Technical Support Document
Arkansas

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.

Arkansas submitted updated recommendations on September 11, 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 Arkansas's recommendations and identifies the counties or portions of counties in Arkansas 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. Arkansas' Recommended and the EPA's Intended Designations

Area	Arkansas' Recommended Area Definition	Arkansas' Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Independence County, Arkansas	Independence County	Unclassifiable/ Attainment	Same as State's Recommendation	Unclassifiable
Jefferson County, Arkansas	Jefferson County	Unclassifiable/ Attainment	Same as State's Recommendation	Same as State's Recommendation

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 not 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 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

[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.

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).

Updated designations guidance was issued by the EPA through a March 20, 2015 memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, 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 monitored violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the state of Arkansas.[2] However, there are 2 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 technical support document, the EPA discusses its review and technical analysis of Arkansas' updated 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:

[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.

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.
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 Jefferson County, Arkansas Area

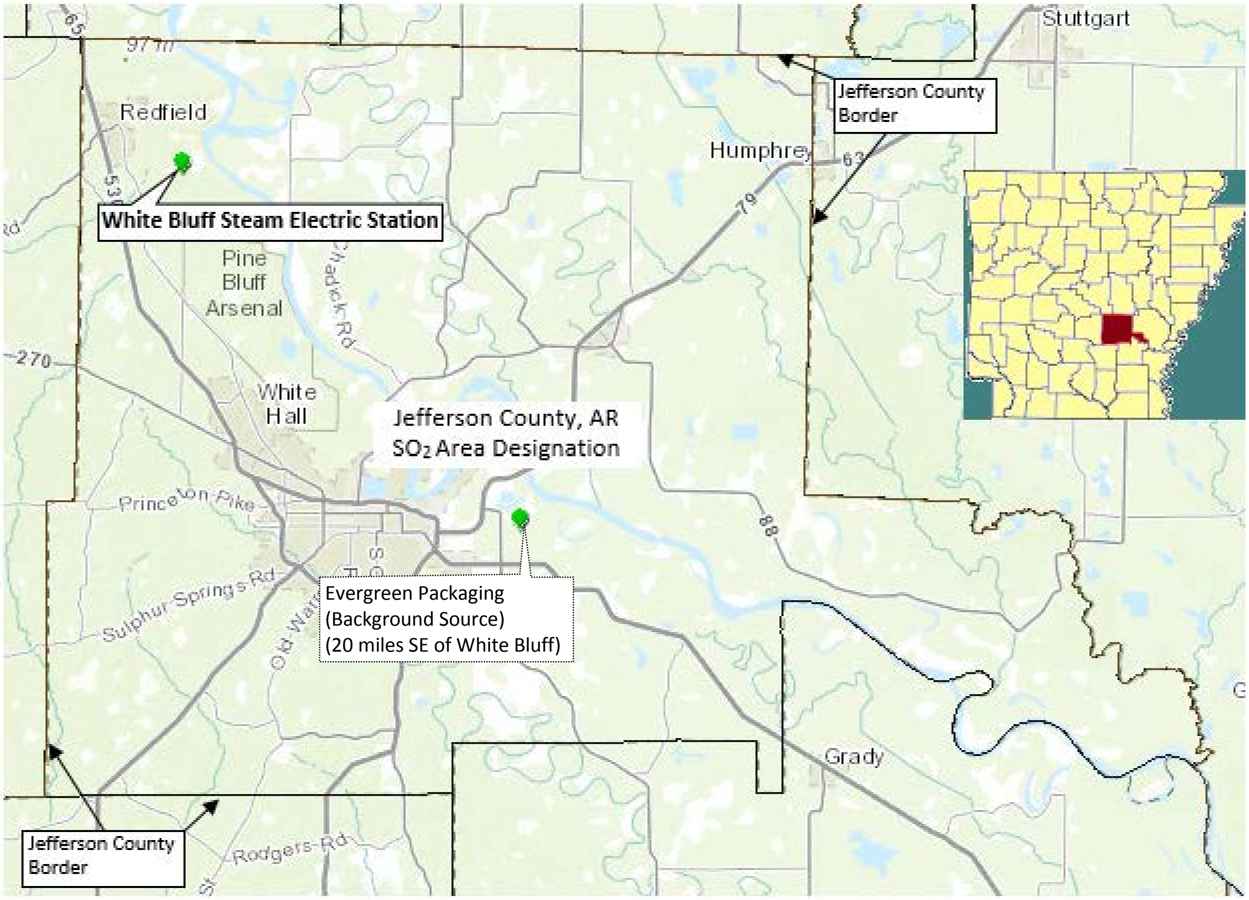
Introduction

The Jefferson County area 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 had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the White Bluff Steam Electric Station (White Bluff station) emitted 31,687 tons of SO_2, and had an emissions rate of 0.59 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 submission, Arkansas recommended that the area surrounding White Bluff station, specifically the entirety of Jefferson County, be designated as unclassifiable/attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees that the area is attaining the standard, and intends to designate Jefferson County as unclassifiable/attainment.

The White Bluff station is located in central Arkansas in the northeastern portion of Jefferson County. The facility is located approximately 38 km south of Little Rock, Arkansas. Included in Figure 1 is the EPA's intended unclassifiable/attainment designation county boundary for the area, which is the same recommended area as the state's unclassified/attainment designation.

Figure 1: The EPA's Intended Area Designation for White Bluff Steam Electric Station



The discussion and analysis that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's 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 Jefferson County. There are no SO_2 air quality monitors in surrounding counties that are representative of the maximum or higher elevated levels of SO_2 around the White Bluff station facility.

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 state used the most recent AERMOD version 15181, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

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 ran the model using the rural mode. The submittal did not specifically discuss why the rural mode was chosen. However, based on our review of aerial photography of the area surrounding the facility, the determination to run the model in rural mode appears appropriate.

Modeling Parameter: Area of Analysis (Receptor Grid)

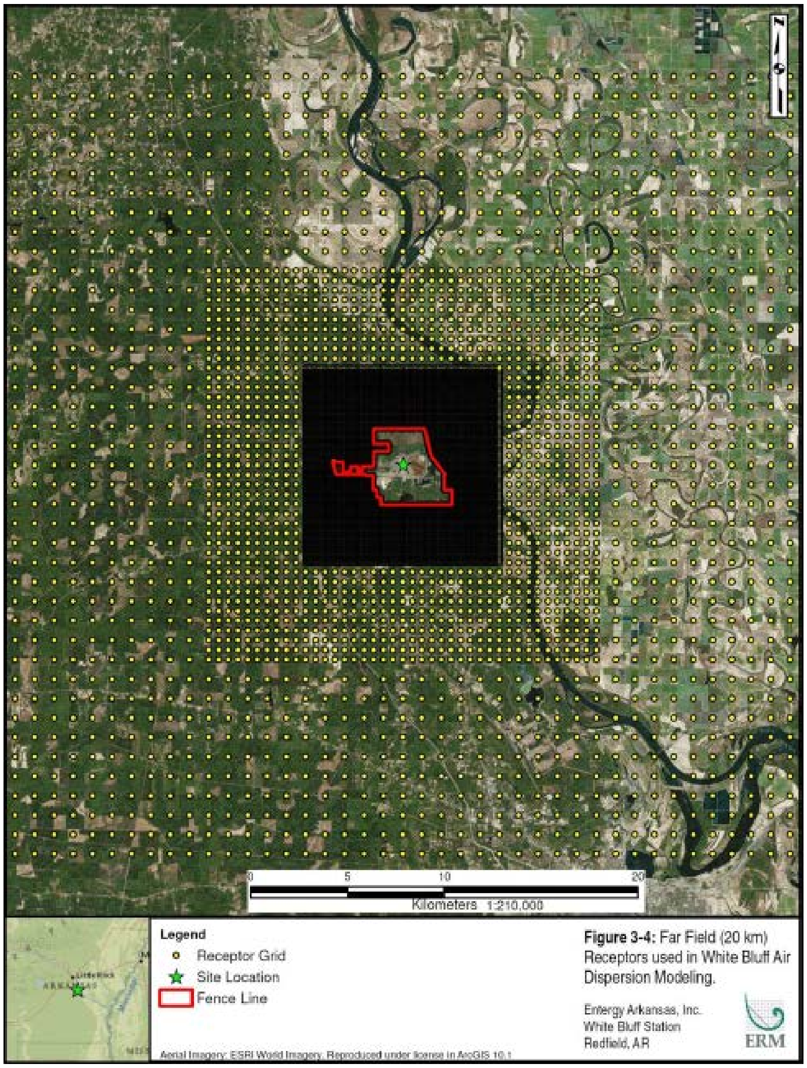
The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the White Bluff station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the 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. The Cartesian receptor grid consisted of the following receptor spacing:

- 50-meter spacing along the facility fence line;
- 100-meter spacing extending from the fence line to 5 kilometers;
- 500-meter spacing extending from 5 to 10 kilometers; and
- 1,000-meter spacing extending from 10 to 20 kilometers.

The spacing is appropriate since it captures the gradient changes in the impact contours from the facility, which show approximately 30-40% decreases within in each spacing selection (see Figure 6).

Figure 2 shows the state's chosen area of analysis surrounding the White Bluff station, as well as receptor grid for the area of analysis.

Figure 2: White Bluff Steam Electric Station Receptor Grid for the Area of Analysis



The submitted modeling did not exclude any specific areas from receptor placement. Instead, receptors were placed throughout the modeled area, which is a conservative approach and consistent with EPA guidance. The impacts of the area's geography and topography will follow in the appropriate section.

Modeling Parameter: Source Characterization

The state characterized the source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with actual emissions. The state also characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRIME was used to assist in addressing building downwash.

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 the White Bluff station and no other emitters of SO_2 within 20 km in the area of analysis. Evergreen Packaging is located 30 km southeast from White Bluff station, but the receptor placement is appropriate since it indicates no significant increases in the concentration gradients modeled beyond 20 km. This distance was selected because the state believes that this area of analysis adequately represents the area that could cause or contribute to a NAAQS violation in the vicinity of the affected source. No other sources beyond 20 km were determined by the state to have the potential to cause significant concentration gradient impacts within the area of analysis. The area of analysis and its associated annual actual SO_2 emissions between 2012 and 2014 are summarized in Table 2 below. Modeled stack parameters for contributing sources in the area of analysis can be seen in Table 3.

Table 2: Actual SO_2 Emissions 2012 – 2014 in the Jefferson County Area of Analysis

Company ID	**Facility Name**	**SO_2 Emissions tpy**		
		2012	**2013**	**2014**
Entergy	White Bluff Steam Electric Station	31,687	34,196	34,223

Table 3: Modeled Stack Parameters for Contributing Sources in Area of Analysis

Description	*Model Source*	*Stack Height*		*Exit Temperature*		*Exit Velocity*		*Stack Diameter*	
		(ft)	*(m)*	*(F)*	*(K)*	*(ft/sec)*	*(m/s)*	*(ft.)*	*(m)*
Unit 1 Boiler[1]	SN01	1000	304.80	---	---	---	---	25.7	7.83
Unit 2 Boiler[1]	SN02	1000	304.80	---	---	---	---	25.7	7.83
Auxiliary Boiler	SN05	15	4.57	475	519.25	65.0	19.81	3.0	0.91
Emergency Diesel Engine	SN21	24	7.32	963	790.54	----	0.001[2]	0.8	0.25
Emergency Fire Pump	SN22	14	4.27	1058	843.15	----	0.001[2]	0.5	0.15

For White Bluff station in the area of analysis, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. CEMS data was used to generate hourly emissions files for the affected sources.

There are two boilers in operation at the White Bluff station, Unit 1 and Unit 2. Units 1 and 2 are vented to a common, dual-flue stack. For these main units, three years (2012-2014) of actual hourly emissions, stack temperature, and exhaust flow rate data were input into the model. This emissions data was provided by Entergy from prior submittals to the EPA's Clean Air Markets Database, while temperature and exhaust flow rates were provided by Entergy from the facility CEM system. As per the Modeling TAD, the actual 1000 ft. height of the main stack was represented in each case. The two Units at the facility were modeled as separate sources, each emitting from their own flue.

The auxiliary boiler was also modeled using actual hourly emissions data. For this source, however, exhaust temperature and velocity were not available, so for all hours the exit temperature and velocity were set to the values located in the Arkansas Department of Environmental Quality (ADEQ) source registration tables for the auxiliary boiler.

The Emergency Diesel Generator and Emergency Fire Pump Engine at the facility both have horizontal exhaust releases. This is represented in the modeling by setting the exit velocity of each source to 0.001 meters per second (m/s) to simulate the lack of vertical momentum out of the stack. Emissions data were only available on a monthly total emission basis for each engine. To convert that data into an emission rate for modeling, for each engine the total annual emissions for each year was determined and the highest annual total selected. That total was then divided by 52 to represent that the engines are tested once per week during the year. The resulting emission rate was then used as the lb/hr emission rate in the modeling. Based on information provided by Entergy employees, the emergency generator is typically tested weekly on Wednesdays, while the fire pump is typically tested on Friday evenings. To simulate this standard practice, the emergency generator was set in the modeling using the HRDOW7 emission factor (i.e., variable by hour of day and 7 days per week) to emit during an 8 hour period on Wednesdays from 8 AM to 4 PM, and the fire pump was set to operate on Friday's from 4 PM until Midnight. While this significantly overestimates the total emissions of the emergency engines, because the form of the 1-hour SO_2 standard only considers the hour with the highest concentration each day, at least 7 of these hours are "dropped" and thus only one hour worth of emission is potentially included in the maximum daily impacts. We note that if these two emergency engines are operated less than an hour per week that it is likely conservative to add these sources in the modeling as it is unlikely they would impact the maximum modeled values if modeled with a temporally varying emission file.

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.

Three years (2012-2014) of surface observations from the NWS tower at Adams Field Airport in Little Rock, AR (WBAN No. 13963) and concurrent upper air data from North Little Rock Municipal Airport in North Little Rock, AR (WBAN No. 03952) were processed with the most recent version of AERMET (v.15181) the meteorological preprocessor for AERMOD, along with the two pre-processors to AERMET: AERSURFACE (v.13016) and AERMINUTE (v.14337). AERMET was applied to create the two meteorological data files required for input to AERMOD.

AERMET requires specification of site characteristics including surface roughness (z_o), albedo (r), and Bowen ratio (B_o). These parameters were developed according to the guidance provided by EPA in the AERMOD Implementation Guide (AIG) (EPA, 2008a) using AERSURFACE. The area within 1 km of the meteorological tower at Adams Field was broken into 12 sectors of 30 degrees each to analyze the surface characteristics in each 30 degree arc around the tower. AERMET uses the surface characteristics in the sector from which the wind approaches the tower as part of the meteorological data processing for each hour.

In AERSURFACE, the various land cover categories are linked to a set of seasonal surface characteristics. As such, AERSURFACE requires specification of the seasonal category for each month of the year. The following five seasonal categories are offered by AERSURFACE:

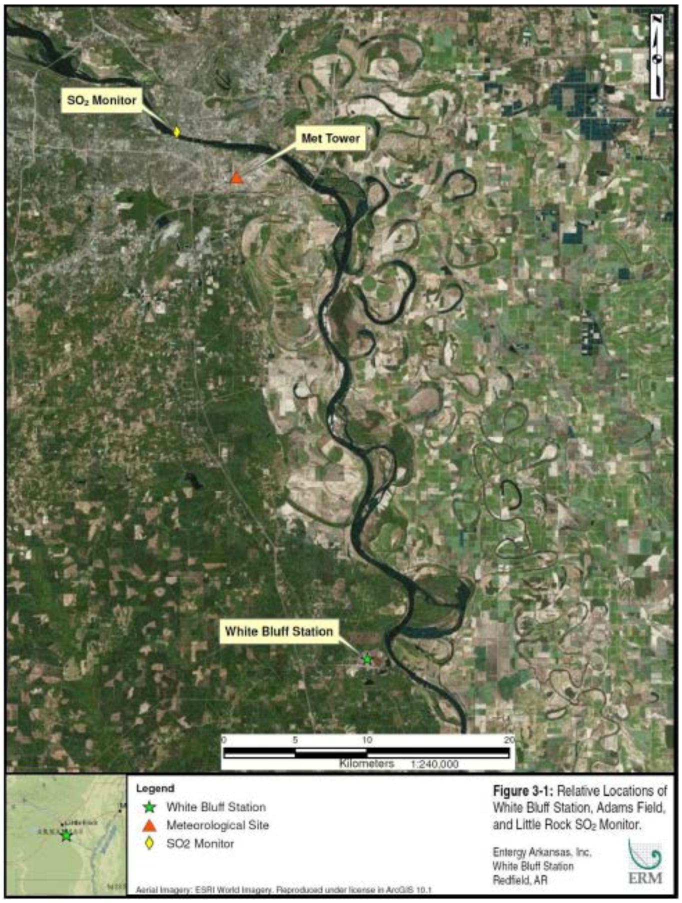
1. Midsummer with lush vegetation;
2. Autumn with unharvested cropland;
3. Late autumn after frost and harvest, or winter with no snow;
4. Winter with continuous snow on ground; and
5. Transitional spring with partial green coverage or short annuals.

The AERSURFACE run was performed using the seasonal temporal resolution option. The default seasonal distribution was used: December, January, and February were categorized as winter with no snow, March, April, and May as spring, June, July, and August as summer, and

September, October, and November as fall. The precipitation was assumed to be average over the 3-year period.

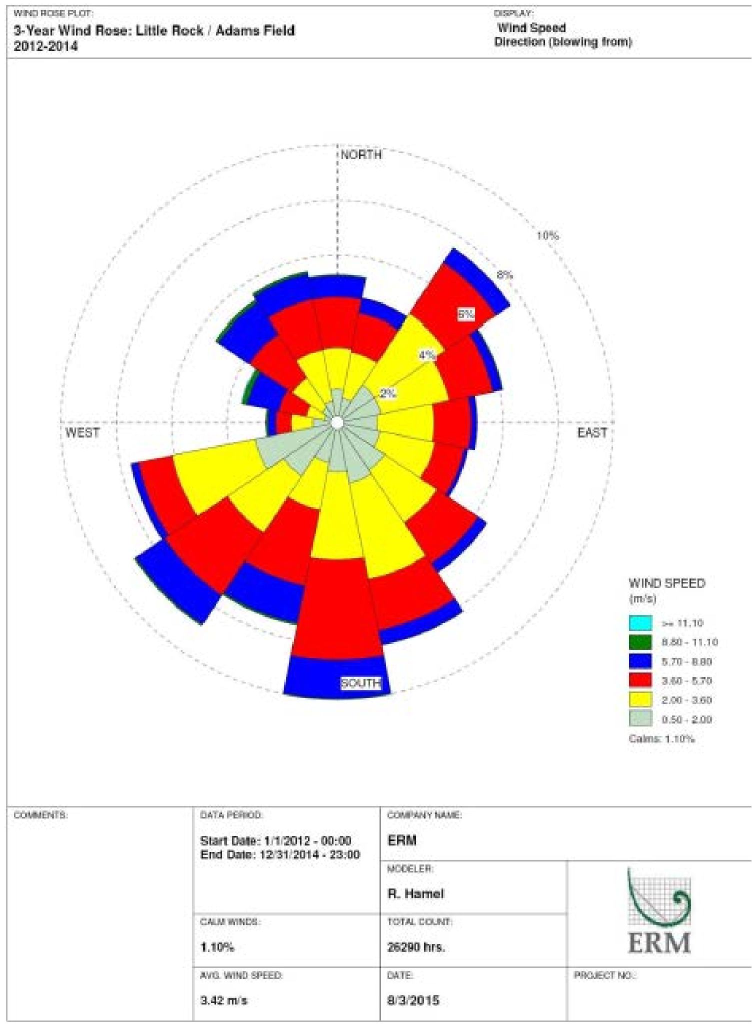
Additionally, 1-minute ASOS wind data, collected at the Adams Field meteorological tower, were processed using the AERMINUTE pre-processor for AERMET. Figure 3 shows the relative location of Adams Field and White Bluff station.

Figure 3: Meteorology Tower Location



The 3-year surface wind rose for Little Rock, Adam's Field, is depicted in Figure 4. In this figure, the frequency and magnitude of wind speed and direction are defined in terms of where the wind is blowing from. The distance from White Bluff station is 21.7 miles and the average wind speed is 3.42 m/s.

Figure 4: Little Rock-Adams Field Cumulative Annual Wind Rose for Years 2012 – 2014



Modeling Parameter: Geography and Terrain

Terrain elevations from National Elevation Data ("NED") from USGS were processed using the most recent version of AERMAP (v.11103) to develop the receptor terrain elevations required by AERMOD. NED data files contain profiles of terrain elevations, which in conjunction with receptor locations are used to generate receptor height scales. The height scale is the terrain elevation in the vicinity of a receptor that has the greatest influence on dispersion at that location and is used for model computations in complex terrain areas.

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 Jefferson County area of analysis, the state chose the second tier approach and calculated seasonal diurnal background concentrations at the Little Rock monitor (Monitor ID #05-119-0007). The background concentrations for this area of analysis are shown in Table 4, and these values were incorporated into the final AERMOD results. This approach is consistent with the EPA's Modeling TAD and March 1, 2011 memorandum titled, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS." While this memorandum nominally addresses NO_2, the document and its recommended approaches also apply to the 1-hour SO_2 NAAQS.[3]

Table. 4. Seasonal Diurnal SO_2 Concentrations at Little Rock Monitor (µg/m3)

Hour[1]	*Winter*	*Spring*	*Summer*	*Fall*
1	6.89	5.67	4.80	5.50
2	7.85	5.32	4.28	6.19
3	7.33	6.19	4.45	6.02
4	6.89	5.76	4.19	4.71
5	8.55	4.97	4.19	5.15
6	9.60	4.80	5.41	5.85
7	9.60	6.28	5.50	6.63
8	8.99	5.24	6.11	6.54
9	7.50	6.46	7.68	7.85
10	8.38	8.20	7.42	9.07
11	9.16	8.46	9.95	8.20
12	10.73	15.09	10.38	9.34
13	9.69	11.08	10.91	11.17
14	10.56	9.34	9.86	9.51
15	10.03	8.20	13.18	9.95
16	9.42	7.94	9.34	10.47
17	7.15	9.86	11.08	9.16
18	7.50	7.42	9.69	7.24
19	9.25	6.37	9.86	6.98
20	12.30	6.54	8.73	5.93
21	9.07	6.02	6.19	6.28
22	6.11	8.99	5.76	5.67
23	6.46	7.07	5.67	5.85
24	7.24	6.81	5.41	6.11

1. Hours in AERMOD are defined as hour-ending. i.e., Hour 1 is the period from midnight through 1 AM, etc.

[3] See http://www3.epa.gov/scram001/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf, p 19 - 20

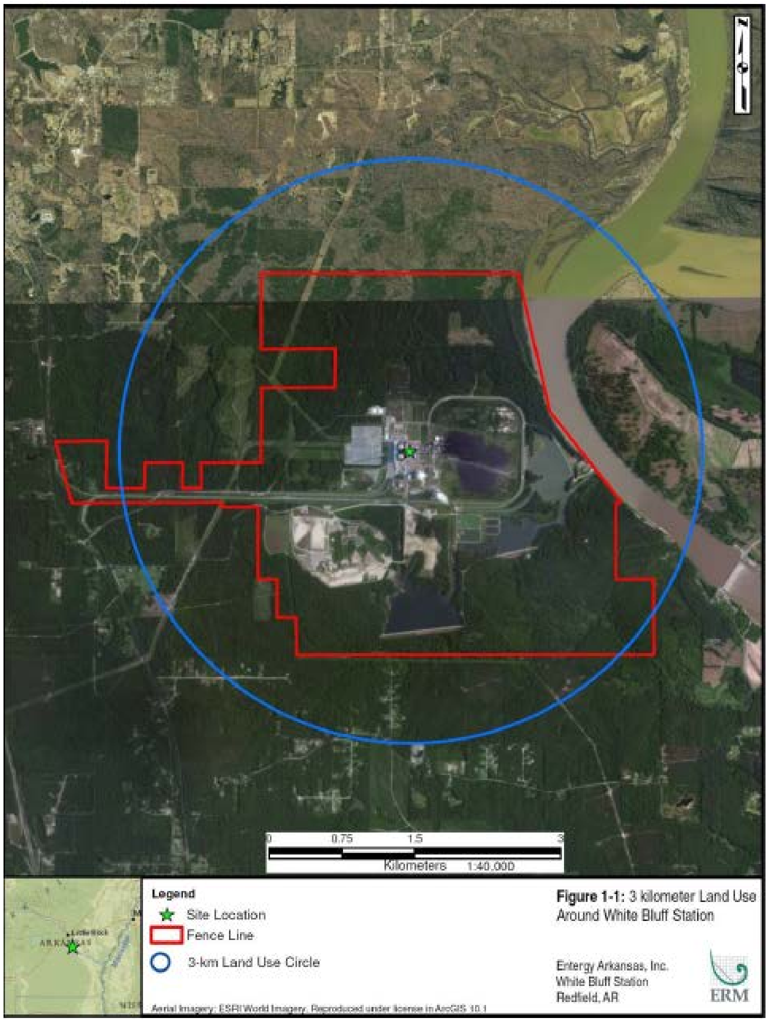
Summary of Modeling Results

The AERMOD modeling parameters for the Jefferson County area of analysis are summarized below in Table 5:

Table 5: AERMOD Modeling Parameters for the Jefferson County Area of Analysis

Jefferson County, OK Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	5
Modeled Structures	Yes
Modeled Fence Lines	Yes (see Figure 5)
Total receptors	-
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Adams Field in Little Rock
Upper Air Meteorology Station	North Little Rock Airport
Methodology for Calculating Background SO_2 Concentration	2nd tier monitoring data
Calculated Background SO_2 Concentrations	See Table 4

Figure 5: White Bluff Steam Electric Station Modeled Fence Line



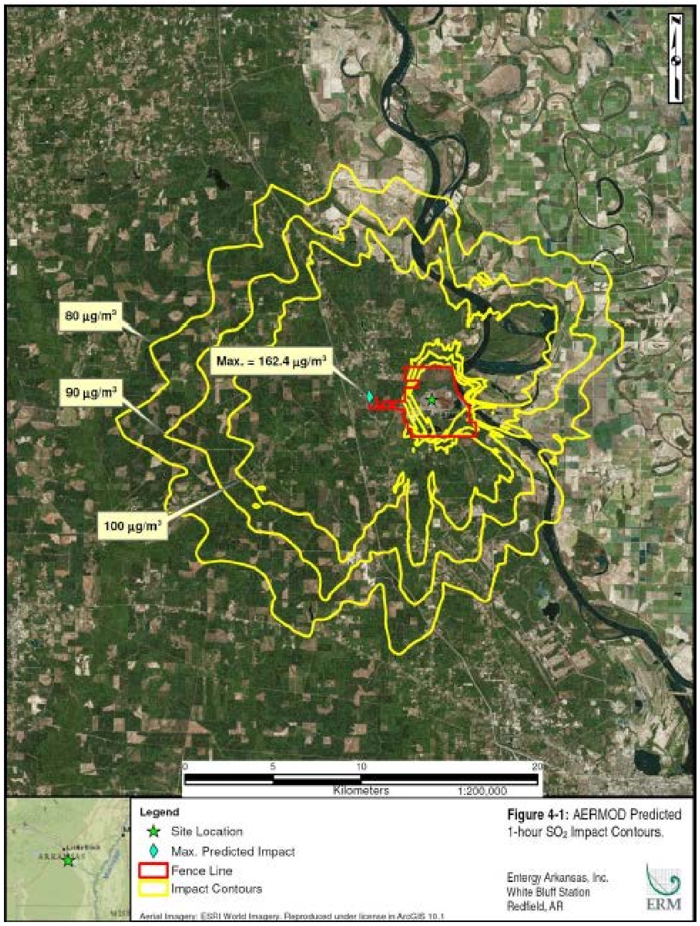
The results presented below in Table 6 show the magnitude of the highest predicted modeled concentration based on actual emissions.

Table 6: 2012 – 2014 Max Predicted 99th Percentile 1-Hour SO_2 Concentration in the Jefferson County Area of Analysis based on Actual Emissions

Source	*White Bluff Only*	*White Bluff and Background*	*1-hr. SO_2 NAAQS*	*Below NAAQS?*
White Bluff Station	153.7	162.4	196.5	Yes

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 162.4 μg/m^3, or 62.04 ppb. This modeled concentration included the background concentrations of SO_2, and is based on actual emissions from the facility. Figure 6 shows the modeled impacts from White Bluff station, including background concentration, with the maximum impact location identified by the blue diamond.

Figure 6: White Bluff Station Modeled Impacts



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the White Bluff station, other nearby sources, and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries.

One facility in Jefferson County which was not addressed by the state is located approximately 30 km southeast of the White Bluff station. According to the 2014 state emissions inventory, Evergreen Packaging in Pine Bluff emitted 1,077 tpy of SO_2, which is a decrease from the reported 2011 NEI emissions of 1,755 tpy. Based on the distance from White Bluff station (20 miles southeast) and available information, the EPA does not believe that emissions from Evergreen Packaging are likely to cause or contribute to a violation of the NAAQS within the Jefferson County area of analysis. For comparison, the modeled maximum concentration from White Bluff station which attains the NAAQS is less than 5 km from the facility. Based on available information and Evergreen Packaging's decreasing emissions over time when compared to those from White Bluff station which have been modeled to attain the NAAQS, the EPA does not have reason to believe that emissions from Evergreen Packaging are causing or contributing to a violation of the NAAQS elsewhere in Jefferson County.

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

Other Relevant Information

Additional modeling for the White Bluff facility was received from the Sierra Club. The submitter's modeling results assert that there are impacts in excess of the 1-hour SO_2 standard with a maximum-modeled concentration of 233.6 $\mu g/m^3$. However, our review of Sierra Club's modeling identified multiple errors in stack parameters, as well as less refined modeling approaches as compared with the state's submittal (ex. variable stack velocity and temperature were not included). Stack parameters need to be accurate to calculate the emission rate, plume dispersion effects, and ground level concentration that come from the stacks. The inaccuracy in Sierra Club's modeling of stack parameters appears to result from incorrect units on the stack temperatures. The modeled stack temperature values for the two units at White Bluff station corresponds to stack temperatures in degrees Fahrenheit taken from the facility's operating permit. Sierra Club did not convert these temperatures to Kelvin prior to running AERMOD resulting in a significantly lower modeled stack temperature and an underestimate in dispersion due to stack conditions (overestimating of off-site impacts). Sierra Club also did not include the additional refinement of variable stack parameters, as allowed by the modeling TAD, and was not as representative of daily operations when compared with the state's analysis. The state's modeling was determined to follow the modeling TAD more closely, and is more representative of actual operation conditions at White Bluff station. Therefore, our intended unclassifiable/attainment designation for Jefferson County is based on the state's analysis. The Sierra Club's modeling submittal, including modeling files and associated modeling report, are available for review as part of the docket for the SO_2 designations action.

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 White Bluff station as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the unclassifiable/attainment area is comprised of the entirety of Jefferson County.

When evaluating the modeling submitted by the state, no major issues were identified. The modeling shows attainment, and the modeling closely follows EPA guidance, including the TAD. Our decision to use Jefferson County as the boundary area for this designation is based upon the state's recommendation and its submitted analysis. Additionally, the EPA has confirmed that there are no other sources in Jefferson County or near its borders that based on available information lead us to believe they are likely to cause or contribute to a violation of the NAAQS within Jefferson County.

At this time, our intended designations for Arkansas 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 Arkansas by either December 31, 2017, or December 31, 2020.

Technical Analysis for the Independence County, Arkansas Area

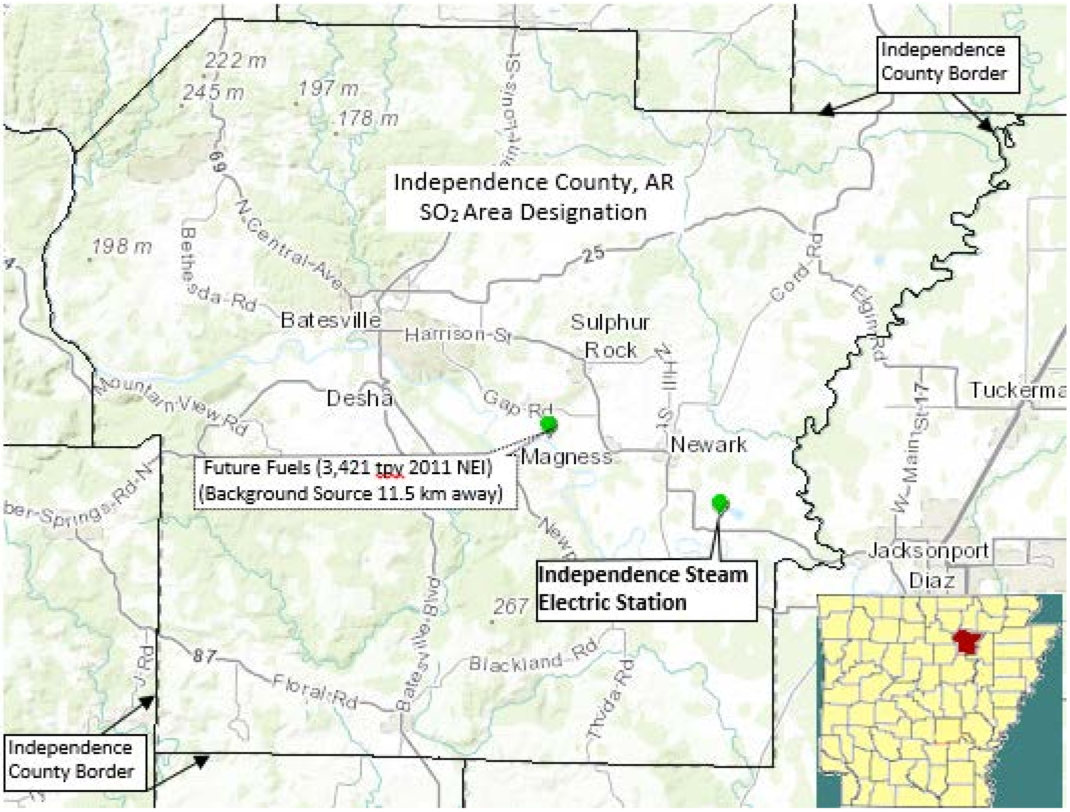
Introduction

The Independence County area contains a stationary source 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, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Independence Steam Electric Station (Independence station) emitted 32,974 tons of SO_2, and had an emissions rate of 0.59 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 submission, Arkansas recommended that the area surrounding the Independence station, specifically the entirety of Independence County, be designated as unclassifiable/attainment based on an assessment and characterization of impacts on air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA disagrees with the state's recommendation for the area, and intends to designate the area, specifically the entirety of Independence County, as unclassifiable.

The Independence station is located in northeastern Arkansas in the eastern portion of Independence County. The facility is located approximately 5 km southeast of Newark, Arkansas. Included in the figure is the EPA's intended unclassifiable designation county boundary for the area, which is the same recommended area as the state's unclassified/attainment designation.

Figure 1: The EPA's Intended Area Designation for Independence Steam Electric Station



The discussion and analysis that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's 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 Independence County. There are no SO_2 air quality monitors in surrounding counties that are representative of the maximum or higher elevated levels of SO_2 around the Independence station facility

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 state used the most recent AERMOD version 15181, and a discussion of the individual components will be referenced in the corresponding discussion that follows as appropriate.

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 with 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, as indicated in the modeling files, the state used the rural dispersion approach. Based on our review of aerial photography surrounding the facility, rural mode appears appropriate.

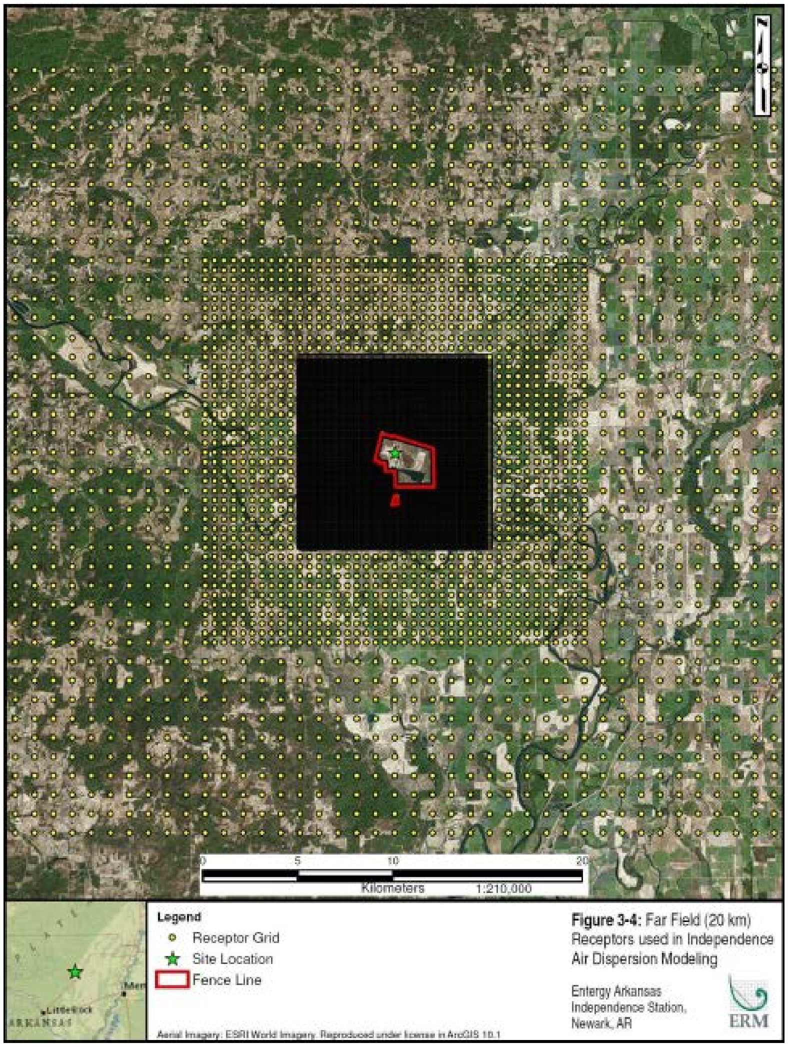
Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the Independence station 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. The Cartesian receptor grid consisted of the following receptor spacing:

- 50-meter spacing along the facility fence line;
- 100-meter spacing extending from the fence line to 5 kilometers;
- 500-meter spacing extending from 5 to 10 kilometers; and
- 1,000-meter spacing extending from 10 to 20 kilometers.

Figure 2 shows the state's chosen area of analysis surrounding the Independence station, as well as receptor grid for the area of analysis.

Figure 2: Independence Steam Electric Station Receptor Grid for the Area of Analysis



Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor and record ambient impacts. The impacts of the area's geography and topography will follow in the appropriate section.

Modeling Parameter: Source Characterization

The state characterized the source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with actual emissions for Independence station. The state also correctly characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRIME was used to assist in addressing building downwash.

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 using 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."

The state did not include any additional off-site emitters of SO_2 in its modeling analysis. As shown in Figure 1, Future Fuels is located approximately 11.5 km northwest of Independence station, within the area of analysis included in the modeled receptor grid. Future Fuels emitted 3,421 tpy SO_2 in 2012. The area of analysis and its associated annual actual SO_2 emissions between 2012 and 2014 are summarized below.

Table 1: Actual SO_2 Emissions 2012 – 2014 in the Independence County Area of Analysis

Company ID	Facility Name	SO_2 Emissions tpy		
		2012	2013	2014
Entergy	Independence Steam Electric Station	32,974	28,854	30,029

Table 2: Modeled Stack Parameters for Sources in Area of Analysis

Description	*Model Source*	*Stack Height*		*Exit Temperature*		*Exit Velocity*		*Stack Diameter*	
		(ft)	*(m)*	*(F)*	*(K)*	*(ft/sec)*	*(m/s)*	*(ft.)*	*(m)*
Unit 1 Boiler[1]	SN01	1000	304.80	---	---	---	---	25.7	7.83
Unit 2 Boiler[1]	SN02	1000	304.80	---	---	---	---	25.7	7.83
Auxiliary Boiler	SN05	15	4.57	475	519.26	65.0	19.81	3.0	0.91
Emergency Diesel Engine	SN20	14	4.27	963	790.54	----	0.001[2]	0.8	0.25
Emergency Fire Pump	SN22	14	4.27	700	644.26	----	0.001[2]	0.4	0.13

For Independence station, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. CEMS data was used to generate hourly emissions files for the affected sources.

There are two boilers in operation at the Independence station, Unit 1 and Unit 2. Units 1 and 2 are vented to a common, dual-flue stack. For these main units, three years (2012-2014) of actual hourly emissions, stack temperature, and exhaust flow rate data were input into the model. This emissions data was provided by Entergy from prior submittals to the EPA's Clean Air Markets Database, while temperature and exhaust flow rates were provided by Entergy from the facility CEM system. As per the Modeling TAD, the actual 1000 ft. height of the main stack was represented in each case. The two Units at the facility were modeled as separate sources, each emitting from their own flue. This is a conservative representation because it neglects potentially enhanced buoyancy from a combined plume from both flues.

The auxiliary boiler was also modeled using actual hourly emissions data. For this source, however, exhaust temperature and velocity were not available, so for all hours the exit temperature and velocity were set to the values located in the ADEQ source registration tables for the auxiliary boiler.

The two emergency engines at the facility both have horizontal exhaust releases. This is represented in the modeling by setting the exit velocity of each source to 0.001 m/s to simulate the lack of vertical momentum out of the stack. Emissions data were only available on a month by month total emission basis for each engine. To convert that data into an emission rate for modeling, for each engine the total annual emissions for each year was determined and the highest annual total selected. That total was then divided by 52 to represent that the engines are tested once per week during the year. The resulting emission rate was then used as the lb/hr emission rate in the modeling. Based on information provided by facility staff, the emergency generator is tested weekly on Wednesdays, while the fire pump is tested on Friday evenings. To simulate this standard practice, the emergency generator was set in the modeling using the HRDOW7 emission factor (i.e., variable by hour of day and 7 days per week) to emit during an 8 hour period on Wednesdays from 8 AM to 4 PM, and the fire pump was set to operate on Friday's from 4 PM until Midnight. While this tends to overestimate the total emissions of the emergency engines, because the form of the 1-hour SO_2 standard only considers the hour with the highest concentration each day, at least 7 of these hours are "dropped" and thus only one hour worth of emission is potentially included in the maximum daily impacts. We note that if these two emergency engines are operated less than an hour per week that it is likely conservative to add these sources in the modeling as it is unlikely they would impact the maximum modeled values if modeled with a temporally varying emission file.

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.

Guidance for regulatory air quality modeling recommends the use of one year of on-site meteorological data or five years of representative off-site meteorological data. The SO_2 Modeling TAD however, specifies that 3 years of meteorological data concurrent to the actual emissions data being input into the model be used. Since on-site data are not available for the Independence station, meteorological data available from the National Weather Service (NWS) were used in this analysis.

Three years (2012-2014) of surface observations from the NWS tower at Adams Field Airport in Little Rock, Arkansas (WBAN No. 13963) and concurrent upper air data from North Little Rock Municipal Airport in North Little Rock, Arkansas (WBAN No. 03952) were processed with the most recent version of AERMET (v.15181) the meteorological preprocessor for AERMOD, along with the two pre-processors to AERMET: AERSURFACE (v.13016) and AERMINUTE (v.14337). AERMET was applied to create the two meteorological data files required for input to AERMOD.

AERMET requires specification of site characteristics including surface roughness (zo), albedo (r), and Bowen ratio (Bo). These parameters were developed according to the guidance provided by EPA in the AERMOD Implementation Guide (AIG) (EPA, 2008a) using AERSURFACE. The area within 1 km of the meteorological tower at Adams Field was broken into 12 sectors of 30 degrees each to analyze the surface characteristics in each 30 degree arc around the tower. AERMET uses the surface characteristics in the sector from which the wind approaches the tower as part of the meteorological data processing for each hour.

In AERSURFACE, the various land cover categories are linked to a set of seasonal surface characteristics. As such, AERSURFACE requires specification of the seasonal category for each month of the year. The following five seasonal categories are offered by AERSURFACE:

1. Midsummer with lush vegetation;
2. Autumn with unharvested cropland;
3. Late autumn after frost and harvest, or winter with no snow;

4. Winter with continuous snow on ground; and
5. Transitional spring with partial green coverage (short annuals).

The AERSURFACE run was performed using the seasonal temporal resolution option. The default seasonal distribution was used: December, January, and February were categorized as winter with no snow, March, April, and May as spring, June, July, and August as summer, and September, October, and November as fall. The precipitation was averaged over the 3-year period.

Additionally, 1-minute ASOS wind data, collected at the Adams Field meteorological tower, were processed using the AERMINUTE pre-processor for AERMET. Figure 3 shows the 3-year wind rose for Adams Field; Figure 4 shows the relative location of Adams Field and Independence station; and the data characteristics of Adams Field are shown in Table 3.

The 3-year surface wind rose for Little Rock, Adam's Field, is depicted in Figure 3. In this figure, the frequency and magnitude of wind speed and direction are defined in terms of where the wind is blowing from. The distance from Independence station is 80.1 miles and the average wind speed is 3.42 m/s.

Figure 3: Little Rock-Adams Field Cumulative Annual Wind Rose for Years 2012 – 2014

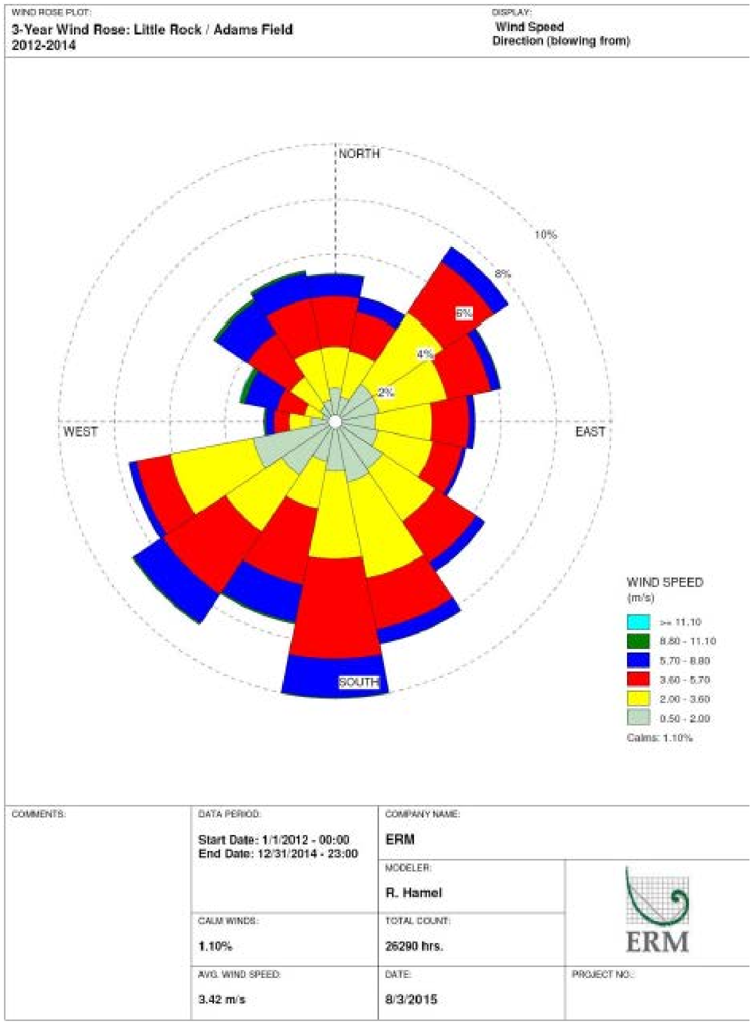


Figure 4: Meteorology Tower Location

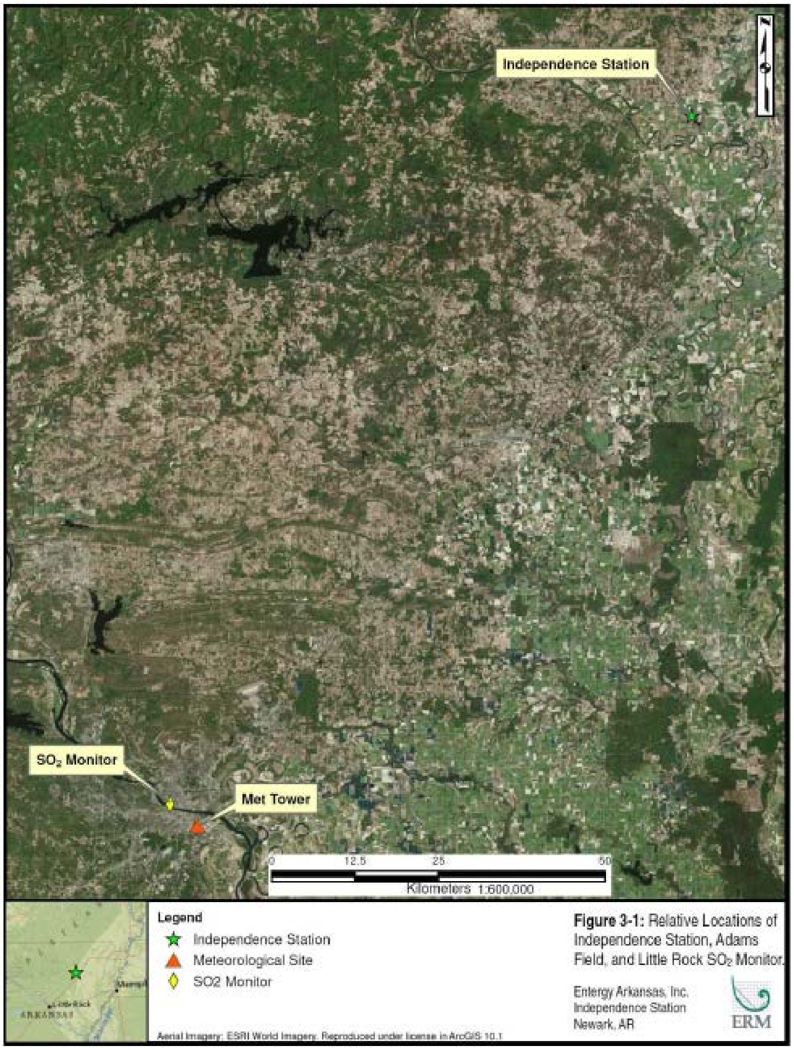


Table 3: Characteristics of Adams Field Met Station

Distance from White Bluff Station	21.7 miles
Average Wind Speed	3.42 m/s
Percent Calm Hours	1.10%
Data Completeness	99.95%

Modeling Parameter: Geography and Terrain

Terrain elevations from National Elevation Data ("NED") from USGS were processed using the most recent version of AERMAP (v.11103) to develop the receptor terrain elevations required by

AERMOD. NED data files contain profiles of terrain elevations, which in conjunction with receptor locations are used to generate receptor height scales. The height scale is the terrain elevation in the vicinity of a receptor that has the greatest influence on dispersion at that location and is used for model computations in complex terrain areas.

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 99^{th} percentile monitored concentrations by hour of day and season or month. For the Independence County area of analysis, the state chose background concentrations based on the most recent complete years of available monitoring data. A review of the data showed that the most representative monitor for use in the modeling is located in Little Rock (Monitor ID# 05-119-0007). EPA's Modeling TAD and other guidance allows for a temporally varying approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. The modeling was performed with a set of seasonal diurnal values developed using the methodology described in the EPA's March 1, 2011 Clarification Memorandum titled, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard." While this memorandum nominally addresses NO_2, the document and its recommended approaches also apply to the 1-hour SO_2 NAAQS.[4]

[4] See http://www3.epa.gov/scram001/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf, p 19 - 20

Table 4: Background Seasonal Diurnal SO_2 values for the Area of Analysis

Hour[1]	Winter	Spring	Summer	Fall
1	6.89	5.67	4.80	5.50
2	7.85	5.32	4.28	6.19
3	7.33	6.19	4.45	6.02
4	6.89	5.76	4.19	4.71
5	8.55	4.97	4.19	5.15
6	9.60	4.80	5.41	5.85
7	9.60	6.28	5.50	6.63
8	8.99	5.24	6.11	6.54
9	7.50	6.46	7.68	7.85
10	8.38	8.20	7.42	9.07
11	9.16	8.46	9.95	8.20
12	10.73	15.09	10.38	9.34
13	9.69	11.08	10.91	11.17
14	10.56	9.34	9.86	9.51
15	10.03	8.20	13.18	9.95
16	9.42	7.94	9.34	10.47
17	7.15	9.86	11.08	9.16
18	7.50	7.42	9.69	7.24
19	9.25	6.37	9.86	6.98
20	12.30	6.54	8.73	5.93
21	9.07	6.02	6.19	6.28
22	6.11	8.99	5.76	5.67
23	6.46	7.07	5.67	5.85
24	7.24	6.81	5.41	6.11

1. Hours in AERMOD are defined as hour-ending. i.e., Hour 1 is the period from midnight through 1 AM, etc.

Summary of Modeling Results

The AERMOD modeling parameters for the Independence County area of analysis are summarized below in Table 5:

Table 5: AERMOD Modeling Parameters for the Independence County Area of Analysis

Independence County, Arkansas Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	5
Modeled Structures	Yes
Modeled Fence Lines	Yes (see Figure 5)
Total receptors	Large Grid (20 km)

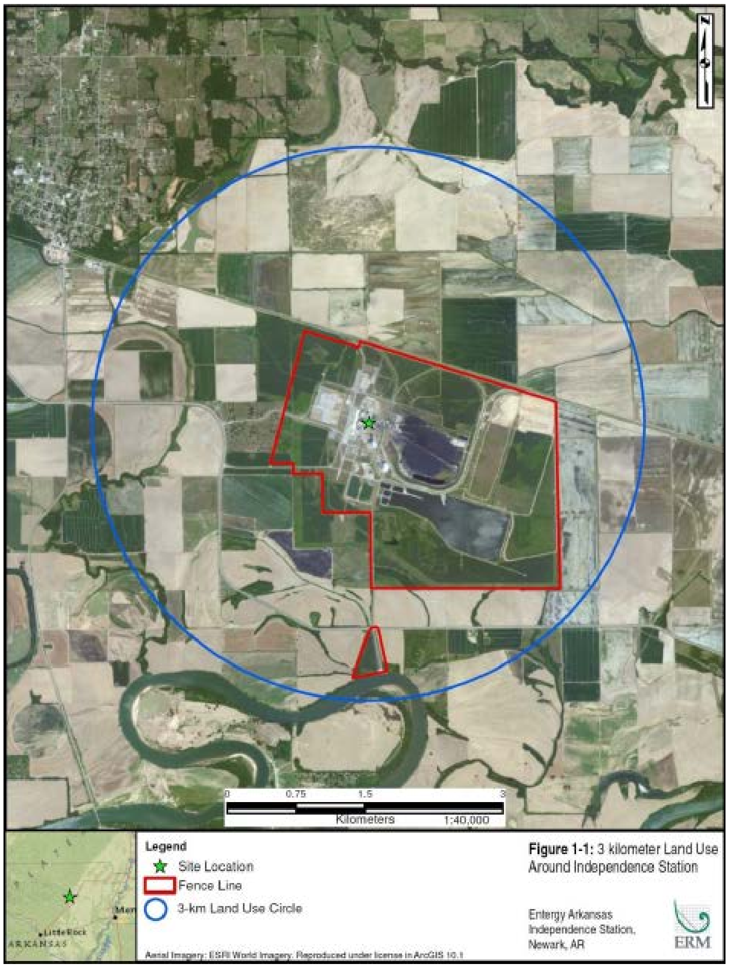
	13,812 receptors
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Adams Field in Little Rock
Upper Air Meteorology Station	North Little Rock Airport
Methodology for Calculating Background SO_2 Concentration	Seasonal and Diurnal background Values Little Rock monitor
Calculated Background SO_2 Concentration	Seasonal Diurnal Values Used (See Table 5)

The results presented below in Table 6 show the magnitude of the highest predicted modeled concentration based on actual emissions.

Table 6: 2012 – 2014 Max Predicted 99th Percentile 1-Hour SO_2 Concentration in the Independence County Area of Analysis based on Actual Emissions

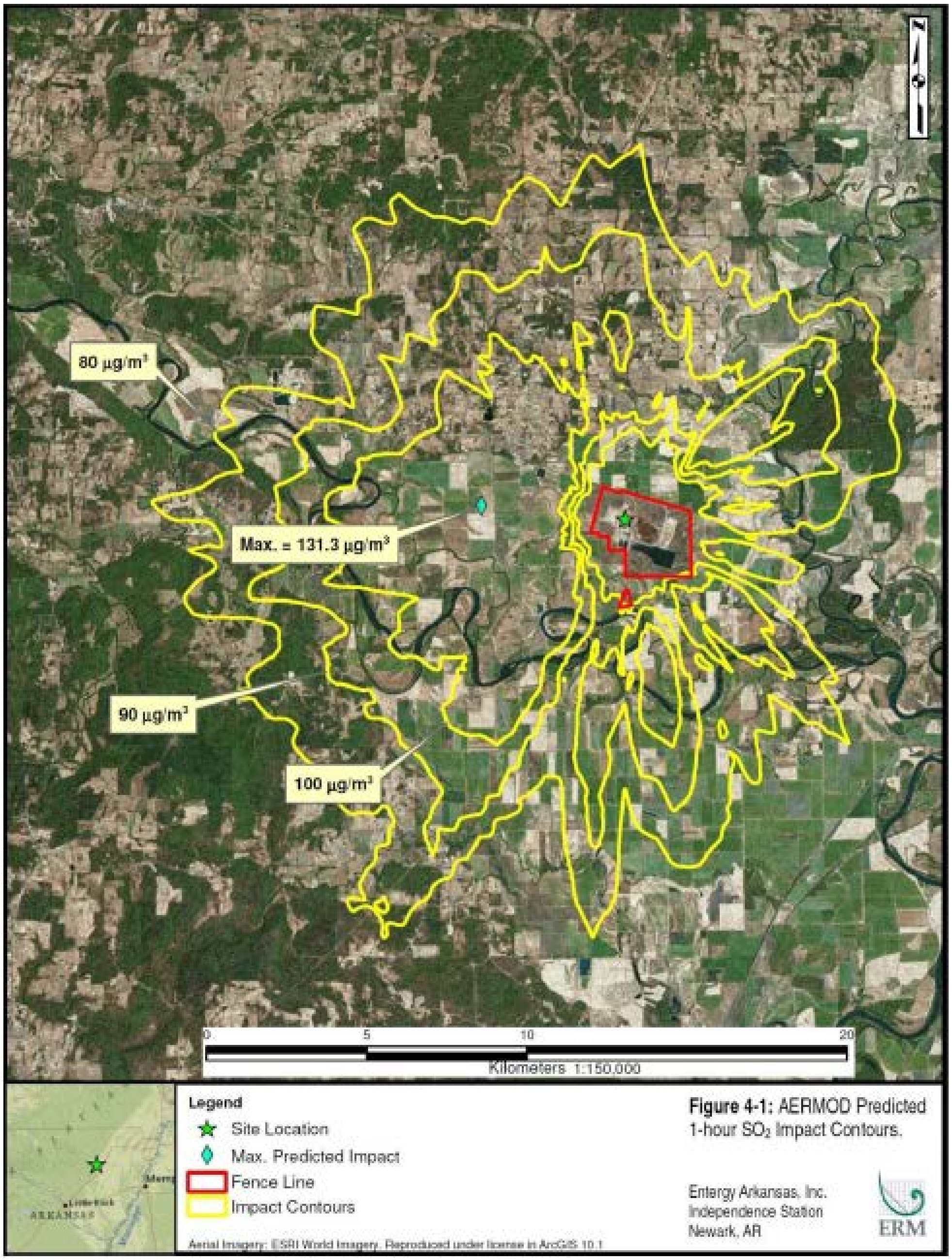
Source	*Independence Only*	*Independence and Background*	*1-hr. SO_2 NAAQS*	*Below NAAQS?*
Independence Station	122.2	131.3	196.5	Yes

Figure 5: Independence Steam Electric Station Modeled Fence Lines



The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 131.3 $\mu g/m^3$, or 50.16 ppb. The modeled concentration is based on actual emissions from the facility and included the background concentration of SO_2.

Figure 6: Independence Modeled Impacts



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the Independence station and background is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable area, specifically with respect to clearly defined legal boundaries.

There is one other emitter of SO_2, Future Fuels, located approximately 12 km to the northwest of Independence station. The state did not include this facility in its modeling analysis, and the EPA is not prepared at this time to fully assess the expected maximum impacts from Future Fuels when considered alone, or in tandem with Independence station. We are also not prepared to assume that the emissions are captured fully by the background estimate since a temporally varying approach was used. As discussed in additional modeling we have reviewed, Future Fuels has very large impacts in Independence County and it is necessary to include Future Fuels directly in the modeling because of the size of their impacts. According to the 2011 NEI, there are no other sources emitting at or above 100 tpy of SO_2 in Independence County, or in any neighboring county. As a result, we do not have reason to believe that sources in any neighboring county have the potential to cause or contribute to a violation of the NAAQS within Independence County. The EPA believes that our intended unclassifiable area, consisting of Independence County, Arkansas, 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:

Additional modeling for the Independence station was received from the Sierra Club on September 30, 2015. It showed impacts in excess of the 1-hour SO_2 NAAQS. The modeling included emissions from two main Independence station stacks and Future Fuels. The modeling analysis indicated that many receptors were above the standard, with a maximum SO_2 concentration of 586 $\mu g/m^3$ (224 ppb). In November 2015, ADEQ and Entergy (Independence station) submitted modeling to the EPA in response to Sierra Club's September 30, 2015 submission. The cumulative modeled emission results for Future Fuels were similar to those provided by Sierra Club. Both sets of modeling confirm that Future Fuels has exceedances, but there is disagreement on whether those exceedances actually contribute to the impacts from Independence station. Sierra Club reported that those exceedances contribute, whereas ADEQ and Entergy (Independence station) reported that they do not.

The EPA's review of the Sierra Club's modeling analysis identified areas that were either inconsistent with, or as not as refined as the Modeling TAD recommends. For example, Sierra Club did not include variable stack velocity and temperature for the Independence station stacks, and they utilized actual annualized emissions from the 2012 State Emissions Inventory to calculate Future Fuel's emission rate. The Independence station modeling report submitted in November 2015 followed the Modeling TAD more closely by including source apportionment. This analysis indicated that the contribution of emissions from Independence station compared to the modeled exceedances was not above the interim 1-hr SO_2 SIL. However, the emission rates used in the Independence station modeling were obtained from Sierra Club modeling, which were inconsistent with the Modeling TAD, specifically with respect to the emissions from Future Fuels. As a result, the EPA believes that the extent and temporal pattern of the potential modeled nonattainment due to Future Fuels has not been adequately characterized. Consequently, the EPA does not have sufficient information to accurately assess the potential contribution of Independence station from either set of modeling. The analysis and evaluation of the Independence facility impacts cannot be completed until the modeling inputs are refined to include Future Fuels' emissions in a manner that is consistent with the Modeling TAD.

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 Independence station as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of all area within the Independence County borders. Our decision is based on the state's recommendation and modeling results provided by various parties.

The initial modeling provided by the state did not include emissions from sources near Independence station which may have an impact on air quality. Specifically, the state did not include emissions from Future Fuels. Sierra Club's modeling for the area around Independence station asserting violations of the NAAQS, which included emissions from Future Fuels, was premised on several factors that are inconsistent with the Modeling TAD. Lastly, while the state provided a response to Sierra Club's modeling, the EPA believes that without a comprehensive emissions profile for the area, including emissions from Future Fuels, air quality in the area has not been sufficiently characterized to inform an intended designation other than unclassifiable. The EPA notes that the state has submitted its list of sources that must be characterized under the SO_2 Data Requirements Rule,[5] and Future Fuels' inclusion on the list requires the state to characterize its emissions in accordance with all applicable regulatory requirements. Based on all available information, including the reasons discussed above, the EPA is unable at this time to determine whether the area is meeting or not meeting the NAAQS.

At this time, our intended designation for the state only applies 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 Arkansas by either December 31, 2017, or December 31, 2020.

[5] 80 FR 51052.