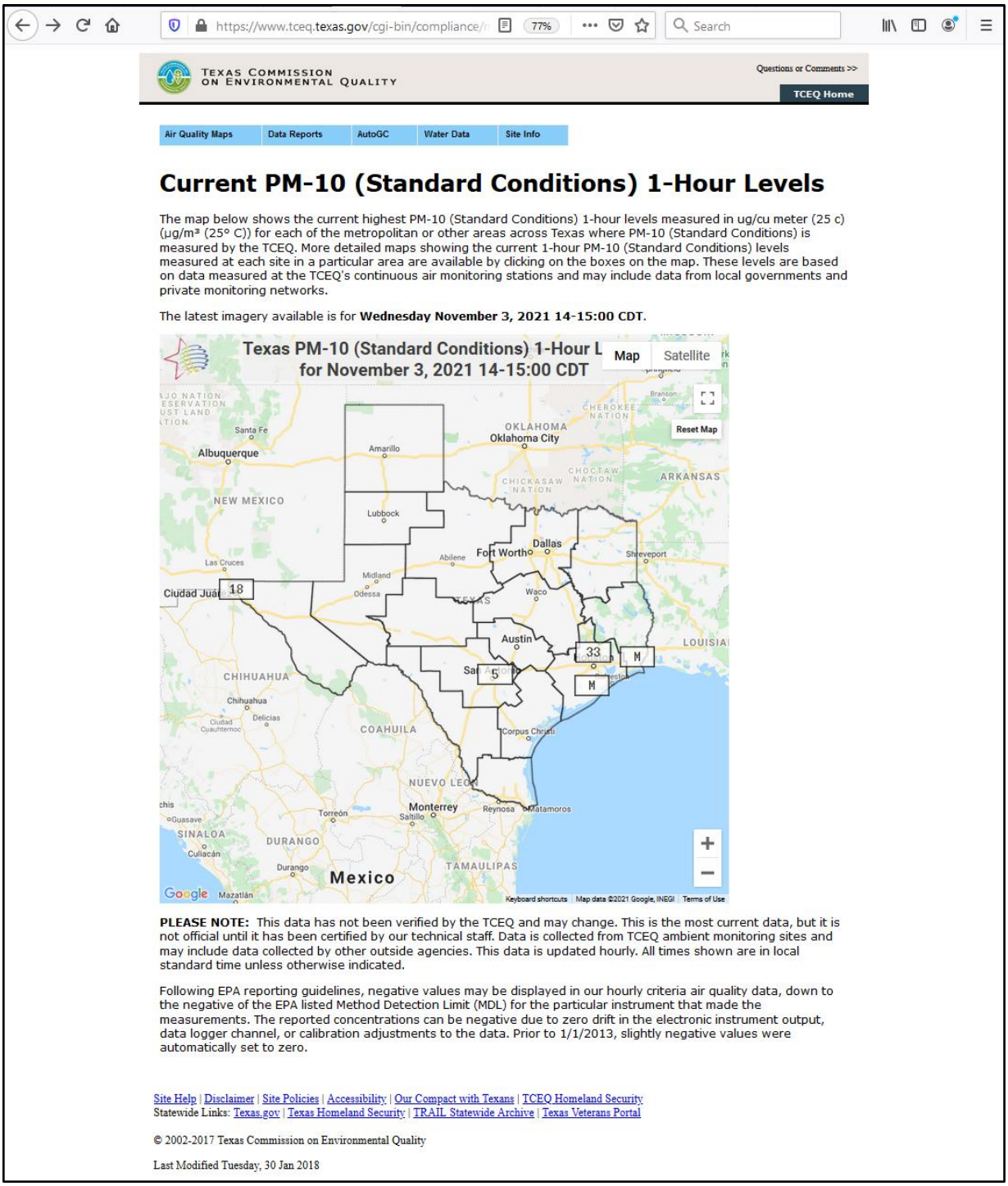
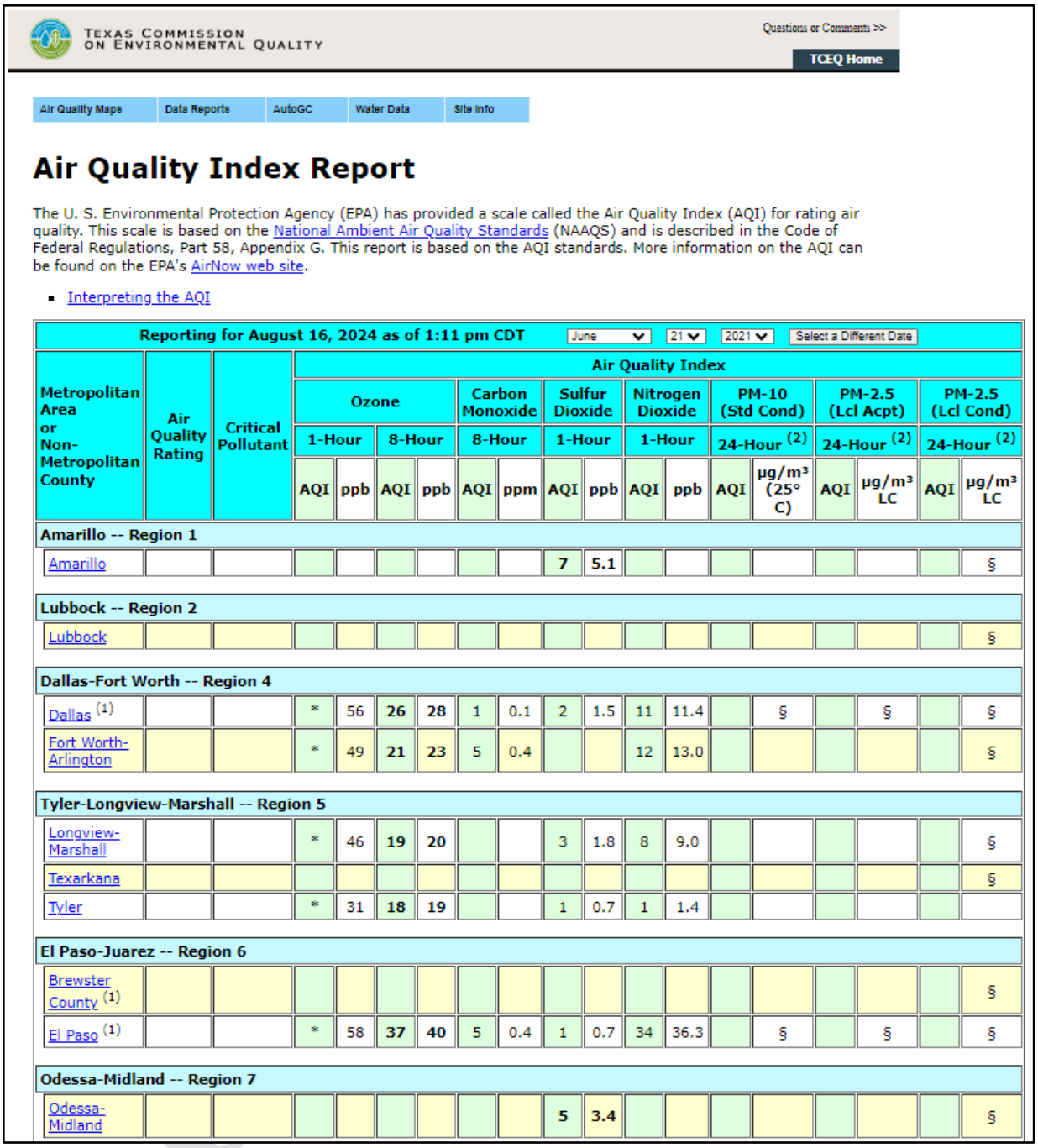


Figure D-3: Sample of TCEQ Map of Current PM_{10} Levels



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Questions or Comments >>

TCEQ Home

Air Quality Maps | Data Reports | AutoGC | Water Data | Site Info

Air Quality Index Report

The U. S. Environmental Protection Agency (EPA) has provided a scale called the Air Quality Index (AQI) for rating air quality. This scale is based on the National Ambient Air Quality Standards (NAAQS) and is described in the Code of Federal Regulations, Part 58, Appendix G. This report is based on the AQI standards. More information on the AQI can be found on the EPA's AirNow web site.

- Interpreting the AQI

Reporting for August 16, 2024 as of 1:11 pm CDT June 21 2021 Select a Different Date

Metropolitan Area or Non-Metropolitan County	Air Quality Rating	Critical Pollutant	Air Quality Index															
			Ozone				Carbon Monoxide		Sulfur Dioxide		Nitrogen Dioxide		PM-10 (Std Cond)		PM-2.5 (Lcl Acpt)		PM-2.5 (Lcl Cond)	
			1-Hour		8-Hour		8-Hour		1-Hour		1-Hour		24-Hour (2)		24-Hour (2)		24-Hour (2)	
			AQI	ppb	AQI	ppb	AQI	ppm	AQI	ppb	AQI	ppb	AQI	µg/m³ (25° C)	AQI	µg/m³ LC	AQI	µg/m³ LC
Amarillo -- Region 1																		
Amarillo									7	5.1								§
Lubbock -- Region 2																		
Lubbock																		§
Dallas-Fort Worth -- Region 4																		
Dallas (1)			*	56	26	28	1	0.1	2	1.5	11	11.4		§		§		§
Fort Worth-Arlington			*	49	21	23	5	0.4			12	13.0						§
Tyler-Longview-Marshall -- Region 5																		
Longview-Marshall			*	46	19	20			3	1.8	8	9.0						§
Texarkana																		§
Tyler			*	31	18	19			1	0.7	1	1.4						
El Paso-Juarez -- Region 6																		
Brewster County (1)																		§
El Paso (1)			*	58	37	40	5	0.4	1	0.7	34	36.3		§		§		§
Odessa-Midland -- Region 7																		
Odessa-Midland									5	3.4								§

Figure D-4: Sample of a Portion of TCEQ Air Quality Index Report

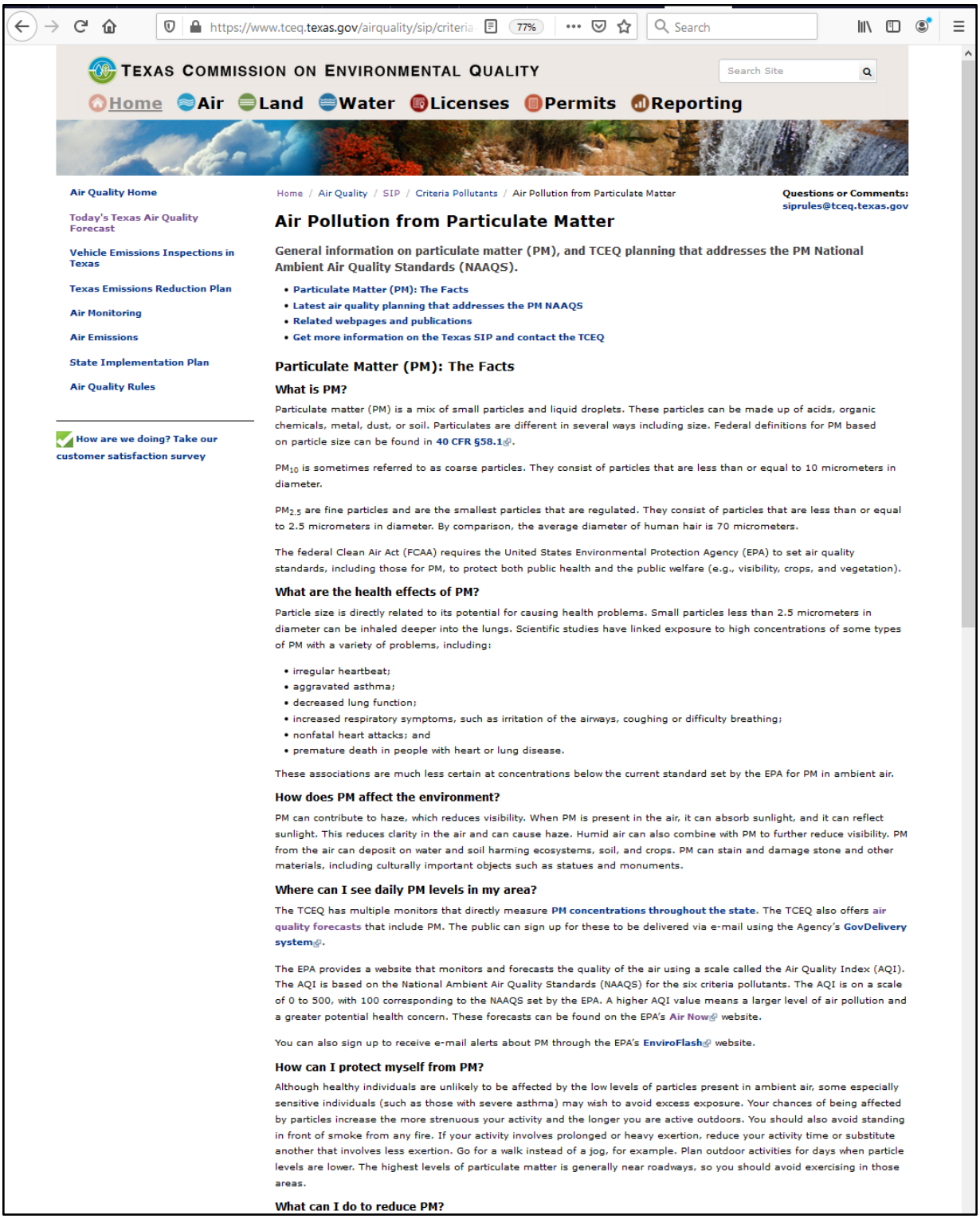


Figure D-5: Sample of a Portion of the TCEQ Particulate Matter Webpage

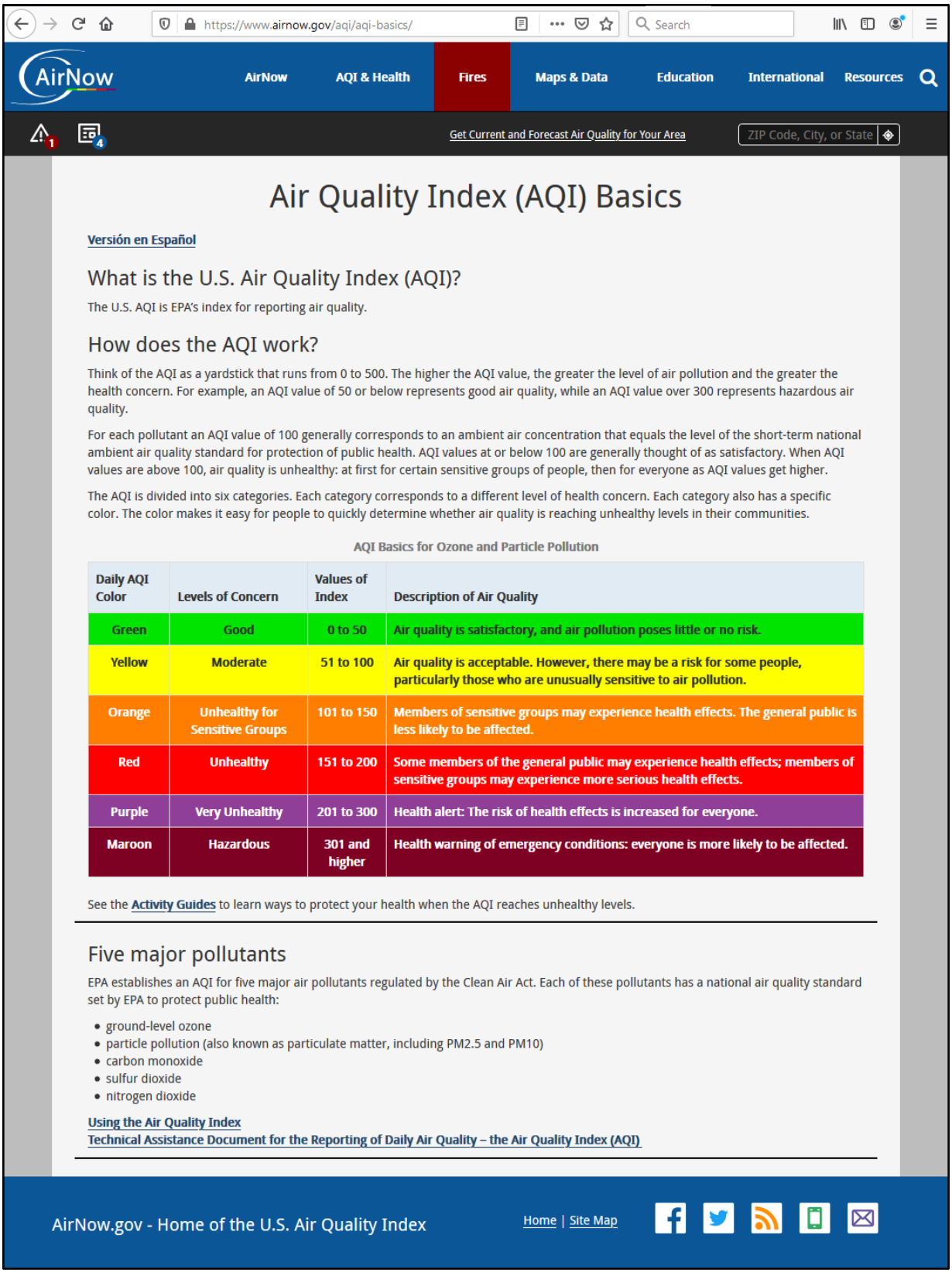


Figure D-6: Sample of a Portion of the EPA Air Quality Index Guide