Technical Support Document:

Chapter 8
Intended Round 4 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Texas

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, we, or us) must designate areas as either "nonattainment," "attainment," or "unclassifiable" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. See CAA section 107(d)(1)(A)(i)-(iii).

In this action, EPA defines a nonattainment area as an area that, based on available information including (but not limited to) monitoring data and/or appropriate modeling analyses, EPA has determined either: (1) does not meet the 2010 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS. An attainment/unclassifiable area is defined as an area that, based on available information including (but not limited to) appropriate monitoring data and/or modeling analyses, EPA has determined meets the NAAQS and does not likely contribute to ambient air quality in a nearby area that does not meet the NAAQS. An unclassifiable area is defined as an area for which the available information does not allow EPA to determine whether the area meets the definition of a nonattainment area or the definition of an attainment/unclassifiable area.

EPA is under a December 31, 2020, deadline to designate all remaining undesignated areas as required by the U.S. District Court for the Northern District of California.[1] This deadline is the final of three deadlines established by the court for EPA to complete area designations for the 2010 SO_2 NAAQS. The remaining undesignated areas are: 1) those areas which, under the court order, did not meet the criteria that required designation in Round 2 and also were not required to be designated in Round 3 due to installation and operation of a new SO_2 monitoring network by January 2017 in the area meeting EPA's specifications referenced in EPA's SO_2 Data Requirements Rule (DRR)[2], and 2) those areas which EPA has not otherwise previously designated for the 2010 SO_2 NAAQS. EPA previously issued guidance on how to appropriately and sufficiently monitor ambient air quality in the "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (SO_2 NAAQS Designations Monitoring TAD).[3]

[1] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).
[2] *See* 80 FR 51052 (August 21, 2015), codified at 40 CFR part 51 subpart BB.
[3] https://www.epa.gov/sites/production/files/2016-04/documents/so2monitoringtad.pdf

In previous final actions, EPA has issued designations for the 2010 SO_2 NAAQS for most areas of the country.[4] As mentioned, EPA is under a deadline of December 31, 2020, to designate the areas addressed in this technical support document (TSD) as required by the U.S. District Court for the Northern District of California. We are referring to the set of designations being finalized by the deadline of December 31, 2020, as "Round 4" or the final round of the designations process for the 2010 SO_2 NAAQS. After these Round 4 designations are completed, there will be no remaining undesignated areas for the 2010 SO_2 NAAQS.

This TSD addresses designations for all remaining undesignated areas in Texas for the 2010 SO_2 NAAQS. Areas with monitored violations of the 2010 SO_2 NAAQS are evaluated in this TSD in addition to an area with an invalid design value. Undesignated areas in Texas without monitored violations are referenced in this TSD for completeness and are covered in more detail in Chapter 2.

Texas submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on June 2, 2011 and updated its recommendations for all areas on September 18, 2015.[5] The state submitted supplemental recommendation information supporting their initial recommendation for Orange County in a letter dated May 11, 2020 to address more recent air quality monitoring data for monitors that were installed pursuant to the DRR.[6] In our intended designations, we have considered all the submissions from the state, except where a later submission indicates that it replaces an element of an earlier submission.

Table 1 identifies EPA's intended Round 4 designations and the areas in Texas to which they would apply. It also lists Texas' current recommendations. EPA intends to designate these areas by December 31, 2020, through an assessment and characterization of air quality based primarily on ambient monitoring data, including data from existing and new EPA-approved monitors that have collected data from January 2017 forward, pursuant to the DRR; additionally, other available evidence and supporting information, such as air dispersion modeling in certain situations, may also be considered.[7]

[4] Most areas of the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), December 13, 2016 (81 FR 89870), January 9, 2018 (83 FR 1098) and April 5, 2018 (83 FR 14597). EPA is not reopening these previous designation actions in this current Round 4 of designations under the 2010 SO_2 NAAQS, except where specifically discussed.

[5] https://www.regulations.gov/contentStreamer?documentId=EPA-HQ-OAR-2014-0464-0080&contentType=pdf

[6] May 11, 2020 Letter from Toby Baker, Executive Director of the Texas Commission on Environmental Quality to Ken McQueen USEPA Region 6 Regional Administrator, included in the docket for this action.

[7] Detailed SO_2 monitor information may be found in either the 2016 or 2017 ambient monitoring network plans, or associated addenda.

Table 1. Summary of EPA's Intended Designations and the Designation Recommendations by Texas.

Area/County	Texas' Recommended Area Definition	Texas' Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Hutchinson	Hutchinson County	Unclassifiable/ Attainment	Same as State's Recommendation	Nonattainment
Navarro	Navarro County	Attainment	Same as State's Recommendation	Nonattainment
Howard	Howard County	Unclassifiable/ Attainment	Same as State's Recommendation	Nonattainment
Bexar	Bexar County	Unclassifiable/ Attainment	Same as State's Recommendation	Attainment/ Unclassifiable
Harrison*	Harrison County	Unclassifiable/ Attainment	Same as State's Recommendation	Attainment/ Unclassifiable
Jefferson*	Jefferson County	Attainment	Same as State's Recommendation	Attainment/ Unclassifiable
Orange*	Orange County	Unclassifiable/ Attainment	Same as State's Recommendation	Unclassifiable
Robertson*	Robertson County	Unclassifiable/ Attainment	Same as State's Recommendation	Attainment/ Unclassifiable
Titus*	Titus County (partial)	Unclassifiable/ Attainment	Same as State's Recommendation	Attainment/ Unclassifiable

* EPA addresses these areas in Chapter 2 with all other areas which EPA intends to designate "attainment/unclassifiable" or "unclassifiable."

Areas that EPA previously designated in Round 1 (*see* 78 FR 47191), Round 2 (*see* 81 FR 45039 and 81 FR 89870), and Round 3 (*see* 83 FR 1098 and 83 FR 14597) are not affected by the designations in Round 4 unless otherwise noted.

2. General Approach and Schedule

An updated designations guidance document was issued by EPA through a September 5, 2019, memorandum from Peter Tsirigotis, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Regional Air Division Directors, U.S. EPA Regions 1-10.[8] To better reflect the Round 4 designations process, this memorandum supplements, where necessary, prior

[8] https://www.epa.gov/sites/production/files/2019-09/documents/round_4_so2_designations_memo_09-05-2019_final.pdf

designations guidance documents on area designations for the 2010 primary SO_2 NAAQS issued on March 24, 2011, March 20, 2015, and July 22, 2016. This memorandum identifies factors that EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The document also contains the factors that EPA intends to evaluate in determining the boundaries for all remaining areas in the country. These factors include: 1) air quality characterization via ambient monitoring and/or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

In EPA's September 2019 memorandum, we note that Round 4 area designations will be based primarily on ambient monitoring data, including data from existing and new EPA-approved monitors that have collected data at least from January 2017 forward, pursuant to the DRR. In addition, EPA may evaluate air dispersion modeling submitted by state air agencies for two specific circumstances. First, states may submit air dispersion modeling to support the geographic extent of a nonattainment boundary. Second, states may submit air dispersion modeling to demonstrate that new permanent and federally enforceable SO_2 emissions limits provide for attainment of the 2010 SO_2 NAAQS and represent a more accurate characterization of current air quality at the time of designation than does monitoring of past air quality.

This TSD is organized such that there is a section for each area in Texas for which air quality monitoring data indicate a violation of the 2010 SO_2 NAAQS, or if the 2017-2019 design value is invalid. When modeling information is available, it is evaluated in the context of that section. EPA does not plan to revise this intended designations TSD after consideration of state and public comment on our intended designation. A separate final TSD will be prepared as necessary to document how we have addressed such comments in the final designations.

The following are definitions of important terms used in this document:

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the 2010 SO_2 NAAQS.
3) Intended designated nonattainment area –an area that, based on available information including (but not limited to) monitoring data and/or appropriate modeling analyses, EPA intends to determine either: (1) does not meet the 2010 SO_2 NAAQS or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Intended designated attainment/unclassifiable area – an area that, based on available information including (but not limited to) appropriate monitoring data and/or appropriate modeling analyses, EPA intends to determine meets the 2010 SO_2 NAAQS and does not likely contribute to ambient air quality in a nearby area that does not meet the NAAQS.
5) Intended designated unclassifiable area – an area for which the available information does not allow EPA to determine whether the area meets the definition of a nonattainment area or the definition of an attainment/unclassifiable area.
6) Modeled violation – a modeled design value impact above the 2010 SO_2 NAAQS demonstrated by air dispersion modeling.

7) Recommended attainment area – an area that a state, territory, or tribe has recommended that EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that EPA designate as nonattainment.
9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that EPA designate as unclassifiable.
10) Recommended attainment/unclassifiable (or unclassifiable/attainment) area – an area that a state, territory, or tribe has recommended that EPA designate as attainment/unclassifiable (or unclassifiable/attainment).
11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to EPA.

3. Technical Analysis for the Hutchinson County Area

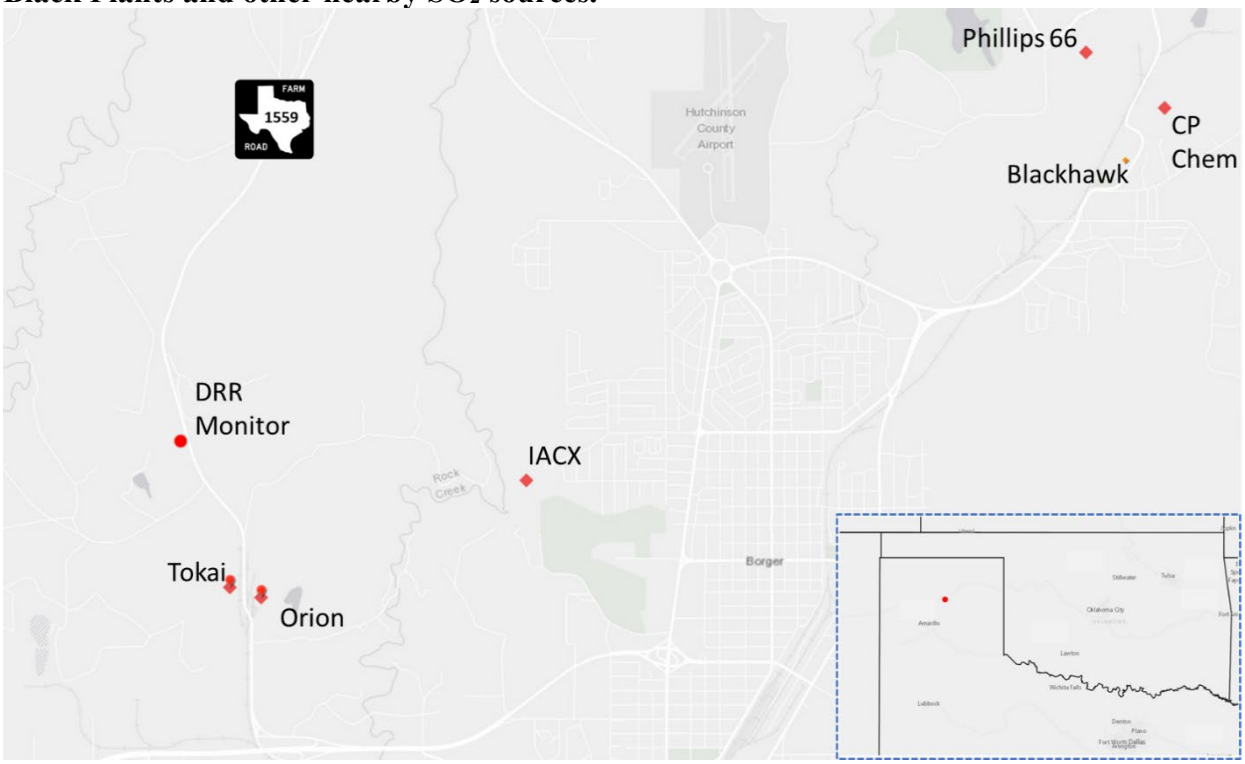
3.1. Introduction

EPA must designate the Hutchinson County, Texas area by December 31, 2020, because the area has not been previously designated, and Texas installed and began operating a new, EPA-approved monitor pursuant to the DRR. This section presents all the available air quality information for the portion of Hutchinson County that includes the following SO_2 sources around which the DRR required the state to characterize air quality:

- The Orion Carbon Black facility emits 2,000 tons or more of SO_2 annually. Specifically, Orion emitted 3,108 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Texas has chosen to characterize it via monitoring.
- The Tokai Carbon Black facility, formerly known as Sid Richardson, emits 2,000 tons or more of SO_2 annually. Specifically, Tokai emitted 4,863 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Texas has chosen to characterize it via monitoring.

As seen in Figure 1 below, the Orion and Tokai facilities are located in the panhandle of Texas, about 2.2 km west of the city of Borger, Texas on a secondary state road, named FM1559. FM1559 divides the two facilities with Borger on the east and Tokai on the west. The DRR monitor, AQS 48-233-1073, is located about 1.1 km to the NNW of the nearest source at the two facilities, also on FM1559. Several other nearby Hutchinson County SO_2 sources are also shown in Figure 1, including IACX, Phillips 66, Blackhawk, and CP Chem. These sources are discussed in section 3.3.2.

Figure 1. Map of the Hutchinson County, Texas Area Addressing Orion and Tokai Carbon Black Plants and other nearby SO_2 sources.



In its September 18, 2015 recommendation letter, Texas recommended that the Hutchinson County area, as one of the Texas counties without an SO_2 monitor, be designated as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the state's recommended boundaries consist of the boundaries of Hutchinson County. Texas, however, provided EPA with this recommendation prior to the installation and operation of an EPA-approved monitor and before the state had monitoring data for the 2017-2019 period. Texas has not updated its recommendation after these monitoring data became available. EPA does not agree with Texas' recommendation as to the designation category and intends to designate all of Hutchinson County, Texas, as described below, as nonattainment for the 2010 SO_2 NAAQS based upon currently available monitoring information for the 2017-2019 period. Our intended boundaries are consistent with the state's recommended boundaries and are described below.

3.2. Air Quality Monitoring Data for the Hutchinson County, Texas

EPA considered design values for air quality monitors in the Hutchinson County area by assessing the most recent 3 consecutive years (i.e., 2017-2019) of quality-assured, certified ambient air quality data in the EPA Air Quality System (AQS) using data from Federal Reference Method and Federal Equivalent Method monitors that are sited and operated in accordance with 40 CFR parts 50 and 58.[9] Procedures for using monitored air quality data to

[9] SO_2 air quality data are available from EPA's website at https://www.epa.gov/outdoor-air-quality-data.

determine whether a violation has occurred are given in 40 CFR part 50 Appendix T, as revised in the 2010 SO_2 NAAQS rulemaking. The 2010 1-hour SO_2 NAAQS is met when the design value is 75 ppb or less. Whenever several monitors are located in an area, the design value for the area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e., monitors with design values greater than 75 ppb) in a geographic area forms the basis for designating that area as nonattainment. The remaining factors, described in the next section, are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor(s). Table 2 contains the 2017-2019 design values for the area of analysis.

Table 2. 2010 SO_2 NAAQS Design Values for the Hutchinson County Area.

AQS Site ID	Monitor Location	2017 99th Percentile (ppb)	2018 99th Percentile (ppb)	2019 99th Percentile (ppb)	2017-2019 Design Value (ppb)
48-233-1073	19440 FM 1559, Borger Texas	246	213.6	167.5	**209**

Data collected at this monitor indicates that the design value at the monitor is 2.75 times the 75 ppb level of the 2010 SO_2 NAAQS. Therefore, a portion of the area must be designated nonattainment because of the violating monitor.

3.3. Intended Designation Boundary Determination

EPA must designate as nonattainment any area that violates the NAAQS and any nearby area that contributes to ambient air quality in the violating area. Hutchinson County shows a violation of the 2010 SO_2 NAAQS based on data collected between 2017 and 2019, and, therefore, some area around the violating monitor must be designated nonattainment. In this section, we consider the appropriate geographical extent of the nonattainment area.

A nonattainment area should contain the area violating the NAAQS (e.g., the area around a violating monitor or encompassing modeled violations), as well as any nearby areas (e.g., counties or portions thereof) that contain emissions sources contributing to the violation. (*See* CAA section 107(d)(l)(A)(i)). Accordingly, although EPA considers county boundaries as the analytical starting point for determining SO_2 nonattainment areas, an evaluation of five factors for each area may be considered in determining the geographic scope of a nonattainment boundary.

EPA guidance identifies the following on five factors for consideration: 1) ambient air quality data or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries, as well as other relevant available information. While the factors are presented individually, they are not independent. Instead, the five-factor analysis process carefully considers their interconnections and the dependence of each factor on one or more of the others.

3.3.1. Factor 1: Ambient Air Quality Data and Dispersion Modeling Results

Ambient air quality data are discussed in the previous section. Texas did not provide any source-oriented modeling to assess the geographic extent of the sources' impacts that are causing the monitored 2010 SO_2 NAAQS violations in the Hutchinson County area. Texas did not submit modeling to assess the boundaries, so we intend to use the additional analysis factors, described below, to support the intended nonattainment boundary determination.

3.3.2. Factor 2: Emissions-Related Data

Texas provides information on annual emissions data for point sources in the county area through its State of Texas Air Reporting System (STARS) online database[10]. EPA accessed the STARS database in May 2020 and downloaded the most recent data. Table 3 shows the most recently available 3 years of actual emissions data for the DRR facilities that are being characterized by the SO_2 monitor described previously.

The state's emissions data show that the SO_2 emissions from the facilities vary from year to year but that there does not appear to be a trend. Both facilities continue to emit over 2,000 tons per year.

Table 3. Actual SO_2 Emissions of Sources with Source-Specific SO_2 Monitors in the Hutchinson County Area.

Company	Facility	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
TOKAI CARBON CB LTD	BORGER CARBON BLACK PLT	5,184	6,950	5,792
ORION ENGINEERED CARBONS LLC	BORGER CARBON BLACK PLANT	3,290	3,706	3,512

Evidence of SO_2 emissions in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. EPA has also considered SO_2 emissions data from Texas' STARS database for other facilities within 20 km of the violating monitors as listed in Table 4. Also, because of the proximity of Carson County boundary to the facilities, EPA examined the emissions inventory and found no sources in Carson County emitting more than 1 tpy of SO_2 in 2017.

[10] https://www.tceq.texas.gov/assets/public/implementation/air/ie/pseisums/2014_2018statesum.xlsx

Table 4. SO_2 Emissions of Nearby Sources in the Hutchinson and Carson County Areas.

County	Facility Name	Distance from Violating Monitor (km)	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
Hutchinson	CHEVRON PHILLIPS CHEMICAL COMPANY LP - PHILTEX RYTON PLANT	8	510.633	530.109	461.5859
Hutchinson	PHILLIPS 66 COMPANY - BORGER REFINERY	7.6	209.0956	204.8912	218.2842
Hutchinson	IACX* - ROCK CREEK GAS PLANT	2.6	185.0959	184.1431	3.0159
Hutchinson	BORGER ENERGY ASSOCIATES LP - BLACKHAWK POWER PLANT	7.6	67.7	71.8	82.4
Hutchinson	SOLVAY	8	0.19	0.19	0.18
Carson	Not Applicable	Not Applicable	< 1	<1	<1

* The IACX facility was recently purchased from DCP, the facility was shown as DCP in STARS.

When designating areas, EPA does not consider anticipated future emission reductions that are not yet federally enforceable and in effect. However, we note here that the Tokai and Orion facilities are subject to Federally enforceable consent decrees that the EPA estimates will result in actual future SO_2 emissions reductions at the two sources.

To estimate actual SO_2 emissions reductions at the facilities, we compared the average annual emissions for 2016-2018 to the new reduced allowable emissions required by the consent decrees. Consistent with Table 2, the 2016-2018 average annual SO_2 emission rate is 5,975 tpy for Tokai and 3,503 tpy for Orion. The consent decrees require application of emissions controls and a reduction in allowable SO_2 emissions limits to be effective April 2021 at Tokai (reducing allowable emissions to 5,015 tpy) and December 2022 at Orion (reducing allowable emissions to

423 tpy).[11,12] The estimated actual SO_2 reductions after implementation of controls to meet the consent decree requirements are approximately 960 tpy (from 5,975 tpy) at Tokai and 3,078 tpy (from 3,503 tpy) at Orion, totaling 4,038 tpy in reductions when compared to 2016-2018 emissions.

3.3.3. Factor 3: Meteorology

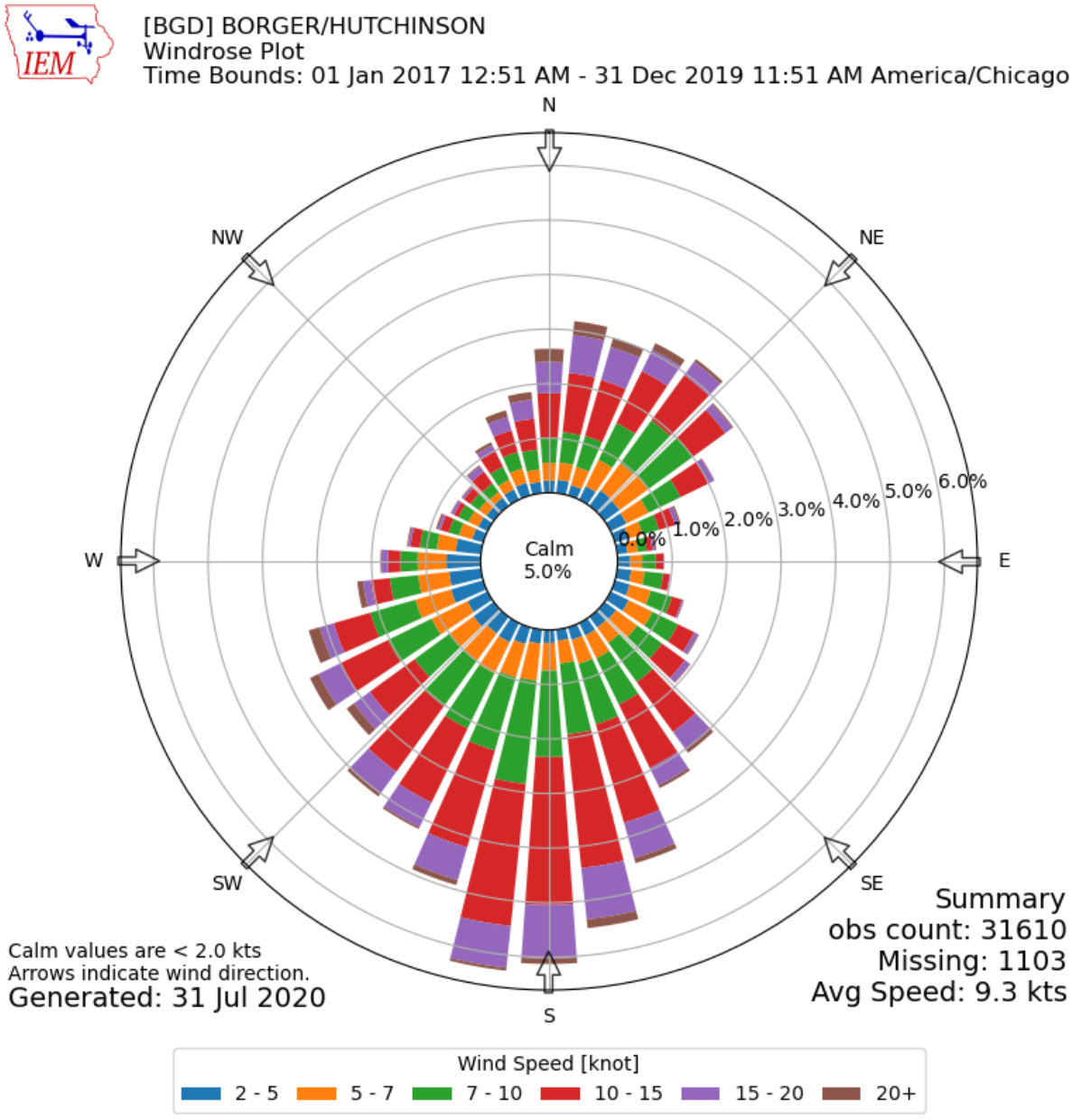
Texas did not provide an analysis of the meteorology (*e.g.,* weather and transport patterns) for the Hutchinson County area. EPA evaluated meteorological data for the period 1/1/2017 – 7/31/2019 to determine how weather conditions, including wind speed and direction, affect the plume of sources contributing to the ambient SO_2 concentrations at the monitor. The wind rose in Figure 2, relying on meteorological records from the nearest National Weather Service meteorological station in Hutchinson County (Hutchison County Airport), indicates winds blow most often from the south to the north at speeds ranging from 6 to 15 knots.[13]

[11] Tokai's current permitted allowable SO_2 emissions are 16,079 tpy. The Consent Decree requires Tokai to reduce allowable emissions by 11,064 tpy by April 2021. Tokai's allowable emissions after the reductions would be 5,015 tpy. Tokai consent decree at https://www.epa.gov/enforcement/sid-richardson-carbon-and-energy-company-clean-air-act-settlement.

[12] Orion's current permitted allowable SO_2 emissions are 18,159 tpy. The Consent Decree requires Orion to reduce allowable emissions by 17,736 tpy. Orion's allowable emissions after reductions would be 423 tpy. Orion consent decree at https://www.epa.gov/enforcement/orion-engineered-carbons-llc-clean-air-act-settlement.

[13] Figure obtained from the Iowa State University Iowa Environmental Mesonet website (https://mesonet.agron.iastate.edu/)

Figure 2. Wind Rose (2017-2019) for Hutchinson County, Texas Using Data from the Borger/Hutchinson County Airport.

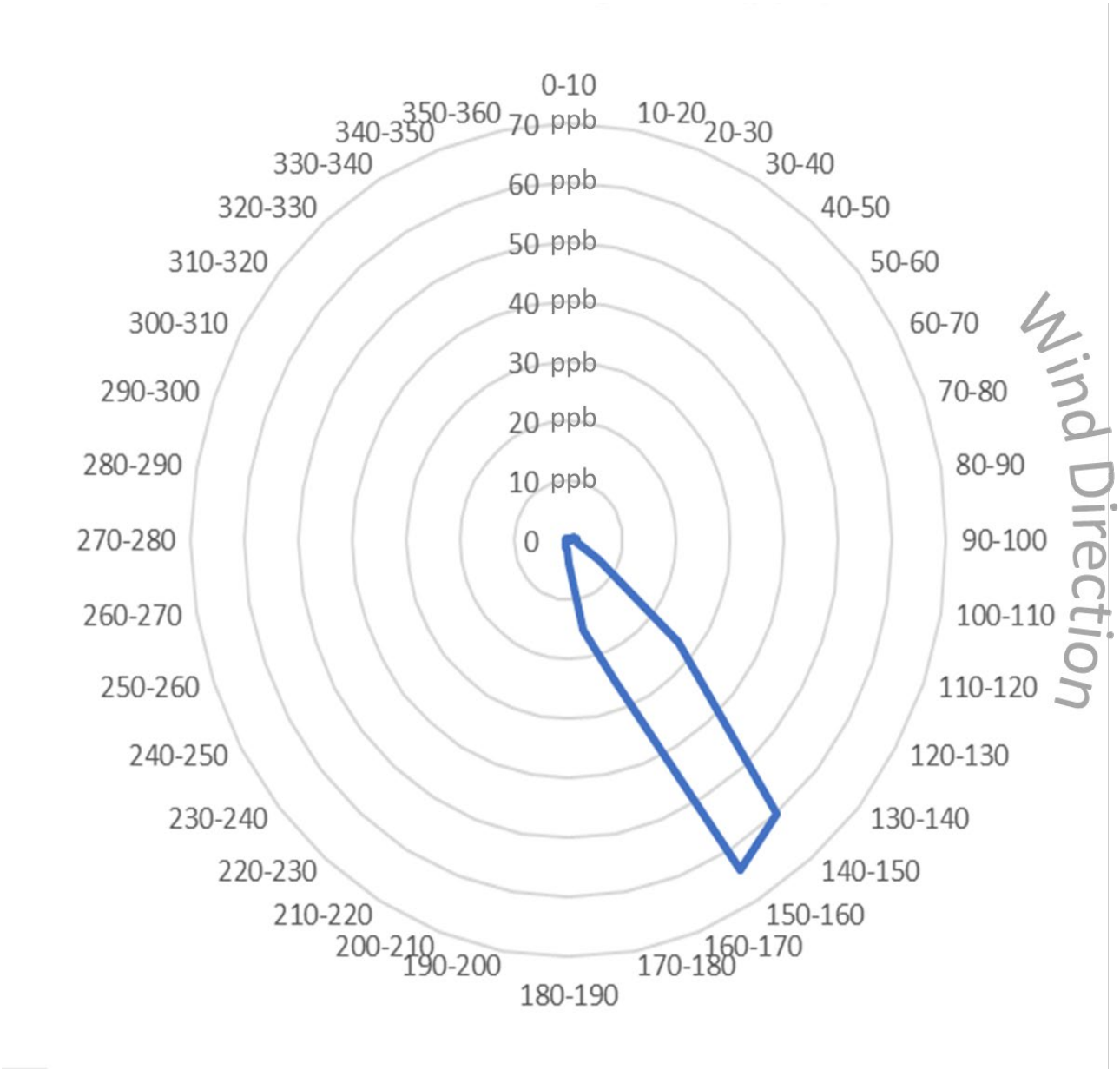


These prevailing winds from the south would transport the emissions from the Orion and Tokai Carbon black plants in the direction of the DRR monitor. Referring to Figure 1, the other SO_2 sources in Hutchinson County are located to the northeast of the carbon black plants. Winds from the either the northeast or the southwest will align with the other sources' locations and create the potential for combined impacts from their plumes with plumes from the carbon black plants. Thus, while south-southeast winds would cause the most direct impacts of Orion and Tokai carbon black plants on the monitored concentrations, violations may also be occurring with other common wind directions; notably from the southwest, in which the plumes from the carbon

black plants align with those of other nearby sources such as the IACX gas plant and other sources to the northeast.

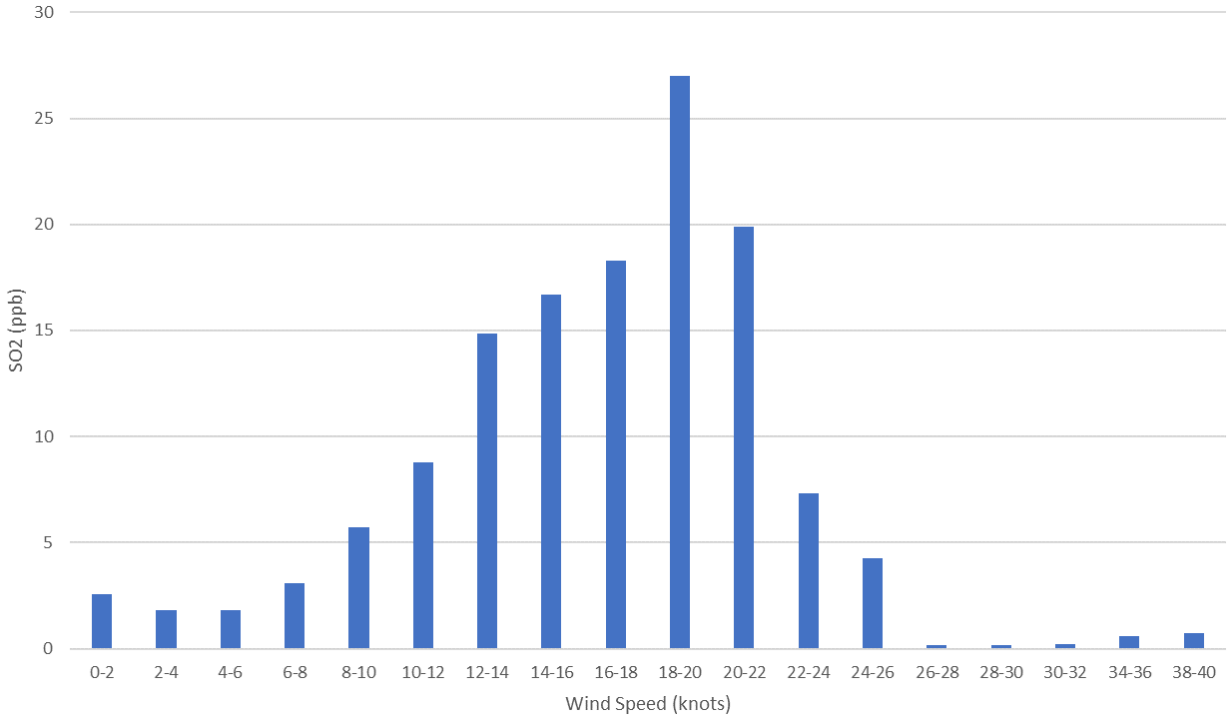
Figure 3 shows that the average measured SO_2 concentration is highly dependent on wind direction as measured at the on-site DRR station. Those wind directions from the Orion and Tokai sources give much higher SO_2 concentrations than other directions. This is consistent with the two carbon black plants accounting for nearly all the impact at the DRR monitor from among the sources listed in Tables 3 and 4.

Figure 3. Pollution Rose of 2016-2019 Average SO_2 (ppb) Versus Wind Direction for the Hutchinson County DRR Monitor. Observations with missing wind direction or SO_2 concentrations were excluded from the averaging.



Additionally, the concentrations are dependent on wind speeds; as shown in Figure 4 for wind directions between 130 and 180 degrees, the average concentration at the monitor increases with wind speeds until the peak average SO_2 concentration (100 ppb) at wind speeds between 18-20 knots (20.7-23.0 mph). The association of the highest concentrations with such a high wind speed indicates that it takes high winds to bring the centerline of the plume in contact with the ground within a short distance. This is a common pattern for monitors located near elevated point sources.

Figure 4. 2016 – 2019 Average SO_2 (ppb) Versus Wind Speed (knots) for the Hutchinson County DRR Monitor for Wind Directions between 140° and 160°. Observations with missing wind speed, wind direction, or SO_2 were excluded from the averaging.

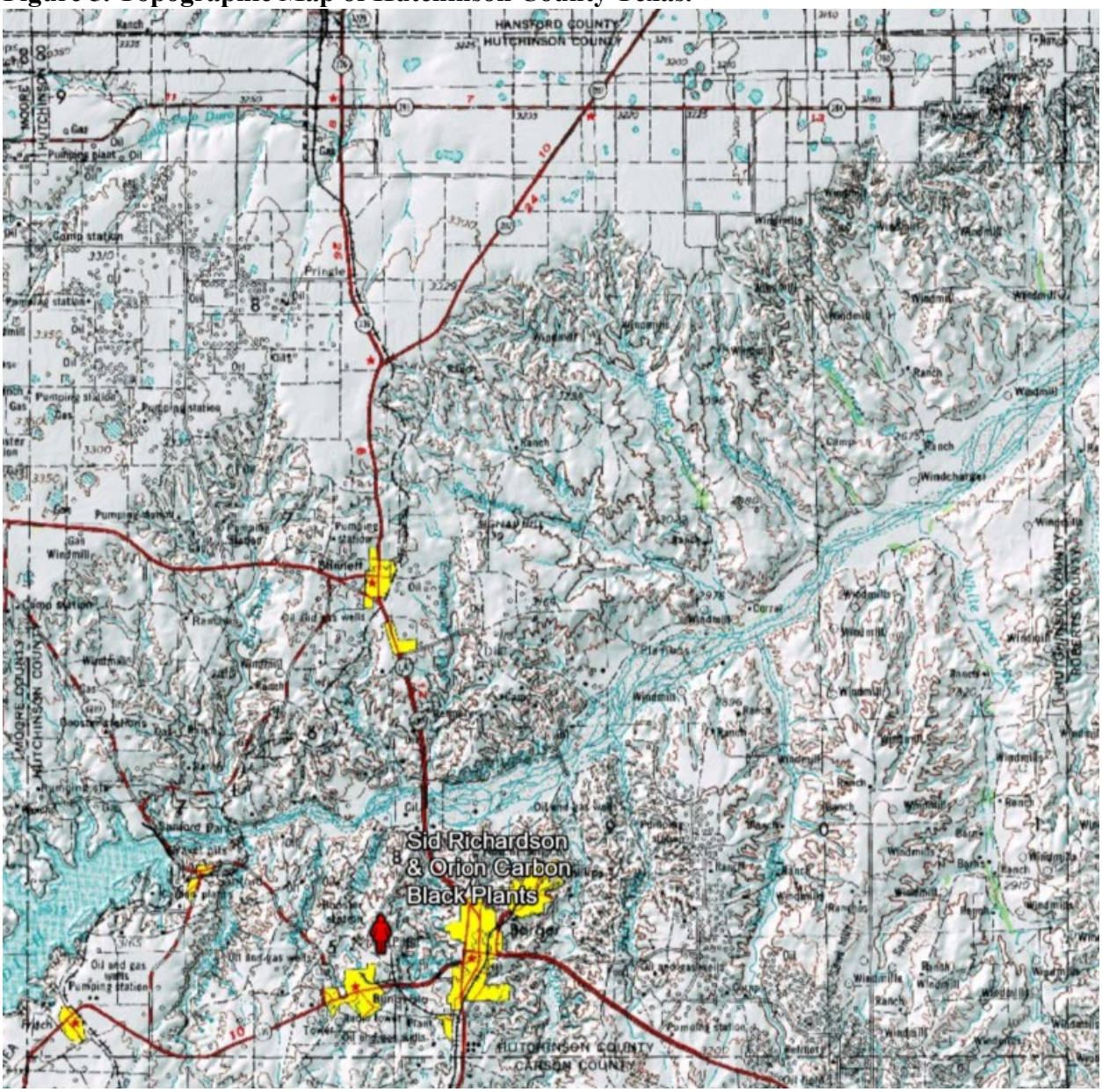


The combination of the pollution rose and the plot of concentrations versus wind speed indicate that the high SO_2 concentrations are originating predominantly from nearby elevated point sources from the direction of the Orion and Tokai carbon black plants. This indicates that the carbon black plants are causing the violations of the 2010 SO_2 NAAQS at the monitor and, given the wind directions associated with the violations at the monitor, other sources in the area, such as Phillips, likely do not contribute at the monitor because they are not upwind. However, evidence of source-receptor relationships between specific emissions sources and high SO_2 concentrations at violating monitors is not the only factor in determining the appropriate contributing areas and the appropriate extent of EPA's intended nonattainment area. Depending on wind direction, emissions from other sources in the area could combine with the emissions from the carbon black plants which may contribute to violations of the standard beyond the immediate area surrounding the monitor and carbon black plants, which supports designating an expanded nonattainment area.

3.3.4. Factor 4: Geography and Topography

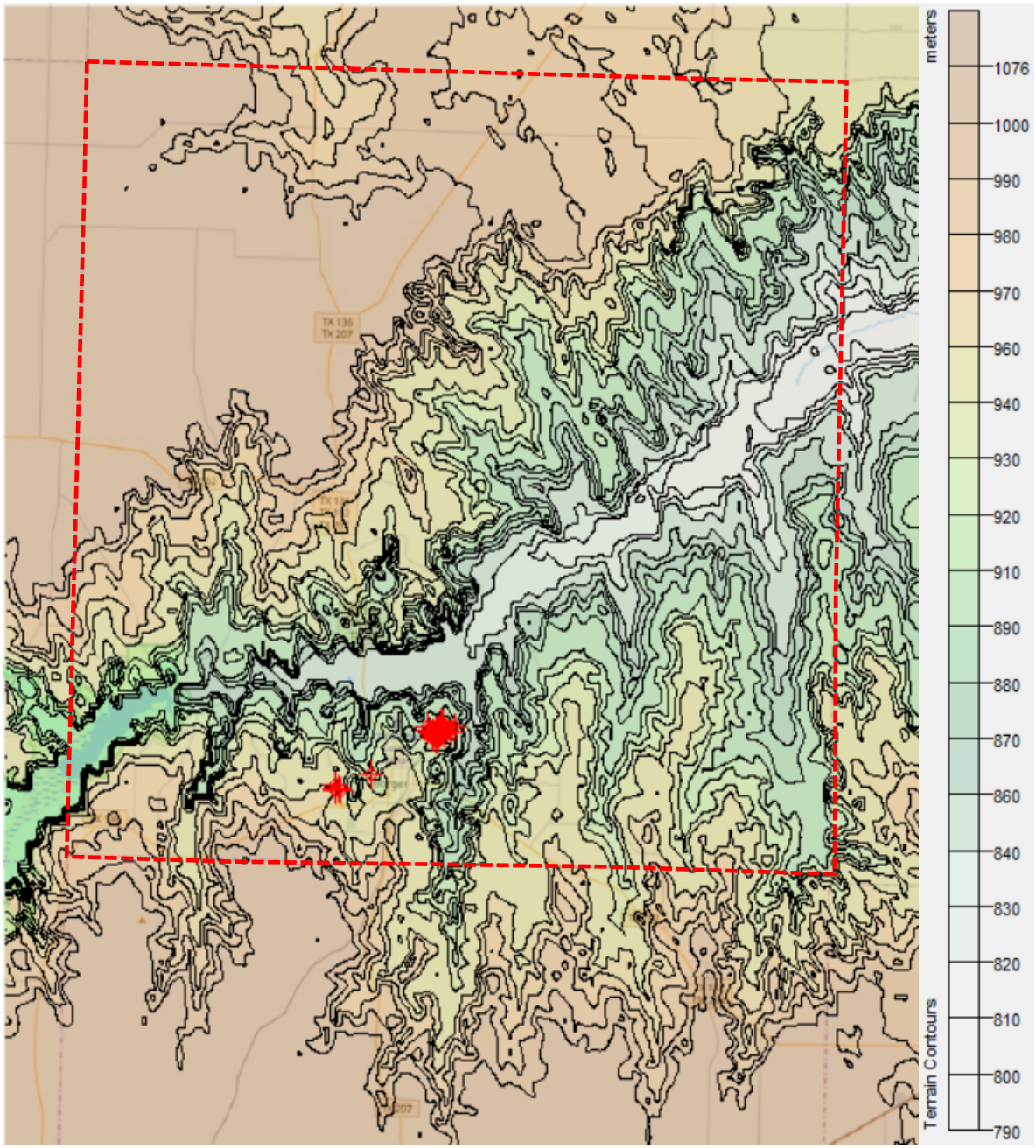
Texas did not provide an analysis of the geography and topography of the Hutchinson County area. EPA examined the physical features of the land that may affect the distribution of emissions and may help define nonattainment area boundaries. As shown in Figure 5, Hutchinson County is marked by a high plain with an elevation over 1000 meters (m) in the northern part with stream eroded canyons over 35 m deep. South Palo Dura Creek runs across the northwestern part of the plain. Further south, complex north to south hills occur over the lower 2/3 of the county with peaks at about 910 m and with varying depths. These hills are bisected by the Canadian River Valley at a depth of about 840 m in the area nearest to the carbon black plants. Lake Meredith, elevation 839 m, is found in the southwest corner of the county. The carbon black plants are located near the southern boundary of the county and are at an elevation of about 945 m. The terrain found at the northern portion of the county is over 60 m above the elevation of the carbon black plants beginning at a distance of about 30 km. Potentially these higher elevations could enhance the SO_2 concentrations in the northern part of the county, especially under stable transport conditions. However, this could be reduced since the rough topography combined with the high wind speeds would lead to a deeper-than-normal mechanically mixed boundary layer.

Figure 5. Topographic Map of Hutchinson County Texas.



There is also elevated terrain above 1000 m (over 55 m higher than the Tokai and Orion elevations) within 5 km to the south of the facilities in neighboring Carson County as shown in Figure 6. The proximity to the higher terrain could potentially cause elevated concentrations of SO_2 in Carson County. There are no SO_2 point sources in Carson County greater than 1 tpy.

Figure 6. Topographic Map Hutchinson County and Portions of Surrounding Counties. The county border is the dotted red line and the SO_2 sources as denoted by the red crosses, from left to right: Tokai and Orion Carbon Black Plants; IACX - Rock Creek Gas Plant; Chevron Phillips Chemical Company LP - Philtex Ryton Plant; Phillips 66 Company - Borger Refinery; and Borger Energy Associates LP - Blackhawk Power Plant.



3.3.5. Factor 5: Jurisdictional Boundaries

Texas did not provide an analysis of the jurisdictional boundaries to establish the geographic extent of the violating area. EPA considers existing jurisdictional boundaries for the purposes of

providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area. Our goal is to base designations on clearly defined legal boundaries that align with existing administrative boundaries when reasonable. Existing jurisdictional boundaries used to define a nonattainment area must encompass the area that has been identified as meeting the nonattainment definition.

In its 2015 designation recommendations, prior to the installation of the DRR monitor, Texas recommended the county boundary for those counties which did not have SO_2 monitoring data and recommended these to be designated as Attainment.

The proximity of the carbon black plants to the Carson County border is a potential consideration for the boundary of the nonattainment area. Carson County was previously designated as Attainment/Unclassifiable in Round 3. Since the design value at the DRR monitor, 1.1 km north of the facilities, is over twice the standard, a question arises as to the concentrations 4 km to the south on higher terrain. Consideration was given to the meteorology causing the high concentrations at the DRR monitor and the prevalence of those conditions for transport to the south, and the presence of any SO_2 sources in northern Carson County. As shown in Figure 2, the prevalence of winds > 15 knots from the north is similar to the prevalence of these high winds from the south. Since the highest concentrations at the DRR monitor coincide with wind speeds greater than 15 knots, the meteorology may also be favorable for high concentrations on the higher terrain in Carson County. However, Carson County has no SO_2 sources with emission rates greater than 1 tpy. Therefore, EPA believes there are no significant SO_2 sources that could contribute to nonattainment in the Hutchinson County area or be included in controls for the area to reach attainment of the 2010 SO_2 NAAQS.

The jurisdictional boundaries of Hutchinson County are established by the borders of Hutchinson County with neighboring counties.

3.4. Other Information Relevant to the Designation of the Hutchinson County Area

EPA did not receive additional information relevant to the designation of this area.

3.5. EPA's Assessment of the Available Information for the Hutchinson County, Texas Area

A monitor in the Hutchinson County area is violating the 2010 SO_2 NAAQS based on the 2017-2019 design value. EPA evaluated five factors and all available information to determine the geographic extent of the violating area. Two DRR sources are located within 2 km to the south of the violating monitor and there are several other major SO_2 sources in Hutchinson County located to the east of the monitor that could contribute to nonattainment at unmonitored locations.

The prevailing winds are from the south and so exposes the monitor location to the impacts of the DRR sources' plumes a significant portion of the time. The high wind speeds that correspond with maximum 1-hour concentrations at the monitor indicate an elevated buoyant plume such as

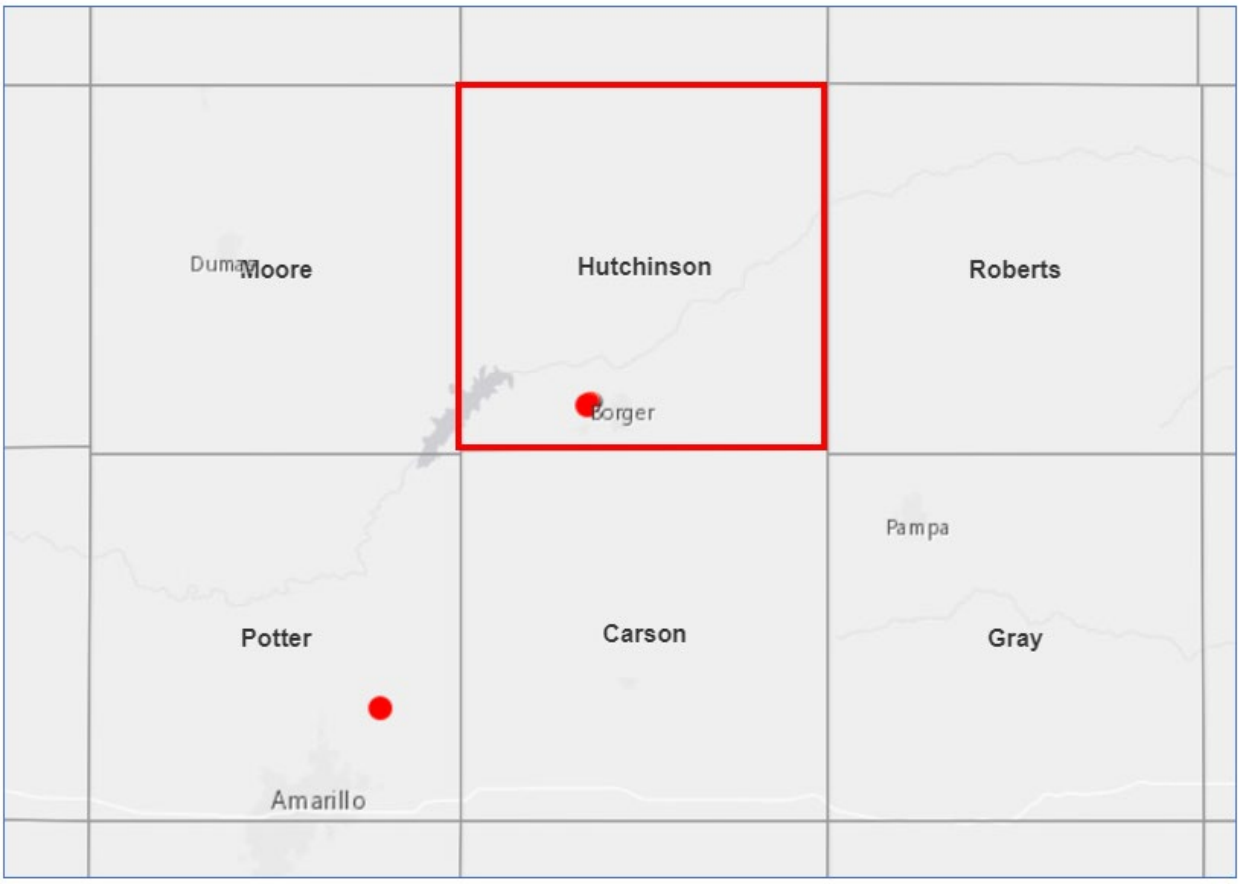
from the carbon black plants. Also, the maximum impacts are associated with wind directions originating from the direction where carbon black plants are located. For other wind directions, the highest wind speeds are westerly, which presents the possibility that emissions from the carbon black plant could combine with the emissions from the other Hutchinson County SO_2 sources, thus contributing to a violation of the 2010 SO_2 NAAQS downwind of those sources. The presence of complex, elevated terrain in northern Hutchinson County that could enhance concentrations under stable conditions supports inclusion in the nonattainment area. The clear jurisdictional boundary is the Hutchinson County border.

EPA believes that our intended nonattainment area, bounded by the Hutchinson County boundary will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended nonattainment area.

3.6. Summary of EPA's Intended Designation for the Hutchinson County, Texas Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, EPA intends to designate Hutchinson County as nonattainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the boundaries of Hutchinson County. Figure 7 shows the boundary of this intended designated area.

Figure 7. Boundary of the Intended Hutchinson County Nonattainment Area. The red markers indicate the locations of DRR monitors.



4. Technical Analysis for the Navarro County Area

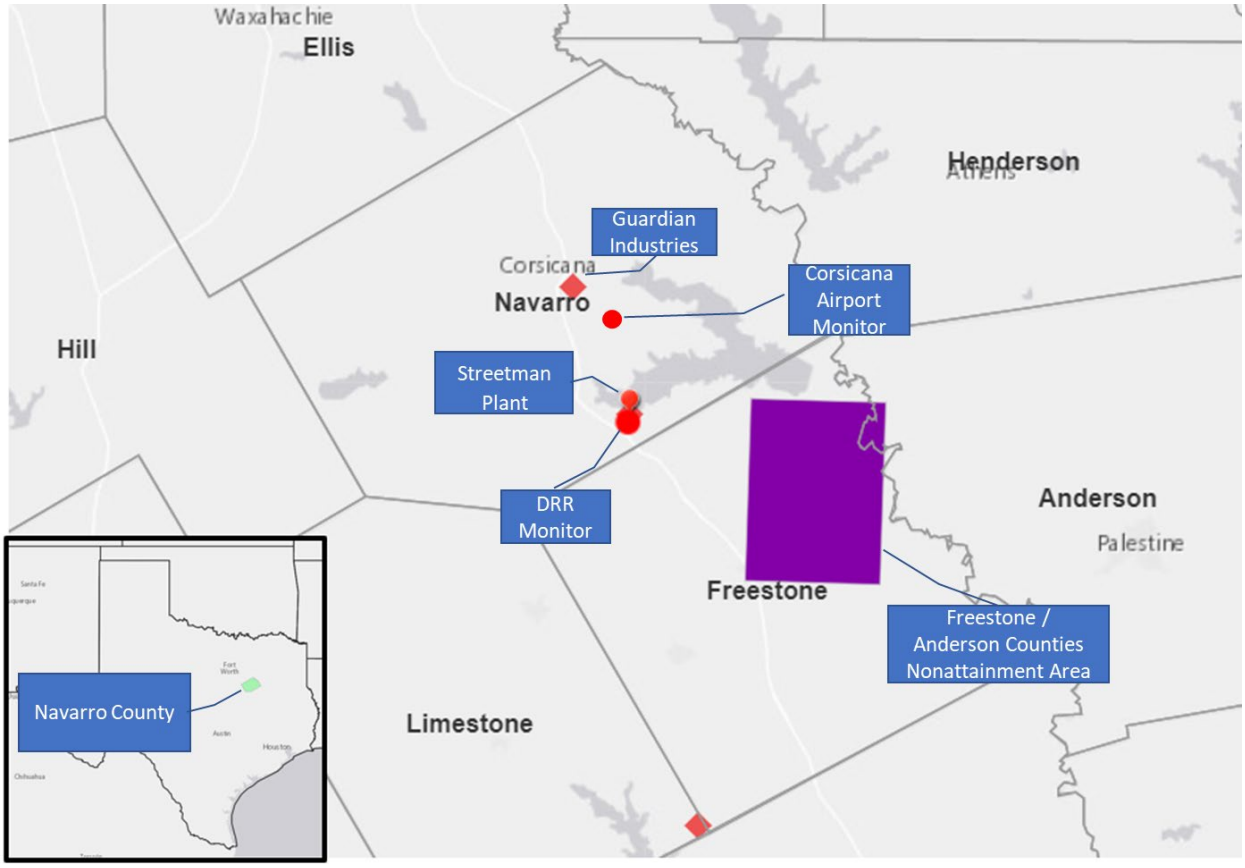
4.1. Introduction

EPA must designate the Navarro County, Texas area by December 31, 2020, because the area has not been previously designated, and Texas installed and began operating a new EPA-approved monitor pursuant to the DRR. This section presents all the available air quality information for the portion of county that includes the following SO_2 source around which the DRR required the state to characterize air quality:

- The Streetman Plant facility emits 2,000 tons or more of SO_2 annually. Specifically, Streetman Plant emitted 3350 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Texas has chosen to characterize it via monitoring.

As seen in Figure 8 below, the Streetman Plant facility is located on the southern shore of the Richland Chambers Reservoir, toward the western end. It is about 4.2 km north of the boundary with Freestone County and about 16 km west of the Freestone/Anderson Counties SO_2 nonattainment area. As shown in Figure 9, the DRR monitor is located about 1.2 km to the SSW of the Streetman Plant.

Figure 8. Map of the Navarro County, Texas Area Addressing the Streetman Plant. The purple rectangle demarks the previously designated Freestone/Anderson County SO_2 nonattainment area.



In its September 18, 2015 recommendation letter, Texas recommended that the Navarro County area be designated as attainment for the 2010 SO_2 NAAQS; Texas' recommended boundary included the entirety of Navarro County. Texas, however, provided EPA with this recommendation prior to the installation and operation of the EPA-approved monitor and before the state had monitoring data for the 2017-2019 period. Texas has not updated its recommendations after these monitoring data became available. EPA does not agree with Texas' recommendation as to the designation category and intends to designate all of Navarro County, Texas, as described below as nonattainment for the 2010 SO_2 NAAQS based upon currently available monitoring information for the 2017-2019 period. Our intended boundary is consistent with the state's recommended boundary and is described below.

Figure 9. Satellite Image of Streetman Plant and DRR Monitor Showing Direction and Distance to the Monitor.

4.2. Air Quality Monitoring Data for the Navarro County, Texas

EPA considered design values for air quality monitors in the Navarro County area by assessing the most recent 3 consecutive years (i.e., 2017-2019) of quality-assured, certified ambient air quality data in the EPA Air Quality System (AQS) using data from Federal Reference Method and Federal Equivalent Method monitors that are sited and operated in accordance with 40 CFR

parts 50 and 58.[14] Procedures for using monitored air quality data to determine whether a violation has occurred are given in 40 CFR part 50 Appendix T, as revised in the 2010 SO_2 NAAQS rulemaking. The 2010 1-hour SO_2 NAAQS is met when the design value is 75 ppb or less. Whenever several monitors are located in an area, the design value for the area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e., monitors with design values greater than 75 ppb) in a geographic area forms the basis for designating that area as nonattainment. The remaining factors, described in the next section, are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor(s). Table 5 contains the 2017-2019 design values for the area of analysis.

Table 5. 2010 SO_2 NAAQS Design Values for the Navarro County Area.

AQS Site ID	Monitor Location	2017 99th Percentile (ppb)	2018 99th Percentile (ppb)	2019 99th Percentile (ppb)	2017-2019 Design Value (ppb)
48-349-1081	Richland Southeast 1220 Road ("DRR monitor")	103.6	140.8	250.4	**165**
48-349-1051	Corsicana Airport	51.2	39.9	36.5	**43**

Data collected at the Streetman DRR monitor indicates that 99th percentile of the maximum daily 1-hour concentration in each year of the 3-year period were above the level of the 2010 SO_2 NAAQS and that the 99th percentile concentration in 2019 was three times the level of the 2010 SO_2 NAAQS. The data were complete for all 4 quarters in 2017 and 2018 and for two quarters in 2019. Even with two incomplete quarters in 2019, the valid design value computed for all three years is more than double the 2010 SO_2 NAAQS. The design value for this monitor is valid because the data substitution procedure specified in 40 CFR Appendix T to Part 50, the SO_2 Data Handling Appendix, indicates the validity of the finding that the design value exceeds the 2010 SO_2 NAAQS. Therefore, a portion of the area must be designated nonattainment.

4.3. Intended Designation Boundary Determination

EPA must designate as nonattainment any area that violates the 2010 SO_2 NAAQS and any nearby area that contributes to ambient air quality in the violating area. Navarro County shows a violation of the 2010 SO_2 NAAQS based on data collected between 2017 and 2019, and, therefore, some area around the violating monitor must be designated nonattainment. In this section, we consider the appropriate geographical extent of the nonattainment area.

A nonattainment area should contain the area violating the 2010 SO_2 NAAQS (e.g., the area around a violating monitor or encompassing modeled violations), as well as any nearby areas (e.g., counties or portions thereof) that contain emissions sources contributing to the violation. (*See* CAA section 107(d)(l)(A)(i)). Accordingly, although EPA considers county boundaries as

[14] SO_2 air quality data are available from EPA's website at https://www.epa.gov/outdoor-air-quality-data.

the analytical starting point for determining SO_2 nonattainment areas, an evaluation of five factors for each area may be considered in determining the geographic scope of a nonattainment boundary.

EPA guidance identifies the following five factors for consideration: 1) ambient air quality data or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries, as well as other relevant available information. While the factors are presented individually, they are not independent. Instead, the five-factor analysis process carefully considers their interconnections and the dependence of each factor on one or more of the others.

4.3.1. Factor 1: Ambient Air Quality Data and Dispersion Modeling Results

Ambient air quality data are discussed in the previous section. Texas did not provide any source-oriented modeling to assess the geographic extent of the source's impacts that are causing the monitored 2010 SO_2 NAAQS violations in the Navarro County area. There is no other air quality modeling information available to EPA at this time to supplement the monitoring data for the two monitors in Table 5. These data show that part of the county may be attaining the standard, so we intend to use the additional analysis factors, described below, to support the intended nonattainment boundary determination.

4.3.2. Factor 2: Emissions-Related Data

Texas provides information on annual emissions data for point sources in the Navarro County area through its State of Texas Air Reporting System (STARS) online database. EPA accessed the STARS database in May 2020 and downloaded the most recent data. Table 6 shows the most recently available three years of emissions data for the DRR facilities that are being characterized by the SO_2 monitor described previously.

The state's emissions data show that the SO_2 emissions from the facility varies slightly from year to year and that there does not appear to be a trend. The facility continues to emit well above 2,000 tons per year.

Table 6. SO_2 Emissions of Sources with Source-Specific SO_2 Monitors in the Navarro County Area.

Company	Facility	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
ARCOSA LWS LLC	STREETMAN PLANT	3,422	3,493	3,451

Evidence of SO_2 emissions in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. EPA has also considered SO_2 emissions data from Texas' STARS database for other facilities within 20 km of

the violating monitors as listed in Table 7. Within Navarro County the other major SO_2 source is Guardian Industries with average emission rate from 2016-2018 of 291 tpy, less than 1/10 of the emission rate of the Streetman plant and located over 19 km from the monitor. Also, because of the proximity of Freestone County boundary to the facilities, EPA examined the emissions inventory and found that the previous major SO_2 emissions source in Freestone County, Big Brown Steam Electric Station (BBSES), permanently ceased operations in February 2018 and now has zero emissions. All other sources in Freestone County from the STARS database had a total of less than 15 tpy SO_2 emissions in 2018.

Table 7. SO_2 Emissions of Nearby Sources in the Navarro County Area.

County	Facility Name	Distance from Violating Monitor (km)	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
Navarro	Guardian Industries Corsicana	19.1	296.8	298.7	278.8
Freestone	Big Brown	29.7	42,470	47,633	6,659

4.3.3. Factor 3: Meteorology

Texas did not provide an analysis of the meteorology (*e.g.,* weather and transport patterns) for the Navarro county area. EPA evaluated meteorological data to determine how weather conditions, including wind speed and direction, affect the plume of sources contributing to the ambient SO_2 concentrations. As shown in Figure 10, meteorological records for the nearest NWS meteorological station[15] at the Corsicana Airport indicate winds blow predominantly from the south. The southerly winds include wind speeds equal to and greater than the speeds noted below as corresponding with the highest average concentrations at the DRR monitor. This indicates that the elevated concentrations from the Streetman plant would be expected to extend to the north.

[15] Figure obtained from the Iowa State University Iowa Environmental Mesonet website (https://mesonet.agron.iastate.edu/)

Figure 10: Wind Rose for Navarro County, Texas Using Data from the Corsicana Airport.

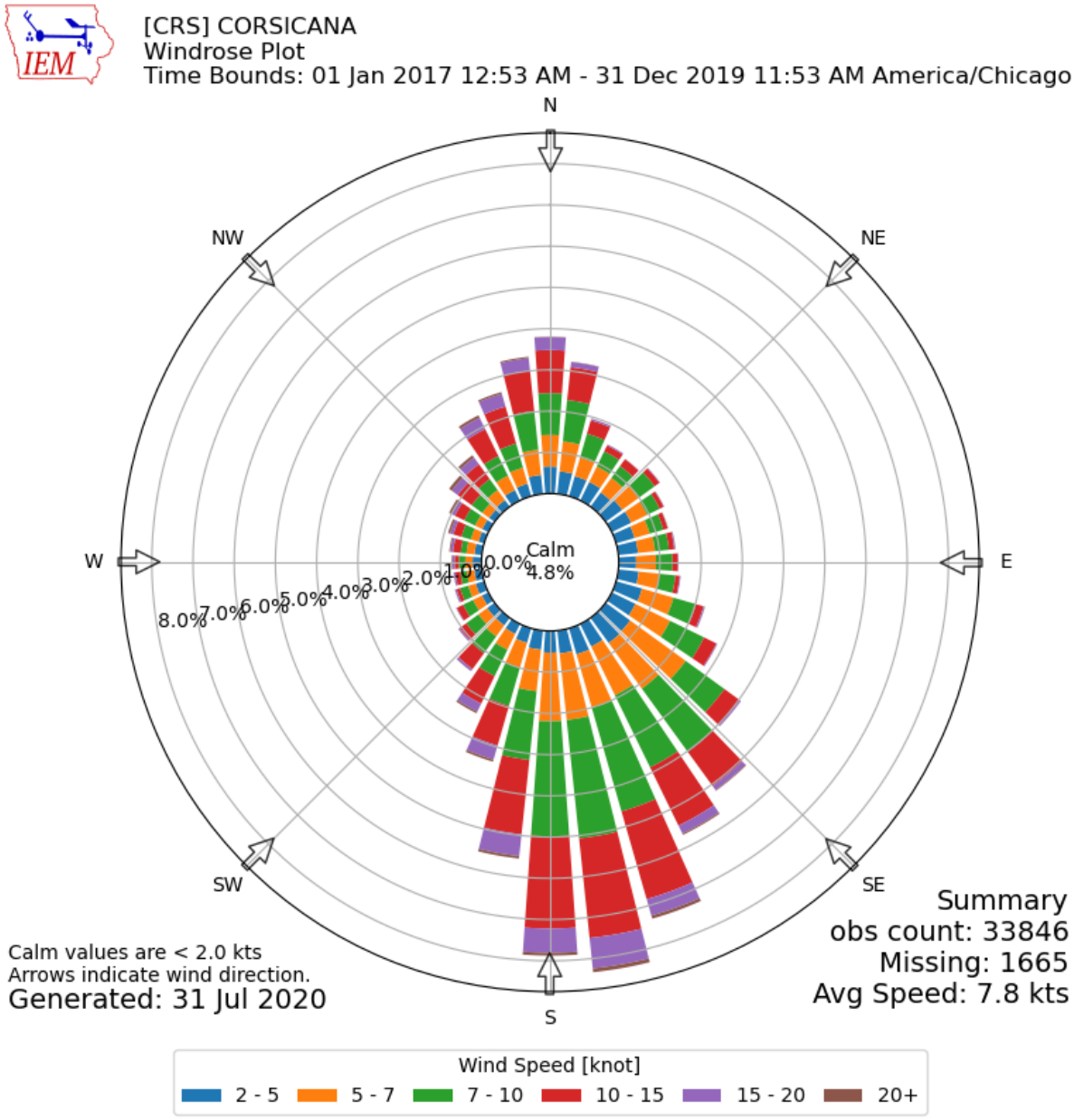


Figure 11 shows that the average concentrations recorded at the monitor are highly directional and that the highest correspond with the wind direction from the Streetman Plant. This indicates that the Streetman Plant is the primary source of the SO_2 concentrations recorded. We note that the Big Brown Electric Generating Station (located 29.4 km away at 110°) was operational in 2017 and into the first quarter of 2018, corresponding to the small spike for winds from 100-110°.

Figure 11. Average 1-hour SO_2 Concentration (ppb) at the Navarro DRR monitor for 2017-2019 as a Function of Wind Direction.

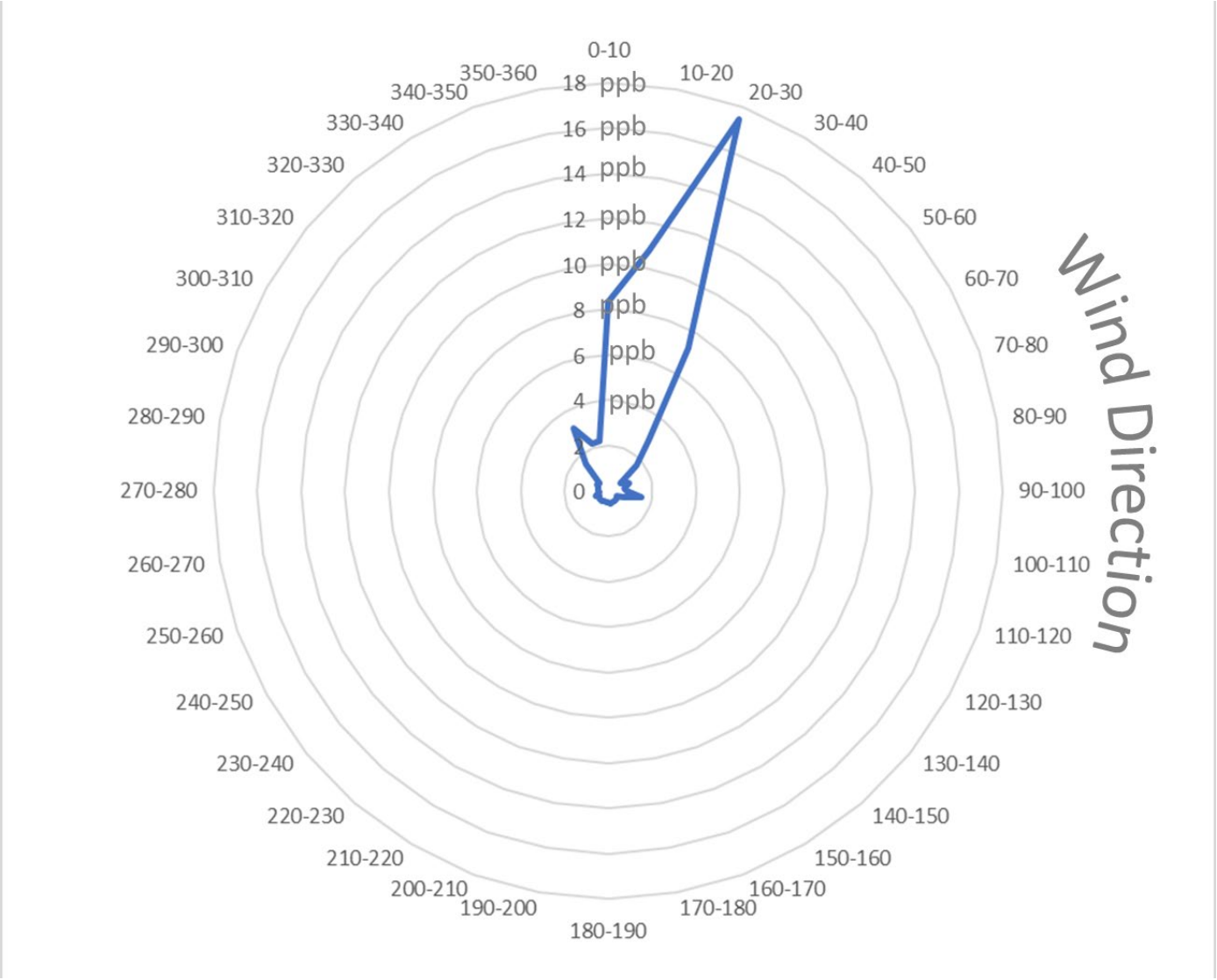
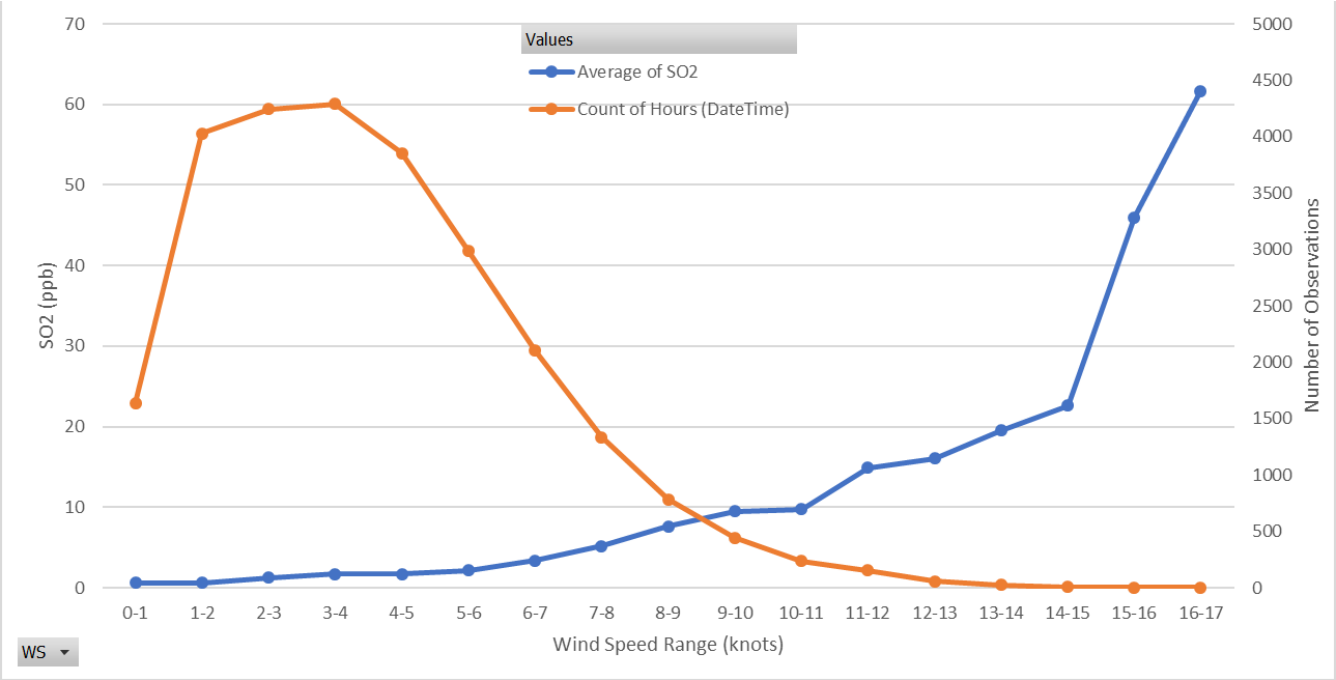


Figure 12 is a plot of the average SO_2 concentrations for wind directions from the Streetman Plant versus wind speed. The 1-hour average concentration increases with wind speed up to the maximum recorded wind speed of 16-17 knots. The number of observations is very low at the upper end of the wind speed range, only one observation was recorded at the highest range. This type of response is typical of a monitor near an elevated, buoyant point source which requires higher wind speeds to bring the plume centerline quickly to the ground. The Streetman Plant's kiln has a 35 m stack with an exit temperature of 340°K, which is slightly buoyant.

Figure 12. Average 1-hour average SO_2 Concentration (ppb) at the Navarro DRR monitor for 2017-2019 as a Function of Wind Speed (knots) for Wind Directions of 20-30 Degrees.



Evidence of source-receptor relationships between specific emissions sources and high SO_2 concentrations at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of EPA's intended nonattainment area.

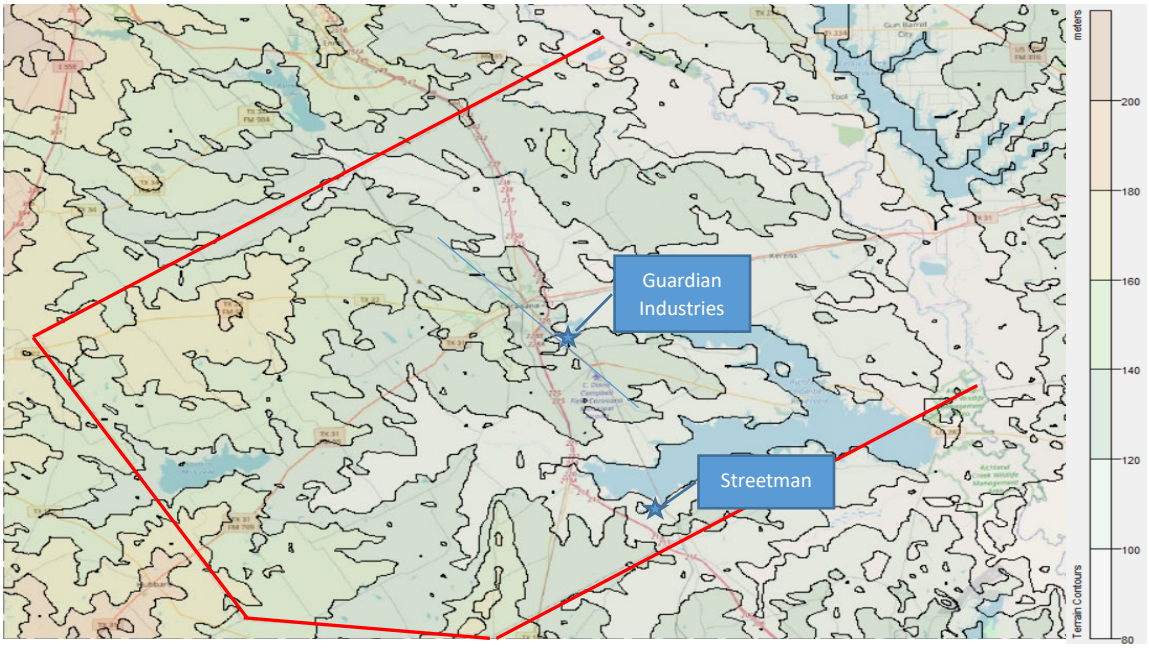
There are no major currently operating sources to the south of the DRR monitor whose emissions could contribute to high concentrations that may be expected to the north of the Streetman plant. The Big Brown Steam Electric Generating Station in Freestone Country shut down in February 2018 and is located in a direction of 110° which is not a direction from which higher wind speeds are typically seen. The largest currently operating source in Freestone County is the Freestone Energy Center, which emitted 11.7 tons of SO_2 in 2017, located 22.6 km south from the Streetman Plant. To the north of the Streetman Plant there are no major SO_2 sources, but the minor source, Guardian Industries, could contribute to the observed concentrations at the DRR monitor. Also, Streetman's emissions may combine with Guardian Industries emissions to the north of Guardian causing nonattainment.

4.3.4. Factor 4: Geography and Topography

Texas did not provide an analysis of the geography and topography of the Navarro County area. EPA examined the physical features of the land that may affect the distribution of emissions and may help define nonattainment area boundaries.

As shown in Figure 8 the DRR monitor is located within 4 km of the southern boundary of Navarro County with Freestone County. Figure 13 shows the terrain contours of Navarro County and portions of surrounding counties. The terrain around the Streetman Plant is at an elevation of about 110 m. The remainder of Navarro County is hilly and bisected with numerous streams and reservoirs. The northern and western parts of the country have hills located about 38 km distant with crests of over 180 m, about 50 m higher than at the monitor. The boundary with Ellis County is about 69 km to the north. There is the potential for slightly enhanced impacts at large distances from the source because of the elevated terrain.

Figure 13. Terrain Contour Map of the Navarro County Area and Portions of Surrounding Counties. The blue stars show the locations of the two major sources in the county.



4.3.5. Factor 5: Jurisdictional Boundaries

Texas did not provide an analysis of the jurisdictional boundaries to establish the geographic extent of the violating area. EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area. Our goal is to base designations on clearly defined legal boundaries that align with existing administrative boundaries when reasonable. Existing jurisdictional boundaries used to define a nonattainment area must encompass the area that has been identified as meeting the nonattainment definition.

The jurisdictional boundaries of Navarro County are defined by the borders of Navarro County with neighboring counties.

4.4. Other Information Relevant to the Designation of the Navarro County, Texas Area

EPA did not receive additional information relevant to the designation of this area.

4.5. EPA's Assessment of the Available Information for the Navarro County, Texas Area

A DRR monitor in the Navarro County area is violating the 2010 SO_2 NAAQS based on the 2017-2019 design value. EPA evaluated its recommended five factors and all available information to determine the geographic extent of the violating area. A DRR source is located about 1.2 km to the north of the violating monitor and there is one other major SO_2 source in Navarro County located 19 km to the north of the monitor that could contribute to nonattainment at unmonitored locations. The Southern border of Navarro County abuts Freestone County and is approximately 4 km south of the Streetman Plant. There are no major SO_2 sources currently permitted to operate in Freestone County that would be expected to contribute to the nonattainment area. In Round 2, EPA designated a portion of Freestone County around the Big Brown Steam Electric Generating Station (about 16 km south of the Streetman Plant) as nonattainment while designating the remaining area as Attainment/Unclassifiable. With the permanent and enforceable shutdown of the Big Brown Station in 2018, there are no currently operating major SO_2 sources in Freestone County. Currently, the largest source in Freestone County is Freestone Energy Center, with 11.7 tons of SO_2 per year located 22.6 km south of the Streetman Plant.

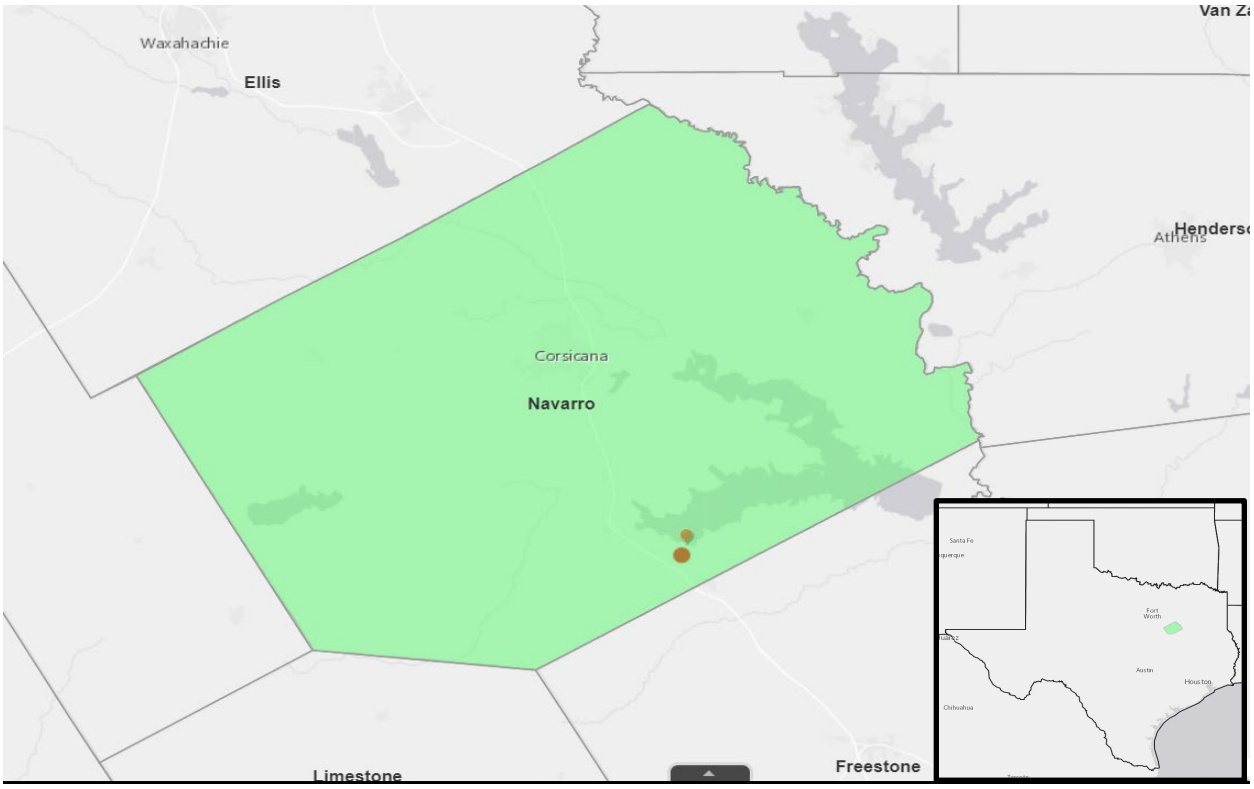
The prevailing winds are from the south, so the monitor location to the south of the Streetman Plant is not exposed to the impacts of the plant's plumes most of the time. However, there is still a significant incidence of winds from the north during which the Streetman Plant emissions have direct impacts on the monitor. The high wind speeds (> 20 knots) coincident with maximum 1-hour concentrations at the monitor indicate that an elevated buoyant plume such as from the Streetman Plant kiln may contribute to the violating monitor. Also, the highest concentrations occur for wind directions from the Streetman Plant. For other wind directions the high wind speeds, associated with the highest monitored concentrations, are also frequent from the south but not for westerly winds or easterly winds. This presents the possibility that emissions from the Streetman Plant could combine with the emissions from the other Navarro County SO_2 sources to the north thus contributing to a violation of the 2010 SO_2 NAAQS downwind of those sources. The hilltop elevations in the northern and western parts of the county are about 100 feet higher than at the Streetman Plant, potentially leading to enhanced concentrations from the Streetman Plant plume and other Navarro County sources. The clear jurisdictional boundary is the Navarro County boundary.

EPA believes that our intended nonattainment area, bounded by the borders of Navarro County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended nonattainment area.

4.6. Summary of EPA's Intended Designation for the Navarro County, Texas Area

After careful evaluation of the state's recommendation as well as all available relevant information, EPA intends to designate Navarro Country, Texas as nonattainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the boundaries of Navarro County. Figure 14 shows the boundary of this intended designated area.

Figure 14. Boundary of the Intended Navarro County, Texas Nonattainment Area



5. Technical Analysis for the Howard County Area

5.1. Introduction

EPA must designate the Howard County, Texas area by December 31, 2020, because the area has not been previously designated and Texas installed and began operating a new EPA-approved monitor pursuant to the DRR. This section presents all the available air quality information for the portion of Howard County that includes the following SO_2 source around which the DRR required the state to characterize air quality:

- The Big Spring Carbon Black facility emits 2,000 tons or more of SO_2 annually. Specifically, Big Spring Carbon Black emitted 5,947 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Texas has chosen to characterize it via monitoring.

As seen in Figures 15 and 16 below, the Big Spring Carbon Black facility is located in west Texas about 3.5 km to the east of Big Spring, Texas on the west side of North Midway Road, just to the north of Interstate 20. The DRR monitor is located across North Midway Road approximately 0.15 km to the northeast of the Big Spring Carbon Black facility.

Figure 15. Map of the Howard County, Texas Area Addressing the Big Spring Carbon Black Plant and Other SO_2 Sources.

Figure 16. Detail Map of the Howard County, Texas Area Addressing the Big Spring Carbon Black Plant, Big Spring Refinery and DRR Monitor Locations.

In its September 18, 2015 recommendation letter, Texas recommended that Howard County be designated as attainment for the 2010 SO_2 NAAQS. Specifically, the state's recommended boundaries consist of the borders of Howard County. Texas, however, provided EPA with this recommendation prior to the identification of existing SO_2 monitors and prior to the installation and operation of the EPA-approved monitor and before the state had monitoring data for the 2017-2019 period. Texas has not updated its recommendation after these monitoring data became available. EPA does not agree with Texas' recommendation as to the designation category and intends to designate all of Howard County, Texas, as described below, as nonattainment for the 2010 SO_2 NAAQS based upon currently available monitoring information for the 2017-2019 period. Our intended boundaries are consistent with the state's recommended boundaries and are described below.

5.2. Air Quality Monitoring Data for the Howard County, Texas Area

EPA considered design values for air quality monitors in the Howard County, Texas area by assessing the most recent 3 consecutive years (i.e., 2017-2019) of quality-assured, certified ambient air quality data in the EPA Air Quality System (AQS) using data from Federal Reference Method and Federal Equivalent Method monitors that are sited and operated in

accordance with 40 CFR parts 50 and 58.[16] Procedures for using monitored air quality data to determine whether a violation has occurred are given in 40 CFR part 50 Appendix T, as revised in the 2010 SO_2 NAAQS rulemaking. The 2010 1-hour SO_2 NAAQS is met when the design value is 75 ppb or less. Whenever several monitors are located in an area, the design value for the area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e., monitors with design values greater than 75 ppb) in a geographic area forms the basis for designating that area as nonattainment. The remaining factors, described in the next section, are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor. Table 8 contains the 2017-2019 design values for the area of analysis.

Table 8. 2010 SO_2 NAAQS Design Values for the Howard County, Texas Area.

AQS Site ID	Monitor Location	2017 99th Percentile (ppb)	2018 99th Percentile (ppb)	2019 99th Percentile (ppb)	2017-2019 Design Value (ppb)
48-227-1072	1218 N. Midway Rd	88.2	99.3	79.6	**89**

Data collected at this monitor indicates that the monitor had complete data in all years for all four quarters and is valid for comparison with the 2010 SO_2 NAAQS. The 99th percentile concentration in each year was greater than the level of the 2010 SO_2 NAAQS and the 3-year design value was 19% above the 2010 SO_2 NAAQS. Therefore, a portion of the area must be designated nonattainment because of the violating monitor.

5.3. Intended Designation Boundary Determination

EPA must designate as nonattainment any area that violates the 2010 SO_2 NAAQS and any nearby area that contributes to ambient air quality in the violating area. Howard County, Texas shows a violation of the 2010 SO_2 NAAQS based on data collected between 2017 and 2019, and, therefore, some area around the violating monitor must be designated nonattainment. In this section, we consider the appropriate geographical extent of the nonattainment area.

A nonattainment area should contain the area violating the 2010 SO_2 NAAQS (e.g., the area around a violating monitor or encompassing modeled violations), as well as any nearby areas (e.g., counties or portions thereof) that contain emissions sources contributing to ambient air quality in the violating area. (*See* CAA section 107(d)(l)(A)(i)). Accordingly, although EPA considers county boundaries as the analytical starting point for determining SO_2 nonattainment areas, an evaluation of five factors for each area may be considered in determining the geographic scope of a nonattainment boundary.

EPA guidance identifies the following five factors for consideration: 1) ambient air quality data or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and

[16] SO_2 air quality data are available from EPA's website at https://www.epa.gov/outdoor-air-quality-data. SO_2 air quality design values are available at https://www.epa.gov/air-trends/air-quality-design-values.

topography; and 5) jurisdictional boundaries, as well as other relevant available information. While the factors are presented individually, they are not independent. Instead, the five-factor analysis process carefully considers their interconnections and the dependence of each factor on one or more of the others.

5.3.1. Factor 1: Ambient Air Quality Data and Dispersion Modeling Results

Ambient air quality data are discussed in the previous section. Texas did not provide any source-oriented modeling to assess the geographic extent of the sources' impacts that are causing the monitored 2010 SO_2 NAAQS violations in the Howard County area. There is no other air quality modeling information available to EPA at this time, so we intend to use the additional analysis factors, described below, to support the intended nonattainment boundary determination.

5.3.2. Factor 2: Emissions-Related Data

Texas provides information on annual emissions data for point sources in the Howard County area through its State of Texas Air Reporting System (STARS) online database. EPA accessed the STARS database in May 2020 and downloaded the most recent data. Table 9 shows the most recently available three years of emissions data for the DRR facility that is being characterized by the SO_2 monitor described previously.

The state's emissions data show that the SO_2 emissions from the facility varies from year to year but that there does not appear to be a trend. The facility continues to emit well above 2,000 tons per year.

Table 9. SO_2 Emissions of Sources in the Howard County, Texas Area.

Facility Name	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
BIG SPRING CARBON BLACK PLANT	6,043	5,328	4,629

Evidence of SO_2 emissions in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. EPA has also considered SO_2 emissions data from Texas' STARS emissions reporting system for facilities listed in Table 10 within 25 km of the violating monitor. There are two sources within 2 km of the monitor, the Big Spring Refinery and Big Spring Cogeneration; Big Spring Refinery is a major SO_2 source with an average of 810 tpy emissions for 2016-2018. Three other sources are within 25 km of the DRR monitor, with the South Feagan 2 Treating Facility also being a major SO_2 source, having an average of 136 tpy emissions. We note that the Big Spring Carbon Black Plant and both major sources are located in a direction of approximately 220-230° (southwest) from the DRR monitor, though both the carbon black plant and the refinery are near enough that plumes from their emission points can cumulatively align over a wider arc as discussed below.

Table 10. SO_2 Emissions of Sources Greater Than One TPY Near the Howard County, Texas DRR Monitor.

County	Facility Name	Distance from Violating Monitor (km)	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
Howard	BIG SPRING REFINERY	1.4	721.8	769.8	937.4
Howard	BIG SPRING COGENERATION	1.6	0.4137	0.22	1.7
Howard	SOUTH FEAGAN 2 TREATING FACILITY	18.3	80.1	203.1	124.3
Howard	FRYAR TREATING FACILITY	18.3	8.4	Not Available	0.03
Howard	EAST VEALMOOR GAS PLANT	24.3	44.8	44.7	49.5
Glasscock	CORONADO MIDSTREAM DEADWOOD CRYO PLANT	38	125	145	30.8

EPA's 2017 National Emission Inventory system gives the emissions for the individual units making up the facilities of the major sources. For Big Springs Carbon Plant, nearly all the emissions are from three stacks serving the furnaces and dryers. These sources are located within an arc upwind of the monitor ranging from 222-252° (generally southwest) as shown in Figure 17. The plumes from the stacks will align for wind directions from the south or north, although combined impacts are less likely at the DRR monitor. Details on the individual sources at the Big Spring Carbon Plant are given in Table 11.

Figure 17. Map of Individual Emission Sources at Big Spring Carbon Black Plant Relative to the DRR Monitor Location.

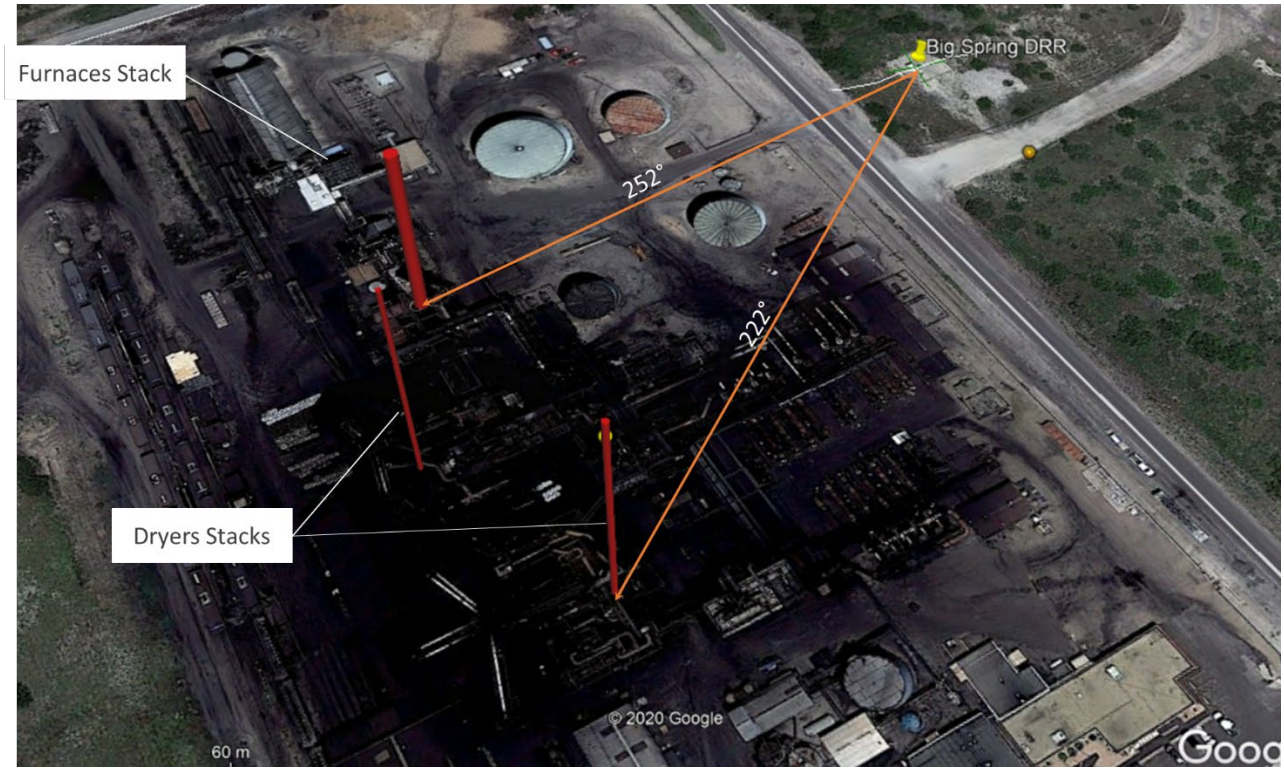
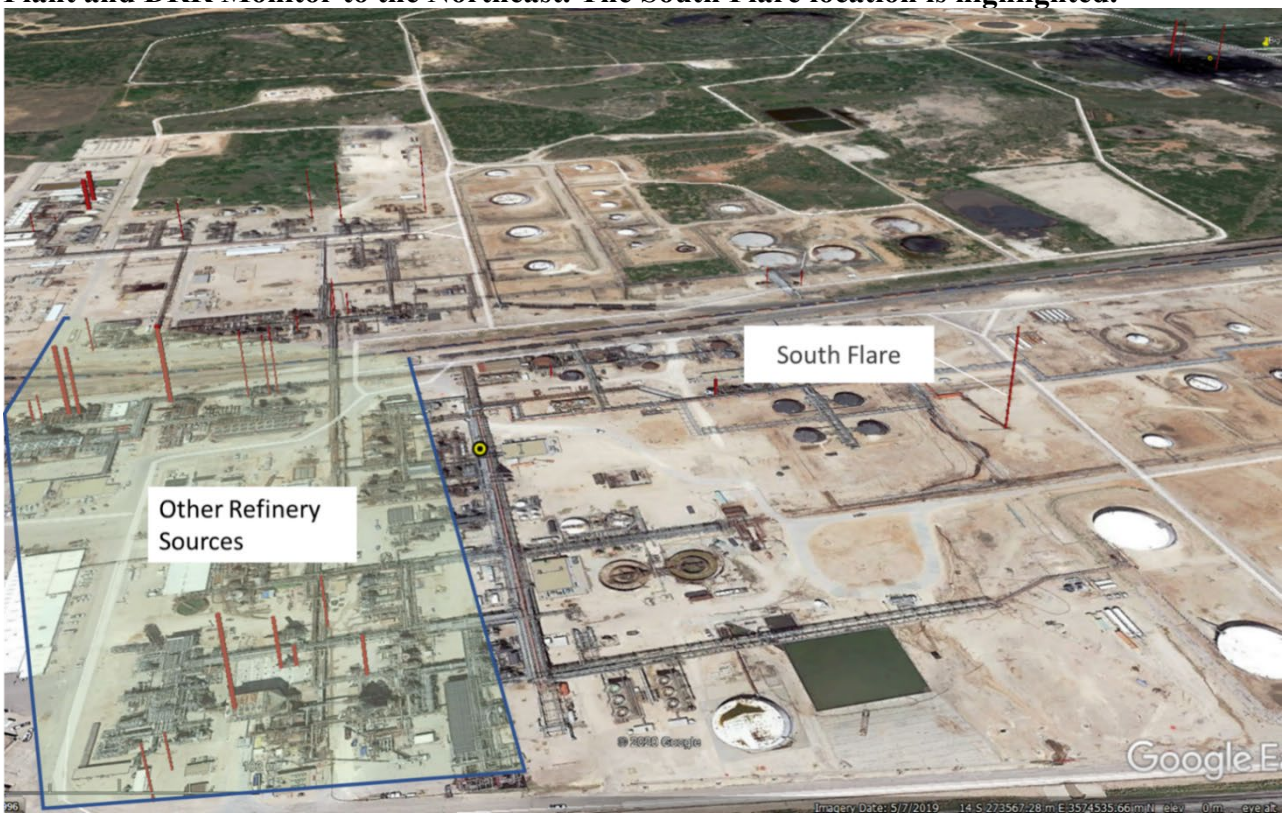


Table 11. Individual Emission Sources at the Big Spring Carbon Black Plant.

UNIT_ID	REL_POINT_ID	Annual Emissions (tons)	Longitude	Latitude	Process Description
19944213	19289212	1,161	-101.409	32.27992	Other combustion
19943513	19290212	<<1	-101.407	32.27845	Process Heater
19943713	19289612	<<1	-101.407	32.27851	Process Heater
19943913	19289312	600	-101.409	32.27945	Dryer
19944113	19290112	415	-101.409	32.27906	Dryer
19944313	19290112	415	-101.409	32.27906	Dryer
19943813	19289212	1,161	-101.409	32.27992	Furnace
19943613	19290112	415	-101.409	32.27906	Dryer
19944013	19289212	714	-101.409	32.27992	Furnace

The Big Spring Refinery is located about 1.4 km from the DRR monitor and its sources subtend an upwind arc in relation to the monitor of 210 – 226°. Most of the sources are clustered from 215-226° in relation to the monitor, as shown in Figure 18, with the South Flare source at 209° in relation to the monitor.

Figure 18. Big Spring Refinery Stacks in the Foreground with Big Spring Carbon Black Plant and DRR Monitor to the Northeast. The South Flare location is highlighted.



Texas also has an Air Emission Event Report Database[17], where industry reports emission events for non-permitted releases. EPA searched the database to identify any releases in Howard County during the 2017-2019 monitoring period as part of an investigation of an outlier event, as discussed in section 5.3.3. There were 272 total emission events reported, not all of which were necessarily for SO_2 releases. Restricting the emission events to only the three major SO_2 sources yielded 59 events: 25 for Big Spring Carbon Black, 34 for Big Spring Refinery, and 0 for South Feagan Treating Facility. Although information from each event can be pulled up there is no summary information available from the site. Data from the event database is referenced later in this TSD when examining specific SO_2 events recorded at the monitor.

5.3.3. Factor 3: Meteorology

Texas did not provide an analysis of the meteorology (*e.g.,* weather and transport patterns) for the Howard County, Texas area. EPA evaluated meteorological data to determine how weather conditions, including wind speed and direction, affect the plume of sources contributing to the ambient SO_2 concentrations.

As mentioned above, the stacks at Big Spring Carbon Black Plant are located within an arc of 222-252° upwind of the DRR monitor. The Big Spring Refinery stacks are in an upwind arc of

[17] https://www2.tceq.texas.gov/oce/eer/index.cfm. Results of the referenced search are in the docket eer_results_060520200821.xls

209 – 226° relative to the monitor so there is a slight directional overlap between the two sources.

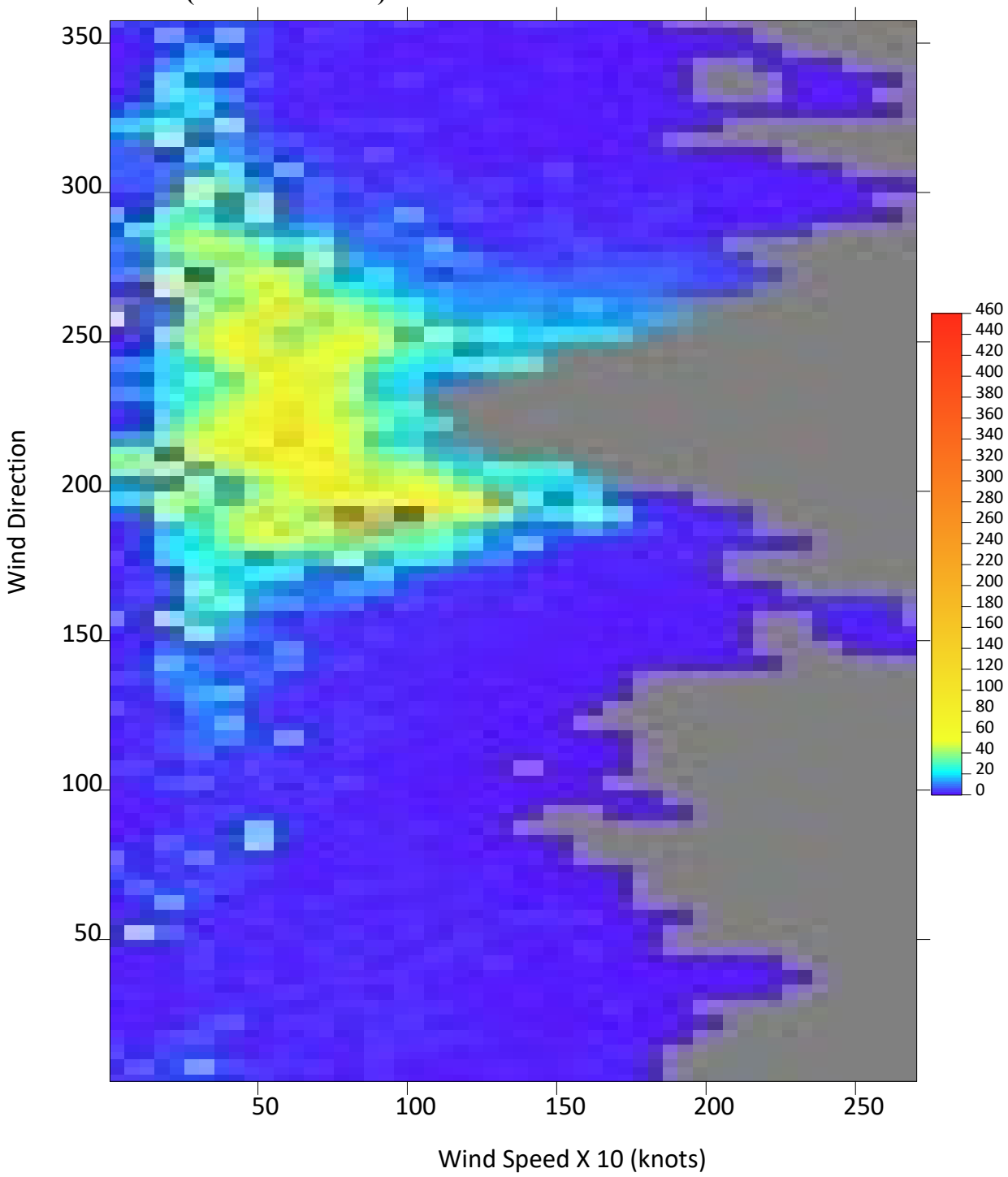
A review of the hourly SO_2 data for the monitor shown in Table 12 shows that the data for March 9, 2018 appears to be an outlier from all the other data for the three-year period, the daily maximum being more than three times the maximum for any other day. This is an unusual relationship for the magnitudes at concentrations extremes and suggests that an abnormal condition may be contributing to the concentrations on that day.

Table 12. Ranked Daily Maximum 1-hour SO_2 Concentrations Above the 2010 SO_2 NAAQS at the Howard Country DRR Monitor for the 2017-2019 Period.

Date	Daily Max SO_2 (ppb)
2018-03-09	460
2018-01-19	133.5
2017-11-24	117.2
2019-08-03	108.7
2017-12-23	107.3
2018-02-15	99.7
2018-02-16	99.3
2017-01-24	98.1
2019-10-09	91.8
2018-11-17	91.7
2017-07-24	86.5
2017-11-18	84.6
2017-04-20	84
2018-03-20	81.1
2019-08-02	79.9
2019-10-13	79.6
2017-11-20	79.6
2017-01-11	78.1
2018-01-07	77.4
2018-01-10	76.1
2018-01-31	76

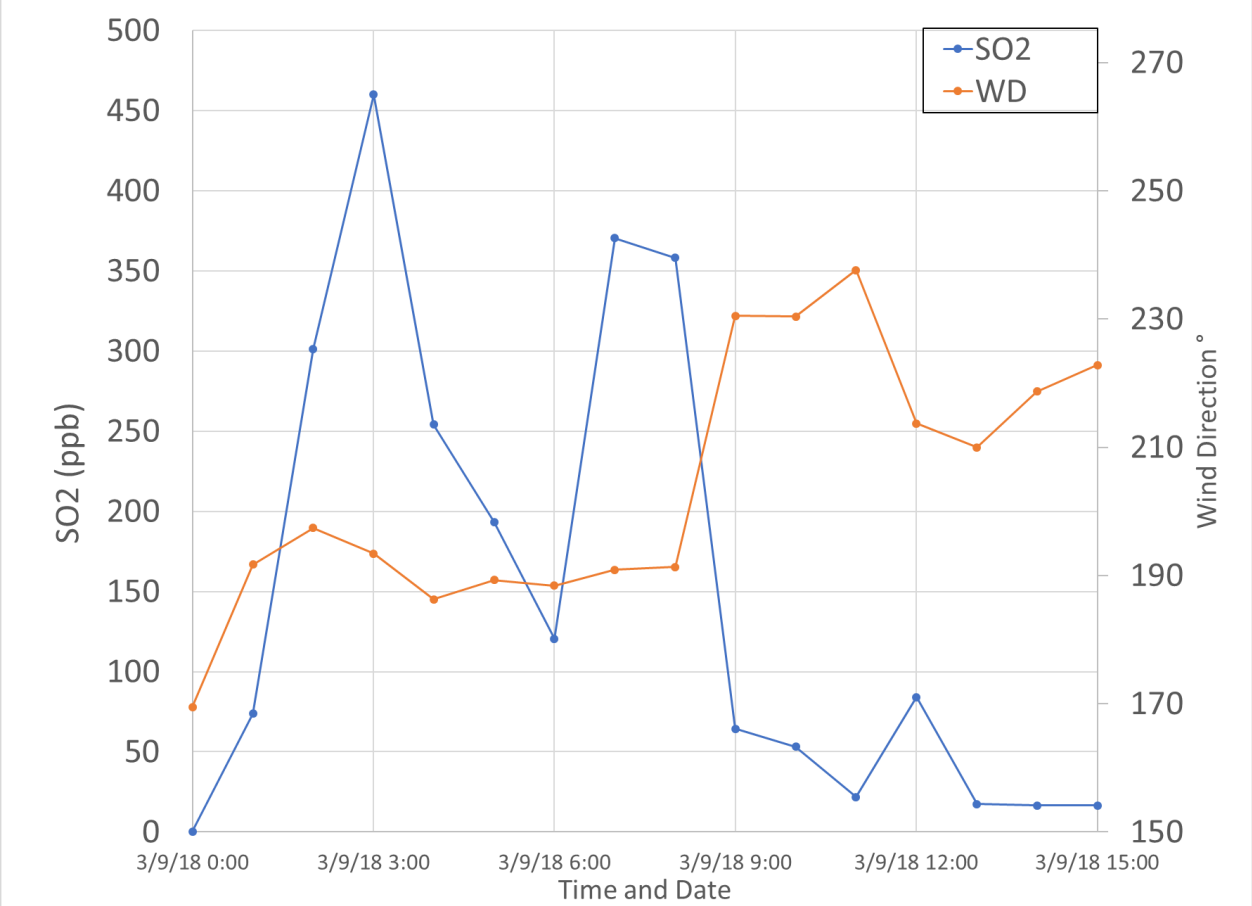
Figure 19 plots the maximum hourly SO_2 concentrations for the 3-year period as a function of wind speed and wind direction. The maximum concentration falling into a given wind speed – wind direction bin is plotted with the hotter colors denoting higher SO_2 concentrations. For the wind directions from the Big Spring Carbon Black Plant sources to the monitor (222-252°), the highest concentrations are 140-160 ppb, while winds during the highest concentrations (up to 460 ppb) are from 190-195°. The presence of two modes in the concentrations suggests an impact from two overlapping sources. Another factor apparent from the plot is that the highest concentrations from the direction of Big Spring Carbon Black Plant occur at lower wind speeds (6-9 knots) than from the direction of the Big Spring Refinery (8-14 knots). This could indicate a source with a higher buoyancy and effective plume height from the refinery.

Figure 19. Contour Plot of Maximum 1-hour SO_2 Concentrations from the DRR Monitor As a Function of Wind Speed (Knots Times a Factor of 10, in 1 Knot Increments) and Wind Direction (in 5° Increments).



For the period of highest concentrations, March 9, 2018, the TCEQ air emission event report database contained no reported events for the carbon black facility but there was an event reported for the Big Spring Refinery. The event report[18] states that the event started at 3/8/2018 at 11:47 PM and ended 3/11/2018 at 9:36AM and released 41,457 lb SO_2 from the South Flare. Figure 20 shows the SO_2 concentrations and wind directions for the peak day.

Figure 20. SO_2 Concentrations and Onsite Wind Directions for 3/9/2018 at the Howard County DRR Monitor.



Because of the correspondence of the start of the event to the occurrence of high concentrations and the close alignment of the on-site wind directions with the location of the flare, the exceedance at the DRR monitor on this day for Big Spring Carbon Black may have been contributed to by the excess emissions from the Big Spring Refinery. The South Feagan Gas Treating Plant was also upwind during the period of exceedance.

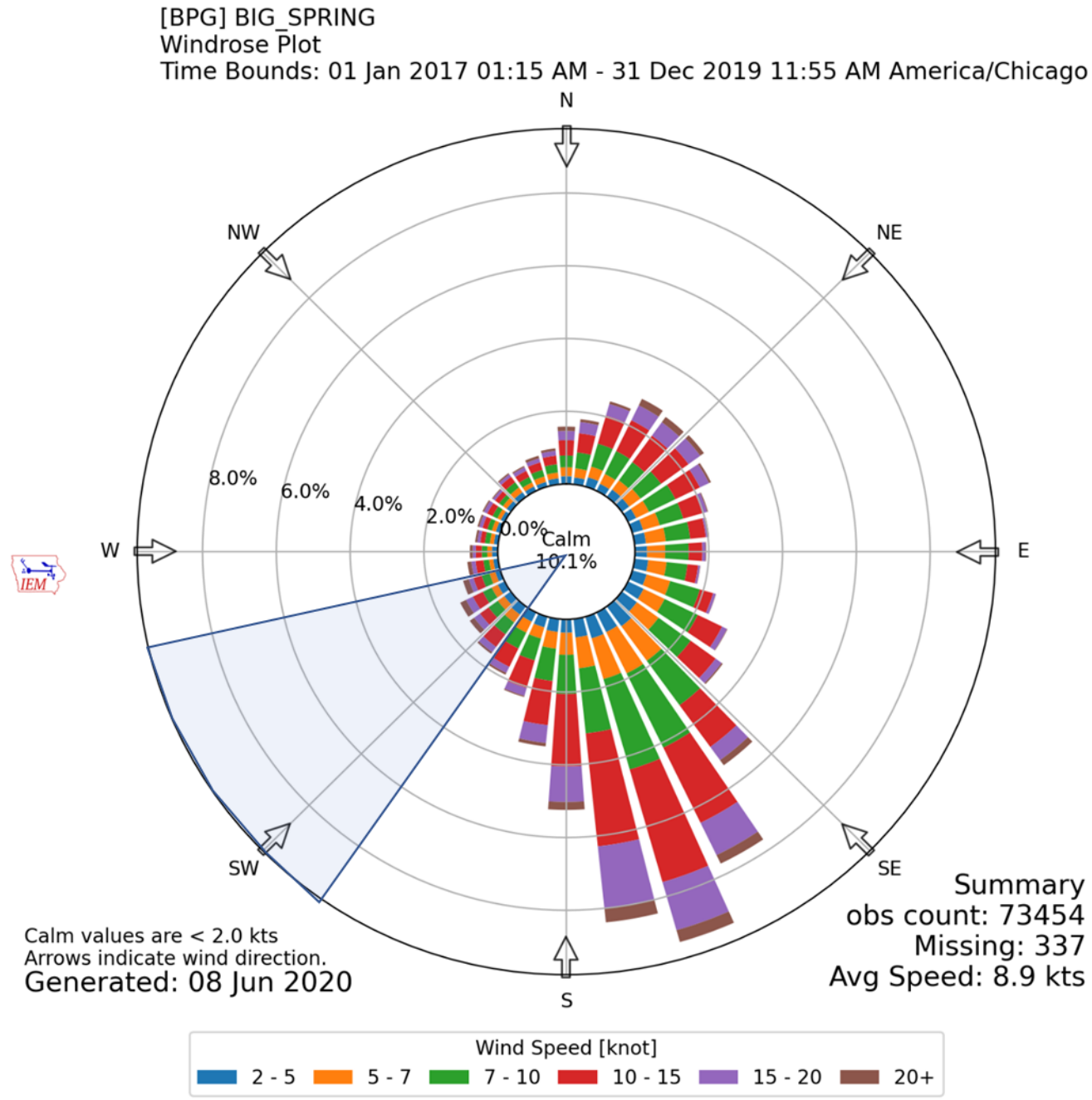
[18] https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=280208

EPA evaluated the incidence of excess emissions during 2017-2019 from the Big Spring Refinery as reported to TCEQ. There were 28 events with SO_2 emissions with total emissions estimated at 318,919 pounds. The event on March 8-9, 2018 released 41,458 pounds at an average rate of 717 pounds per hour. There were two other events which had higher average release rates, July 14, 2018 (1,177 pounds per hour) and November 1, 2018 (1,437 pounds per hour) and five additional events above 200 pounds per hour.

Evidence of source-receptor relationships between specific emissions sources and high SO_2 concentrations at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of EPA's intended nonattainment area. As shown in Figure 21[19], meteorological records for the nearest NWS meteorological station at Big Spring Airport indicate winds blow predominantly from the south-southeast with winds from the north through west infrequent.

[19] Figure obtained from the Iowa State University Iowa Environmental Mesonet website (https://mesonet.agron.iastate.edu/)

Figure 21: Wind Rose for Big Spring Airport, Howard County, Texas for 2017-2019. The sector for wind directions from the sources at Big Spring Carbon Black Plant toward the DRR monitor (222°-252°) is highlighted in blue.



Winds from the direction of Big Spring Carbon Black's main sources (222-252° from the monitor) occur about 5.4% of the time and from the direction of the South Flare (190° from the monitor) about 2% of the time. The nearest SO_2 source in the direction of the prevailing winds is the Rawhide Gas Plant in neighboring Glasscock County with 11.1 tpy emissions in 2017 at a distance of about 32 km.

5.3.4. Factor 4: Geography and Topography

Texas did not provide an analysis of the geography and topography of the Howard County, Texas area. EPA examined the physical features of the land that may affect the distribution of emissions and may help define nonattainment area boundaries. The Big Spring DRR monitor is at about 730 m elevation located near the Beales Creek Valley. Maps of the terrain elevations in Howard County and portions of the neighboring counties are plotted in Figures 22 and 23. To the northwest, in the direction of the prevailing winds, are hills with elevations up to 860 m located 36 km in the northwest corner of Howard County. The nearest complex terrain with elevations to 860 m is to the south for South Mountain and to the southeast for the Signal Mountains, as shown in Figure 23.

Figure 22. Topographic Maps of Howard County, Texas and Portions of Nearby Counties. The red crosses are SO_2 sources with the refinery on the left and the carbon black plant on the right.

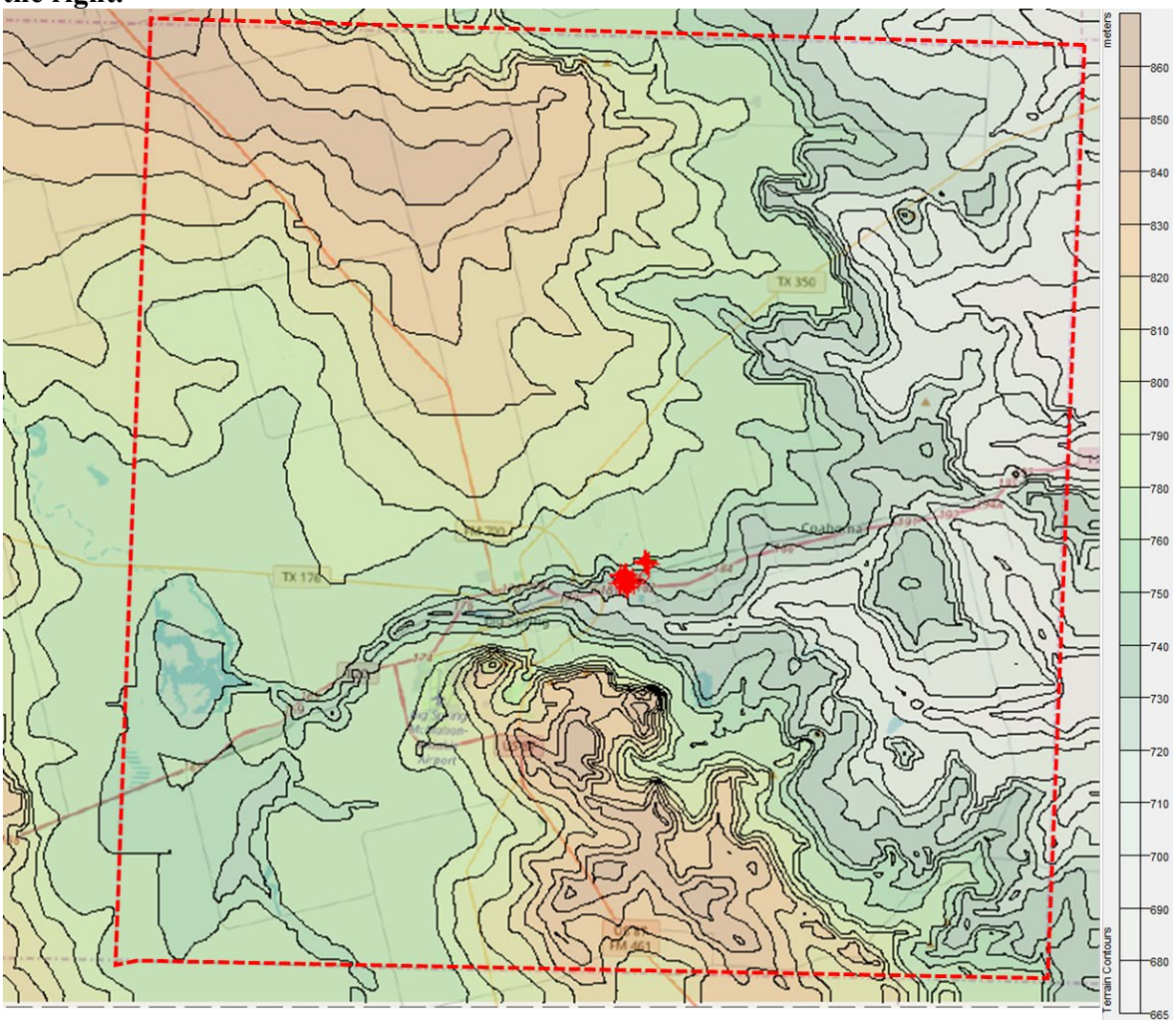
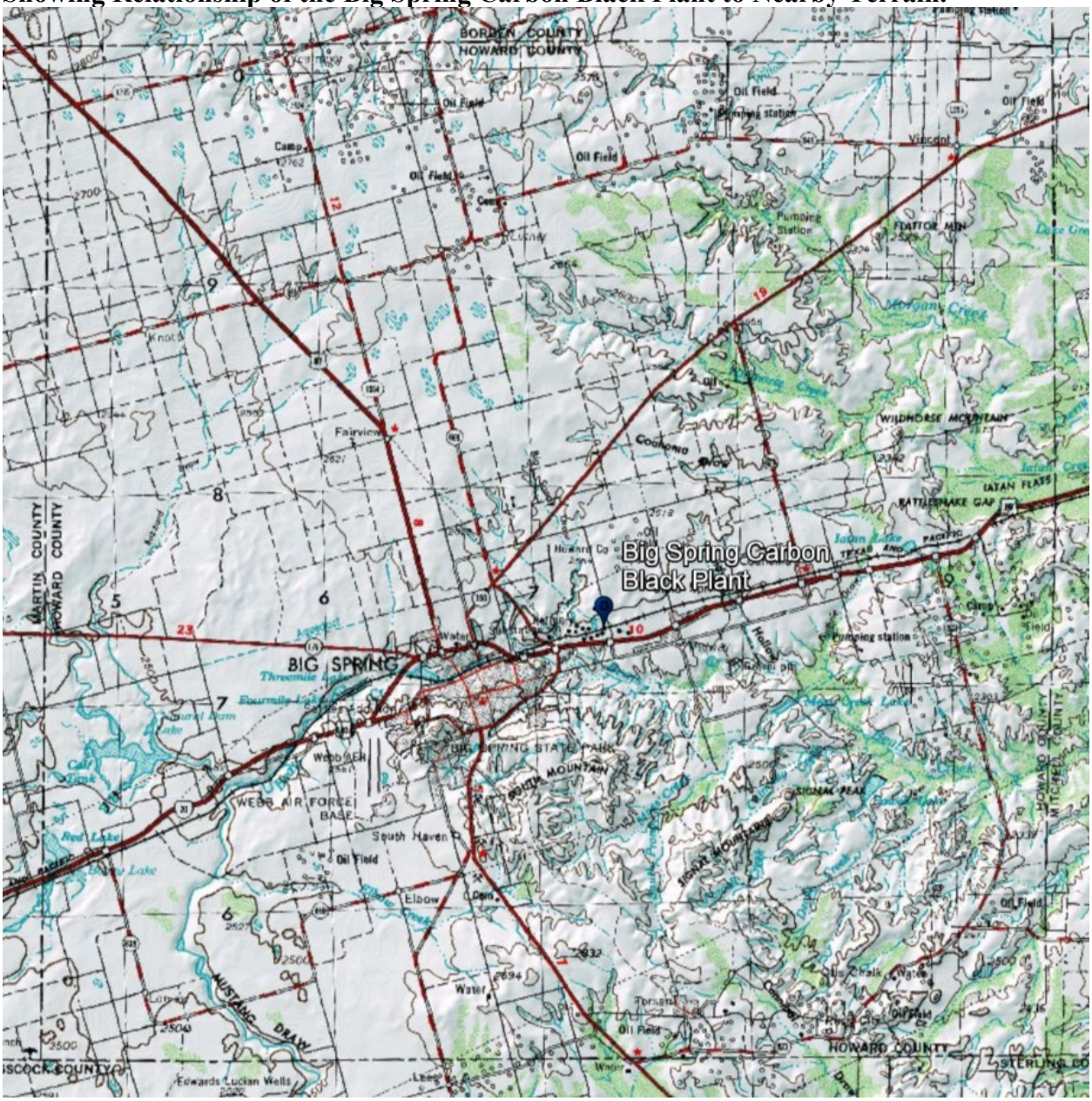


Figure 23. Topographic Maps of Howard County, Texas and Portions of Nearby Counties Showing Relationship of the Big Spring Carbon Black Plant to Nearby Terrain.



5.3.5. Factor 5: Jurisdictional Boundaries

Texas did not provide an analysis of the jurisdictional boundaries to establish the geographic extent of the violating area. EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area. Our goal is to base designations on clearly defined legal boundaries that align with existing administrative boundaries when reasonable. Existing jurisdictional boundaries used to define a nonattainment area must encompass the area that has been identified as meeting the nonattainment definition.

The jurisdictional boundaries of Howard County are defined by the boundaries of Howard County with neighboring counties.

Texas, in its September 18, 2015 designation recommendations, prior to the installation of the DRR monitor, recommended the county boundary as the jurisdictional boundaries for those counties which did not have SO_2 monitoring data and it recommended those counties be designated as Unclassifiable/Attainment.

5.4. Other Information Relevant to the Designation of the Howard County, Texas Area

EPA did not receive additional information relevant to the designation of this area.

5.5. EPA's Assessment of the Available Information for the Howard County, Texas Area

A monitor in the Howard County, Texas area is violating the 2010 SO_2 NAAQS based on the 2017-2019 design value. EPA evaluated the five factors and all available information to determine the geographic extent of the violating area.

EPA finds that there are two other major sources of SO_2 located within Howard County, Texas that could cause or contribute to the measured violations of the 2010 SO_2 NAAQS in the area. One of these sources had several excess emissions events with emission rates over 200 pounds per hour (a rate of 876 tpy). The highest concentration recorded during the 3-year period was during one of the excess emissions events. The monitor would still be above the 2010 SO_2 NAAQS for this 3-year period if the data during this excess emission event period were not included. There is only one major source outside of Howard County within 50 km of the DRR monitor. In Glasscock County the Coronado Midstream facility with 145 tpy emissions of SO_2 in 2017 is located approximately 38 km to the south of the DRR monitor.

As shown in Figure 21, winds blowing from the major sources (southeast) in the direction of the monitor that align the major sources emissions and produce favorable conditions for high concentrations occur relatively infrequently. The highest concentrations occurred most frequently when winds blew from the southeast in the direction of the monitor at speeds of approximately 7-10 knots. This indicates that the monitor is showing violations despite the most favorable conditions for high concentrations likely occurring in areas to the north and northwest of the Carbon Black Plant and potentially contributing to nonattainment. With the terrain in the direction of the prevailing winds being complex and higher than the carbon black plant by up to about 100 m the impacts from the plant would tend to be enhanced over that expected for flat terrain.

EPA finds that multiple sources of SO_2 within Howard County may cause or contribute to violations of the 2010 SO_2 NAAQS and that terrain features in the county could enlarge the area of impact beyond that expected in flat terrain. No other sources in neighboring counties would be

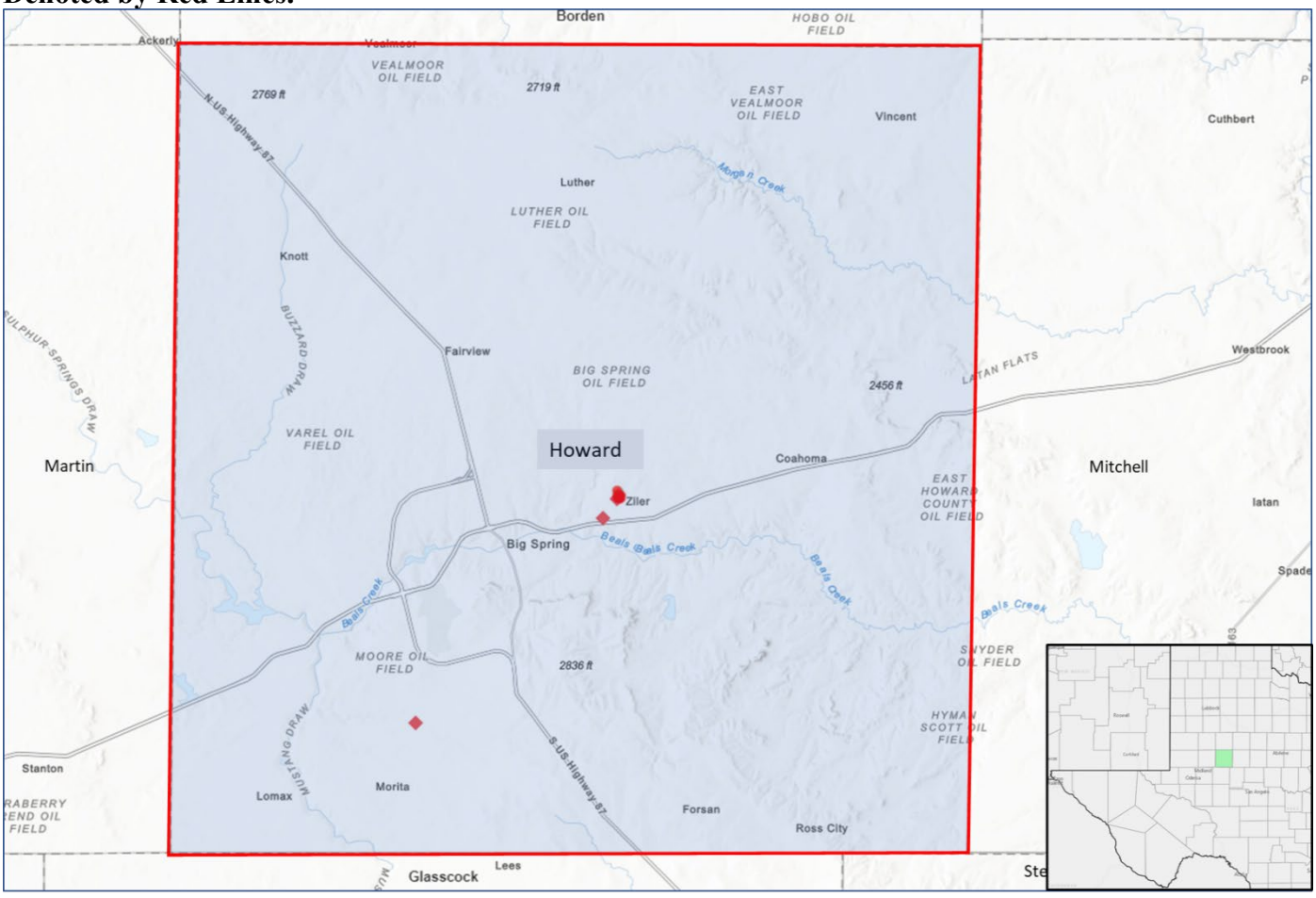
expected to control their SO_2 emissions to bring Howard County into compliance with the standard.

EPA believes that our intended nonattainment area, bounded by the borders of Howard County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended nonattainment area.

5.6. Summary of EPA's Intended Designation for the Howard County, Texas Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, EPA intends to designate Howard County, Texas as nonattainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the borders of Howard County, Texas. Figure 24 shows the boundary of this intended designated area.

Figure 24. Boundary of the Intended Howard County, Texas Nonattainment Area is Denoted by Red Lines.



6. Technical Analysis for the Bexar County Area

6.1. Introduction

EPA must designate the Bexar County, Texas area by December 31, 2020, because the area has not been previously designated and Texas installed and began operating, a new EPA-approved monitor to comply with the DRR. This section presents all the available air quality information for the portion of Bexar County, Texas that includes the following SO_2 source around which the DRR required the state to characterize air quality:

- The Calaveras Power Station facility emits 2,000 tons or more of SO_2 annually. Specifically, Calaveras Power Station emitted 17,133 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Texas has chosen to characterize it via monitoring.

As seen in Figures 25 and 26 below, the Calaveras Power Station facility is located on a peninsula on Calaveras Lake to the east-southeast of San Antonio, Texas. The Calaveras DRR monitor is located about 5 km to the north (346°) and the existing monitor (Calaveras Lake Monitor) is located about 4 km to the south of the Calaveras Power Station facility.

Figure 25. Map of the Bexar County, Texas Area Addressing the Calaveras Power Station.

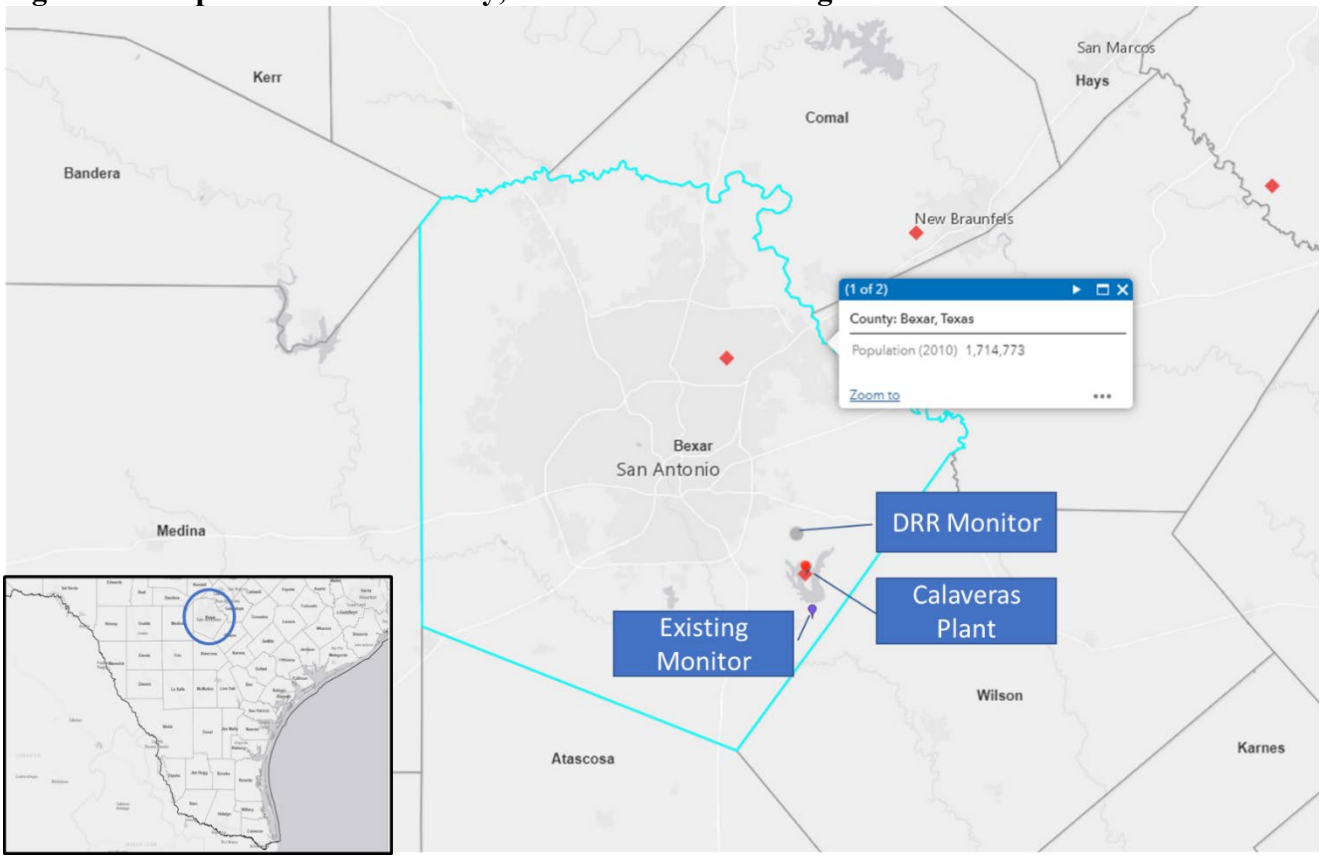


Figure 26. Detail Map of the Bexar County, Texas Area Addressing the Calaveras Power Station.

In its September 18, 2015 recommendation letter, Texas recommended that Bexar County be designated as Attainment for the 2010 SO_2 NAAQS, based on monitored air quality from 2012-2014. Specifically, the state's recommended boundaries consist of the borders of Bexar County. EPA agrees with Texas' recommendation as to the designation category and intends to designate all of Bexar County, Texas, as described below, as attainment/unclassifiable for the 2010 SO_2 NAAQS based upon a weight of evidence analysis including but not limited to currently available monitoring information for the 2017-2019 period. Our intended boundaries are consistent with the state's recommended boundaries and are described below.

6.2. Intended Designation for Bexar County, Texas Area

As detailed below, the design value for the DRR monitor in Bexar County is invalid and is not determinative on this area's designation. However, that monitoring data may still be considered when supplemented with other information to designate the county. EPA has conducted a 5-factor analysis for a weight of evidence (WOE) approach to designate Bexar County.

6.2.1. Factor 1: Air Quality Monitoring Data for the Bexar County, Texas Area

EPA considered design values for air quality monitors in the Bexar County, Texas area by assessing the most recent 3 consecutive years (i.e., 2017-2019) of quality-assured, certified ambient air quality data in the EPA Air Quality System (AQS) using data from Federal Reference Method and Federal Equivalent Method monitors that are sited and operated in accordance with 40 CFR parts 50 and 58.[20] Procedures for using monitored air quality data to determine whether a violation has occurred are given in 40 CFR part 50 Appendix T, as revised in the 2010 SO_2 NAAQS rulemaking. The 2010 1-hour SO_2 NAAQS is met when the design value is 75 ppb or less. Whenever several monitors are located in an area, the design value for the area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e., monitors with design values greater than 75 ppb) in a geographic area forms the basis for designating that area as nonattainment. The remaining factors, described in the next section, are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor. Table 13 contains the 2017-2019 design values for the area of analysis.

Table 13. 2010 SO_2 NAAQS Design Values for the Bexar County, Texas Area.

AQS Site ID	Monitor Location	2017 99th Percentile (ppb)	2018 99th Percentile (ppb)	2019 99th Percentile (ppb)	2017-2019 Design Value (ppb)
48-029-0059	Calaveras Lake	17.0	13.9	1.9	**11***
48-029-1080	San Antonio Gardner Road (DRR Monitor)	29.3	32.1	3.7	**22***

*Design Value is invalid.

The data collected at these monitors indicate that hourly concentrations and annual 99th percentile daily maximum 1-hour concentrations are consistently well below the level of the 2010 SO_2 NAAQS. However, the DRR monitor design value is invalid due to insufficient valid data in the 4th quarter of 2018. A quarter is incomplete if less than 75% of the days have a valid daily max. To run substitution, the incomplete quarter must have valid daily max data for at least 50% of the days and there must be valid daily max data for at least 200 days across the three matching quarters in the three-year design value period.[21] The DRR monitor only had 17 days of valid data in the 4th quarter of 2018, well below the 50% threshold to be eligible for data substitution for calculation of the design value. Because the design value is invalid, EPA cannot designate the Bexar County area based on the invalid 2017-2019 design value for the San Antonio Gardner Road DRR monitor (AQS ID 48-029-1080) alone. We have, therefore, adopted a weight of evidence approach considering all available information, including monitoring data and emissions trends, to determine the intended designation for the area.

[20] SO_2 air quality data are available from EPA's website at https://www.epa.gov/outdoor-air-quality-data. SO_2 air quality design values are available at https://www.epa.gov/air-trends/air-quality-design-values.
[21] 40 CFR Appendix T to Part 50 - Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Sulfur (Sulfur Dioxide)

First, considering the DRR monitor data we can estimate the magnitude of the maximum daily concentrations that would have to have occurred during the missing data period to render a valid 3-year design value above the 2010 SO_2 NAAQS. We can then compare that to the data during the remainder of the three-year period. Table 14 gives the maximum SO_2 concentration by quarter and the annual maximum SO_2 concentration and 99th percentile concentration.

Table 14. Maximum SO_2 Concentration (ppb) and Number of Valid SO_2 measurements by Quarter and the Annual Maximum and 99th Percentile Concentrations (ppb) at the DRR Monitor.

Period	Maximum 1-hour SO_2 Concentration	Number of Observations	99th Percentile Annual 1-hour SO_2 Concentration
2017	**47.7**	**8363**	**29.3**
Qtr1	20.8	2111	
Qtr2	24	2124	
Qtr3	47.7	2082	
Qtr4	36.3	2046	
2018	**38.3**	**6282**	**32.1**
Qtr1	24.1	2025	
Qtr2	38.3	2125	
Qtr3	27.4	1681	
Qtr4	16	451	
2019	**4.2**	**7993**	**3.7**
Qtr1	3.7	1830	
Qtr2	4	1850	
Qtr3	4.2	2164	
Qtr4	2.8	2149	
Grand Total	**47.7**	**22638**	

To calculate the design value, assuming sufficient valid data, the 99th percentile concentration from each year is averaged for the three-year period and the result is rounded to the nearest whole number or 1 ppb (decimals 0.5 and greater are rounded up to the nearest whole number, and any decimal lower than 0.5 is rounded down to the nearest whole number)

$$DV = Round(\frac{99th\ Percentile(\mathrm{Yr1}) + 99th\ Percentile(\mathrm{Yr2}) + 99th\ Percentile(\mathrm{Yr3})}{3})$$

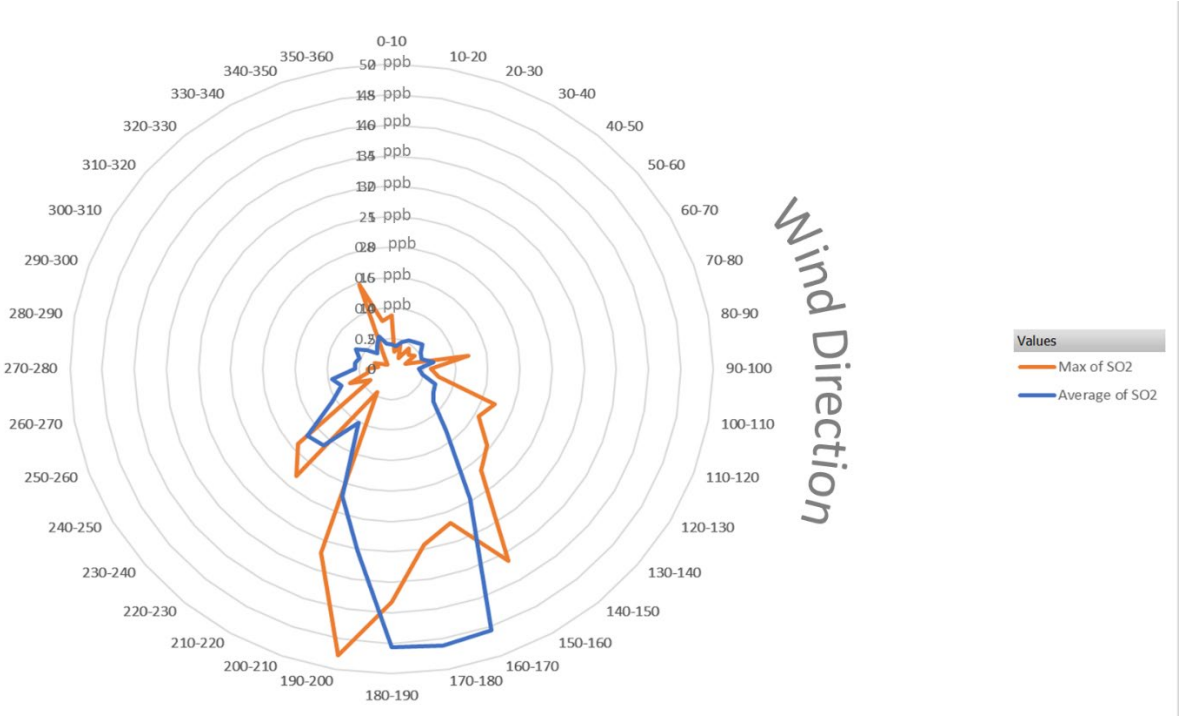
For the design value for the DRR monitor to be above the 2010 SO_2 NAAQS the total of the three-year 99th percentiles would have to be equal to or greater than 226.5 (3 X 75.5) ppb. The sum of the 99th percentiles for 2017 and 2019 are 33.0 (29.3 + 3.7) ppb, so the required 99th percentile (the 4th high value, meaning 3 greater values would also occur) for 2018 would need to be at least 193.5 ppb. In the other 3 quarters of 2018 the maximum value was 38.3 ppb, well less than the required 193.5 ppb. This means that four daily maximum values of at least 193.5 ppb

would all have to have occurred during the period of missing data in 4th quarter of 2018 (Qtr4-2018).

EPA estimated an upper probability (that is the actual probability would likely be less) of four daily maximum values above 193.5 occuring as follows. Since there were 17 days with valid daily maximum concentrations the required four days with daily maximum concentrations greater than or equal to 193.5 ppb would have occurred in a span of 74 days (91 less 17). There were 983 days during the three-year period with valid daily maximum concentrations. Based on the valid data for the 3-year period, the probability of recording a daily maximum concentration greater than or equal to 47.7 ppb (the maximum concentration observed) on any given day is approximately 0.001 or 0.1% (1 / 983). The probability of recording a value greater than 47.7 ppb in the 74-day period is $7.4 \text{ X } 10^{-2}$ or 7.4% (74 * 1 X 0.001). The probability of four days with an hourly value equal to or above 47.7 ppb in the 74-day period would be $2.76 \text{ X } 10^{-5}$ or 0.00276% (0.074 * 0.073 * 0.072 * 0.071). Since the concentration required to exceed the 2010 SO_2 NAAQS is 4 times 47.7 ppb, the actual probability of exceeding 193.5 ppb is certainly significantly lower. Since the SO_2 standard is a statistical standard where 1% of the daily maximum values can be greater than the 2010 SO_2 NAAQS level, a probability much less than 1% for the occurrence of a concentration sufficient to cause a violation is consistent with (but not sufficient to demonstrate) attainment of the standard at the monitor.

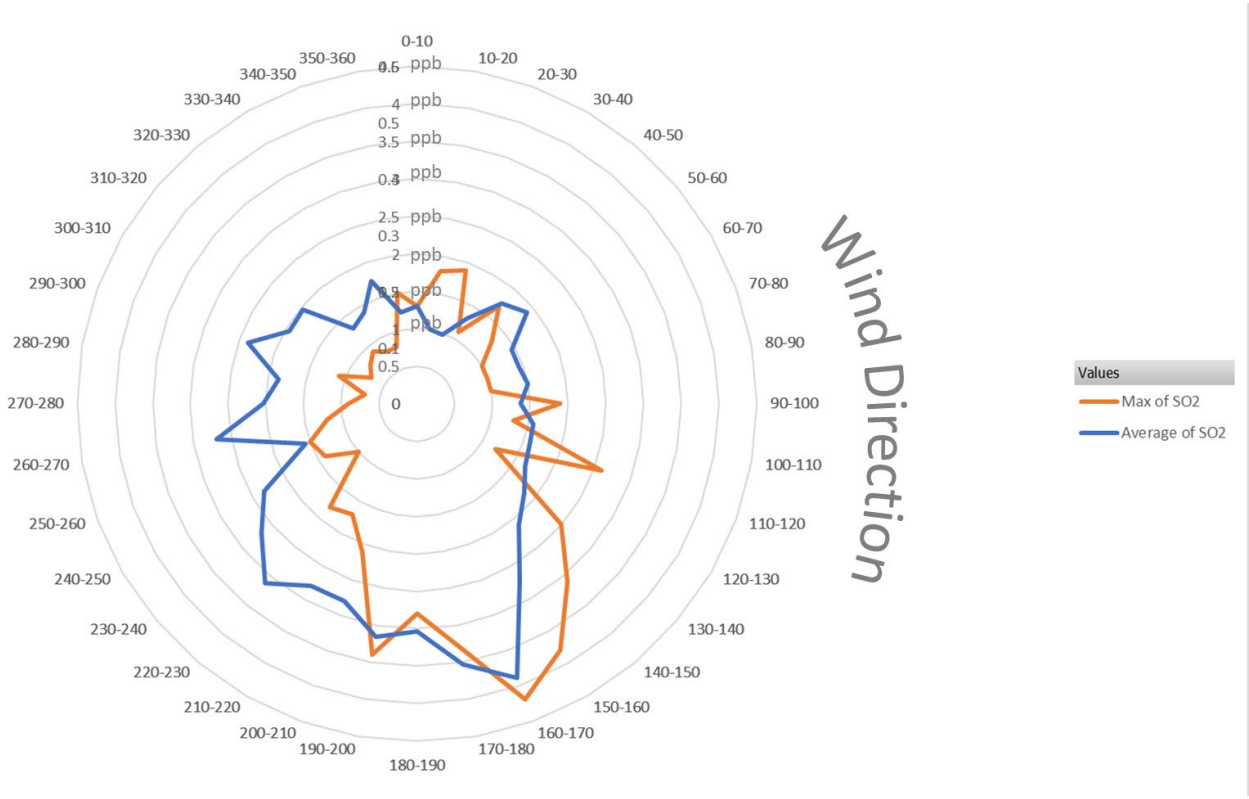
A plot of the 1-hour SO_2 concentrations versus wind direction is given in Figure 27 where the average and maximum concentrations are plotted on separate axes, the highest value plotted for the maximum is 50 ppb and for the average is 2 ppb. The plot shows that by far the highest concentrations are associated with the wind directions from the Calaveras Power Station (166°). The secondary maximum at 220-230° is in the direction of the V.H. Braunig Plant at a distance of about 11.7 km which had SO_2 emissions of 6.4 tpy in 2017 and 8.4 tpy in 2018. The higher average concentrations for 350-360° are in the direction of the Tessman Road Landfill Gas Power Station (5 tpy of SO_2 in 2017 and 4.6 tpy in 2018) and the Tessman Road Landfill (32 tpy of SO_2 in 2017 and 38 tpy in 2018) at a distance of about 8.5 km, and Portland Cement (530 tpy of SO_2 in 2017 and 360 tpy in 2018) at 23 km.

Figure 27. SO_2 Average and Maximum Concentrations Versus Wind Direction for the DRR Monitor for 2017-2019.



Since, as discussed below, the SO_2 emissions rate from the Calaveras Power Station greatly declined in 2019 and the lower emission rate will be more representative of the situation going forward, a pollution rose is also plotted for 2019 in Figure 28. The average and maximum are plotted on separate axes, the highest value plotted for the maximum is 5 ppb and for the average is 0.6 ppb. The maximum concentrations in 2019 from the direction of Calaveras Power Station are about 1/10 of those for the full 3-year period.

Figure 28. SO_2 Average and Maximum Concentrations Versus Wind Direction for the DRR Monitor for 2019.

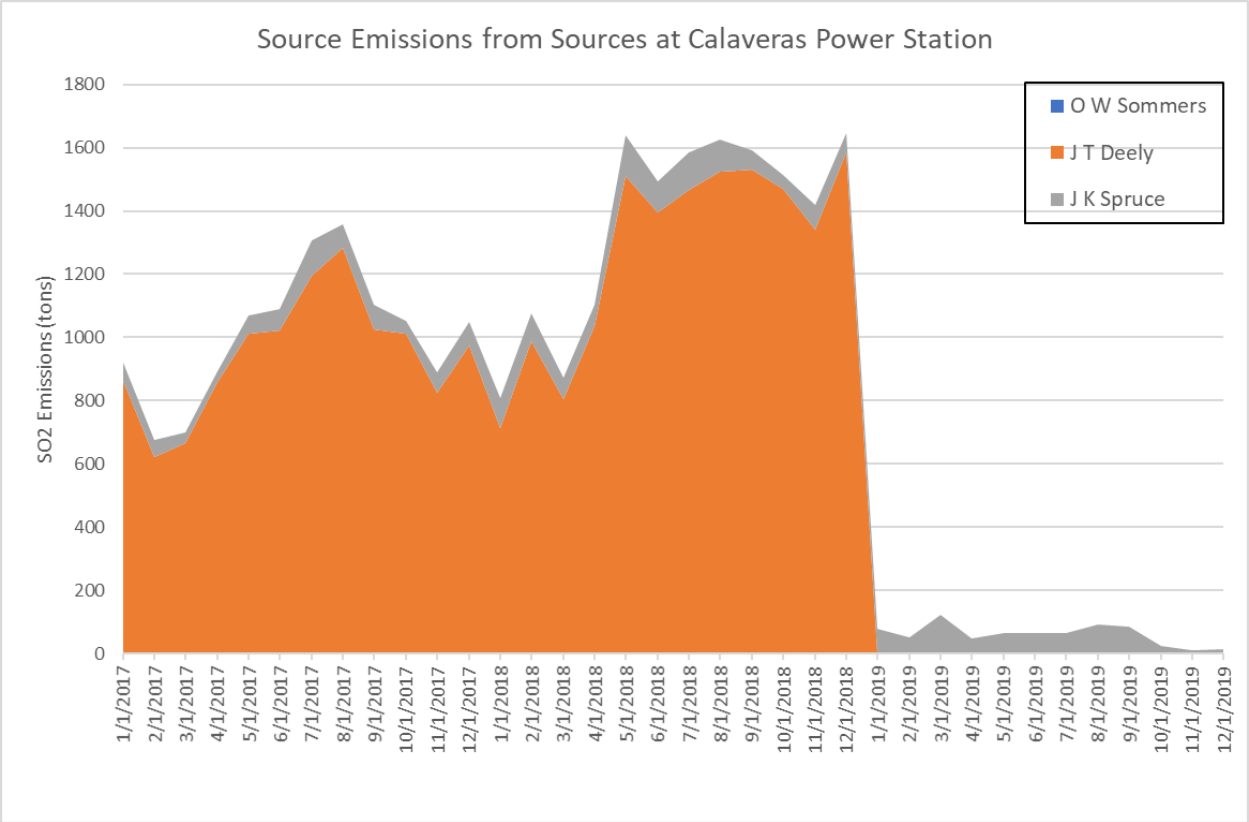


6.2.2. Factor 2: SO_2 Emissions Data for the Bexar County, Texas Area

The Calaveras Power Station contains three power plants operated by CPS Energy. The plants include the J.T. Deely Power Plant (Facility ID 6181), the O.W. Sommers Power Plant (Facility ID 3611), and the J.K. Spruce Power Plant (Facility ID 7097). O.W. Sommers is natural gas fired and has minimal SO_2 emissions. J.T. Deely permanently and enforceably shut down[22] on December 31, 2018, during the monitoring period. J.K. Spruce remains in operation. Figure 29 shows the monthly SO_2 emissions from Calaveras Power Station by source. After the closure of J.T. Deely, the average SO_2 emission rate from all sources at the power station declined from 1,186 tons per month for 2017-2018 to 60 tons per month in 2019, a decline of 95%.

[22] J.T. Deeley Power Plant's New Source Review Permit 90267 was voided on Oct 14, 2019. https://www2.tceq.texas.gov/airperm/index.cfm?fuseaction=airpermits.project_report&proj_id=307952&addn_num_txt=90267.

Figure 29. Monthly SO_2 Emissions from Calaveras Power Station by Source.



As shown by the decline in the quarterly maximum SO_2 concentrations and the annual 99th percentile concentration in 2019 given in Table 14 above and the decline in maximum concentrations shown by comparing Figures 27 and 28, the 95% decrease in emissions corresponds with an approximate 88% decrease (1 – (3.7/Average(29.3,32.1))) in the 99th percentile SO_2 concentrations measured at the DRR monitor The 99th percentile concentration in 2019 was only 3.7 ppb, about 5% of the level of the 2010 SO_2 NAAQS.

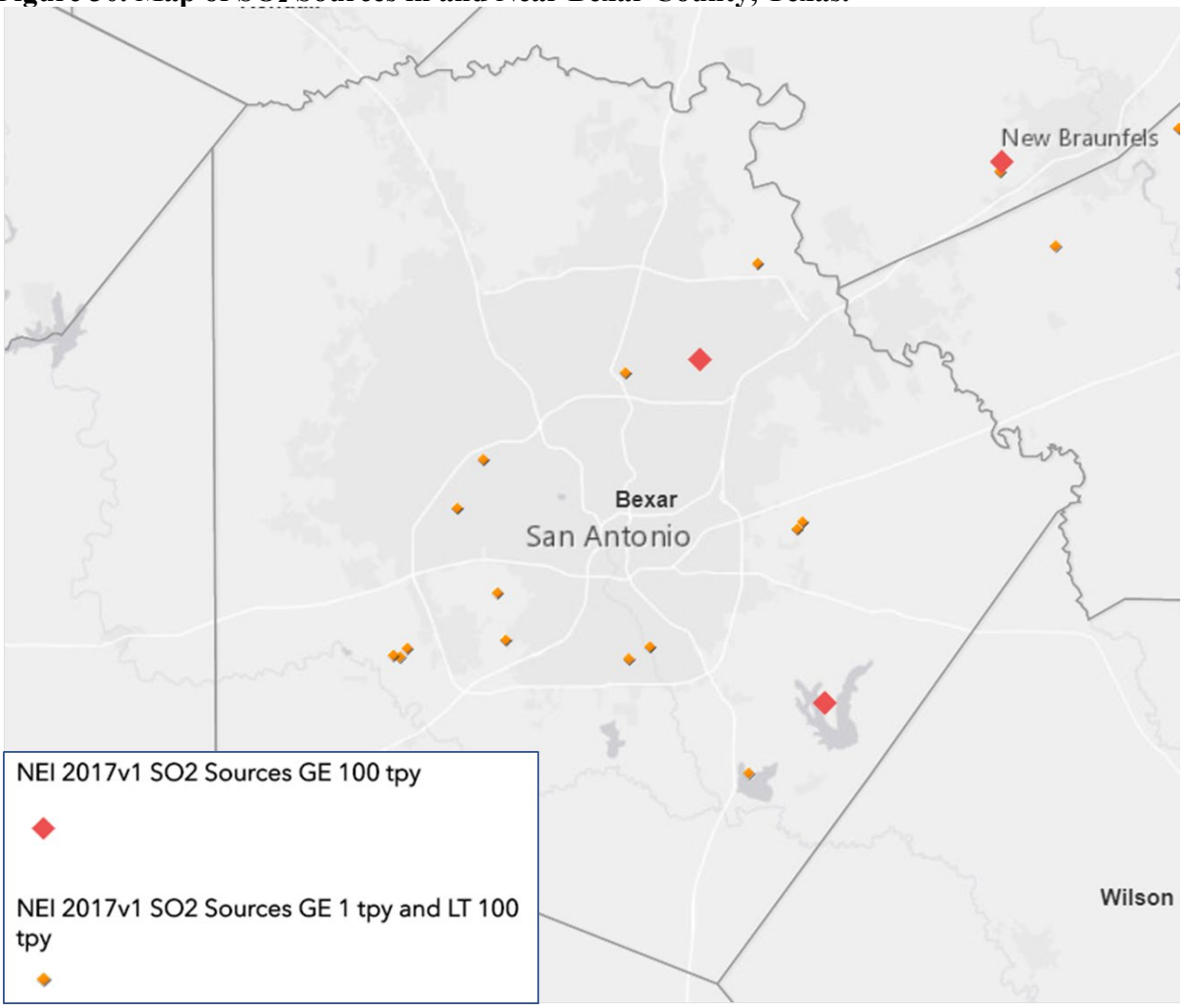
EPA also examined the SO_2 emissions of nearby sources in the Bexar County Area using data for the most recent years as supplied by Texas through their State of Texas Air Reporting System (STARS)database system. EPA accessed the STARS database in May 2020 and downloaded the most recent data. Table 15 reports the SO_2 emission rates for the Bexar County facilities with at least 1 ton per year emissions in any one year. The Calaveras Power Station contributed an average of 96% of the county's SO_2 emissions over the three-year period. The Calaveras Power Station's emissions were quite variable with the emissions in 2018 more than double those in 2016. Looking solely at the total emissions for the county it appears that they are increasing each year. To determine if there is a trend for other sources in the county, the table also gives the emissions from all sources except the power station. The emissions from all other sources is between 500-600 tons per year with no apparent trend. Since the power station shut down at the end of 2018 the emission rate for Bexar County would now be expected to be well less than 1,000 tons distributed over the 3,253 km^2 area of the county.

Table 15. SO_2 Emissions for 2016-2018 of Sources in the Bexar County, Texas Area with SO_2 Emissions >1 tpy.

County	Facility Name	2016 SO_2 Emissions (tons)	2017 SO_2 Emissions (tons)	2018 SO_2 Emissions (tons)
Bexar	PORTLAND CEMENT	439.2	530.3	360.4
Bexar	CALAVERAS POWER STATION	8,243.7	12,097.6	16,371.4
Bexar	LEON CREEK PLANT	2.4	3.4	6.9
Bexar	V.H. BRAUNIG	7.0	6.4	8.4
Bexar	PETROLEUM REFINERY	9.8	7.7	7.95
Bexar	1604 PLANT	3.2	3.2	3.4
Bexar	SOUTHWEST RESEARCH INSTITUTE	3.5	8.6	6.5
Bexar	INTERTEK AUTOMOTIVE RESEARCH	2.4	1.9	2.1
Bexar	TESSMAN ROAD LANDFILL	13.3	32.2	37.6
Bexar	COVEL GARDENS RPD FACILITY	4.1	6.8	64.0
Bexar	TESSMAN RD LFG POWER STATION	5.0	5.1	4.6
Bexar	COVEL GARDENS LANDFILL GAS POWER STATION	10.3	9.9	10.7
Bexar	NELSON GARDENS ENERGY PLANT	7.9	-	-
Bexar	Total Emissions	8,748	12,709	16,878
Bexar	Total Emissions for all sources other than the Calaveras Power Station	504	612	507

Figure 30 maps the SO_2 sources in Bexar County. EPA has not received any additional information on proposed new or amended sources put into place after the date of the emissions inventory data provided in the table above.

Figure 30. Map of SO_2 Sources in and Near Bexar County, Texas.



When designating areas, EPA does not consider anticipated future emission increases or decreases that are not yet in effect. However, we note here that that the state did not provide any information on anticipated future emissions increases.

In neighboring counties there are major SO_2 sources. In Atascosa County, the San Miguel Power Plant with 11,880 tpy SO_2 emissions in 2018 is located 69 km to the south of the DRR monitor and 46 km south of the Bexar County line. Also in Atascosa County, is the Marathon Oil Gaujillo Central Facility with 225 tpy SO_2 emissions in 2018, located 57 km south of the Bexar County line. Atascosa County was designated as Attainment/Unclassifiable in Round 2 of the SO_2 designations based on modeling of the area demonstrating attainment submitted to EPA by industry. Because the facilities are located so far from the DRR monitor in Bexar County, they likely do not cause or contribute to violations in Bexar County.

In Comal County, the Lhoist Bulk Mineral Handling facility had emissions of 270 tpy of SO_2 in 2018; the facility is located 15 km from the Bexar County line and 39 km from the DRR monitor. Comal County was designated as Attainment/Unclassifiable in Round 3 of the SO_2

designations. Because the facility has relatively low emissions and is located 39 km from the DRR monitor, it likely does not cause or contribute to violations in Bexar County.

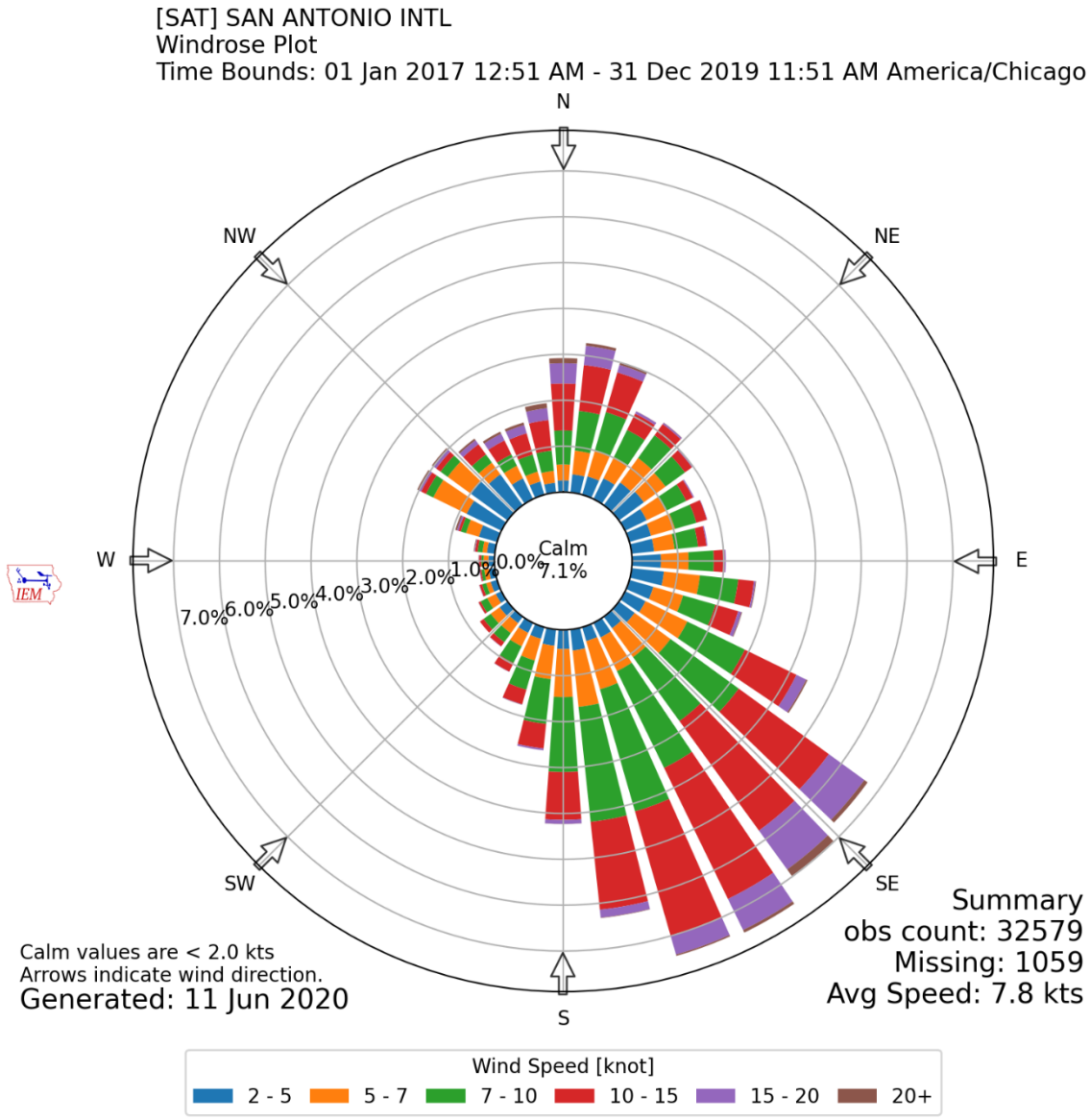
6.2.3. Factor 3: Meteorology

Texas did not provide an analysis of the meteorology (*e.g.,* weather and transport patterns) for the Bexar County area. EPA evaluated meteorological data to determine how weather conditions, including wind speed and direction, affects the plume of sources contributing to the ambient SO_2 concentrations at the DRR monitor.

A wind rose, Figure 31[23], for the three-year period plotted from the San Antonio International Airport located about 26 km to the northwest of the DRR monitor shows prevalent winds from the southeast, from the direction of the Calaveras Power Station, with about half of the winds being 10 knots or less. Most of the winds were between 7 – 15 knots. There is also an incidence of winds around 2% per 10° ray for the directions NW to the NE, allowing for transport of emissions from the other sources shown in Figure 30 to the DRR monitor.

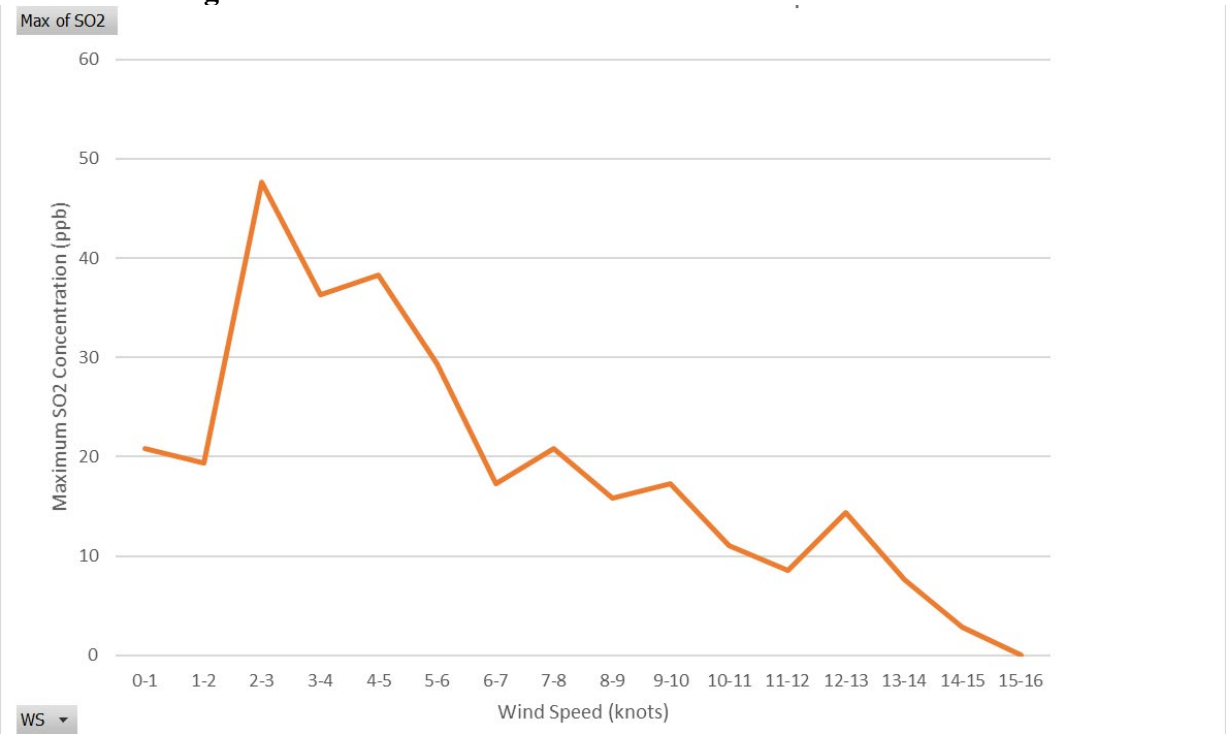
[23] Figure obtained from the Iowa State University Iowa Environmental Mesonet website (https://mesonet.agron.iastate.edu/)

Figure 31. 2017-2019 Wind Rose for the San Antonio International Airport ASOS Station.



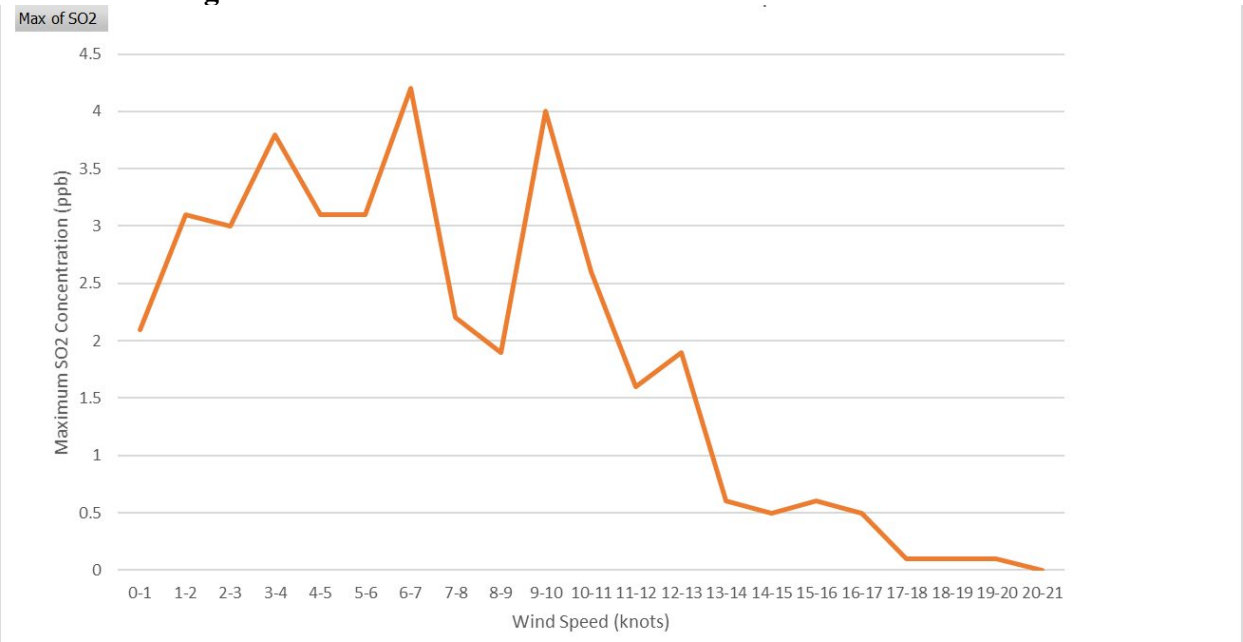
Prior to the shutdown of J.T. Deely the maximum concentrations at the DRR monitor were strongly dependent on wind speed. Because Deely has a 213 m tall stack and the exit temperature is about 408°K (over 100°C above ambient temperature) the general expected relationship at a properly sited monitor would be of increasing concentrations with wind speed until an upper limit is reached above 10 knots then a steep drop. The higher wind speed is required to bring the centerline of the elevated plume in contact with the ground relatively near the stack, above that critical speed increasing winds disperse the plume. For the DRR monitor the actual relationship is quite different as can be seen in Figure 32. The maximum concentrations were reached between 2-3 knots and then the concentration decreased with increasing wind speed.

Figure 32. Relationship of Maximum SO_2 Concentration Versus Wind Speed at the DRR Monitor During 2017-2018 for Wind Directions between 150° – 190°.



After the shutdown of J.T Deely at the end of 2018, maximum concentrations are not as dependent on the wind speed as shown in Figure 33. The data in Figure 33 are not screened for direction since as was shown in Figure 28, in 2019 there was not a strong directional dependence of concentrations. The overall concentrations have declined greatly from the two earlier years and vary between 2-4 ppb up to a wind speed of 12 knots, then decline.

Figure 33. Relationship of Maximum SO_2Concentration Versus Wind Speed at the DRR Monitor During 2019 for All Wind Directions.

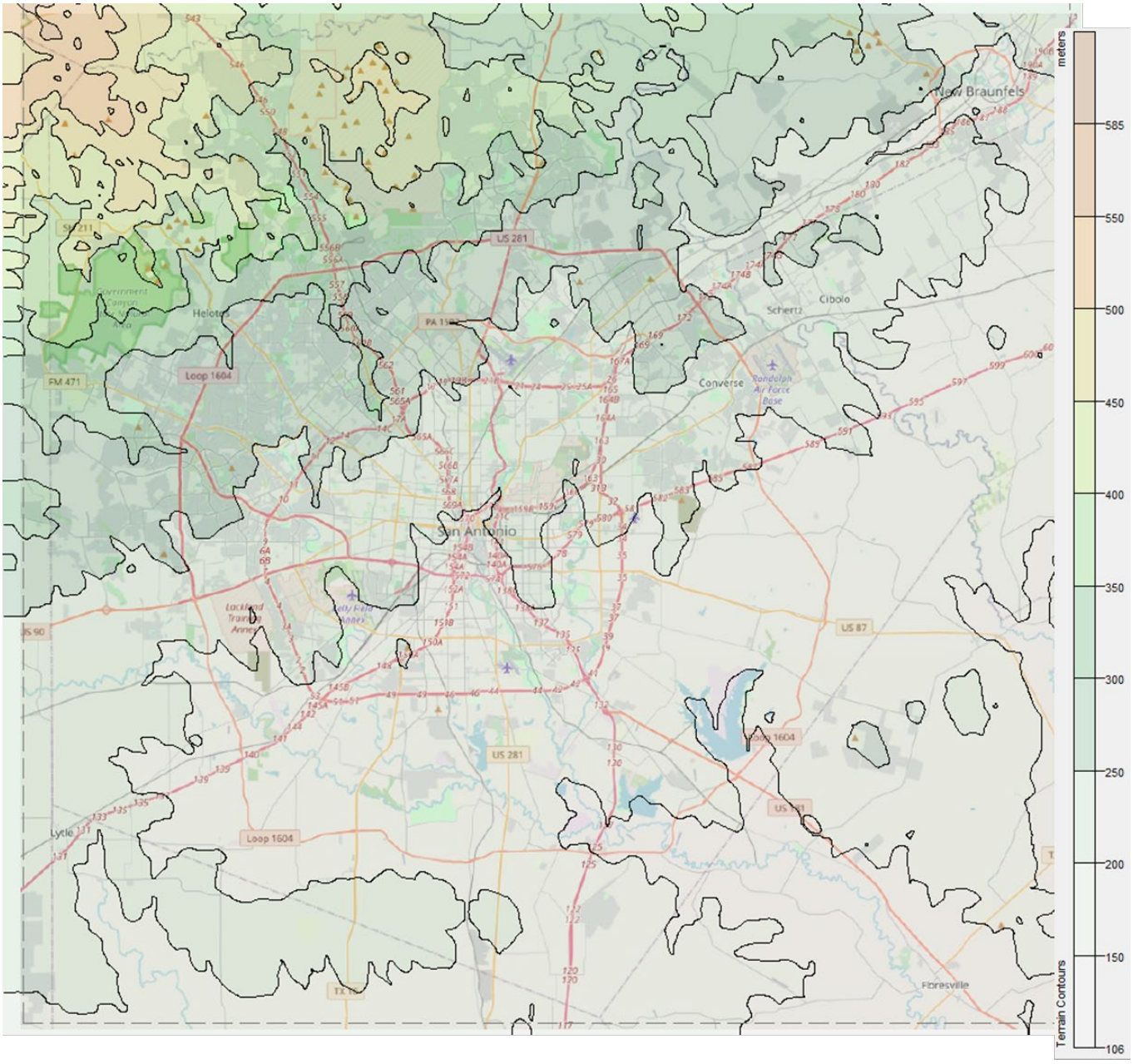


Evidence of source-receptor relationships between specific emissions sources and SO_2 concentrations at monitors is another important factor in the weight of evidence approach in determining that the appropriate contributing areas and sources have been represented at the monitor. The meteorological data show that the monitoring station was located in an area favorable for transport from the Calaveras Power Station.

6.2.4. Factor 4: Geography and Topography

Texas did not provide an analysis of the geography and topography of the Bexar County area. EPA examined the physical features of the land that may affect the distribution of emissions and evaluate the representativeness of the monitoring data. Figure 34 plots the terrain contours around Bexar County. The DRR monitor and the Calaveras Power Station are located at about 200 m elevation. The immediate area is relatively flat and an elevation of 300 m is not reached until about 11 km to the north. The elevations continue to increase to the northwest where elevations of up to 585 m are reached at a distance of about 67 km.

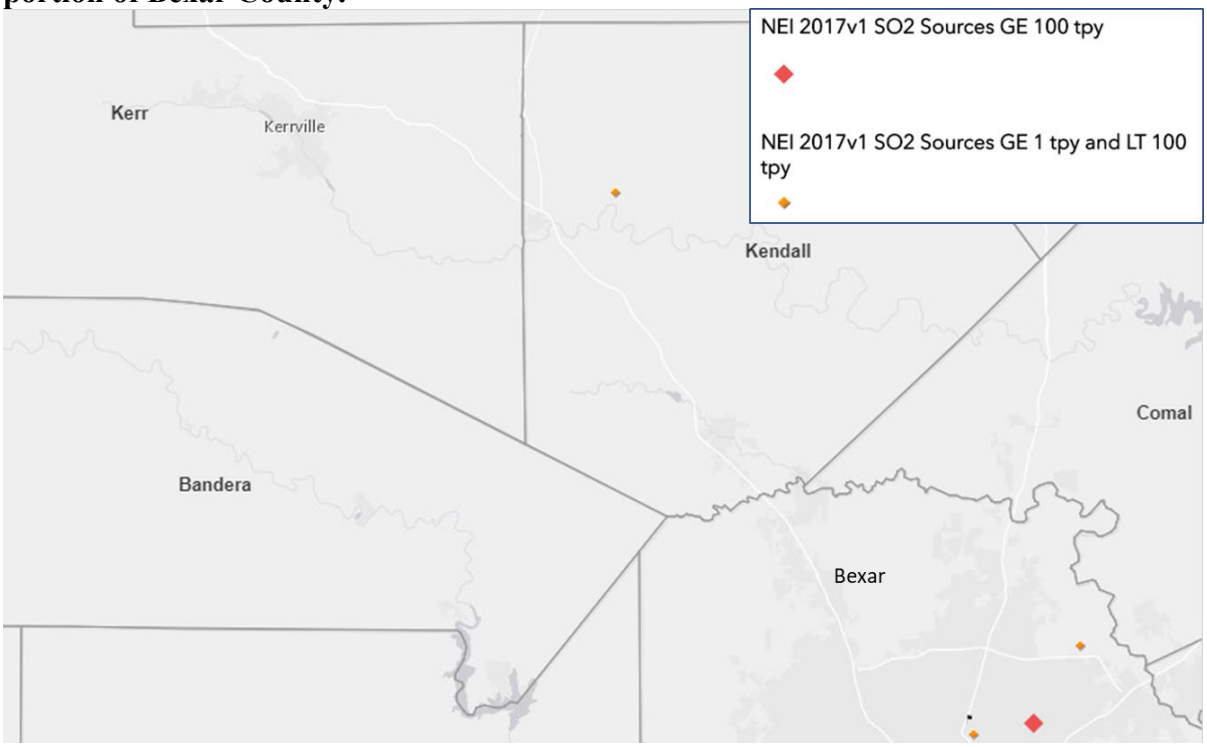
Figure 34. Elevation Contours (meters) for Bexar County and Portions of Surrounding Counties.



The terrain in the vicinity of the Calaveras Power Station and the DRR monitor do not appear to be favorable for an enhancement of concentrations in the immediate area. There is significant terrain to the northwest but it is over 50 km distant and we do not believe, especially with the recent reductions in emissions, that high concentrations would be expected due to the existing sources in Bexar County.

EPA examined the counties in the north, adjacent to the area of elevated terrain, for sources that could cause nonattainment. As shown in Figure 35, there are no major sources in any of the adjacent counties.

Figure 35. Map of SO_2 sources in counties adjacent to high terrain found in the northwest portion of Bexar County.



6.2.5. Factor 5: Jurisdictional Boundaries

EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area. Our goal is to base designations on clearly defined legal boundaries that align with existing administrative boundaries when reasonable. Existing jurisdictional boundaries used to define an attainment area must encompass the area that has been identified as meeting the attainment definition.

Texas recommended that Bexar County be designated as unclassifiable/attainment. These state recommendations were submitted September 18, 2015, before the DRR monitoring was conducted.

6.3. Other Information Relevant to the Designation of the Bexar County Area

EPA did not receive additional information relevant to the designation of this area.

6.4. EPA's Assessment of the Available Information for the Bexar County, Texas Area

Monitors in the Bexar County area suggest the area is attaining the 2010 SO_2 NAAQS based on the 2017-2019 design values. However, because of missing data in one quarter the design value for the DRR monitor for the Calaveras Power Station is invalid. For this reason, EPA could not

rely solely on the design value to designate the county as attainment/unclassifiable as it normally would had the design value been valid. In order to determine the correct designation for the county, EPA conducted a weight of evidence analysis considering several factors and all available information to determine the air quality status relative to the 2010 SO_2 NAAQS.

- The two monitors in the county were located within 5 km of the source contributing 95% of the SO_2 emissions in the county and never measured a 1-hour average concentration more than 65% of the level of the standard during the three-year monitoring period. A statistical analysis of the all three years of data from the DRR monitor showed that the upper limit of the probability of violating the standard was 0.00276%.
- The wind rose shows that the DRR monitor was well sited to be influenced by the emissions from the Calaveras Power Station.
- The existing Calaveras Lake monitor, only 4 km to the south of the Calaveras Power Station, was not located in the prevailing wind direction and did not record a 99th percentile concentration greater than 23% of the standard even prior to the shutdown of the J.T. Deely plant.
- The major source at the Calaveras Power Station shut down at the end of 2018 contributing to a decline in the county's emissions by 95%, with a corresponding reduction in the 2019 design value by 90% compared to 2017-2018 values. Since the statistical analysis in the first bullet considered all three years of data, including the two years prior to the shutdown, the probability of a future violation has been significantly reduced even further because of the facility's retirement.
- Elevated, complex terrain in the northwestern portion of Bexar County is more than 50 km distant and thus not expected to result in concentrations near the level of the 2010 SO_2 NAAQS with the current Bexar County sources. Nor are there any major sources in the counties adjacent to the elevated terrain that could cause or contribute to a violation of the 2010 SO_2 NAAQS.

All of the adjacent counties have been previously designated as attainment/unclassifiable in previous rounds of the SO_2 designations process. Atascosa County with San Miguel Electric Plant was designated in Round 2 and all other surrounding counties were designated in Round 3. Thus, there are no nearby nonattainment areas to which the sources in Bexar County could be contributing.

EPA believes that our intended attainment/unclassifiable area, bounded by the borders of Bexar County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended attainment/unclassifiable area.

6.5. Summary of EPA's Intended Designation for the Bexar County, Texas Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, EPA intends to designate Bexar County as attainment/ unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the borders of Bexar County. Figure 36 shows the boundary of this intended designated area.

Figure 36. Boundary of the Intended Bexar County Attainment/Unclassifiable Area.