AECOM Environment

Prepared for:
International Paper
Mansfield, LA Mill

Prepared by:
AECOM
Chelmsford, MA
60485388
March 2016

Mansfield Mill
DeSoto Parish, Louisiana
1-hour SO_2 Modeling Report

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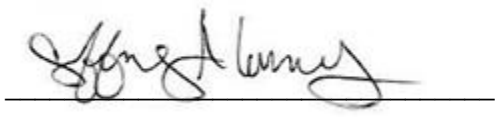
Prepared By: Brian Stormwind



Reviewed By: Jeffrey Connors

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1.0 Introduction

1.1 Executive Summary

This document summarizes the results of sulfur dioxide (SO_2) air quality modeling analysis for the International Paper (IP) Mansfield Mill (Mansfield Mill or the Mill) located in DeSoto Parish, LA. This modeling analysis was developed to address questions, uncertainties and data gaps leading to United States Environmental Protection Agency's (EPA) precautionary decision to propose (81 FR 10563) a large geographical area surrounding both the Dolet Hills Power Station (Dolet Hills) and IP Mansfield Mill as nonattainment with 1-hr SO_2 National Ambient Air Quality Standards (NAAQS). This analysis considers emissions from both IP and Dolet Hills and provides gap filling information to allow an informed SO_2 designation decision for DeSoto Parish.

This analysis shows:

- Emissions from the IP Mansfield Mill do not cause or significantly contribute (no more than 0.40% of the total concentration) to any modeled exceedances of the SO_2 NAAQS.
- The highest offsite impacts attributed to IP Mansfield Mill sources is 138 $\mu g/m^3$, comfortably (30%) below the NAAQS (196.5 $\mu g/m^3$).
- Offsite impacts attributed to Mansfield Mill sources are highest within 1 -2 km of the mill property boundary. Accordingly, offsite concentrations decrease with increasing distance from the mill. At 5-8 kilometers south-south west (in the direction on Dolet Hills), offsite impacts from Mansfield Mill sources are reduced to levels close to ambient background levels.
- IP Mansfield Mill and Dolet Hills are located approximately 14 km apart. As such, IP's emissions have no significant effect on ambient concentrations near the Dolet Hills site.
- The highest modeled "combined" impact considering emissions from Dolet Hills, IP Mansfield Mill and background levels is 208 $\mu g/m^3$. The Mansfield Mill is conservatively predicted to account for 0.23 $\mu g/m^3$ (less than 0.50%) of this combined impact.
- Based on these modeling results, the IP Mansfield Mill should be specifically excluded from and remain outside any SO_2 nonattainment area boundary that may result from this designation process.

1.2 Background

On February 11, 2016, the EPA Region 6 issued a letter to the Honorable John Bel Edwards, Governor of Louisiana, providing notice that EPA disagreed with Louisiana's SO_2 designation recommendation for the area surrounding Dolet Hills Power Station in DeSoto Parish. In short, EPA provided notice of its intention to designate a 193 square kilometer (~ 75 sq miles) area in DeSoto Parish including the Dolet Hills Power Station and IP's Mansfield Mill, as nonattainment with the 1-hour SO_2 NAAQS. Shortly thereafter, notice of this proposed designation action was published in the Federal Register (81FR 10563, 3/1/16) along with the opening of a 30-day public comment period.

The rational for EPA's proposed action was outlined in a technical support document (TSD; see Appendix A). According to the technical support document, EPA 's decisions were based solely on air quality modeling of emissions from Dolet Hills prepared by the Sierra Club and subsequently amended by LADEQ. IP Mansfield Mill's emissions were not included in this or any subsequent modeling evaluations. The work in this document expands the previous modeling effort by LDEQ/Sierra Club to include Mansfield Mill sources, and amends the analysis as detailed in subsequent sections. . The modeling methodology used in this analysis was originally outlined in the letter modeling protocol submitted to LDEQ on March 8, 2016 (provided in Appendix B).

1.3 Overview of Analysis

As described above, modeling in this report was conducted in a manner consistent with the LDEQ/Sierra Club analyses with the following exceptions to either refine the analysis or address potential deficiencies identified by EPA:

1. All modeling was conducted using AERMOD DEFAULT model options (see Section 2.0).

2. Estimated actual stack exhaust flow rates/exit velocities were used in addition to the actual hourly emissions (used in the Sierra Club/LDEQ modeling) for Dolet Hills Power Station (see Section 2.1.2). The Sierra Club and LDEQ modeling had used a constant exit velocity based on full load operations.

3. Building downwash was incorporated for both Dolet Hills and the Mansfield Mill (see Section 2.0). No building downwash was included in the modeling performed by Sierra Club or LDEQ.

4. Meteorological data was re-processed with the latest version of AERMET, Version 15181 (formerly, data processed with the prior version of AERMET, Version 14134, was used) (see Section 2.4).

5. IP Mansfield Mill sources were included in the modeling using their allowable emission rates for all SO_2 sources except Power Boiler #1 and #2 which were modeled using representative maximum hourly emission rates (see Section 2.1.1).

6. The modeling was conducted using one comprehensive receptor grid encompassing the area surrounding both facilities (see Section 2.2).

7. Ambient background concentrations were updated based on 2013-2015 data for the Shreveport Monitor. 2011-2013 was used as part of the TSD, however that data only represented 2013 as the monitor was not in operation in 2011 and 2012. For this analysis, rather than conservatively adding the modeled design concentration with the monitored design concentration for this analysis, as a refinement, the ambient background was combined with modeled concentrations on a seasonal hour-of-day basis in accordance with EPA guidance in their March 1, 2011 clarification memo[1] and as outlined in EPA's SO_2 Modeling Technical Analysis Document (TAD)[2] (see Section 2.6).

Further details on these items and the modeling approach is provided in Section 2 of this report. A CD that contains all model input and output files is provided in Appendix C.

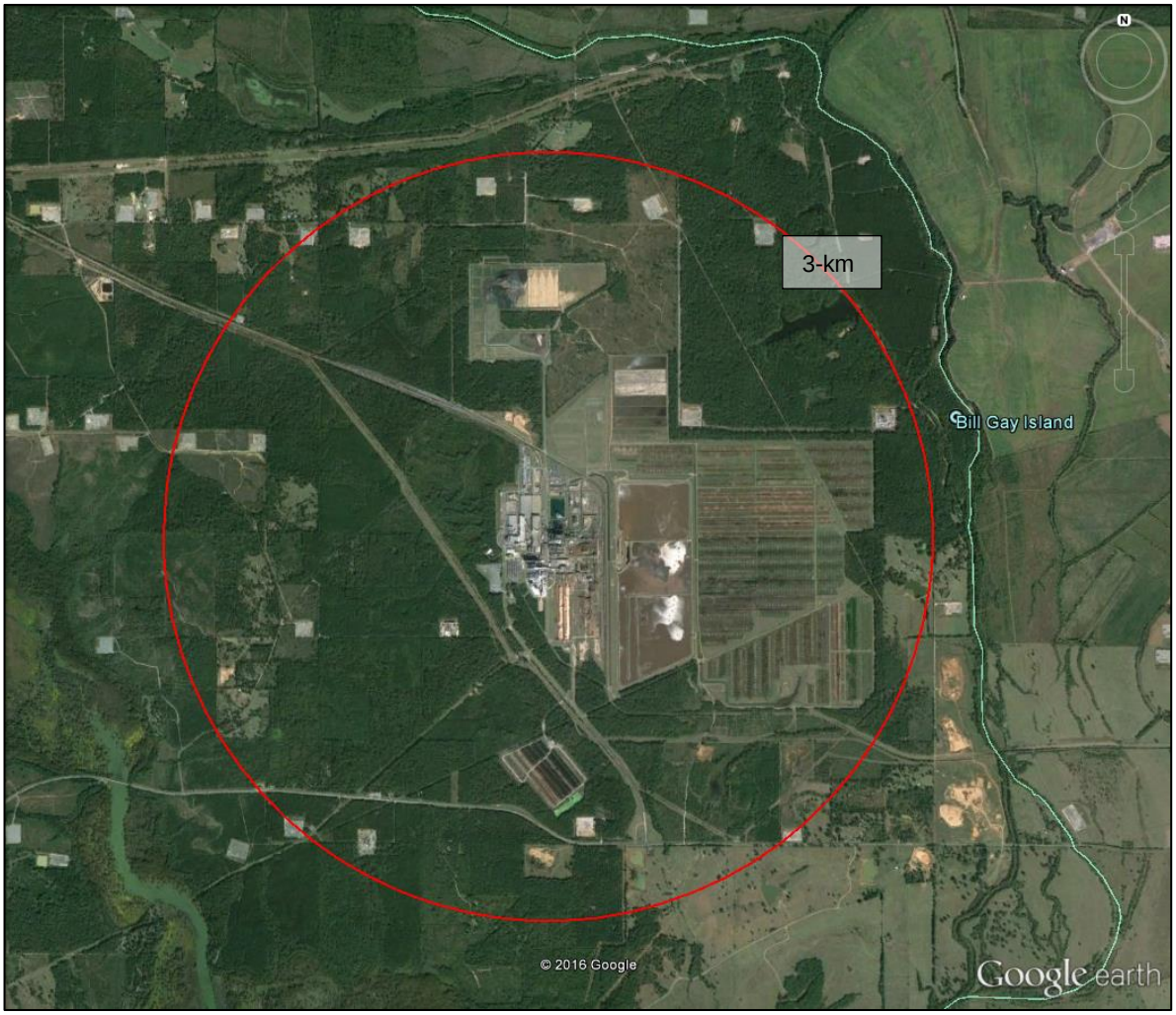
[1] http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

[2] Available at: https://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf

1.4 Facility Description and Location

IP's Mansfield Mill is located in a rural area on the northeast side of Mansfield, LA, in the northern portion of DeSoto Parish. The facility is a containerboard mill whose sources of SO_2 emissions include: power boilers that burn a combination of either tire-derived fuel (TDF), gas, bark, and/or oil, two recovery furnaces, a lime kiln, an incinerator, a gas turbine, and two smelt dissolving tanks. Additional details regarding these sources and their inclusion in the modeling is provided in Section 2.1.2. The facility location is shown in Figure 1-1.

Figure 1-1 Location of the Mansfield Mill



2.0 Model Application and Options

Consistent with the Sierra Club and LDEQ modeling, AERMOD (Version 15181) was used for the analysis. AERMOD is the EPA guideline model for short-range transport and has the ability to account for the source types and dispersion environment located at, and surrounding, the Mansfield Mill and Dolet Hills. AERMOD (USEPA, 2004a) is appropriate for use in many different types of dispersion environments including sources subject to building downwash and sources located in flat or elevated terrain.

For this application, AERMOD was applied using all regulatory default options and the modeling procedures were consistent with applicable guidance, including the February 2016 "SO_2 NAAQS Designations Modeling Technical Assistance Document" (TAD) issued by EPA. The current version of the TAD references other EPA modeling guidance documents, including the following clarification memos (1) the August 23, 2010 "*Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 NAAQS*" and (2) the March 1, 2011 "*Additional Clarification Regarding Application W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard*" (hereafter referred to as the "Clarification Memo"). In the March 1, 2011 clarification memo, EPA declares that the memo applies equally to the 1-hour SO_2 NAAQS even though it was prepared primarily for the 1-hour NO_2 NAAQS.

Based on EPA guidance provided in the TAD, all stacks were modeled with their actual physical stack height. In addition, the EPA's Building Profile Input Program (BPIP-Version 04274) version that is appropriate for use with PRIME algorithms in AERMOD were used to incorporate downwash effects in the model for all stacks at Dolet Hills and the Mansfield Mill included in the analysis. Figure 2-1 shows the Mansfield Mill stacks and building included in the BPIP analysis. The BPIP input and output files are provided in the modeling archive in Appendix C.

2.1 Source Data

2.1.1 Mansfield Mill

The Mansfield Mill primary SO_2 sources and buildings are shown in Figure 2-1. Source stack parameters and emissions are summarized in Table 2-1.

The EPA TAD allows for use of actual hourly emissions as well as the very conservative approach of using maximum potential emission rates. A hybrid approach was used for the Mansfield Mill sources by using a conservative constant, representative maximum hourly SO_2 emission rate for Power Boilers No. 1 and 2 while all other Mill sources were modeled with maximum permitted emission rates.

Maximum actual SO_2 emission factors from the Nos. 1 and 2 Power Boilers were developed from a statistical evaluation of the hourly SO_2 CEM data (lb/MMBtu) for the period 2012-2014. The resulting maximum actual SO_2 emission factors are 0.425 lb/MMBtu (No. 1 Power Boiler) and 0.480 lb/MMBtu (No. 2 Power Boiler). These maximum actual emission factors were multiplied by the maximum heat input of each boiler (760 MMBtu/hr) to obtain the maximum actual SO_2 emission rate for the Nos. 1 and 2 Power Boilers (323.3 and 364.9 lbs/hr, respectively). These rates were then conservatively modeled for every hour for the period 2012-2014.

Comparison of the maximum actual hourly SO_2 emission rate to the actual hourly SO_2 emission rate shows that 99.5% of all actual hourly SO_2 rates are below the maximum actual rates modeled. Review of the remaining 0.5% of the actual rates determined to be above the modeled maximum actual rates shows these periods to be atypical operations.

Given the low fraction of time and intermittent nature of the actual emission rates are above the two proposed maximum actual emission rates, use of these maximum actual SO_2 rates will provide a conservative depiction of the modeled concentrations associated with the 1-hour SO_2 NAAQS given its percentile basis (99th percentile).

Exhaust parameters were taken from the facility Title V operating permit and were verified by the Mansfield Mill.

2.1.2 Dolet Hills Power Station

As discussed in EPA's TSD, the Sierra Club and LDEQ modeling of Dolet Hills was conducted with 3 years, 2012-2014, of actual emission data coupled with constant exit flowrate/velocity and temperature based on 100% load (the latter was indicated by EPA to be a shortcoming of the analysis).

In order to address EPA's comment, hourly exit flowrate/velocity data were developed for this application to refine the analysis. Direct measurements of actual hourly exit flowrate/velocity and temperature for Dolet Hills were not available. However, heat input, MMBtu/hr, was available for Dolet Hills from the EPA Air Markets Program Data[3]. Concurrent with the hourly emission rates, hourly values of exit velocity for the Dolet Hills stack were computed based on the product of the full load exhaust flowrate (assumed to be 84.78 ft/s according to the LDEQ and Sierra Club modeling) and the ratio of the actual hourly heat input/maximum load heat input (7,600 MMBtu/hr). The full load exit temperature was not adjusted as significant variability in the temperature as a function of load is not expected. The 84.78 ft/s full load exhaust flowrate is also fairly consistent with data available in the Tile V Permit renewal for the Dolet Hills available on LDEQ's website (October 2013, Permit Activity No. PER20100002). This Title V Permit renewal was also used as a reference to determine the maximum heat input at 7,600 MMBtu/hr to the unit.

The physical stack parameters for the Dolet Hills main stack and full load exhaust parameters are summarized in Table 2-2.

[3] https://ampd.epa.gov/ampd/

Figure 2-1 Mansfield Mill Sources and Buildings

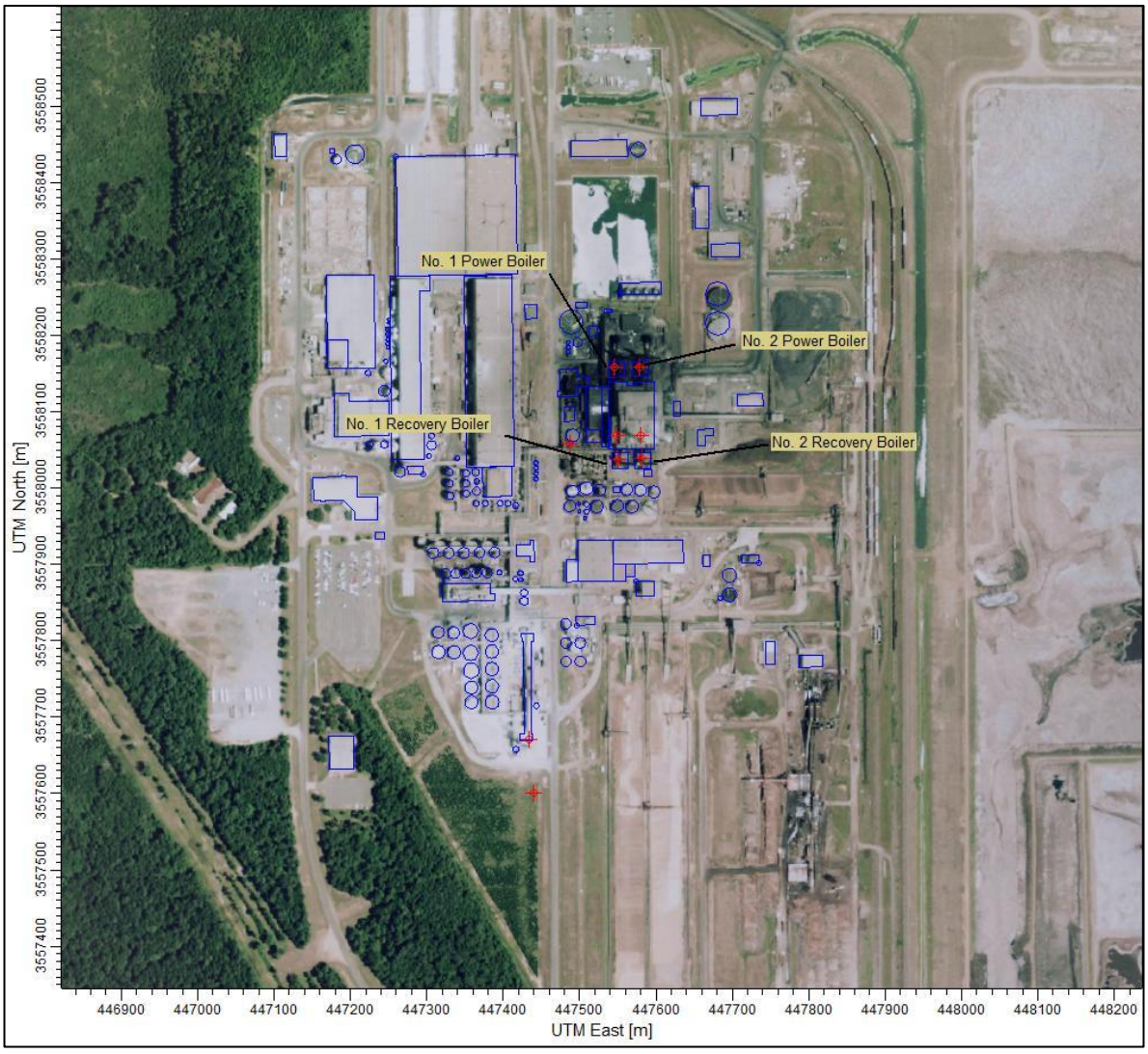


Table 2-1 Stack Parameters and Emission Rates – Mansfield Mill

Parameter	Source								
	No. 1 Power Boiler	**No. 2 Power Boiler**	**Lime Kiln**	**No. 1 Recovery Boiler**	**No. 2 Recovery Boiler**	**No. 1 Smelt Dissolving Tank**	**No. 2 Smelt Dissolving Tank**	**Gas Turbine/HR SG Stack**	**HVLC/LVHC Incinerator**
Stack ID	01-78	02-78	03-78	04-78	05-78	06-78	07-78	13-93	57-99
Base Elevation (ft)	179.8	179.1	179.1	179.1	179.1	179.1	179.1	179.5	179.1
Stack Height (ft)	263.0	263.0	120.0	263.0	263.0	261.0	261.0	113.0	100.0
Stack Diameter (ft)	9.5	9.5	8.0	9.9	9.9	7.0	7.0	11.7	2.5
Exhaust Velocity (ft/sec)	101.5	101.5	23.4	96.2	96.2	30.9	30.9	47.8	33.3
Exhaust Temperature (°F)	426.0	426.0	192.0	400.0	400.0	160.1	160.1	272.0	130.0
SO_2 Emission Rate (lb/hr)	323.2	364.9	1.20	217.64	217.64	1.35	1.35	<0.001	10.93

Table 2-2 Stack Parameters and Emission Rates – Dolet Hill Main Stack

Parameter	Main Boiler Stack
Base Elevation (ft)	244.2
Stack Height (ft)	525.0
Stack Diameter (ft)	25.0
Exhaust Velocity (ft/sec)	Varied hourly
Exhaust Temperature (°F)	163.0
SO_2 Emission Rate (lb/hr)	Varied hourly

2.2 Receptor Grid

The modeling was conducted using one comprehensive receptor grid encompassing the area surrounding Dolet Hills and the Mansfield Mill. The grid extends out a minimum of 20 kilometers in all directions from each facility. The grid was based on the following specifications:

- 25-meter spacing around each facility's ambient air boundary;
- Beyond the ambient air boundary from each facility, 100-meter spaced receptors were used out to 3-5 km depending on the direction from the facilities;
- Beyond the 100-meter spaced receptors a 250-meter spaced grid were used out to an additional 4-8 kilometers from each facility depending on the direction;
- Beyond the 250-meter spaced receptors a 500-meter spaced grid will be used out to an additional 5 kilometers; and
- Beyond the 500-meter spaced receptors a 250-meter spaced grid will be used out to an additional 10 kilometers.

The receptor grid is shown in Figure 2-2.

The extent of this grid was sufficient to capture the maximum modeled impacts from each facility as well as the combined impacts from both facilities.

The receptor grid was based on Universal Transverse Mercator (UTM) coordinates referenced to NAD 83 datum and in zone 17. AERMAP (version 11103), the AERMOD terrain preprocessor program, was used to calculate terrain elevations and critical hill heights for the modeled receptors (NAD83 datum and zone 18) using National Elevation Data (NED). The NED dataset was be downloaded from the USGS website (http://viewer.nationalmap.gov/viewer/) and consisted of 1 arc second (~30 m resolution) NED. As per the AERMAP User's Guide (USEPA, 2004c), the domain was sufficient to ensure all significant nodes are included such that all terrain features exceeding a 10% elevation slope from any given receptor, are considered.

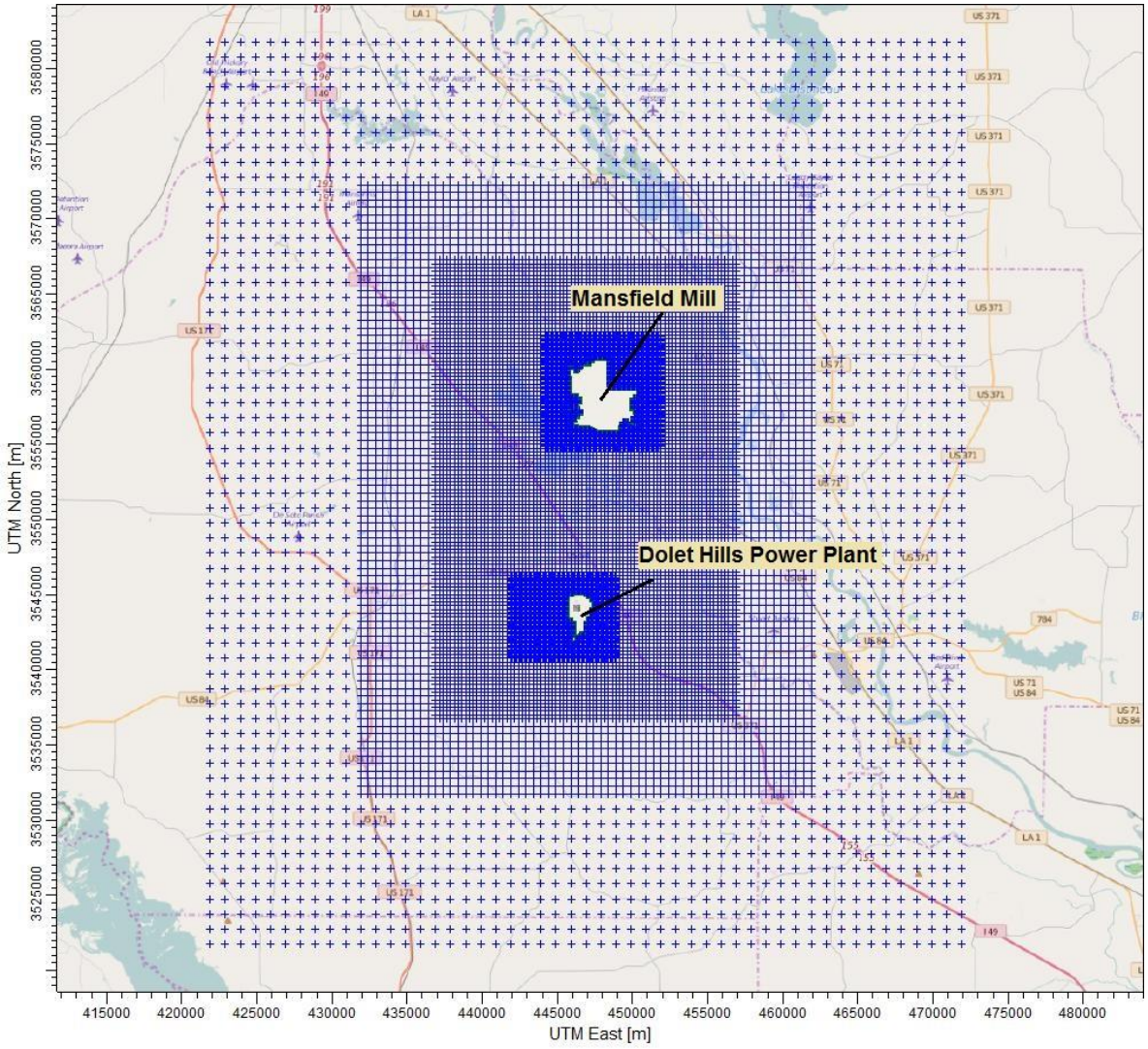
2.3 Dispersion Environment

Consistent with modeling performed by the Sierra Club and LDEQ, and EPA's findings in the TSD, AERMOD was applied in rural mode given the predominantly rural land use of the study area.

2.4 Meteorological Data for Modeling

The same three years of meteorological data used by Sierra Club and LDEQ was used in this application of AERMOD; 2012-2014 data from Shreveport, LA. The data were reprocessed with the latest version of EPA's AERMET (USEPA, 2004b), version 15181 (the data were formerly processed with version 14134) and AERMINUTE, version 15272. We do note that a comparison of both data sets indicated that there were no differences in the meteorological data processed with either version of AERMET.

Figure 2-2 AERMOD Receptor Grid



2.5 Background Monitoring Data

Ambient air quality data are used to represent the contribution of non-modeled sources to the total ambient air pollutant concentrations for the NAAQS analysis.

The Sierra Club and LDEQ analysis utilized monitored data from the Caddo Parish monitor in Shreveport, approximately 40 kilometers north of the Mansfield Mill (see Figure 2-3). While EPA states in the TAD that the Shreveport monitor has "the lowest measured background concentration in the state", the Shreveport monitor is the most representative monitor available for the analysis, if not conservative.

The Mansfield Mill and Dolet Hills facilities are surrounded by rural land use generally consisting of agricultural and undeveloped forested and grassland areas, whereas the Shreveport monitor is in a more urban/developed area consisting of commercial and compact residential land uses. A three-year (2012-2014) wind rose of the Shreveport met data (see Figure 2-4) indicates winds in the region are predominantly from the south. Winds blowing from the south would tend to transport SO_2 emissions from both the power station and mill toward the Shreveport monitor and therefore, this monitor may be influenced to some degree from the emissions from power station and mill. Therefore the use of this monitor may result in some double counting of emissions in the analysis. For these reasons, the Shreveport monitor should be conservative to represent background in the vicinity of the Mansfield Mill and Dolet Hills.

EPA's recommends a tiered approach for adding monitored background concentrations (representing non-modeled sources) in the NAAQS analysis in the Clarification Memo . The first tier approach is conservatively based on adding the monitored design value (3-year average 99^{th} percentile daily 1-hour maximum concentration) to the modeled design value. The second tier uses a temporally varying approach, based on combining the monitored concentrations, by hour of day and season, with the hourly modeling results. The total hourly modeled plus monitored concentrations are then used to determine the design concentration for comparison to the NAAQS. These computations are all done within AERMOD.

Therefore, rather than conservatively adding the modeled design concentration with the monitored design concentration for this analysis, the second tier refinement was used where the ambient background concentration was combined with modeled concentrations on a seasonal hour-of-day basis in accordance with EPA guidance in the Clarification Memo and as outlined in the TAD. Note that for this application, the ambient background concentrations were updated based on 2013-2015 data for the Shreveport monitor. Data from 2011-2013 were reported to be used by Sierra Club and LDEQ as discussed in the TSD, however it appears that data only represented 2013 as the monitor was not in operation in 2011 and 2012. Therefore, the more recent data were used.

Table 2-3 shows the three year design concentrations for the Shreveport monitor.

Table 2-4 shows the season and hour of day ambient background concentrations used for the modeling. A spreadsheet with the season and hour of day background calculations is provided with the modeling archive in Appendix C.

Table 2-3 Shreveport Monitor SO_2 Design Concentrations (2013-2015)

Monitor	Year	Annual Data Capture		99th Percentile Concentration (ppb)	Design Concentration (3-year average)	
		hours	%		ppb	µg/m^3
Shreveport Monitor	2013	8588	98%	12	12	32.3
	2014	8589	98%	14		
	2015	8367	96%	11		

Table 2-4 Shreveport Monitor Season and Hour of Day Background Concentrations (2013-2015)

Hour	Season (ppb)			
	Winter	Spring	Summer	Fall
1	2.5	2.6	2.6	2.1
2	2.8	2.6	2.9	1.9
3	3.0	2.5	2.6	2.1
4	2.9	2.4	2.7	2.4
5	2.9	2.4	2.6	2.1
6	2.7	2.5	2.6	2.0
7	2.3	2.7	2.8	1.9
8	2.4	3.2	5.2	2.7
9	3.2	3.8	9.3	3.8
10	2.7	4.4	9.5	5.3
11	5.1	4.3	6.9	7.0
12	6.1	4.5	6.2	4.6
13	6.4	4.1	4.7	3.7
14	5.1	3.7	3.8	4.2
15	4.2	3.3	3.7	3.1
16	4.1	3.0	4.5	3.8
17	3.7	3.2	3.7	3.0
18	3.1	3.1	3.6	3.4
19	3.1	2.9	4.2	3.3
20	2.8	2.7	3.5	2.7
21	3.7	2.7	3.1	2.1
22	3.2	3.1	2.7	2.0
23	3.9	3.5	3.8	2.1
24	3.1	2.9	2.8	2.3

Figure 2-3 Location of SO_2 Monitor

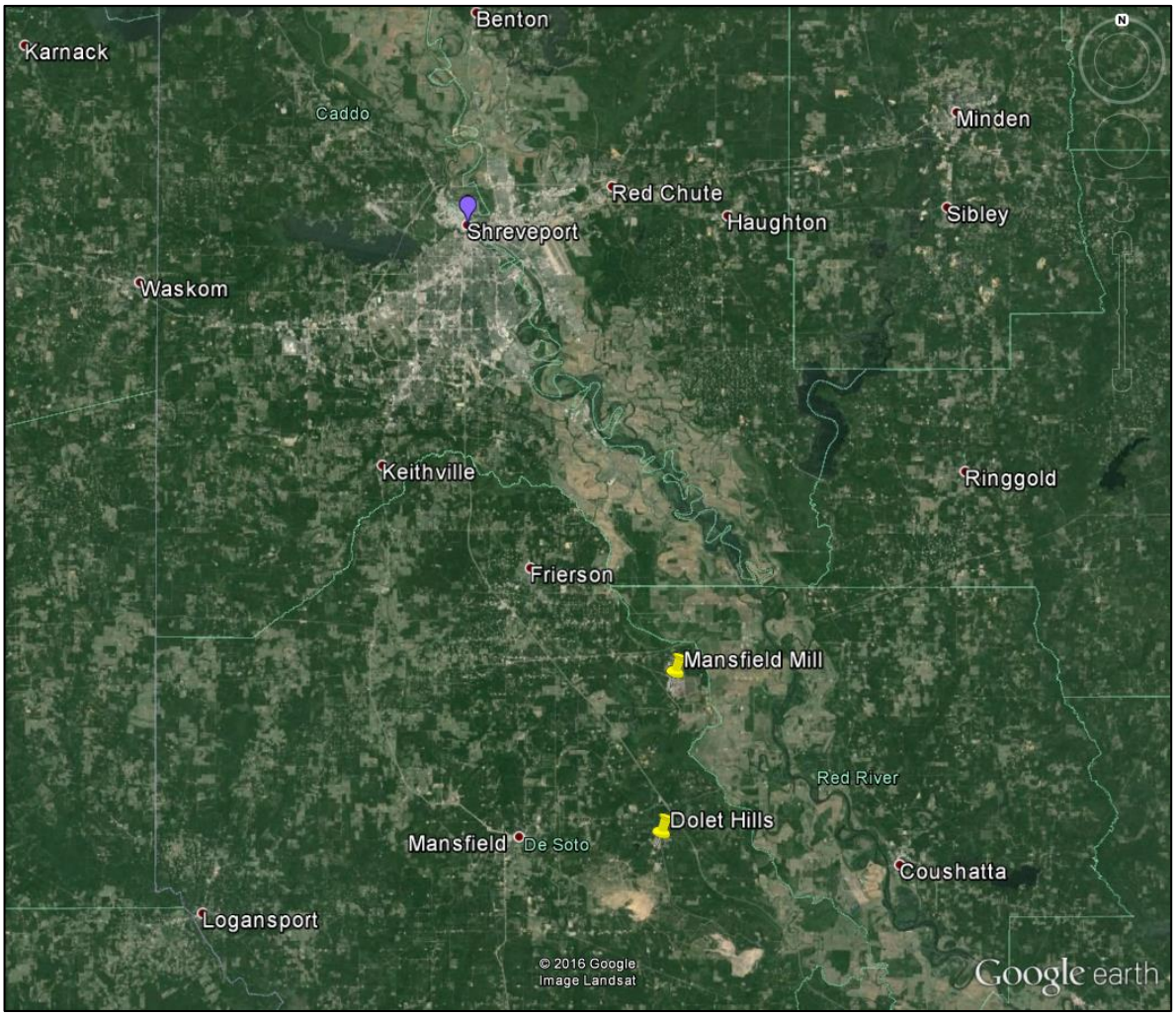
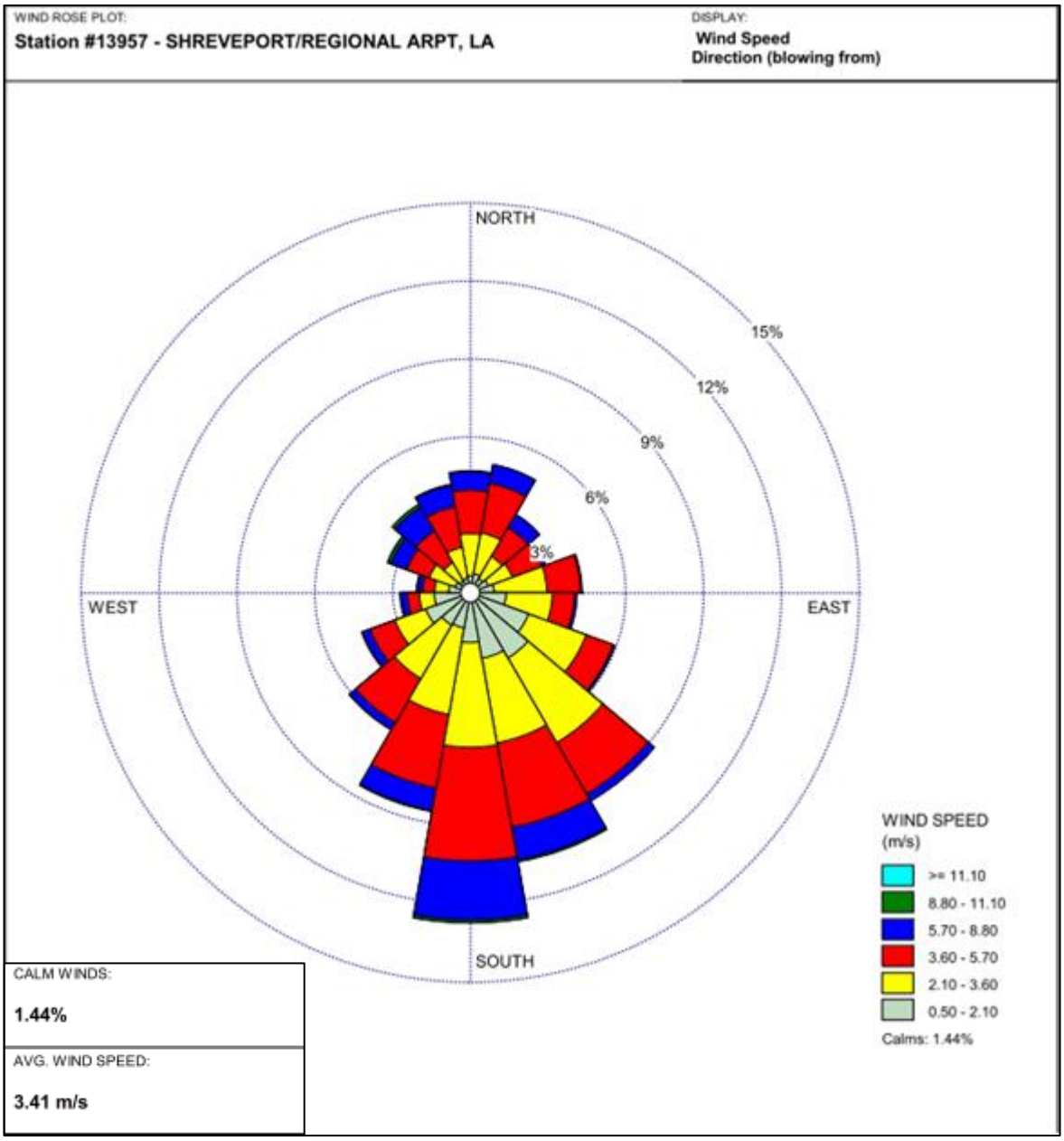


Figure 2-4 Shreveport Wind Rose (2012-2014)



3.0 Modeling Results

AERMOD was applied for the 3-year meteorological data set to determine the combined 1-hour SO_2 modeled concentrations for the Mansfield Mill sources and the Dolet Hills main stack. As noted in Section 2.5, AERMOD was also applied with season/hour-of-day ambient background concentrations to represent non-modeled sources in the NAAQS analysis. AERMOD computes the total design concentrations in the form of the NAAQS which is the highest 3-year average 99^{th} percentile of the daily 1-hour maximum concentrations.

Table 3-1 summarizes the AERMOD modeled concentrations as well as source culpability. The following summarizes of the results in Table 3-1:

- Overall highest concentration due to all sources plus monitored background is 207.57 µg/m^3. This maximum total modeled concentration exceeds the NAAQS (196.5 µg/m^3) and is primarily due to Dolet Hill emissions. The Mansfield Mill sources contribution to this total concentration is only 0.23 µg/m^3 (~0.10% of the total).

- Maximum modeled concentration due to all soucres (plus monitored background) where Mansfield Mill sources have a significant impact (≥ 7.9 µg/m^3) is 152.21 µg/m^3; the contribution from the Mansfield Mill sources is 8.50 µg/m^3 (5.6% of the total).

- Highest concentration (plus background) due to Mansfield Mill sources alone is 137.59 µg/m^3. Figure 3-1 presents an isopleth of the modeling results for the Mansfield Mill sources alone. As shown in Figure 3-1, the highest concentrations associated with the Mansfield Mill sources are at the facility boundary, are below the NAQQS, and they drop off significantly with distance from the Mill. Figure 3-1 also shows that at 5-8 kilometers from the Mill center, the modeled concentrations (attributable to the Mill alone) drop to nearly the same concentration levels of the ambient background. This distance is well short of the Dolet Hills Power Station also shown in Figure 3-1.

In addition, there are a number of other instances and receptor locations where the NAAQS was exceeded. The location of these receptors is shown in Figure 3-2. A detailed summary of all modeled exceedances is provided in Table 3-2. This summary shows that the Mansfield Mill sources do not significantly contribute to any of the modeled exceedances. The maximum modeled contribution to any of the modeled exceedances due to the Mansfield Mill sources is 0.79 µg/m^3 (~0.40% of NAAQS). Figure 3-2 also shows how large the proposed NAA made by EPA is relative to the area of actual modeled exceedances.

These results demonstrate that the Mansfield Mill does not contribute significantly to any of the modeled exceedances which are due to Dolet Hills. The modeling analysis also demonstrates that the Mansfield Mill itself does not cause any modeled exceedance of the NAAQs.

Table 3-1 1-hour SO_2 NAAQS Analysis Results - Concentrations ($\mu g/m^3$)

Case	Total Concentration(1)	Contribution to Total			NAAQS	SIL
		Dolet Hills	Mansfield Mill	Monitored Background		
Overall Maximum	207.57	189.50	0.23	17.85	196	7.9
Maximum where Mansfield Significant	152.21	132.29	8.50	11.42	196	7.9
Maximum due to Mansfield Mill Alone	137.59	--	115.70	21.88	196	7.9

1) 1-hour SO_2 99th percentile design concentrations.

Table 3-2 Mansfield Mill Contribution to Modeled NAAQS Exceedances ($\mu g/m^3$)

Receptor		Maximum Design Concentration (with Background)	Mansfield Mill Contribution to Maximum Design Concentration
X (m)	Y (m)		
443400.00	3544350.00	207.57	0.23
443300.00	3544350.00	207.25	0.55
443000.00	3544450.00	205.42	0.36
443500.00	3544350.00	204.59	0.23
443200.00	3544350.00	204.32	0.67
442900.00	3544450.00	203.86	0.79
443100.00	3544450.00	202.45	0.36
443100.00	3544350.00	201.29	0.67
443600.00	3544350.00	201.20	0.23
443200.00	3544450.00	200.09	0.34
442800.00	3544450.00	199.35	0.79
442600.00	3544550.00	198.43	0.34
443000.00	3544350.00	198.40	0.79
442700.00	3544550.00	198.18	0.32
443300.00	3544450.00	197.67	0.34
443700.00	3544250.00	197.36	0.55
442800.00	3544550.00	197.31	0.47
442500.00	3544550.00	197.27	0.38
442900.00	3544550.00	197.05	0.36
443800.00	3544250.00	196.27	0.23
443700.00	3544350.00	196.20	0.18

Figure 3-1 Mansfield Mill Alone Modeling Results (excludes Ambient Background)

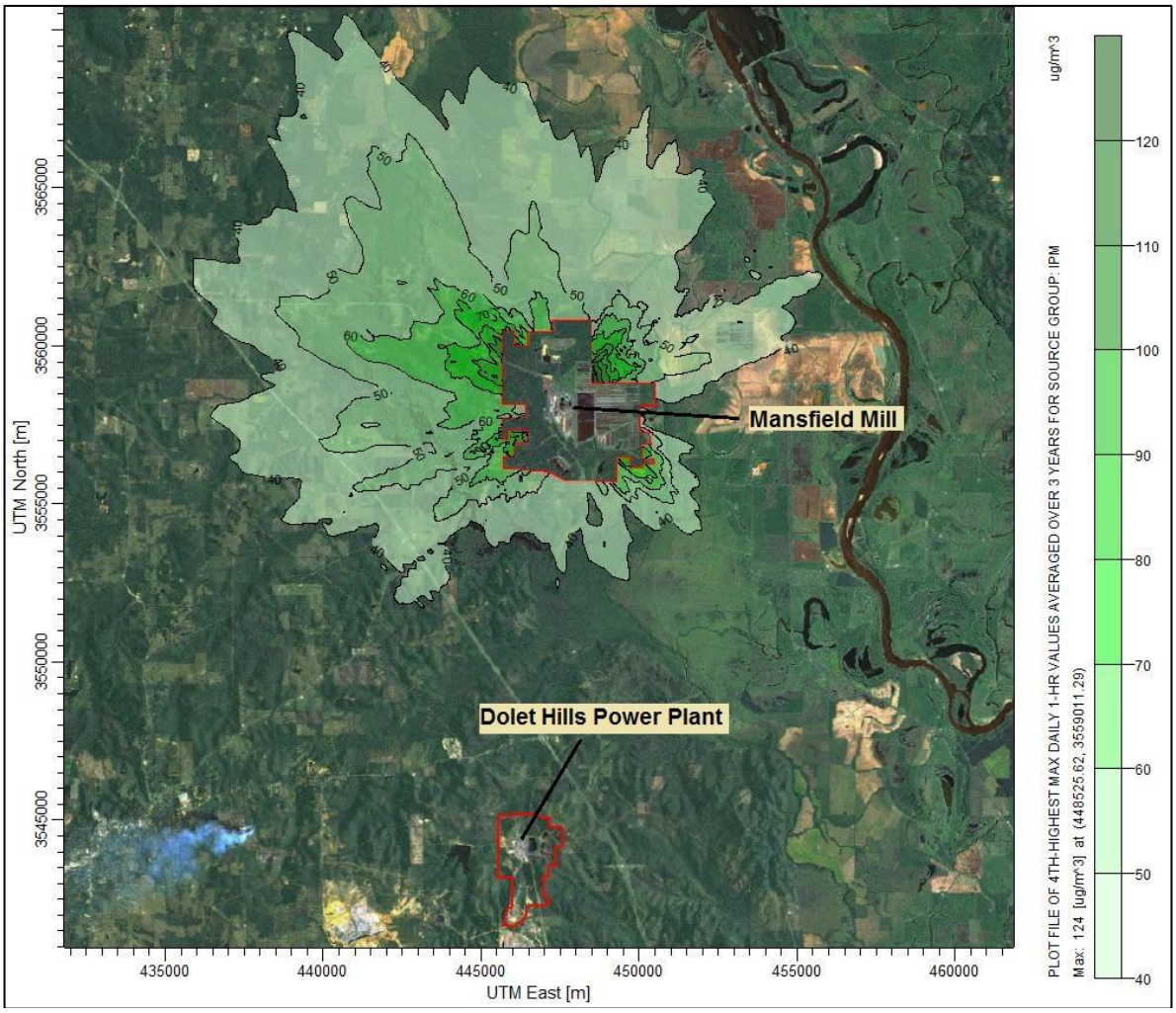
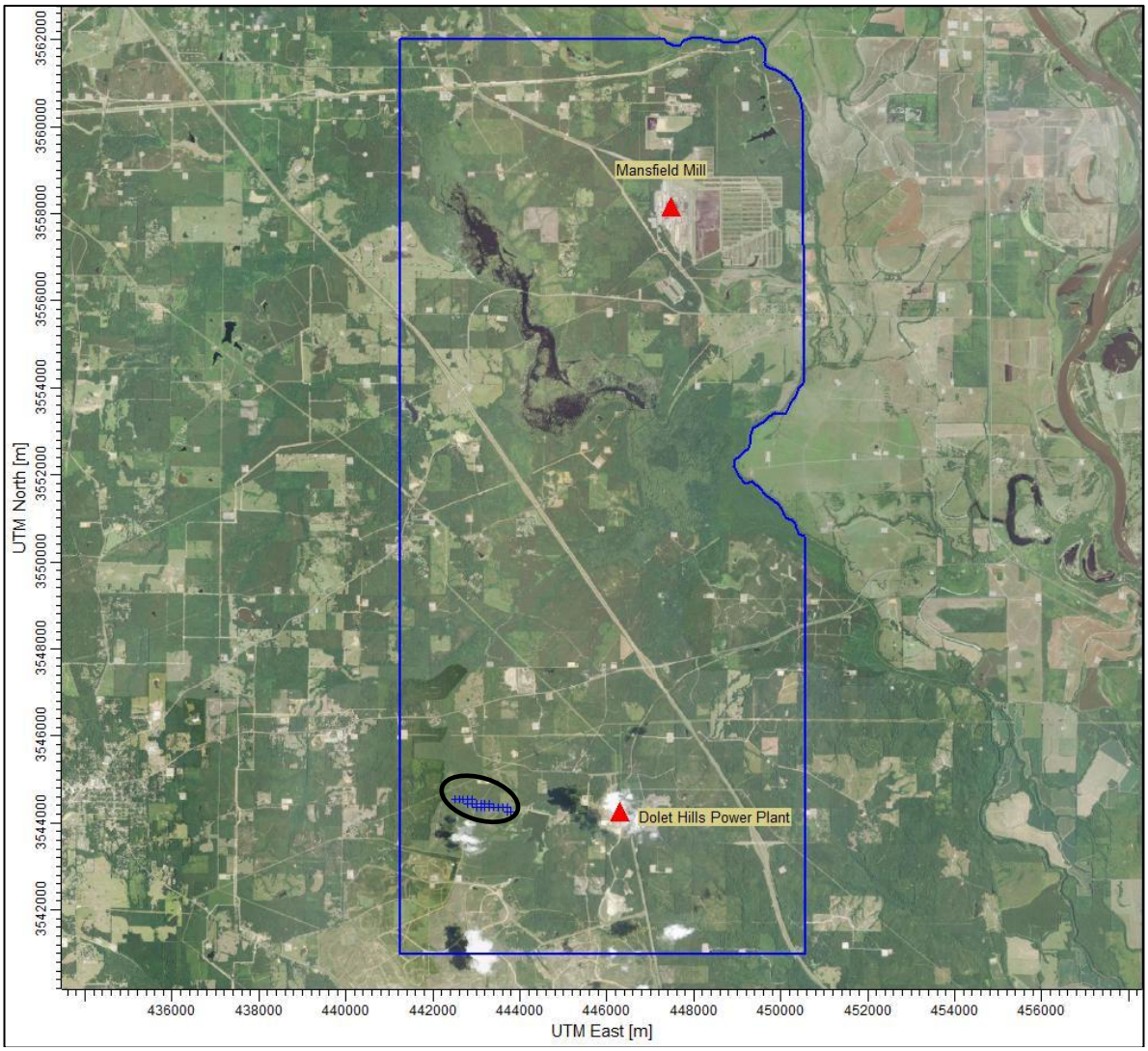


Figure 3-2 Receptor Locations of Modeled NAAQS Exceedances



**Receptor locations with modeled exceedances are shown in blue.*
EPA proposed NAA outlined in with bold blue line

4.0 References

US EPA 1985. Guideline for the Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) - Revised. EPA-450/4-80-023R, US EPA, Research Triangle Park, NC 27711.

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Appendix A

EPA's Technical Support Document

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.

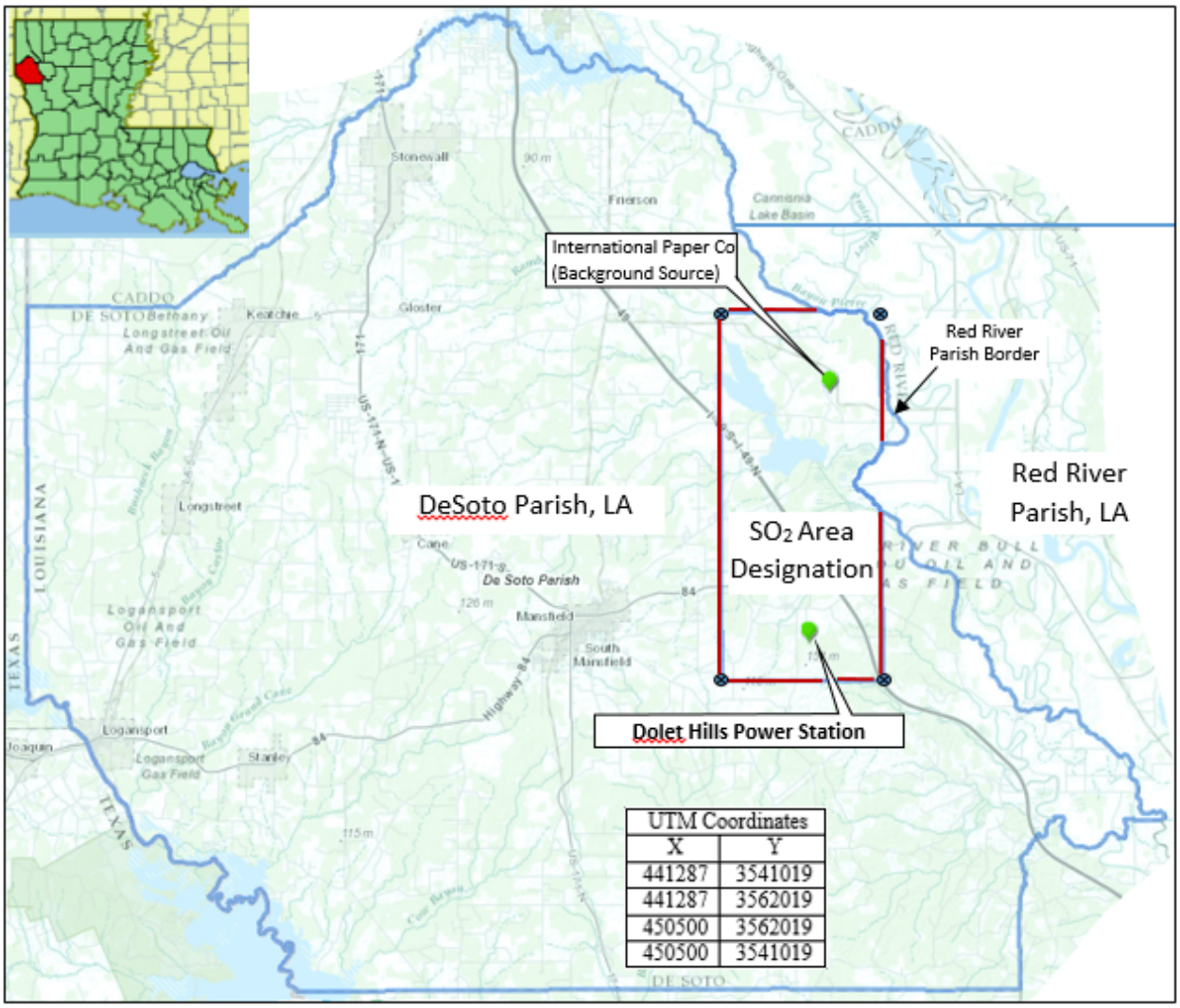
After careful review of the state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area, and intends to designate the area as non-attainment. Specifically, the boundaries for our intended nonattainment area consist of the portions 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.

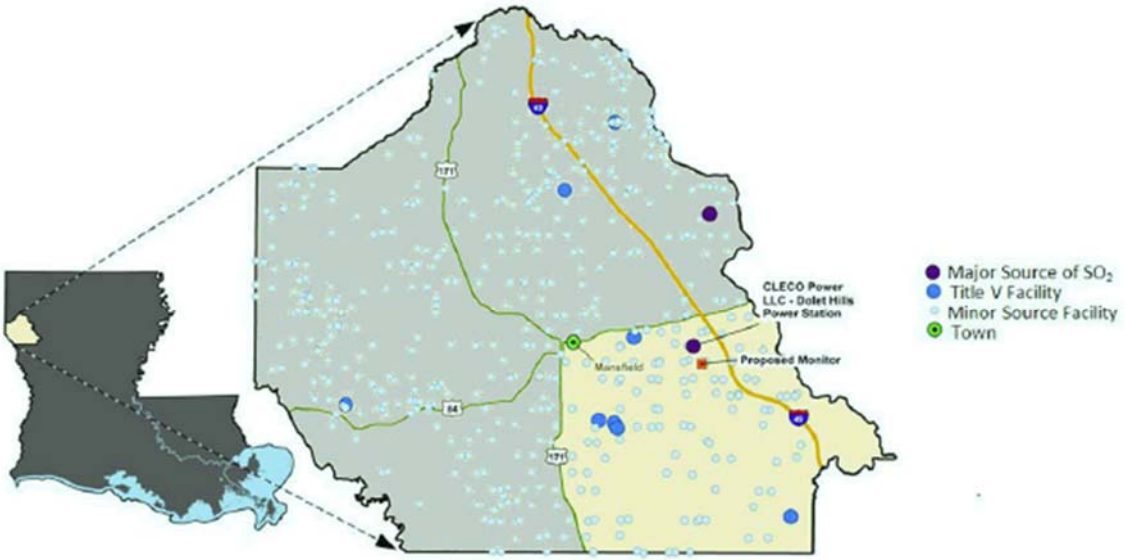
The grid receptor spacing by Sierra Club was retained by the state in their modeling analysis along with all associated elevations and processing information that could potentially impact the area of analysis where maximum SO_2 concentrations are expected. The receptor network contained 21201 receptors (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)

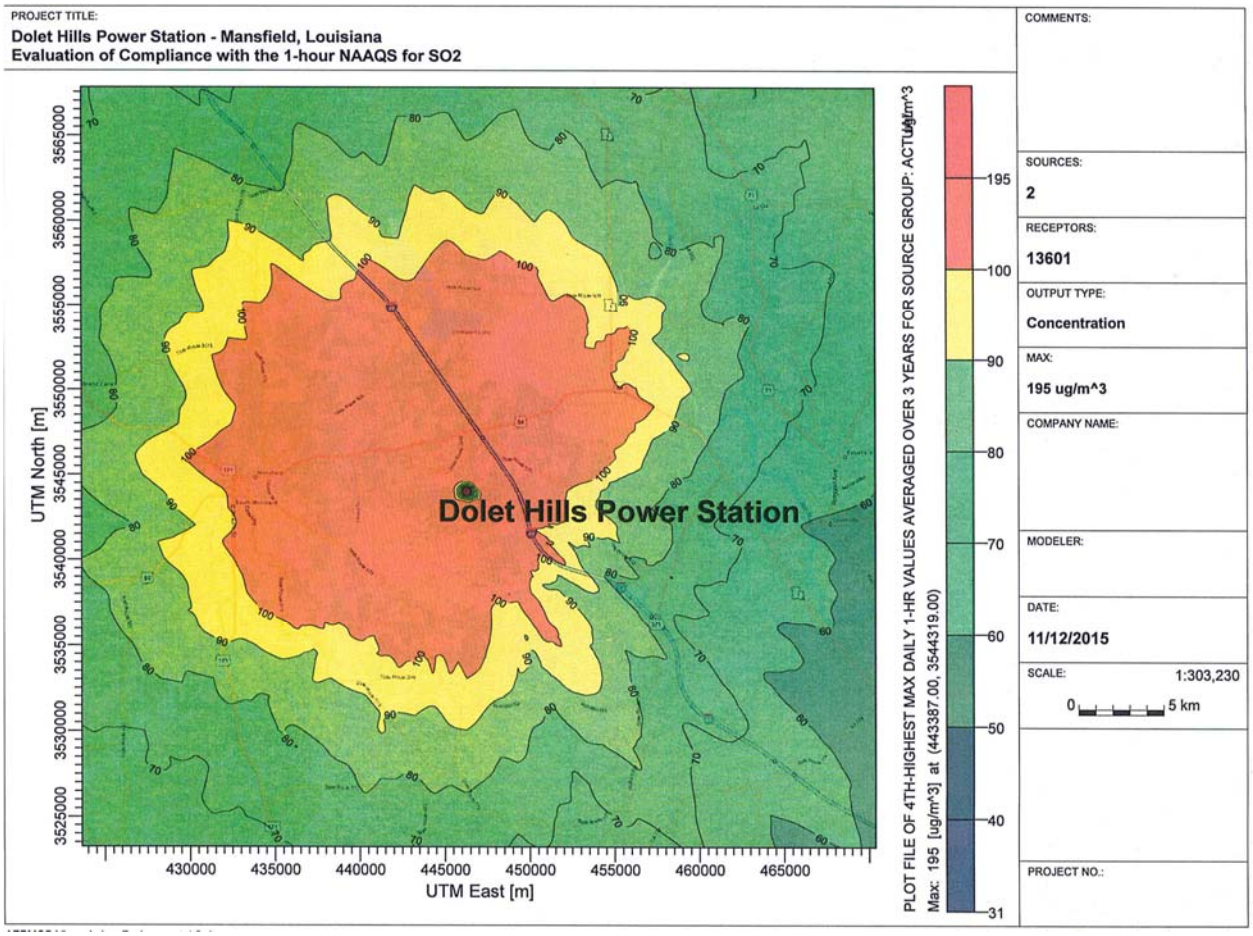
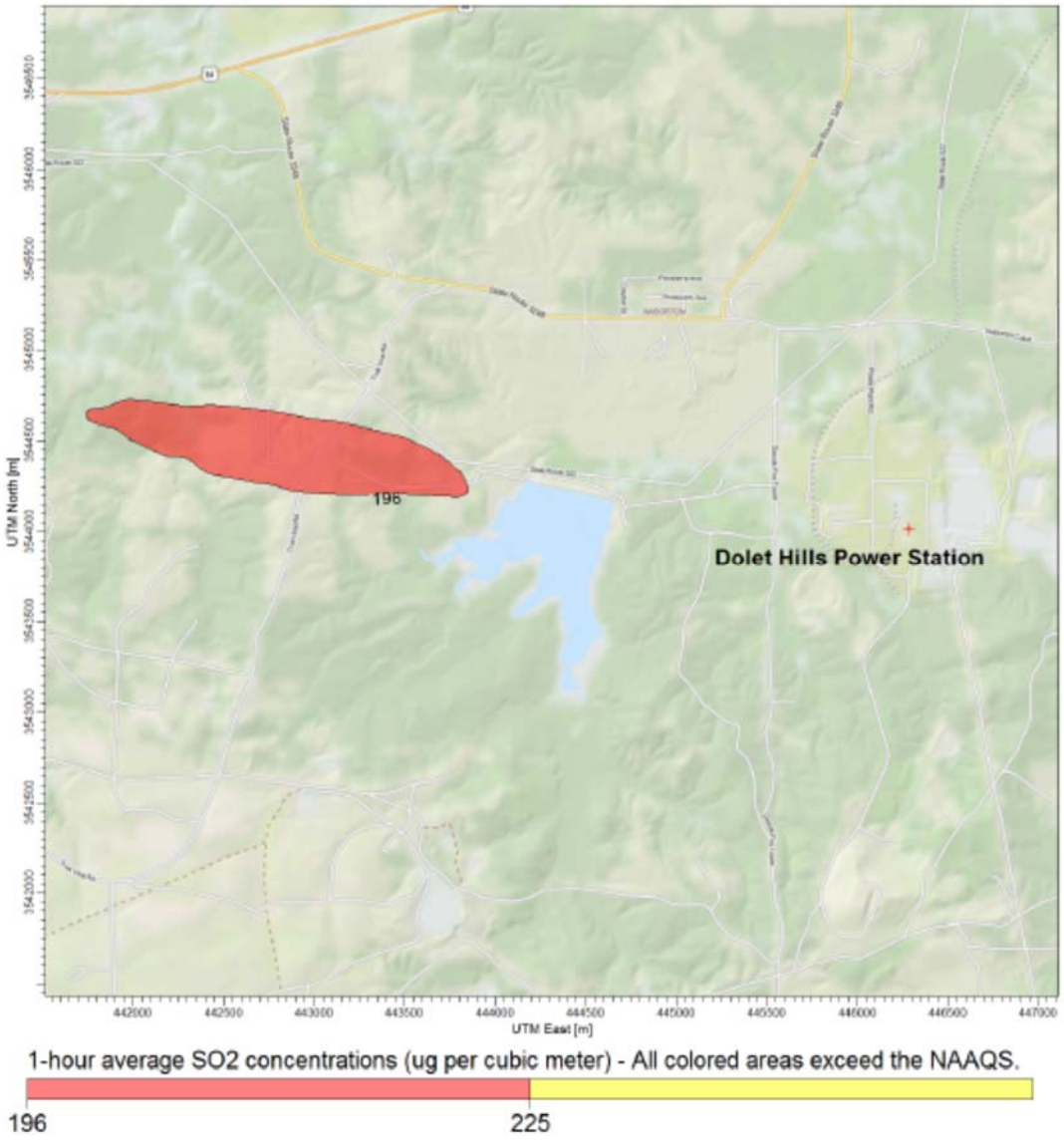


Figure 4: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Dolet Hills Area of Analysis Based on Actual Emissions (Sierra Club)



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.

Appendix B

Modeling Protocol Submitted to LDEQ

AECOM
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March 8, 2016

Ms. Vennetta Hayes
Louisiana Department of Environmental Quality
Air Permits
P.O. Box 4313
Baton Rouge, LA 70821-4313

Subject: Proposed Modeling Methodologies for SO_2 DeSoto Parish, Louisiana Area Designations

Dear Ms. Hayes,

On February 11, 2016, the United States Environmental Protection Agency (EPA) Region 6 issued a letter to the Honorable John Bel Edwards, Governor of Louisiana. This letter was intended to inform Governor Edwards on the latest round of EPA's area designations as they relate to the 1-hour SO_2 National Ambient Air Quality Standards (NAAQS). This first round of designations was targeted based on the consent decree entered into by EPA and the Sierra Club which was the result of the March 2, 2015 court ruling (Sierra Club vs. McCarthy, No. 3-13-cv-3953). According to this ruling, the first round of designations must be made by EPA by July 2, 2016. This letter indicated that parts of DeSoto Parish in Louisiana (among other locations) were intended to be designated as non-attainment.

Attached to the letter was EPA's technical support document (TSD) describing the analyses that were performed to define the boundary of the area designations. The non-attainment area proposed by EPA was extended much further to the north (see Figure 1 of the EPA TSD) compared to that proposed by Louisiana Department of Environmental Quality (LDEQ) in their November 17, 2015 recommendations. LDEQ recommended that the non-attainment area for DeSoto Parish be limited to the southeast quadrant of the parish (shown in Figure 2 of EPA's TSD).

The primary (and only) source modeled to determine this area designation was the Dolet Hills Power Station. EPA's proposed non-attainment area was extended approximately 10-15 kilometers to the north to include the International Paper's (IP) Mansfield Mill (a much smaller SO_2 emission source) even though the modeling presented by the Sierra Club and LDEQ indicated the highest modeled impacts were to the west of Dolet Hills Power Station.

None of the technical analyses performed by EPA, the Sierra Club, or LDEQ included the IP Mansfield Mill. Based on the Sierra Club modeling (which only shows predicted impacts above the NAAQS to the west of the Dolet Hills Power Station), it is highly unlikely that IP Mansfield Mill's

modeled impacts would significantly overlap the modeled exceedances due to the Dolet Hills Power Station (i.e., modeled contribution less than the 1-hour SO_2 interim Significant Impact Level (SIL) of 7.9 $\mu g/m^3$).

Therefore, the intention of this letter is to inform the LDEQ on proposed modeling procedures that will differ from those outlined in EPA's TSD provided with the February 11, 2016 area designation letter. IP proposes to perform additional modeling to determine the impact, if any, on the modeled exceedances of the 1-hour SO_2 NAAQS that are predicted in the vicinity of the Dolet Hills Power Station.

The modeling will be performed in accordance with the approaches outlined in the EPA's TSD and utilized by the Sierra Club and LDEQ with the following exceptions to either refine the analysis or address potential deficiencies identified by EPA in their TSD:

1. All modeling will be conducted using DEFAULT model options.

2. Updates will be made to account for actual flow rates and/or temperatures in the hourly estimates of the Dolet Hills Power Station emissions and stack parameters.

3. Updates will be made to include building downwash for the Dolet Hills Power Station.

4. AERMET Version 15181 will be used in the updated modeling.

5. IP Mansfield Mill sources will be included using their allowable emission rates for all SO_2 sources except Power Boiler #1 and #2 which will be modeled using representative actual maximum hourly emission rates. The representative actual maximum hourly emission rates will be determined by using the 99^{th} percentile (or greater) emission rate for each Power Boiler based on operations during the 2012-2014 period. Overall, this approach is conservative in that it utilizes a representative maximum hourly emission rate for every hour of the year as opposed to actual hourly emissions.

6. The IP Mansfield Mill will include building downwash.

7. The modeling will be conducted using one comprehensive receptor grid encompassing the area surrounding both facilities. The grid will extends out a minimum of 20 kilometers in all directions from each facility. The grid will be based on the following specifications:

    a. 25-meter spacing around each facility's ambient air boundary;
    b. Beyond the ambient air boundary from each facility, 100-meter spaced receptors will be used out to 3-5 km depending on the direction from the facilities;
    c. Beyond the 100-meter spaced receptors a 250-meter spaced grid will be used out and additional 4-8 kilometers from each facility depending on the direction;
    d. Beyond the 250-meter spaced receptors a 500-meter spaced grid will be used out and additional 5 kilometers; and
    e. Beyond the 500-meter spaced receptors a 250-meter spaced grid will be used out and additional 10 kilometers.

8. Ambient background concentrations will be updated based on 2013-2015 data for the Shreveport Monitor. 2011-2013 was used as part of the TSD, however that data only represented 2013 as the monitor was shut down in 2011 and 2012. In addition, rather than conservatively adding the modeled design concentration with the monitored design concentration for this analysis, as a refinement, the ambient background will be combined with modeled concentrations on a seasonal hour-of-day basis in accordance with EPA guidance in their March 1, 2011 clarification memo[1] and as outlined in the SO_2 Modeling Technical Analysis Document (TAD)[2].

IP looks forward to receiving any comments that LDEQ has on these proposed modeling procedures.

Yours sincerely,

Jeffrey Connors
Air Quality Meteorologist
jeffrey.connors@aecom.com

cc\ Tegan Treadaway (LDEQ)
Louis Derose (IP)
Chris Gann (IP)
Brian E Heim (IP)
Sheryl Watkins (AECOM)

[1] http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

[2] Available at: https://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf

Appendix C

Modeling Archive CD