Technical Support Document
Louisiana

Area Designations for the 2010 SO_2 Primary National Ambient Air Quality Standard

Summary

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

Louisiana submitted updated recommendations on November 17, 2015, ahead of a July 2, 2016, deadline for the EPA to designate certain areas established by the U.S. District Court for the Northern District of California. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO_2 NAAQS. Table 1 below lists Louisiana's recommendations and identifies the counties or portions of counties in Louisiana that the EPA intends to designate by July 2, 2016 based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

Table 1: Louisiana's Recommended and EPA's Intended Designations

Area	Louisiana's Recommended Area Definition	Louisiana's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
DeSoto Parish, Louisiana	Within the Southeast Quadrant of DeSoto Parish	Attainment	Portions of Desoto Parish, Louisiana: The area bounded by the following UTM Coordinates* (NAD 83 Datum, UTM Zone 15): X Y 441287, 3541019 441287, 3562019 450500, 3562019 450500, 3541019 * Nonattainment area excludes portions of Red River Parish, Louisiana that fall within this UTM-based boundary	Nonattainment

Calcasieu Parish, Louisiana	Within Calcasieu Parish Borders	Attainment	Same as State's Recommendation	Unclassifiable

Background

On June 3, 2010, the EPA revised the primary (health based) SO_2 NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520) and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO_2. The two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an entire year, codified at 40 CFR 50.4, remain applicable.[1] However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO_2, set at 500 ppb evaluated over 3 hours has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the Clean Air Act requires that, no later than one year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA will promulgate the designations that it deems appropriate. If a state or tribe disagrees with the EPA's intended designations, they are given an opportunity within the 120-day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO_2 NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

Following the initial August 5, 2013 designations, three lawsuits were filed against the EPA in different U.S. District Courts, alleging the agency had failed to perform a nondiscretionary duty under the CAA by not designating all portions of the country by the June 2013 deadline. In an

[1] 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area one year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and EPA approves a SIP providing for attainment of the 2010 NAAQS.

effort intended to resolve the litigation in one of those cases, plaintiffs Sierra Club and the Natural Resources Defense Council and the EPA filed a proposed consent decree with the U.S. District Court for the Northern District of California. On March 2, 2015, the court entered the consent decree and issued an enforceable order for the EPA to complete the area designations according to the consent decree schedule.

According to the consent decree, the EPA must complete the remaining designations on a schedule that contains three specific deadlines. By no later than July 2, 2016 (16 months from the court's order), the EPA must designate two groups of areas: (1) areas that have newly monitored violations of the 2010 SO_2 NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015 for retirement; and that according to the EPA's Air Markets Database emitted in 2012 either (i) more than 16,000 tons of SO_2 or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). Specifically, a stationary source with a coal-fired unit that as of January 1, 2010 had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016 deadline if it had announced through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for states and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO_2 Data Requirements Rule (DRR).

The EPA through a March 20, 2015 memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards issued updated designations guidance, to Air Division Directors, U.S. EPA Regions I-X. This memorandum supersedes earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. These factors include: 1) Air quality characterization via ambient monitoring or dispersion modeling results; 2) Emissions-related data; 3) Meteorology; 4) Geography and topography; and 5) Jurisdictional boundaries. This guidance was supplemented by two technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO_2. Notably, the EPA released its most recent versions of documents titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD) in December 2013.

Based on ambient air quality data collected between 2012 and 2014, no violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the state.[2] However, there are 3 sources in the state meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this draft technical support document, the EPA discusses its review and technical analysis of Louisiana's recommendations for the areas that we must designate. The EPA also discusses any intended modifications from the state's recommendation based on all available data before us.

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 three-year average of the 99th percentile of the annual distribution of daily maximum one-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 NAAQS.
3) Designated nonattainment area – an area which the EPA has determined has violated the 2010 SO_2 NAAQS or contributed to a violation in a nearby area. A nonattainment designation would reflect considerations of state recommendations and all of the information discussed in this document. The EPA's decision would be based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
4) Designated unclassifiable area – an area which the EPA cannot determine based on all available information whether or not it meets the 2010 SO_2 NAAQS.
5) Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA's decision would be based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
6) Modeled violation – a violation based on air dispersion modeling.
7) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.

[2] For designations based on ambient air quality monitoring data that violates the 2010 SO_2 NAAQS, the consent decree directs the EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for the EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO_2 NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to the EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to complete the designation. Instead, we may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the consent decree, i.e., by December 31, 2017, or December 31, 2020.

10) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) Violating monitor – an ambient air monitor meeting all methods, quality assurance and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

Technical Analysis for the DeSoto Parish, Louisiana Area

Introduction

The Dolet Hills Power Station contains a stationary source that according to the EPA's Air Markets Database, emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source has not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Dolet Hills Power Station (Dolet Hills) emitted 20,887 tons of SO_2, and had an emissions rate of 0.80 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 consent decree, the EPA must designate the area surrounding the facility by July 2, 2016.

In its November 17, 2015 recommendation, Louisiana through its state environmental agency, the Louisiana Department of Environmental Quality (LDEQ), recommended that the area surrounding Dolet Hills, specifically the southeast quadrant of DeSoto Parish, be designated as unclassifiable based on information included in a monitoring siting report. The report assessed and characterized air quality for the facility and other nearby sources. Our review and analysis indicated that this initial modeling intended to justify the siting of monitors did not follow either the monitoring TAD or modeling TAD in certain respects and only provided normalized estimates of impacts rather than absolute results.

The EPA also received air modeling performed by Sierra Club (initially in September 2015 and updated in December 2015), asserting that the area around Dolet Hills experiences impacts in exceedance of the NAAQS. The state reviewed this modeling, and subsequently performed its own revised modeling using the input parameters provided by Sierra Club. These assessments and characterization were performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. However, the state factored and used the currently non-default beta option low wind speed modification (LOWWIND3). This revised modeling using LOWWIND3 predicted peak concentrations slightly below the NAAQS. As a result, the state changed its unclassifiable recommendation to attainment.

The EPA notes that the use of beta options, such as ADJ_U* and LOWWIND3, in AERMOD for any regulatory applications requires adherence with Appendix W, Section 3.2.2. This is further explained in the EPA's December 10, 2015 Memorandum titled, "Clarification on the Approval Process for Regulatory Application of the AERMOD Modeling System Beta Options." Among other conditions, the use of beta options requires consultation with the appropriate EPA Regional Offices. Upon concurrence by the EPA's Modeling Clearinghouse, EPA Regional Offices may approve the use of these beta options for regulatory applications as an alternative model. However, LDEQ performed air dispersion modeling intended to characterize air quality as a result of SO_2 emissions from Dolet Hills without prior consultation with and approval from an EPA Regional Office, and therefore has not met the applicable regulatory requirements contained in Appendix W, Section 3.2.2. As a result, the EPA does not believe that the air quality modeling results obtained from the use of these beta options can be used as a reliable indicator of attainment status in the area around Dolet Hills until appropriate alternative model approval is

granted or these beta options are promulgated as regulatory options in AERMOD through EPA rulemaking.

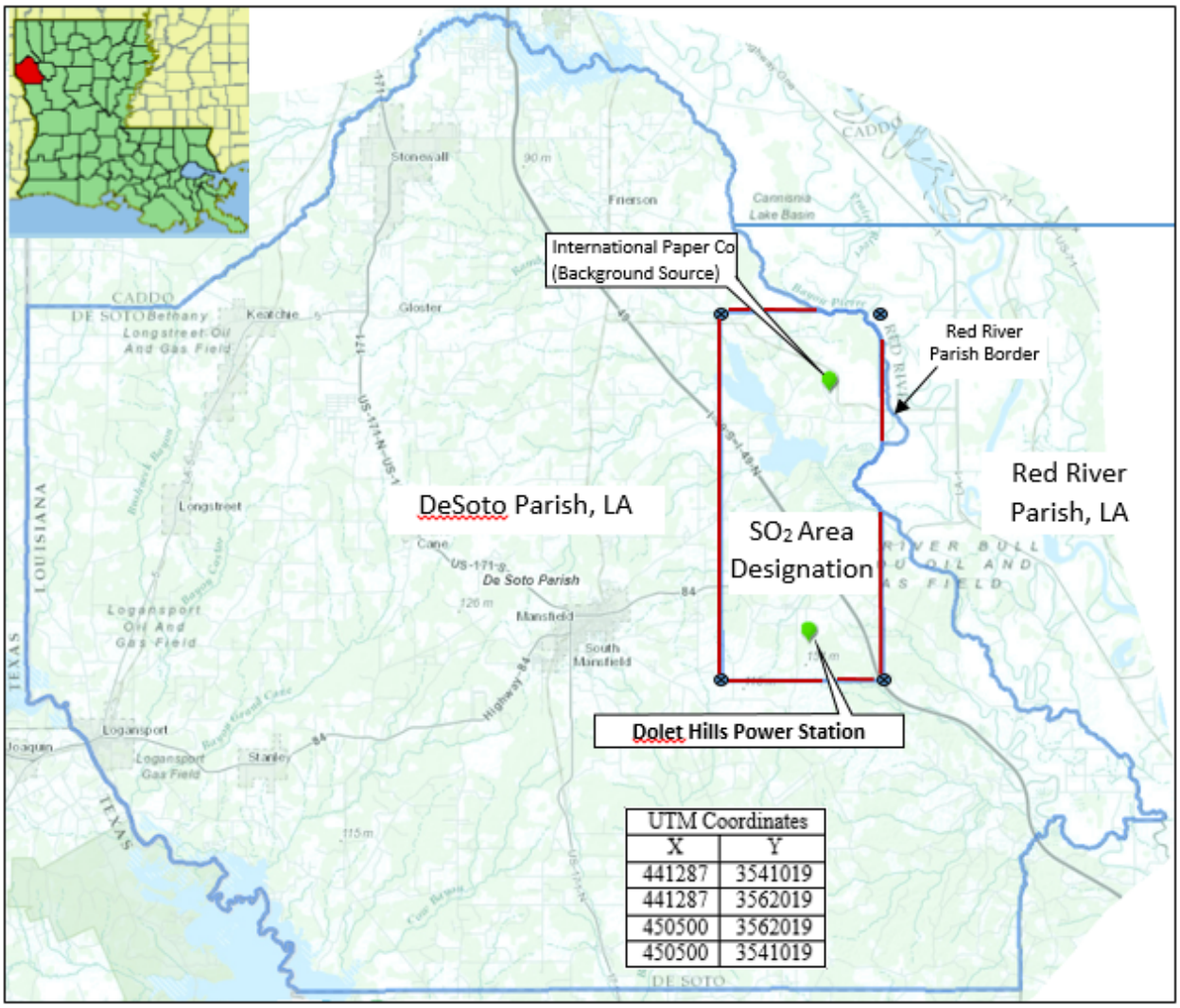
After careful review of the state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area, and intends to designate the area as non-attainment. Specifically, the boundaries for our intended nonattainment area consist of the portions of DeSoto Parish bound by the following Universal Transverse Mercator (UTM) Coordinates (NAD 83 Datum, UTM Zone 15):

X	Y
441287	3541019
441287	3562019
450500	3562019
450500	3541019

However, this intended nonattainment area excludes portions of Red River Parish, Louisiana that fall within this UTM-based boundary. The modeling analyses indicates that there were no violating receptors in Red River Parish. Also, Figures 3 and 4 show that the impact area based on actual emissions did not extend past DeSoto Parish borders and, therefore, the defined nonattainment area should be contained within.

Dolet Hills is located in northwestern Louisiana in the eastern portion of DeSoto Parish. As seen in Figure 1 below, the facility is located approximately 12.5 km directly east of the center of Mansfield. Also included in the figure are major nearby emitters of SO_2, and the DeSoto Parish boundary. EPA's intended nonattainment designation area is the area within DeSoto Parish that lies within a rectangular area defined by UTM coordinates (See Figure 1 below). The nonattainment area excludes portions of Red River Parish, Louisiana that fall within this UTM-based boundary.

Figure 1: SO_2 Nonattainment Area Designation for Dolet Hills



The discussion and analysis that follows below will reference the state's use of the Modeling TAD in its revised modeling analysis, Sierra Club's use of the Modeling TAD, the EPA's assessment of the competing modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment

Air Quality Data

There are no SO_2 air quality monitors in DeSoto Parish. There are no SO_2 air quality monitors in surrounding parishes that are representative of the maximum or higher elevated levels of SO_2 around Dolet Hills.

Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. In some instances, the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRIME: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The Sierra Club initial modeling (Sept. 2015) was conducted with the previous regulatory version of AERMOD (v14134). The state reviewed Sierra Club's modeling and found that the inputs for the actual emissions were acceptable. The state reran the Sierra Club modeling on the most recent version of AERMOD version 15181, using LOWWIND3 as the only altered model option. A discussion of the individual components will be referenced in the corresponding discussion that follows as appropriate. Sierra Club submitted updated modeling in December 2015 and used the most recent version of AERMOD that was released in July 2015 (v15181).

Modeling Parameter: Rural or Urban Dispersion

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 km of the facility. According to the EPA's modeling guidelines, urban dispersion coefficients are to be used in the dispersion modeling analysis if more than 50% of the area within a 3 km radius of the facility is classified as urban. Otherwise, the source is considered a rural source.

When performing the modeling for the area of analysis, the state agreed with Sierra Club's analysis to use rural mode. Sierra Club used a Geographic Information System (GIS) to determine whether rural or urban dispersion coefficients applied. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA's AERSURFACE v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 0.02% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation. This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report.

Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step toward characterization of air quality in the area surrounding Dolet Hills is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

For the DeSoto Parish area, the state recognized in its monitoring siting report 519 permitted facilities in the parish, with 10 Title V facilities, and only one that represented a major SO_2 emitter within 20 kilometers (km) in any direction of Dolet Hills. The state determined that this was the appropriate distance as described in the 2013 Monitoring TAD. In addition to Dolet Hills, one other major emitter of SO_2 is located within the area of analysis, International Paper Company (IP), is 14 km to the north of Dolet Hills. Neither Sierra Club nor the state's modeling included emissions from IP. The state asserted that emissions from this facility are represented by the background monitor data; however, the EPA does not agree that the background monitor data used adequately represents any potential concentration gradients that may occur in the area of concern from IP's emissions. Based on the modeling provided by Sierra Club and LDEQ, industry modeling for siting a monitor, one of the higher areas with near modeled exceedances was to the south of the facility. When winds are out of the north and resulting in some of the highest values modeled around Dolet Hills, the IP source would be upwind and could contribute to concentration gradients around Dolet Hills and to the south of Dolet Hills. Coupling this with the proximity to Dolet Hills (approx. 14km), and size of IP emissions warrant consideration for explicit modeling, as suggested by Appendix W, because it is likely that the source causes concentration gradients that extend to area impacted by Dolet Hills with some of the higher modeled values that are near the standard.

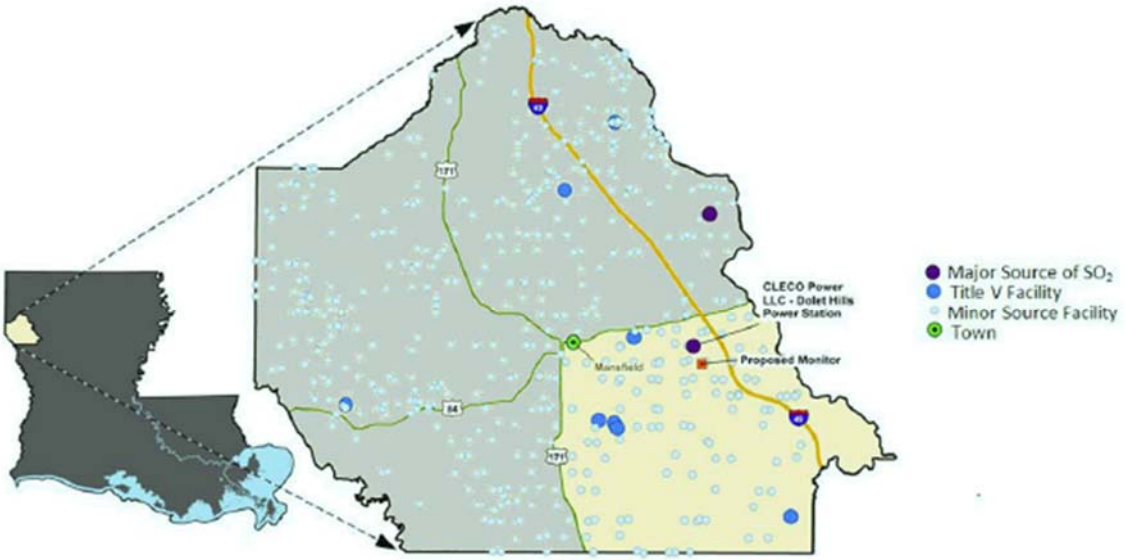
The grid receptor spacing by Sierra Club was retained by the state in their modeling analysis along with all associated elevations and processing information that could potentially impact the area of analysis where maximum SO_2 concentrations are expected. The receptor network contained 21201 receptors (no graphical representation of the receptor grid was provided):

- A 100-meter Cartesian receptor grid centered on Dolet Hills and extending out 5 km.
- A 500-meter Cartesian receptor grid centered on Dolet Hills and extending out 10 kilometers.
- A 1,000-meter Cartesian receptor grid centered on Dolet Hills and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.
- A flagpole height of 1.5 meters was used for all these receptors.

This is a larger grid than we might normally recommend but this grid is acceptable for this analysis. Sierra Club modeling used a slightly elevated flagpole receptor height, but if this was corrected to EPA's recommended height we would expect only a slight change in the modeled

numbers and the area of exceedances and magnitude of the values would be basically the equivalent and not change our proposed action.
Figure 2 shows the area surrounding Dolet Hills originally provided in the state's monitoring siting report provided to the EPA showing the location of all minor and major sources of SO_2 in DeSoto Parish. The state originally recommended that the area designated unclassifiable should be limited to the southeast quadrant of the parish bounded by United States Highway 84 on the north, United States Highway 171 on the west, and the parish boundary on the east and south. As discussed elsewhere, the state revised their recommendation that all of DeSoto Parish should be designated attainment/unclassifiable. EPA's intended nonattainment designation area is the area within DeSoto Parish that lies within a rectangular area defined by UTM coordinates (See Figure 1 above). The nonattainment area excludes portions of Red River Parish, Louisiana that fall within this UTM-based boundary.

Figure 2: Dolet Hills Area of Analysis by the State



Sierra Club's elevations for stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. The elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 was used for these tasks.

Modeling Parameter: Source Characterization

Sierra Club modeled constant exit flowrate and temperature based on 100% load. No consideration was given of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, having the effect of reducing pollutant dispersion and increasing predicted air quality impacts. In addition, no

consideration was given to building or structure downwash. Downwash effects typically increase predicted concentrations near the facility. The state identified International Paper located 14 km north of the Dolet Hills facility with annual emissions exceeding 1,300 tpy as the only other large nearby emission source. However, no sources other than Dolet Hills were included in the modeling performed by the Sierra Club or the state.

Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD does provide for the flexibility of using allowable emissions in the form of the most recently permitted, (referred to as PTE or allowable) emissions rate.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information when it is available, and that these data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA believes that detailed throughput, operating schedules, and emissions information from the impacted source(s) should be used.

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. Specifically, a facility may have recently adopted a new federally enforceable emissions limit, been subject to a federally enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the state included only Dolet Hills in its modeling but identified one other large emitter of SO_2 within 20 km in the area of analysis. The associated annual actual SO_2 emissions between 2012 and 2014 are summarized below.

Table 2: Actual SO_2 Emissions (2012 – 2014) from Facilities in the DeSoto Parish Area

Company ID	**Facility Name**	**SO_2 Emissions (tons per year)**		
		2012	**2013**	**2014**
CLECO Power LLC	Dolet Hills	20,887	14,612	14,177
International Paper Co.	Mansfield Mill	1,569	1,296	1,557
Total Emissions	**All Facilities**	**22,456**	**15,908**	**15,734**

Initial state modeling for the purpose of monitor siting used normalized hourly emissions and actual stack temperature and exit velocity from the CEMS for 2012-2014. Sierra Club modeling utilized hourly emissions data measured by the CEMS from CAMD (2012-2014) and constant stack temperature and exit velocity. The state's revised modeling utilized the Sierra Club model inputs for emissions and stack parameters, but the EPA reiterates that the emissions from IP were not included in the modeling analysis.

Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data are based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the Dolet Hills area of analysis, surface meteorology was obtained for Shreveport Regional Airport located near Dolet Hills. Integrated Surface Hourly (ISH) data for the 2012-2014 period were obtained from the National Climatic Data Center (NCDC).

The state and Sierra Club used AERSURFACE version 13016 to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with winter months having no continuous snow cover.

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Dolet Hills, the concurrent 2012-2014 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Shreveport, Louisiana measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA's FSL website. All reporting levels were downloaded and processed with AERMET (v14134).

Modeling Parameter: Geography and Terrain

The UTM NAD83 coordinate system (Zone 15) was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs and confirmed with GIS.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A Geographic Information System (GIS) was used to determine whether rural or urban dispersion coefficients apply to a site. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 of the Sierra Club modeling report for a discussion of the AERSURFACE analysis.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Dolet Hills area of analysis, consistent with the background concentration identified by the Sierra Club in their analysis, the state chose the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across 2011-2013 for the Bossier Parish monitor – the lowest measured background concentration in the state. The background SO_2 concentration was added to the modeled fourth-highest daily maximum 1-hour SO_2 concentration. The background concentration for this area of analysis was determined by the state to be 31.4 micrograms per cubic meter ($\mu g/m^3$), or 12.0 ppb,[3] and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

The AERMOD modeling parameters for the DeSoto Parish area of analysis are summarized below in table 3:

Table 3: AERMOD Modeling Parameters for the DeSoto Parish Area of Analysis

DeSoto Parish Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	1

[3] The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb SO_2 = approximately 2.62$\mu g/m^3$ SO_2 at 25C and 1 atm.

Modeled Structures	No
Modeled Fence lines	-
Total receptors	21201
Emissions Type	Actual - CEM
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Shreveport Regional Airport (Shreveport, LA)
Upper Air Meteorology Station	Shreveport, LA measurement station
Methodology for Calculating Background SO_2 Concentration	99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across 2011-2013 for Bossier Parish
Calculated Background SO_2 Concentration	12 ppb (31.4 µg/m^3)

The results presented below in table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions.

Table 4: Max 99th Percentile 1-Hr SO_2 Conc.in DeSoto Parish Area Based on Actual Emissions

	Averaging Period	Data Period	Receptor Location		SO_2 Concentration (µg/m^3)	
			UTM Latitude	UTM Longitude	Modeled (including background)	NAAQS
LDEQ revised modeling	99th Percentile 1-Hour Avg.	2012-2014	Not provided	Not provided	194.5	196.5*
Sierra Club modeling	99th Percentile 1-Hour Avg.	2012-2014	Not provided	Not provided	218.7	196.5*

The state's modeling[4] (with the LOWWIND3 non-default option) indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 194.5 µg/m^3, or 74.31 ppb. This modeled concentration included the background concentration of SO_2. This predicted value is graphically represented along with all the other receptors below in Figure 3. Sierra Club December modeling predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 218.7 µg/m^3, or 83.55 ppb. This modeled concentration included

[4] State modeling based on Sierra Club files and not the state's normalized emission modeling.

the same background concentration of SO_2. This predicted concentrations are graphically represented along with all other receptors with values above the NAAQS below in Figure 4.

Figure 3: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Dolet Hills Area of Analysis Based on Actual Emissions (LDEQ's modeling using Sierra Club's inputs)

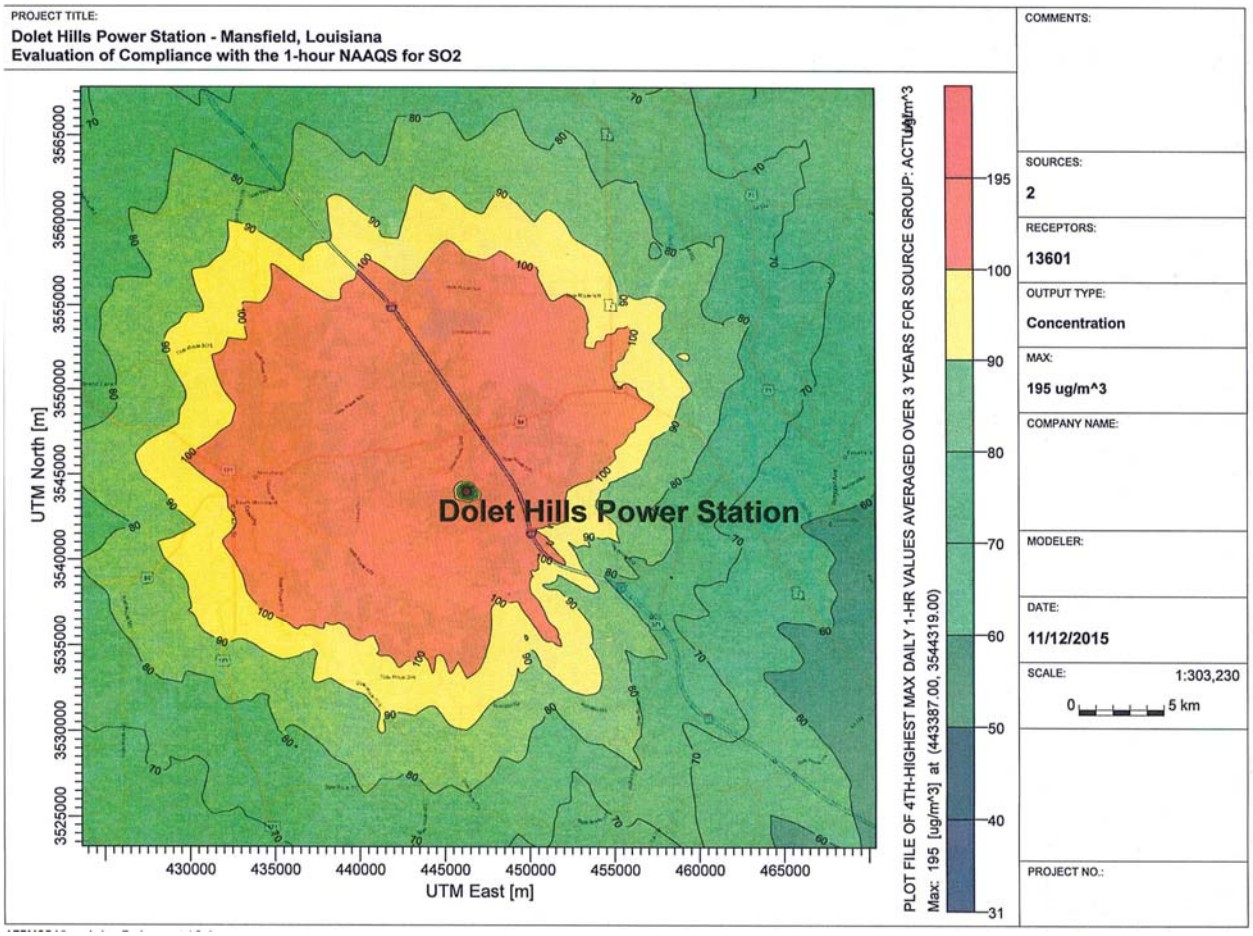
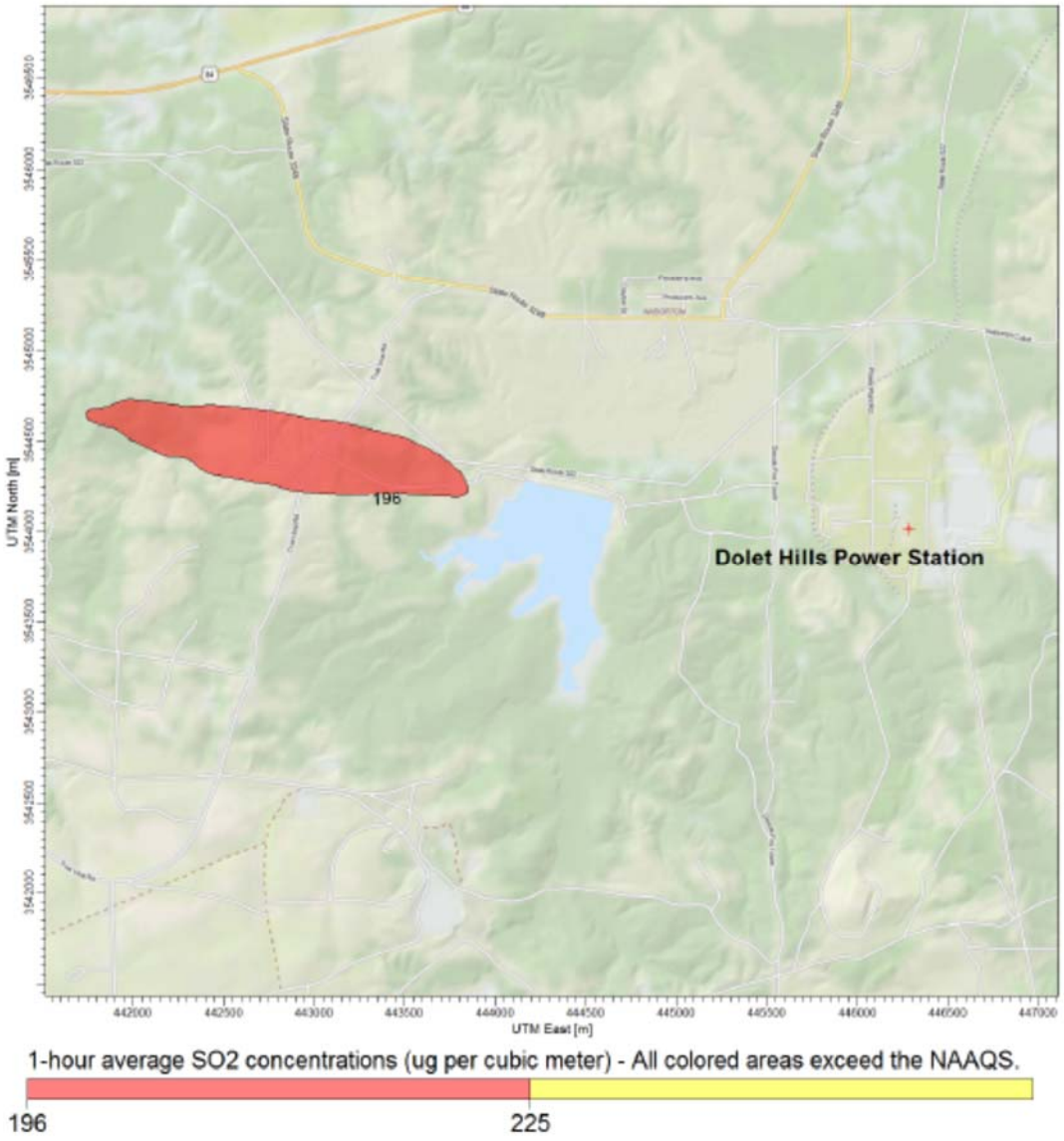


Figure 4: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Dolet Hills Area of Analysis Based on Actual Emissions (Sierra Club)



As discussed previously, the state reran Sierra Club's initial modeling factoring in a low wind non-default modification (beta option) to the model. The Sierra Club modeling provided a peak value of 218.7 µg/m^3, above the standard of 196.5 µg/m^3. The state reran that modeling using the proposed LOWWIND3 option, resulting in a peak value of 194.5 µg/m^3, just below the standard (see Figure 4 above). As previously discussed, the EPA notes that the use of beta options, such as ADJ_U* and LOWWIND3, in AERMOD for any regulatory applications requires adherence with Appendix W, Section 3.2.2. This is further explained in the EPA's December 10, 2015 Memorandum titled, "Clarification on the Approval Process for Regulatory Application of the AERMOD Modeling System Beta Options." Among other conditions, the use of beta options requires consultation with the appropriate EPA Regional Offices. Upon concurrence by the

EPA's Modeling Clearinghouse, EPA Regional Offices may approve the use of these beta options for regulatory applications as an alternative model. However, LDEQ performed air dispersion modeling intended to characterize air quality as a result of SO_2 emissions from Dolet Hills without prior consultation with and approval from an EPA Regional Office, and therefore has not met the applicable regulatory requirements contained in Appendix W, Section 3.2.2. As a result, the EPA does not believe that the air quality modeling results obtained from the use of these beta options can be used as a reliable indicator of attainment status in the area around Dolet Hills until appropriate alternative model approval is granted or these beta options are promulgated as regulatory options in AERMOD through EPA rulemaking.

The Sierra Club modeling, and the state's revised modeling using LOWWIND3, only included constant stack velocity and temperature and did not include building downwash or the nearby International Paper causing some uncertainty in the modeling results. The lack of downwash and variable temperature/velocity, with the non-inclusion of IP, however, generally bias the results of Sierra Club's modeling low. As a result, we believe that Sierra Club's modeling provides sufficient information to determine that the area is not meeting the standard, and therefore we intend to designate it as nonattainment.

Jurisdictional Boundaries:

After the geographic area of analysis associated with the immediate area surrounding Dolet Hills, nearby sources which may potentially be contributing to elevated levels of SO_2, and background concentration was determined, existing jurisdictional boundaries were considered for the purpose of informing our intended nonattainment area, specifically with respect to clearly defined legal boundaries. The EPA believes that while there are no clear jurisdictional boundaries that encompass our intended nonattainment area, UTM coordinates result in clearly defined boundaries.

The state originally recommended an area in the Southeastern quadrant as unclassifiable and then revised that recommendation to attainment for all of DeSoto Parish. Based on our analysis and consideration of modeling results provided by Sierra Club and the state, as well as other nearby sources such as IP, the EPA intends to designate portions of DeSoto Parish as nonattainment. As discussed above when winds are from the north IP is a background source that could contribute significantly to some of the higher modeled values that are on the south side of Dolet Hills and very near the standard. Modeling results for monitor siting indicated the west side and south side were the two primary areas with high frequency of maximum values using normalized emissions. The EPA believes that the IP facility has reported emissions that are large enough such that if they were explicitly modeled in accordance with the Modeling TAD would likely be shown to contribute to the ambient concentrations that have already been modeled to show violations, or near violation, of the NAAQS. Inclusion of IP emissions may likely increase modeled values just below the standard to exceedance levels. Therefore, our intended area includes portions of DeSoto Parish that include the area of modeled exceedances and near exceedances as well as the IP facility because of its likely contribution to the modeled ambient concentrations resulting in additional potential NAAQS violations if IP were included in the modeling.

The EPA believes that our intended nonattainment area, consisting of the area around Dolet Hills and including International Paper, is comprised of clearly defined boundaries, and we find these boundaries to be a suitably clear basis for defining our intended nonattainment area.

Conclusion

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around Dolet Hills in DeSoto Parish, Louisiana as nonattainment for the 2010 SO_2 NAAQS. Specifically, the intended nonattainment area is comprised of the portion of DeSoto Parish bounded by the following UTM Coordinates in meters (NAD83 Datum, Zone 15):

X	Y
441287	3541019
441287	3562019
450500	3562019
450500	3541019

The nonattainment area excludes the portion of Red River Parish, Louisiana that falls within the area bounded by the listed UTM coordinates. Figure 1 above graphically illustrates our intended nonattainment area.

In its original submission, the state recommended that the area surrounding Dolet Hills, specifically the southeast quadrant of DeSoto Parish, be designated as unclassifiable based on a monitoring siting report. The state reran modeling using the input parameters provided by Sierra Club and additionally factored in a low wind speed modification. Based on this modeling, the state changed their recommended designation from unclassifiable to attainment. After careful review of the state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area and cannot rely upon the modeling provided by the state, and intends to designate the area as nonattainment.

At this time, our intended designations for the state only apply to this area and the other area presented in this technical support document. Consistent with the conditions in the March 2, 2015 consent decree, the EPA will evaluate and designate all remaining undesignated areas in Louisiana by either December 31, 2017, or December 31, 2020.

Technical Analysis for the Calcasieu Parish Area

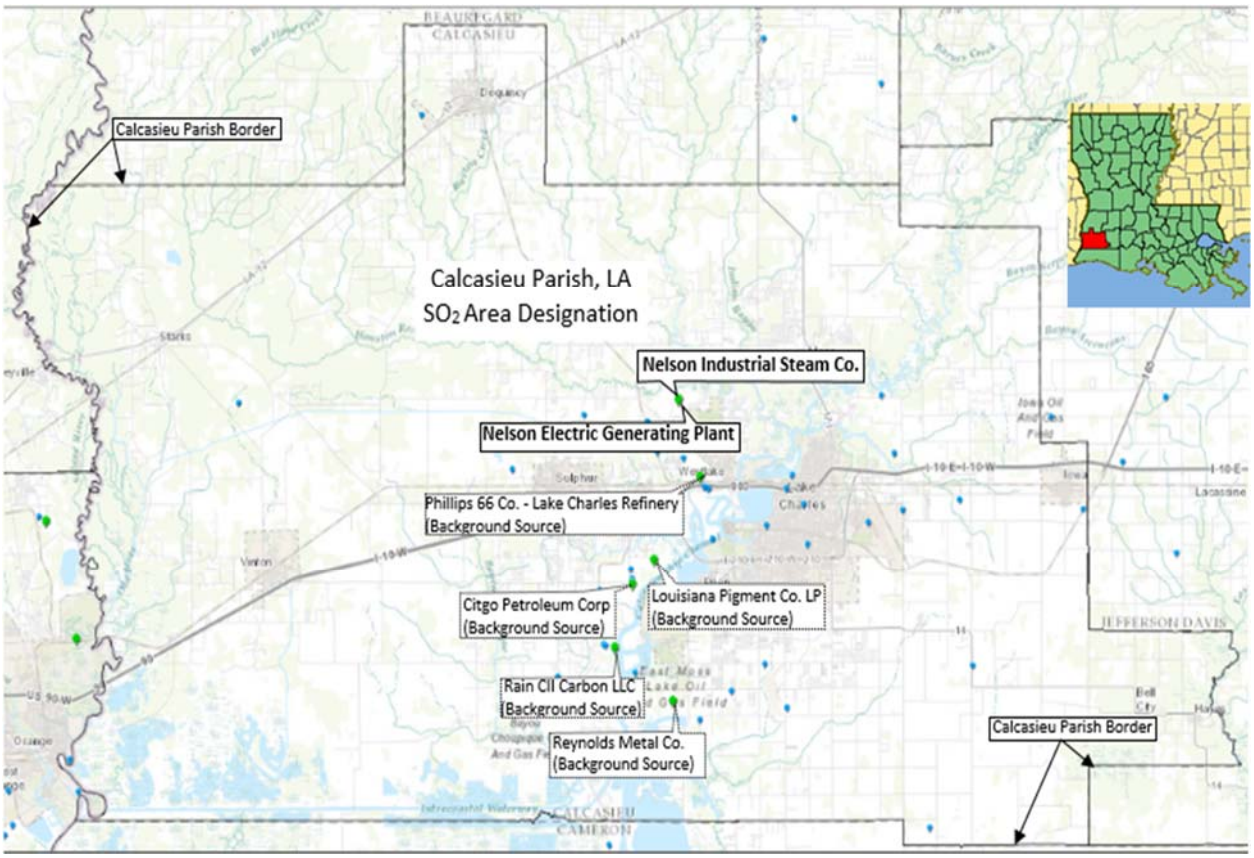
Introduction

The Calcasieu Parish area contains two stationary sources that, according to the EPA's Clean Air Markets Database, emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, these stationary sources have not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Nelson Electric Generating Plant emitted 12,513 tons of SO_2 with an emissions rate of 0.7 lbs SO_2/mmBTU; and the Nelson Industrial Steam Company emitted 6,706 tons of SO_2 with an emissions rate of 0.7 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 consent decree, the EPA must designate the area surrounding these facilities by July 2, 2016.

In its submission, Louisiana recommended that the area surrounding the Nelson Electric Generating Plant and the Nelson Industrial Steam Company, specifically the entirety of Calcasieu Parish, be designated as attainment. This was based on review of available monitor data, an assessment and characterization of air quality from the facilities, and other nearby sources that may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This air quality assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions by a group of local industries and then provided to the state. After careful review of the industry and state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area, and intends to designate the area as unclassifiable. Specifically, the area we intend to designate unclassifiable consists of Calcasieu Parish.

Both the Nelson Electric Generating Plant and the Nelson Industrial Steam Company are located in southwestern Louisiana in the central portion of Calcasieu Parish. As seen in Figure 1 below, the facilities (0.06 km apart) are located approximately 8 km northwest of the center of Lake Charles. Also included in the figure are nearby emitters of SO_2 identified by LDEQ and the EPA's recommended unclassifiable parish area designation, which is the same recommended area as the state's intended attainment designation.

Figure 1: The EPA's Intended Unclassifiable Area for Calcasieu Parish with Large Emitters of SO_2



A group of local industries in Lake Charles area provided 1-Hour SO_2 modeling to the state to use in submission of state recommendations, from this point we will refer to the modeling as 'industry modeling'. -The discussion and analysis that follows below will reference the use of the Modeling TAD, the EPA's assessment of the industry modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment

Air Quality Data

There is a SO_2 air quality monitor in Calcasieu Parish but it is approximately 2.5 km from the Nelson facilities and was not located to yield the maximum concentrations from the Nelson facilities. The Westlake monitor (AQS ID 220-19-0008) monitoring data for 2012 to 2014 (three year average of the 99th percentile 1-hour daily maximum values) is 35 ppb which is approximately 91.7 $\mu g/m^3$. The monitored concentration is approximately 47% of the NAAQS (75 ppb). This monitor is approximately 2.5 km to the South and East of the Nelson facilities and is not representative of the maximum from Nelson facilities and other cumulative sources.

Therefore there is no monitoring data that is representative of the maximum or higher elevated levels of SO_2 around the Nelson facilities.

Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. In some instances, the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRIME: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The industry modeling used AERMOD version 14134, and a discussion of the individual components will be referenced in the corresponding discussion that follows as appropriate. EPA released a newer version of AERMOD (version 15181) in July 2015 while LDEQ's modeling work was already well underway. The EPA does not believe that substantial changes in the modeling results would have been seen if the industry modeling used the more recent version.

Modeling Parameter: Rural or Urban Dispersion

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50% of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50% of the area is urban, urban dispersion coefficients should be used in the modeling analysis. When performing the modeling for the area of analysis, the industry determined that it was most appropriate to run the model in rural mode based on Auer's land use methodology.

Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step toward characterization of air quality in the area surrounding both the Nelson Electric Generating Plant and the Nelson Industrial Steam Company is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

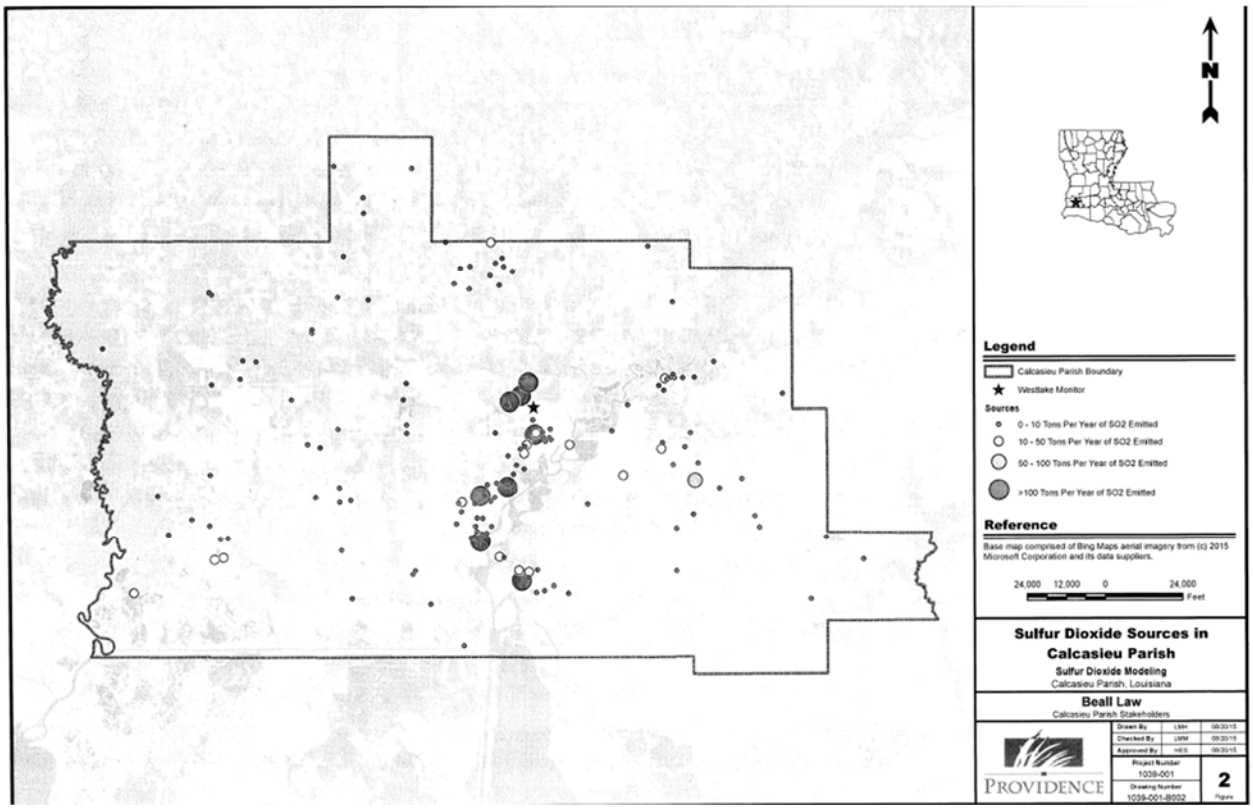
For the Calcasieu Parish area, the industry modeling report identifies all emitters of SO_2 greater than 100 tons per year (tpy) SO_2 based on 2013 emissions data from LDEQ's Emission Reporting and Inventory Center (ERIC). 2013 emissions were selected to reflect the emission reductions due to installation of a scrubber at Rain CII in 2012. Temporary, non-routine, and emergency sources were removed from the list of emission sources, as provided in the Modeling TAD. In addition to the Nelson Electric Generating Plant and the Nelson Industrial Steam Company, the other emitters of SO_2 included in the area of analysis were: Phillips 66 Co., Louisiana Pigment Co. LP, Citgo Petroleum Corp., Rain CII Carbon LLC, and Reynolds Metals Company. Given the large area being analyzed the grid receptor spacing for the area of analysis chosen by the industrial group was as follows:

- An initial 15x25 square km receptor grid was placed at the center of the industrial area with 100 m spacing.
- A second receptor grid with 250 m spacing extended 5 km beyond the first grid.
- A third grid with 500 m spacing extended an additional 5 km from the second grid.
- Receptors lying within industrial boundaries or outside of the parish boundary were removed.

The receptor network included 44,946 total receptors. The report did not specifically explain the total network coverage area. From the information provided it was not clear if the modeling grid receptors were sufficient to adequately capture all the anticipated high-elevated concentrations in the area of analysis.

Figure 2 shows the area surrounding the Nelson Electric Generating Plant and the Nelson Industrial Steam Company and is similar to Figure 1 but also includes all reported point sources of SO_2 with varying circle sizes based on total emissions, but does not include a map of the receptor grid for the area of analysis.

Figure 2: Large Emitters of SO_2 in the Vicinity of the Nelson Generating Plant and Nelson Industrial Steam Company



The EPA recognizes that there are 2 emitters of SO_2 with reported 2011 NEI emissions above 100 tpy in neighboring Orange County, Texas. Echo Carbon Black Plant (4,247 tpy of SO_2) is located approximately 2 km from the western Calcasieu Parish border, and Orange Mill (2,472 tpy of SO_2) is located approximately 3 km from the western Calcasieu Parish border. These sources are close to the western boundary but are over 30 km west of the modeling grid provided by industry that focuses on the Lake Charles area. These two Texas sources would not be expected to cause a concentration gradient in the industry modeling grid for the Lake Charles area due to distance and the winds do not transport west to east often such that transport of these two sources towards the Lake Charles area occurs. Since there is no modeling of these two Texas sources and any potential impacts on the western area of Calcasieu Parish, the EPA is unable to determine at this time whether these nearby sources and areas may contribute to ambient air quality impacts within Calcasieu Parish. We note that the Echo Carbon Black Plant was identified by Texas as DRR source and Texas will have to assess what impacts occur from the DRR source in the area, including consideration of other sources that have potential impacts on local concentration gradients such as the Orange Mill, in the future designation rounds. Texas will have to consider if the SO_2 DRR source (and other nearby sources) have a potential impacts in the western area of Calcasieu Parish.

Modeling Parameter: Source Characterization

The industry modeling included sources within the area of analysis that exceeded 100 tpy SO_2 emissions based on 2013 emissions data. The industry modeling utilized actual stack heights in conjunction with actual annual 2013 emissions. Stack exit temperature and exit velocity were modeled using a single value for the entire modeling period from emission inventories and permitting data. The industry modeling characterized the sources' plume downwash from available building layout and locations using the BPIP AERMOD component.

Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD does provide for the flexibility of using allowable emissions in the form of the most recently permitted, (referred to as PTE or allowable) emissions rate.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information when it is available, and that these data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA believes that detailed throughput, operating schedules, and emissions information from the impacted source(s) should be used.

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. Specifically, a facility may have recently adopted a new federally enforceable emissions limit, been subject to a federally enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the industry modeling included Nelson Electric Generating Plant and the Nelson Industrial Steam Company, together with 7 other emitters of SO_2 within the area of analysis. The facilities in the area of analysis and their associated annual actual SO_2 emissions between 2012 and 2014 are summarized below in Table 1.

Table 1: Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Calcasieu Parish Area of Analysis

Company ID	Facility Name	SO_2 Emissions (tons per year)		
		2012	2013	2014
Entergy Gulf States LA LLC	Nelson Industrial Steam Co.	6,706	6,836	6,107
Entergy Gulf States LA LLC	Nelson Electric Generating Plant	12,513	11,461	10,544
Phillips 66 Co.	Lake Charles Refinery	465	586	510
Citgo Petroleum Group	Lake Charles Manufacturing Complex	1,997	1,898	1,731
Louisiana Pigment Co. LP	Titanium Dioxide Plant	504	606	525
Rain CII Carbon LLC	Lake Charles Calcining Plant	9,162	5,471	4,432
Reynolds Metal Co.	Lake Charles Carbon Co.	4730	4,922	4,926
Total Emissions	**All Facilities**	**36,077**	**31,780**	**28,775**

The industry modeling report listed actual annual emissions source data for 2013 only, instead of using the most recent 3 years of actual emissions data. The actual emissions data listed in the table above were obtained from the State's Emissions Reporting and Inventory Center (ERIC), which is based on annualized inventory data. In other words, hourly CEMs data available for Nelson Electric Generating Plant and the Nelson Industrial Steam Company were not utilized in the modeling, which is an inconsistency with the TAD. Additionally, the industry's modeling did not include any varying emission rates for any of the facilities and the same rate was modeled for all years; this approach is also inconsistent with the TAD.

Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data are based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the Nelson Electric Generating Plant and the Nelson Industrial Steam Company areas of analysis, surface meteorology from the Baton Rouge surface and Lake Charles upper air National Weather Service Station meteorological data for the years 2009 through 2013 was used for this analysis using AERMET. LDEQ's modeling guidance indicates the NWS site in Lake Charles should be used for the surface meteorology. The meteorological data should be representative of the area. The use of Baton Rouge surface data instead of Lake Charles data in the industry modeling does not follow the guidance in the TAD regarding the proximity of the site to area under consideration nor does it follow LDEQ's own guidance for modeling in Southwestern

Louisiana. Baton Rouge is further from the coast and would have different surface meteorology, including wind speed and direction than the Lake Charles surface station. The differences in surface meteorology would impact the frequency of wind directions and speeds that impact maximum concentrations and would also impact how often certain sources align to yield maximum concentrations downwind of sources. Without modeling with correct surface data it is impossible to assess how the maximum and exceedance concentrations (see discussion below about taking into account errors and inappropriate background results in the existing modeling that result in modeled exceedances) would change and if the modeling would still have modeled exceedances, but we know it would give us different results.

The industry modeling report indicated that it used AERSURFACE to determine the site specific surface characteristics. The industry modeling report estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo").

Modeling Parameter: Geography and Terrain

The terrain elevation for each modeled receptor was determined utilizing USGS National Elevation Dataset (NED) data in conjunction with the most recent version of AERMAP. No flagpole receptors were used. AERMAP was used to develop the elevations for buildings, sources, and receptors.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Nelson Electric Generating Plant and the Nelson Industrial Steam Company areas of analysis, the industry group chose a "first tier" approach, based on monitored design values from the Westlake monitor, excluding monitored values from a 90-degree sector centered on the centerline from the modeled sources to the monitor. After excluding a large amount of the monitoring values, the industry group estimated background concentration for this area of analysis was determined to be 37.61 micrograms per cubic meter ($\mu g/m^3$), or 14.37 ppb,[5] and that value was incorporated into the final AERMOD results. See below our analysis of this type of exclusion of some data with impacts of local sources from some wind directions from the monitoring data in developing a modified background monitor value. We note that the industry group interpolated the 99th percentile value rather than selecting the fourth highest value for each year. Following the industry group's methodology but correcting for this error would change the background value from 14.37 ppb to 14.90 ppb (39 $\mu g/m^3$).

[5] The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.62$\mu g/m^3$.

Typically, any exclusion of monitoring data and generation of an alternate background concentration is accompanied by a protocol justification, as each situation where an alternate background concentration may be appropriate is unique. Given the close proximity of the sources (primarily Entergy and Sasol) to the Westlake monitor, we have concerns that more data was excluded than should have been by using the 90 degree arc. The underlying principle is to allow some data to be dropped when winds transport a local source to a monitor, to only have monitoring data that is not significantly impacted by local sources. This new data set can then be used to generate a 'background' concentration. The 90 degree arc is potentially reasonable for intermediate distant sources due to plume spread, etc.; but if a source is fairly close (as in this case) the use of 90 degree arcs drops more monitoring data from the monitoring dataset to estimate background. If more appropriate (smaller) arcs were used then more data would be included in the estimate of background data and it would be expected to yield a higher representative background concentration value than used by the industry. The result of correcting this issue would be higher background value (more data would most likely result in a higher value and could not result in a lower value) which when added to modeling would result in higher values than the current analysis presents. Thus the modeling results are biased low due to this issue. low.

Summary of Modeling Results

The AERMOD modeling parameters for the Nelson Electric Generating Plant and the Nelson Industrial Steam Company areas of analysis are summarized below in Table 2.

Table 2: AERMOD Modeling Parameters for the Calcasieu Area of Analysis

Calcasieu Parish Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	8
Modeled Stacks	228
Modeled Structures	Yes – when data available
Modeled Fence Lines	-
Total receptors	44,946
Emissions Type	Actual (Annual Avg.)
Emissions Years	2013 only
Meteorology Years	2009 through 2013
Surface Meteorology Station	Baton Rouge
Upper Air Meteorology Station	Lake Charles
Methodology for Calculating Background SO_2 Concentration	Wind Sector screening and then1st tier approach using monitoring values not excluded

Calculated Background SO_2 Concentration	14.37/14.9 ppb

The results presented below in table 2 show the magnitude of the highest predicted modeled concentration based on actual emissions.

Table 3: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Calcasieu Parish Area of Analysis Based on Actual Emissions
*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

Averaging Period	Data Period	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2009-2013	468169.80	3337572.70	206.61	196.5*

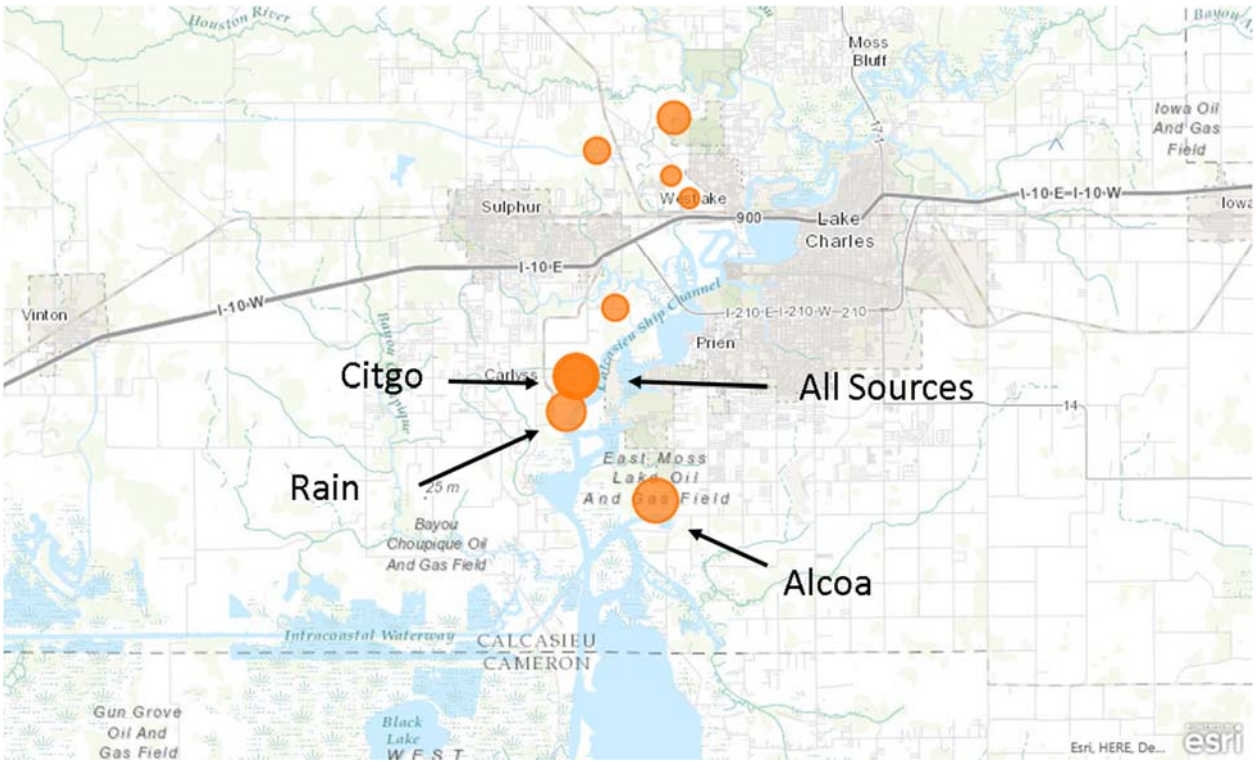
We note an error in the conversion of the AERMOD modeled 99th percentile impact from $\mu g/m^3$ to ppb. The industry group's report converts 168.6 $\mu g/m^3$ to 59.77 ppb. However, based on standard conditions of 25C, 1 atm, and a molecular weight of 64 for SO_2, 168.6 $\mu g/m^3$ equals 64.41 ppb. The industry group's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 206.61 $\mu g/m^3$, or 78.78 ppb. This modeled concentration included the industry group's calculated background concentration of SO_2, and is based on actual annual emissions from the facilities. Based on our correction to the industry group's calculated background concentration, the predicted 99th percentile 1-hour average is 207.6 $\mu g/m^3$ or 79.31ppb.

The EPA investigated where the maximum modeled concentrations of SO_2 are likely to occur because the supporting information provided by the industry group did not include any concentration contour plots or other modeling graphics. Figure 3 is a plot of the maximum impacts from each facility using source grouping and also the maximum total impact from all sources (not including the background monitor value). The two Entergy Nelson facilities impacted by the July 2, 2016 deadline are in the area north of I-10 (two largest circles north of I-10). Source tagging modeling results for just the Nelson Electric Generating Plant and Nelson Industrial Steam Company have predicted maximum impacts of 53 and 83 $\mu g/m^3$ respectively, not including other sources or background concentrations of SO_2 in these values. The maximum impacts in the modeling that were near the standard are in the area south of I-10. The maximum and near maximum modeled values were to the south of Citgo and near two other large emitters of SO_2, specifically Alcoa and Rain. Based on the EPA's preliminary source grouping analysis and the cumulative analysis, it appears that the maximum impact from all facilities is to the south of the Nelson facilities, 10+ km away from Nelson facilities and closer to Citgo, Alcoa, and Rain. The maximum predicted impact from all facilities without background concentrations of

SO_2 near Rain and Citgo was 168.6 μg/m^3 before the arithmetic corrections described above, and the maximum predicted impact value from Alcoa was 162 μg/m^3, without accounting for other sources or background concentrations of SO_2. While the ambient air quality data collected at the Westlake monitor (AQS ID 220-19-0008) may not adequately characterize the emissions from the two Nelson facilities, the most recent design value based on data collected between 2012 and 2014 at the Westlake monitor was 35 ppb. This monitor is located approximately 2.5 km south of the Nelson facilities, and 10 km north of the area where the greatest impacts of SO_2 are expected based on our grouping analysis. While this monitor is not a good monitor for the maximum impacts of Nelson and other sources, it is close enough that the two Nelson facilities could impact often enough to impact the Westlake monitor's design value and is informative that the two Nelson facilities may not be causing exceedances. Therefore, the EPA does not believe that the Nelson facilities are the primary contributors to the predicted maximum concentrations of SO_2 near Rain, Citgo, and Alcoa.

As discussed above the modeling utilized Baton Rouge surface winds (speed & direction) instead of the Lake Charles surface winds that should have been used. The differences in surface meteorology would impact the frequency of wind directions and speeds that impact maximum concentrations and would also impact how often certain sources align to yield maximum concentrations downwind of sources. Without modeling with correct surface data it is impossible to assess how the maximum and exceedance concentrations would change and if the modeling would still have modeled exceedances, but we know it would give us different results even if the rest of the modeling was acceptable and followed the modeling TAD. In order for the modeling to be a reliable indicator of attainment status, it would need to be reassessed with appropriate surface station data for the Lake Charles area. In addition there are several other issues that would need to be addressed: further refinements in variable emissions, refinements to stack parameters, refinements in downwash, and a more appropriate background value to assess the areas around the Nelson facilities and other large emitters of SO_2. While the corrected modeling values indicate possible exceedances around the area around Rain, Citgo, and Alcoa, the modeling is just too uncertain and undefendable to make a conclusion that would support designation of nonattainment, even if this modeling indicates nonattainment for part of Calcasieu Parish. Both Rain and Alcoa are on the SO_2 DRR list submitted by LDEQ to EPA on January 15, 2016 and will have to be addressed in future work with the appropriate surface meteorology and other source emissions and characterizations. The culpability of the Nelson facilities will also have to be addressed in future air quality analysis. These refinements in inputs and using appropriate surface meteorology would likely result in changes in modeling values and locations of the maximum values, and better support an accurate determination of the area's attainment status.

Figure 3: Predicted Maximum SO_2 Impacts for Facilities Near the Nelson Industrial Steam Company and the Nelson Industrial Steam Company



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the Nelson Electric Generating Plant, the Nelson Industrial Steam Company, other nearby sources, and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable area, specifically with respect to clearly defined legal boundaries.

As noted above the EPA recognizes that there are 2 emitters of SO_2 with reported 2011 NEI emissions above 100 tpy in neighboring Orange County, Texas. Echo Carbon Black Plant (4,247 tpy of SO_2) is located approximately 2 km from the Calcasieu Parish border, and Orange Mill (2,472 tpy of SO_2) is located approximately 3 km from the Calcasieu Parish border. On the basis of no modeling or monitoring data available, the EPA is unable to determine at this time whether these nearby Texas's sources contribute to ambient air quality impacts within the western edges of Calcasieu Parish. We note that the Echo Carbon Black Plant was identified by Texas as a DRR source and Texas will have to assess what impacts occur from the DRR source in the area, including consideration of other sources that have potential impacts on local concentration gradients such as the Orange Mill, in the future designation rounds. Texas will have to consider if the DRR source (and other nearby sources) have a potential impacts in the western area of Calcasieu Parish.

The EPA believes that our intended unclassifiable area, consisting of Calcasieu Parish, is comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable area.

Other Relevant Information

The EPA did not receive any additional information about the area in the immediate vicinity of the two Nelson facilities.

Conclusion

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around the Nelson Electric Generating Plant and the Nelson Industrial Steam Company as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of all area within Calcasieu Parish Borders.

When evaluating the modeling submitted by the industry, it was determined that the industry modeling approach is not consistent with the SO_2 Modeling TAD. The surface meteorological station used in the modeling does not appear to be representative and there is an NWS site that is more appropriate in Calcasieu Parish. Furthermore, there was an error in unit conversion of modeled results in $\mu g/m^3$ to ppb, selection of appropriate 99^{th} percentile value from background monitoring data and the background calculation dropped out more monitored data than should have been done and resulted in a lower background concentration than is appropriate. Other concerns: the modeling only takes into account 2013 actual annual emissions based on LDEQ inventory data; the hourly CEM data for Nelson Electric Generating Plant and the Nelson Industrial Steam Company for the 2012-2014 period was not utilized in the modeling; and constant, rather than hourly-variable, stack temperature and exit velocity were utilized. It is also unclear what building information was available for downwash. Lastly, the background monitor value used may not reflect actual conditions in the area that experiences the predicted maximum impacts of SO_2.

As discussed above, we also do not have information on any potential impacts on the western part of Calcasieu Parish from 2 large Orange County, Texas sources near the western border, which also provide some uncertainty in designating Calcasieu Parish.

For these reasons and based on available information, EPA does not have sufficient information to decide whether the area is attaining the standard. Therefore, the EPA's intended designation for the area within Calcasieu Parish is unclassifiable.

At this time, our intended designations for the state only apply to this area and the other area presented in this technical support document. Consistent with the conditions in the March 2, 2015 consent decree, the EPA will evaluate and designate all remaining undesignated areas in Louisiana by either December 31, 2017, or December 31, 2020.