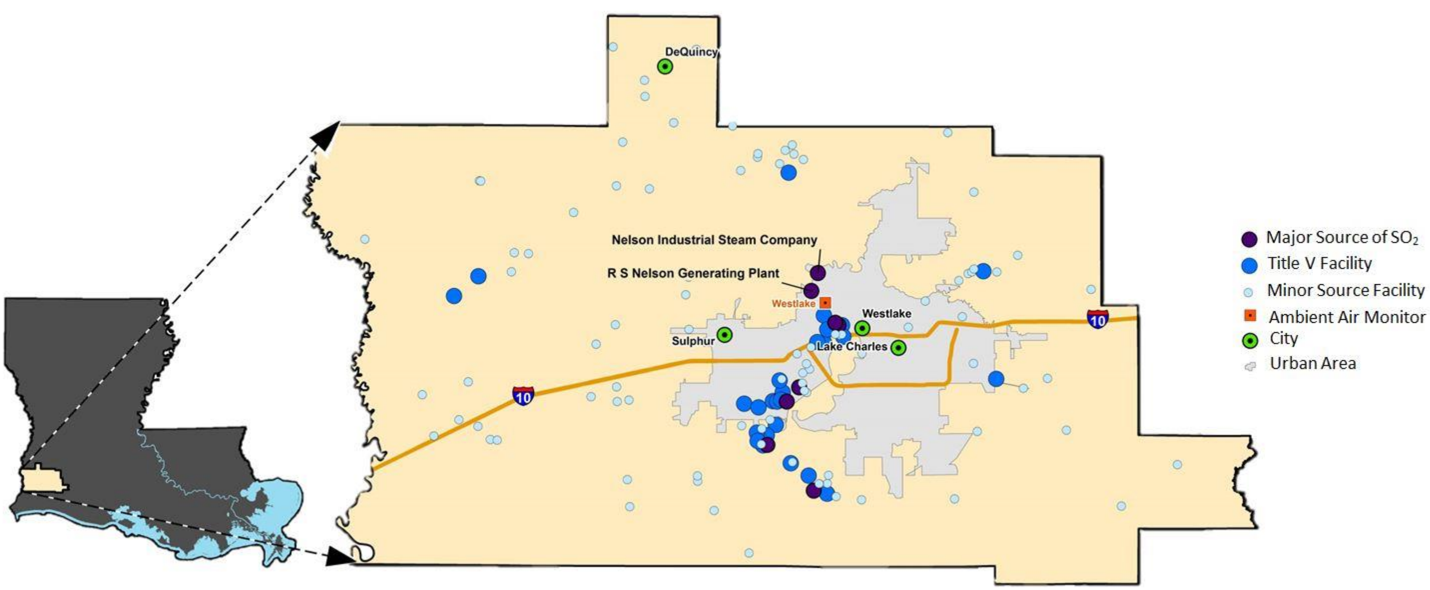
Calcasieu Parish Support Document

On March 2, 2015, a consent decree (CD) was filed in the United States District Court for the Northern District of California, San Francisco Division, which settled a suit between the United States Environmental Protection Agency (US EPA), the Sierra Club, and the Natural Resources Defense Council (Case No. 1-cv-03953). The CD requires US EPA to promulgate remaining area designations under the Primary National Ambient Air Quality Standard (NAAQS) for Sulfur Dioxide (SO_2) in three phases: by July 2, 2016; December 31, 2017; and December 31, 2020.

The first phase of required designations address, in part, sources that according to US EPA's Air Markets Database emitted more than 16,000 tons of SO_2 or emitted more than 2,600 tons of SO_2 and had an average emission rate of 0.45 lbs. of SO_2/mmbtu or higher in 2012. Three such facilities were identified in Louisiana, including two located in Calcasieu Parish and one in De Soto Parish; both Calcasieu Parish facilities are located in the city of Westlake. Nelson Industrial Steam Company (NISCO), operated by Entergy Gulf States Louisiana, L.L.C (EGSL), had an average emission rate of 0.69 lbs. of SO_2/mmbtu in 2012. R S Nelson Generation Plant (Nelson), owned and operated by EGSL, had an average emission rate of 0.46 lbs. of SO_2/mmbtu in 2012.

Calcasieu Parish is located in the southwest corner of Louisiana. The parish encompasses 1,063.66 square miles and has a population of 197,204 according to the latest census data. Lake Charles is the parish seat; the parish also includes the cities of DeQuincy, Sulfur, and Westlake.[1] As of September 1, 2015, the Louisiana Department of Environmental Quality (LDEQ) recognized 128 permitted facilities as follows: 8 facilities that are permitted as major sources of SO_2; 29 other Title V facilities; and 91 minor source facilities with approximately 75 of those falling into the oil and gas sector. LDEQ operates an ambient air monitor (Westlake Monitor) in Calcasieu Parish to monitor air quality in the Lake Charles metropolitan statistical area. the State and Local Air Monitoring Station (SLAMS) monitor, identified as EPA AQS 220190008, uses U.V. Fluorescence and operates continuously for SO_2 monitoring purposes, *see figure 1*.

Figure 1: Calcasieu Parish Permitted Facilities



NISCO is a cogeneration plant owned as partnership among CITGO Petroleum Corporation, Phillips 66 Company, EGSL, and Sasol Chemicals (USA) LLC located in Westlake, Louisiana. The facility is operated by EGSL and currently operates under the following permits:

- Title V Permit Number 0520-00157-V3, issued July 17, 2013; and
- Prevention of Significant Deterioration Permit Number PSD-LA-557 (M-1), issued January 5, 2012.

Nelson is a three unit fossil-fueled steam/electric generation facility also located in Westlake, Louisiana. EGSL operates the facility under the following permits:

- Title V Permit Number 0520-00014-V2, issued October 4, 2013; and
- Acid Rain Title IV Permit No. 0520-00014-IV2, issued October 4, 2013.

According to Louisiana's emission reporting database as of September 15, 2015, 28,942 tons of SO_2 were emitted in 2014. The 8 largest SO_2 emitters represent 99.5% of the SO_2 emitted in the parish, *see table 1*. SO_2 emissions in Calcasieu Parish have seen a reduction of approximately 30% or 7,650 tons since the 2010 SO_2 NAAQS was promulgated, *see figure 4*. These reductions were made possible by the installation of a sulfur dioxide scrubber by the Lake Charles Calcining Plant, LDEQ agency interest number (AI) 3439, in December 2012.

The data provided is consistent with the data provided on US EPA's website regarding SO_2 emissions in Calcasieu Parish.[2]

Table 1: Calcasieu Parish Title V Facilities' Emissions[3]

Agency Interest Number	Facility	2014 SO_2 Emissions (TPY)
19588	Entergy Gulf States LA LLC - Nelson Electric Generating Plant*	10543.56
9142	Entergy Gulf States LA LLC - Nelson Industrial Steam Company*	6106.71
133	Reynolds Metals Co - Lake Charles Carbon Co*	4926.37
3439	Rain CII Carbon LLC- Lake Charles Calcining Plant*	4431.75
1250	Citgo Petroleum Corp - Lake Charles Manufacturing Complex*	1731.44
11496	Louisiana Pigment Co LP - Titanium Dioxide Plant*	524.81
2538	Phillips 66 Co - Lake Charles Refinery*	510.00
7835	Agrilectric Power Partners Ltd	62.79
101748	Air Products & Chemical Inc - Lake Charles Facilityǂ	26.91
3271	Sasol North America Inc - Lake Charles Chemical Complex*	21.65
1255	Eagle US 2 LLC - Lake Charles Complex	17.89
30168	Targa Midstream Services Limited Partnership - Lake Charles LPG Fractionator	11.21
188813	Big Lake Fuels LLC	10.90†
185422	PPG Industries Inc - Silica Plant	10.36
6164	Westlake Petrochemicals LLC - Ethylene Manufacturing Complex	7.08
3585	Calcasieu Refining Co - Lake Charles Crude Oil Refinery	2.21
42895	Sulphur Plant	1.60
119861	Starks Gas Storage LLC - Starks Compressor Station	1.34†

Agency Interest Number	Facility	2014 SO_2 Emissions (TPY)
1251	Grace Division	1.23
184545	Cameron Interstate Pipeline LLC - Holbrook Compressor Station	1.16†
4013	Georgia Gulf Lake Charles LLC - VCM Plant	0.98
18070	Westlake Styrene LLC - Styrene Monomer Production Facility	0.85
1253	Equistar Chemicals LP	0.71
81859	Entergy Gulf States LA LLC - Calcasieu Plant	0.66
1244	Firestone Polymers LLC - Lake Charles Facility	0.60
9061	Westlake Polymers LLC - Polyethylene I & II Plants	0.23
3351	Lake Charles LNG Term	0.19
4777	Tennessee Gas Pipeline Co - Station 820 C-1	0.08
26073	Bio-Lab Inc, A KIK Custom Product Company	0.07
17904	Westlake Styrene LLC - Marine Terminal	0.04
1006	Citgo Pipeline Co - Clifton Ridge Terminal	0.02†
2979	Central Crude Inc - Gillis English Bayou Terminal	0.02†
3766	Citgo Petroleum Corp - Lake Charles Truck Loading Facility	0.01†
16996	Phillips 66 Co - Westlake Petroleum Product Terminal	0.01
27518	Westlake Petrochemicals LLC - Poly III	0.01†
37119	Citgo Pipeline Co - Pecan Grove Tank Farm	0.01
682	Phillips 66 Pipeline LLC - Lake Charles Pipeline Facility	0.00

*Major sources of SO_2 emissions
†Permit limit; actual emissions not reported
ǂTitle V due to CO_2e. Permit converted to minor source 5/1/2015

As previously discussed, LDEQ operates one SLAMS monitor in Calcasieu Parish. In addition to the Westlake Monitor, the Lake Area Industry Alliance (LAIA) operates two SO_2 monitors: the LAIA North Site/Mossville monitor (LAIA North Monitor); and the LAIA South Site/Bayou D'Inde monitor (LAIA South Monitor), *see figure 3*. Based on data from the three monitors, the concentration of SO_2 in the form of the standard, the 3-year average of the 99th percentile of the annual distributions of 1-hour daily maximum concentrations (Design Value, DV), is also declining. In fact, all three monitors are in compliance with the 2010 SO_2 NAAQS, *see figure 4*. Data from the most recent monitoring period indicates DVs of 33, 30, and 50 ppb for the Westlake Monitor, the LAIA North Monitor, and the LAIA South Monitor, respectively.

Figure 3 – Major SO_2 Emitters and Area Monitors

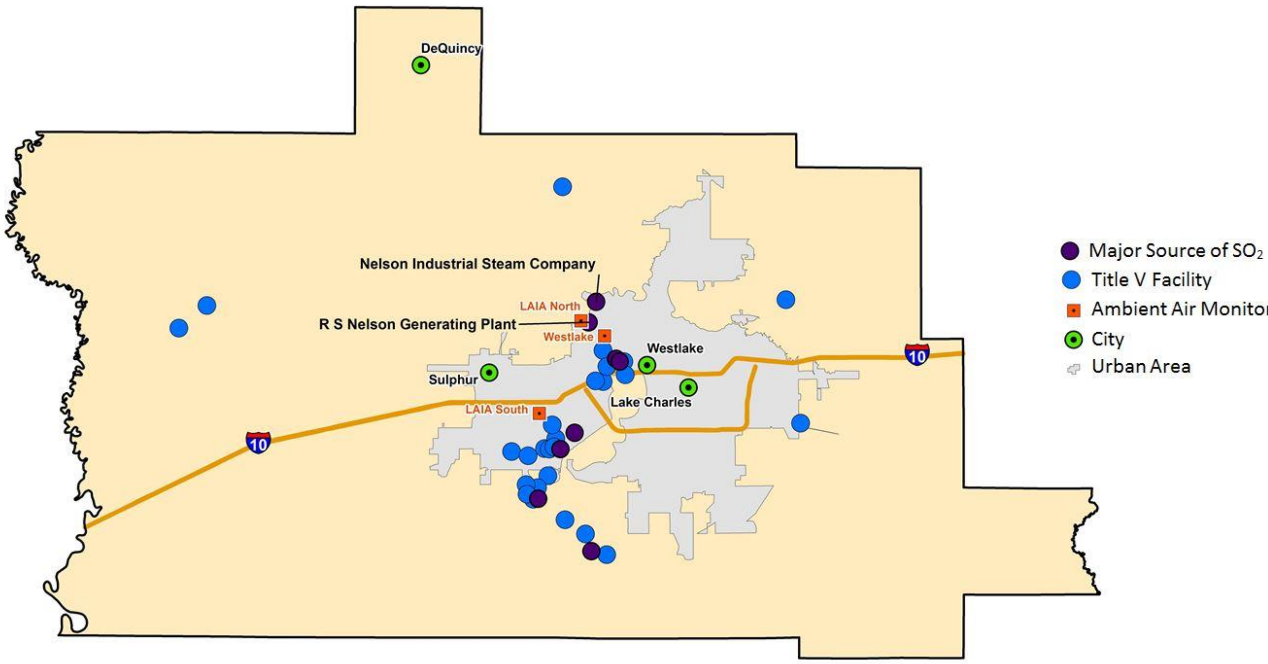
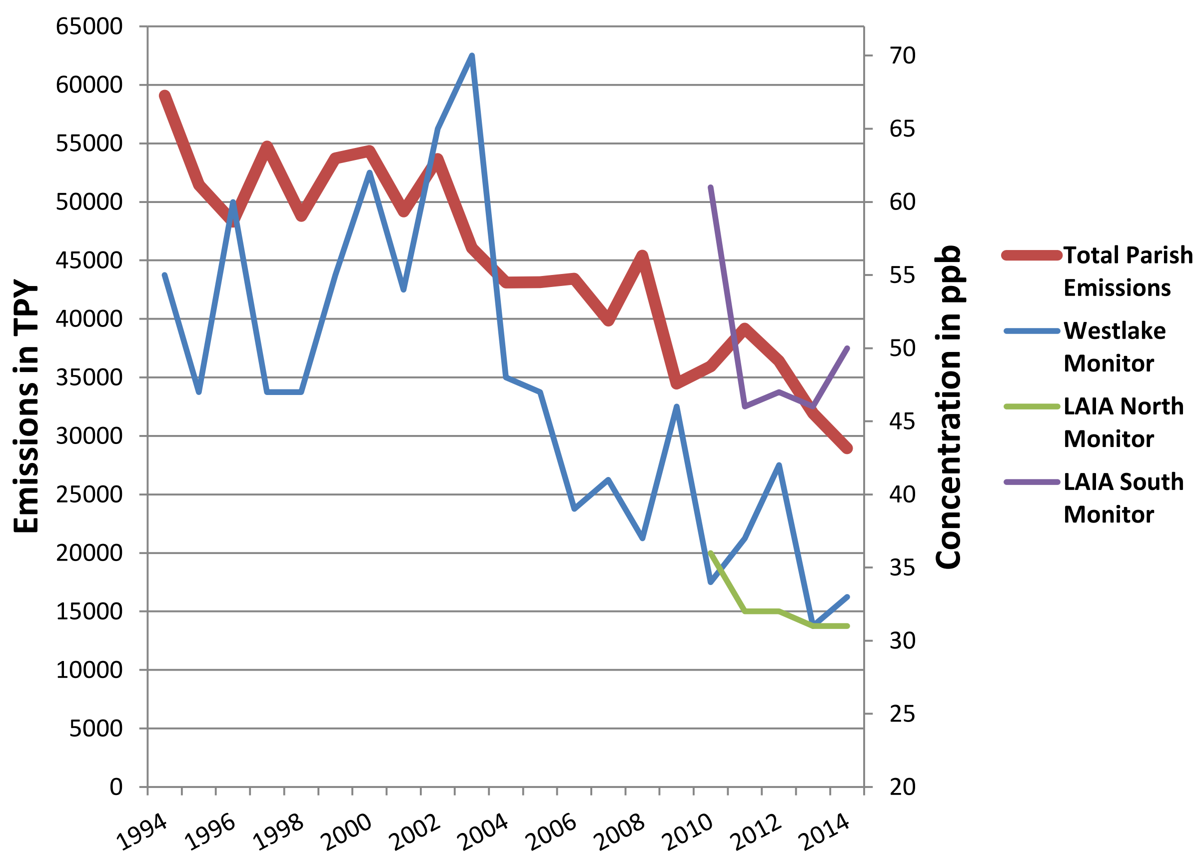


Figure 4 – Calcasieu Parish SO_2 Emissions and Monitoring Data



In an effort to support an impending area designation, the Calcasieu Parish SO_2 Stakeholders Group (Group) conducted modeling to further demonstrate Calcasieu Parish's attainment status. The Group utilized 2013 actual emissions, and documented stack parameters and temperatures as reported to LDEQ's reporting database from the 8 facilities that represent the vast majority of emissions. The Group developed a background concentration of 14.37 ppb using the Westlake Monitoring data as described in the March 2011 US EPA memorandum, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard. AERMOD, version 14134, was run using five years of meteorological data, building downwash, and a 25 kilometer (km) by 35 km receptor grid centered on the industrial area. The complete report of the modeling effort is included as *appendix A*.

The final modeling result yielded a predicted concentration of 168.6 $\mu g/m^3$, 59.77 ppb. The predicted concentration was added to the background concentration and compared to the NAAQS. Modeling results indicate that the area is in attainment with the 1-hour SO_2 standard as the value is below 75 ppb.

Based on the technical review of available facility emissions, reliable monitoring data, and supportive modeling results, LDEQ proposes that Calcasieu Parish be designated as *attainment* for the 2010 Primary SO_2 NAAQS.

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[1] United States Census Bureau: "Calcasieu Parish QuickFacts from the US Census Bureau." September 2015

[2] http://www.epa.gov/airtrends/sulfur.html

[3] 2014 Emissions Reporting & Inventory Center, Louisiana Department of Environmental Quality, Office of Environmental Services, Emission Inventory Group. Released July 6, 2015.

Appendix A:

Calcasieu SO_2 Stakeholders Group Air Quality Modeling Report

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LDEQ RECEIPT
2015 SEP 17 PM 2:08

September 17, 2015

Mr. Mark Hansen
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Ms. Tegan Treadaway
Louisiana Department of Environmental Quality
Office of Environmental Services
P.O. Box 4313
Baton Rouge, LA 70821-4313

Re: Modeling Information Related to 1-Hour Sulfur Dioxide (SO_2) NAAQS Prepared on behalf of the Calcasieu SO_2 Stakeholders Group

Dear Mr. Hansen and Ms. Treadaway:

This correspondence and the attached report are submitted to the U.S. Environmental Protection Agency (EPA), Region 6 and the Louisiana Department of Environmental Quality (LDEQ) on behalf of the Calcasieu SO_2 Stakeholders Group. The attached modeling report and related analysis provide information for your consideration related to the appropriate NAAQS designation for Calcasieu Parish, Louisiana located within EPA Region 6. We appreciate your review of this report and assistance in evaluating the proper designation for this parish.

On June 22, 2010, the EPA promulgated a new 1-hour primary NAAQS for SO_2. On August 15, 2015, the EPA promulgated a final data requirements rule for the 1-hour SO_2 NAAQS. *See,* 80 Fed. Reg. 51,052. Most areas of the country have until January 2017 to submit modeling analysis to the EPA for review or install or relocate ambient air monitors. These areas also have until January 2020 to make final 1-hour SO_2 NAAQS designations. However, on March 2, 2015, the U.S. District Court for the Northern District of California accepted an enforceable order between the EPA and third-parties to resolve litigation concerning the deadline for completing designations. In correspondence from Janet G. McCabe to Peggy M. Hatch, dated March 20, 2015, the EPA notified the LDEQ that EPA is required to make final designations for two parishes in Louisiana by July 2, 2016 pursuant to the enforceable order. Calcasieu Parish is one of the parishes listed in the March 20, 2015 letter that requires an early designation.

The Calcasieu SO_2 Stakeholders Group was formed, in part, to review the 1-hour SO_2 NAAQS implementation and the potentially early designation requirement for Calcasieu Parish. The workgroup is comprised of several industrial facilities located within Calcasieu Parish that emit SO_2 above a major source threshold. A meeting was held with representatives of the workgroup and EPA Region 6 and LDEQ on August 26, 2015. As discussed at our meeting and in the attached report, although there are approximately 151 facilities located within Calcasieu Parish with permitted SO_2 emissions, there are only eight facilities in the parish that emit greater than 100 tons of SO_2 per year. These eight facilities account for approximately 99.5% of all permitted SO_2 emissions in Calcasieu Parish. For this reason, these eight facilities were used in the ambient air modeling conducted on behalf of the workgroup.

AERMOD Version 14134 was used to conduct the ambient air quality modeling for actual SO_2 emissions from the eight facilities located in Calcasieu Parish. Five years of meteorological data, a 50 kilometer grid, and 2013 actual emissions were used in the model. Prior years were excluded due to the installation and use of a SO_2 control device at the Rain CII Carbon LLC Lake Charles facility in December 2012. 2014 actual emissions were not used because the official data was not available at the time the modeling was conducted. As discussed in the report, the background concentration is based on the Westlake Air Monitor located within Calcasieu Parish. 2012-2014 monitoring data was evaluated and impacts from industrial facilities were excluded to establish an accurate background concentration.

The final modeling results added to the adjusted background concentration resulted in a total SO_2 concentration less than the 2010 1-hour SO_2 NAAQS. For this reason, the Calcasieu SO_2 Stakeholders Group believes that an attainment designation for all of Calcasieu Parish is appropriate and justifiable based on the air modeling analysis that followed acceptable EPA protocol and technical assistance documents (TADs) published for this particular NAAQS.

In addition to the modeled results, Calcasieu Parish has three ambient air SO_2 monitors, all located in relatively close proximity to one or more of the facilities included in the modeling analysis. One SO_2 monitor is operated by the LDEQ and two monitors are operated by the Lake Area Industry Alliance (LAIA). However, all monitors comply with the quality assurance/quality control methodology to assure the validity of the monitored data. And all monitors have demonstrated attainment with the 1-hour SO_2 standard for the prior three years and longer. The Calcasieu SO_2 Stakeholders Group believes the results of the three ambient air monitors provide additional substantial evidence that the parish is in full compliance with the 1-hour SO_2 NAAQS.

Based on the modeling results in the attached report along with the existing air monitors, the stakeholders group believes that the EPA and LDEQ should designate Calcasieu Parish as in attainment with 1-hour SO_2 NAAQS. If you have any questions or need additional information concerning this report, I can be reached at (225)336-8450 or kyle@bealllaw.net.

Sincerely,

Kyle Beall

Kyle Beall

Attachments

cc: Guy Donaldson, EPA Region 6
Vivian Aucoin, LDEQ
Kevin Calhoun, Providence Engineering

SEPTEMBER 2015

CALCASIEU SO_2 STAKEHOLDERS GROUP

AIR QUALITY MODELING REPORT

Prepared By:

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Project Number 1039-001

PROVIDENCE

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1.0 INTRODUCTION

On June 22, 2010, the Environmental Protection Agency (EPA) promulgated a new 1-hour SO_2 National Ambient Air Quality Standard (NAAQS). On May 13, 2014, the EPA proposed a data requirements rule to direct state agencies to provide data in order to characterize current air quality in areas of large SO_2 sources. The data developed by the state agencies with this proposed rule would be used by the EPA in future area attainment designations for the 1-hour SO_2 NAAQS.

When a NAAQS is revised, state agencies and the EPA must make area designations under the Clean Air Act (CAA). The area designations process typically relies on air quality concentrations characterized by ambient monitoring data to identify areas that are either meeting or violating the NAAQS. The EPA recognizes that peak concentrations of SO_2 are commonly caused by a few major sources in an area, and that peak concentrations are observed relatively close to those sources. Currently, eight major sources of SO_2 in Calcasieu Parish have been identified.

As part of the NAAQS review process, the EPA conducted an analysis of SO_2 monitors across the country and determined that only up to one-third of the monitors in operation are sited to characterize peak 1-hour ambient concentrations. The EPA has determined that the monitoring network as a whole is not appropriately positioned or of adequate size for the purpose of NAAQS attainment designations.

In the now final data requirements rule, the EPA has promulgated multiple modeling and monitoring approaches for use in the attainment designation of areas with large SO_2 sources.

Several of the major facilities located in Calcasieu Parish have joined together to form the Calcasieu SO_2 Stakeholders Group (Group). The Group has focused efforts on conducting air quality modeling, using AERMOD, to demonstrate attainment with the SO_2 NAAQS. A summary of the modeling effort is given in the report below.

2.0 POLLUTANT MODELED

The new 1-hour SO_2 National Ambient Air Quality Standard (NAAQS) was established to protect public health by reducing the public's exposure to high short-term concentrations. The form of the standard is the 99th percentile of 1-hour daily maximum concentrations, averaged over three years. **Table 2-1** presents the 1-hour SO_2 NAAQS.

Table 2-1
National Ambient Air Quality Standard for SO_2

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
SO_2	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over three years

With the exception of 2010, **Table 2-2** shows that SO_2 emissions in Calcasieu Parish have gradually fallen over the last five years. This is partly due to Rain CII's installation and use of a sulfur dioxide scrubber in December 2012.

Table 2-2
SO_2 Emission Trend in Calcasieu Parish

Year	Actual Emissions of SO_2 (Tons Per Year)
2010	35,950
2011	39,170
2012	36,416
2013	31,932
2014	28,942

3.0 EMISSION SOURCES

Calcasieu Parish currently has 151 facilities that are permitted to emit a combined total of 117,562 tons per year of SO_2. The majority of these emissions (117,506 tons per year or 99.5%) come from facilities that emit greater than 100 tons per year of SO_2. **Figure 1** shows SO_2 sources in Calcasieu Parish.

Modeled emission sources included facilities located within Calcasieu Parish that emit greater than 100 tons per year of SO_2. In accordance with EPA's *Final Rule for 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS)*, actual emissions were used.

> *"The EPA proposed that modeling analyses be based on either actual 1-hour SO_2 emissions from the most recent 3 years or federally enforceable allowable emissions. […] While actual emissions would be the preferred choice to use for emissions inputs, air agencies have the option of using a more conservative*

approach by inputting a source's most recent 3 years of allowable, or "potential to emit," emissions."

Actual emissions were obtained from LDEQ's Emissions Reporting and Inventory Center (ERIC) and based on the 2013 reporting year. Stack parameters were modeled as provided in the 2013 ERIC report. Emissions from 2013 were used as base case emissions due to Rain CII's installation and use of a sulfur dioxide scrubber in December 2012. The sulfur dioxide scrubber is a federally enforceable requirement in the facility's Title V air permit. As a result, emissions from 2011 and 2012 are not representative of current or future emissions in Calcasieu Parish. Reported emissions from 2014 are lower than the reported emissions of 2013. As a result, the 2013 actual emissions are the best representation of current actual emissions and future potential emissions in the study area. Temporary, non-routine, and emergency sources of SO_2 were removed from the list of emissions sources. A list of the modeled sources along with the modeled emission rates and stack parameters is included in **Appendix A**.

4.0 AIR DISPERSION MODEL

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) model Version 14134 was used for the analysis of sulfur dioxide. AERMOD is an EPA-approved steady-state Gaussian plume model capable of modeling multiple sources in complex terrain. The model is currently used for most industrial sources and is the appropriate model for this analysis. The Providence/ORIS BEEST Software was used to run AERMOD.

The analysis used the regulatory default option. The list below identifies these default options:

- Use of elevated terrain algorithms requiring input of terrain height data;
- Use of stack-tip downwash (except for building downwash cases);
- Use of calms processing routines;
- Use of missing data processing routines; and
- Use of a 4-hour half-life for exponential decay of sulfur dioxide for urban sources.

The terrain elevation for each modeled receptor was determined utilizing USGS National Elevation Dataset (NED) data in conjunction with the most recent version of AERMAP. No flagpole receptors were used (*i.e.* receptor heights were set at zero). AERMAP was used to determine the elevation for buildings, sources, and receptors. The most recent version of AERSURFACE was used to determine the site specific surface characteristics (Albedo, Bowen ratio, surface roughness).

The modeling domain has been determined to be "rural" in terms of the AUER Land Use analysis. Therefore, the urban option was not selected in AERMOD.

5.0 BUILDING WAKE EFFECTS (DOWNWASH)

Source proximities were evaluated with respect to nearby structures to determine whether or not the stack emissions might be affected by the turbulent wake of structures and lead to downwash of the plume. Although it was expected that the building wake would have no effect on dispersion from tall stacks, building wake effect was expected for the other sources. Therefore, building downwash was included in this analysis for sources where data was available. This included the following facilities:

Citgo Petroleum Corporation- Lake Charles Manufacturing Complex
Entergy Gulf States Louisiana LLC- Nelson Industrial Steam Co.
Entergy Gulf States Louisiana LLC- Roy S Nelson Plant
Rain CII Carbon LLC- Lake Charles Calcining Plant
Reynolds Metals Company- Lake Charles Carbon Co.

EPA's Building Profile Input Processor (BPIP) program was used to evaluate building downwash parameters and the dominant downwash structure associated with each emission source.

BPIP uses GEP stack heights to determine building downwash effects. Downwash effects are limited to stacks located within a 5L radius, where L is the lesser dimension of the structure (height or the maximum projected width), of a structure. The Schulman-Scire direction-specific downwash technique was applied to stacks having a height less than or equal to H + 1.5L, where H is the structure height. The proper height and width dimensions were determined using current EPA guidance.

6.0 RECEPTOR GRID

An initial 15 x 25 square kilometer receptor grid was placed at the center of the industrial area with 100-meter spacing. A second receptor grid with 250-meter spacing extended five kilometers beyond the first. A third grid with 500-meter spacing extended an additional five kilometers from the second. Receptors lying within industrial boundaries or outside of the parish boundary were removed.

7.0 METEOROLOGICAL DATA

The assigned Baton Rouge surface and Lake Charles upper air National Weather Service Station meteorological data for the years 2009 through 2013 was used for this analysis. The meteorological data was processed using the most recent version of AERMET. The anemometer height was ten meters.

8.0 BACKGROUND DETERMINATION

Hourly sulfur dioxide data was obtained from the Westlake, LA monitor (AQS Number 22-019-0008) and was used to construct background sulfur dioxide concentration in accordance with the approach described in the March 2011 EPA memorandum *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*, as well as the requirements coded within the AERMOD algorithms.

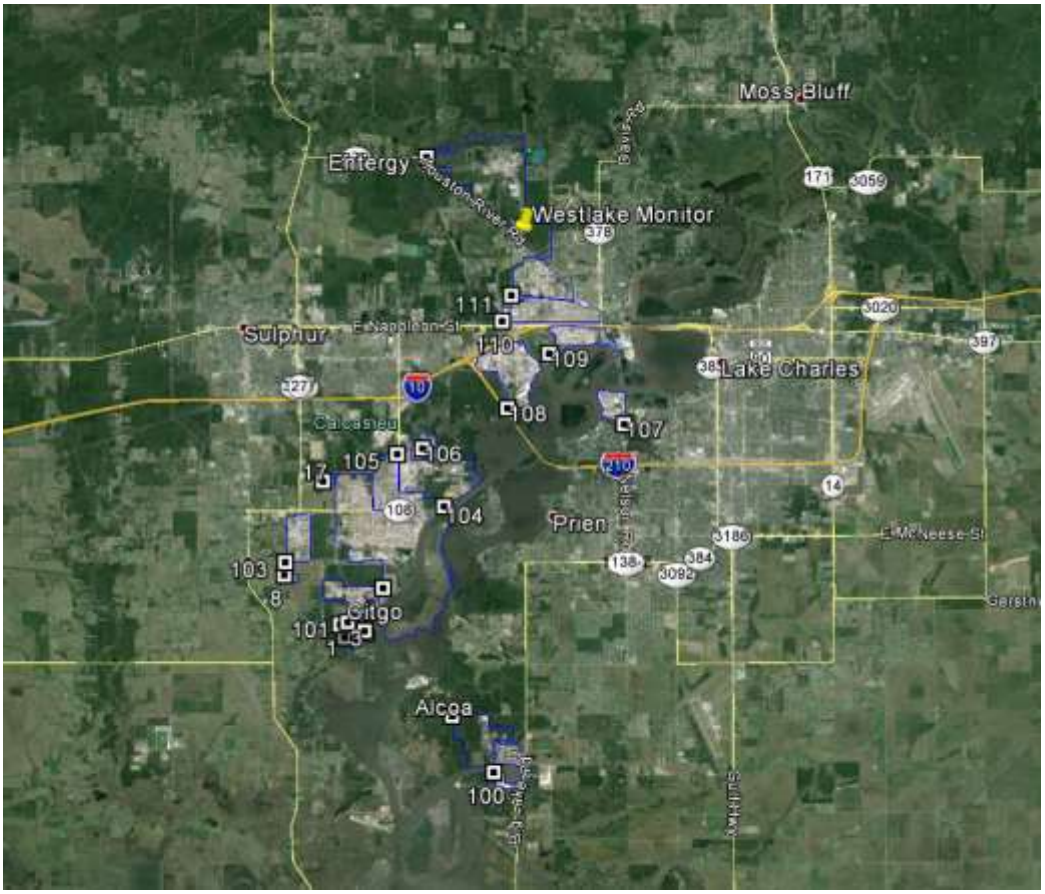
> *"Note that while the discussion of NO_x chemistry options in this memo is exclusive to the 1-hour NO_2 standard, the discussion of other topics in this memo should apply equally to the 1-hour SO_2 standard, accounting for the slight differences in the form of the 1-hour NO_2 and SO_2 standards."*

The Port Arthur, TX monitor (AQS Number 48-245-0021) was also analyzed for use as background data. The Port Arthur monitor is approximately 45 miles from the modeling domain. The Port Arthur monitor is near the Gulf of Mexico, and the predominant wind direction is heavily influenced by land and sea breezes in the area. Additionally, the monitor is dominated by the heavily industrial Beaumont-Port Arthur area. The land use surrounding the monitor is primarily residential. It was determined that the Port Arthur monitor was not representative of the study area based on distance, meteorological data, and surrounding land use.

The background concentration is based on the Westlake monitor located in Westlake, Calcasieu Parish, Louisiana (30.262379°, -93.284989°). Monitoring data was collected from 2012 through 2014 and was reviewed to determine a background concentration. The Westlake monitor is an approved State and Local Air Monitoring Stations (SLAMS) or similar monitor type subject to the quality assurance requirements in 40 CFR Part 58, Appendix A. The Westlake monitor meets the completeness requirements for monitoring data.

The Westlake monitor is stationed in the middle of the modeled sulfur dioxide sources. With the exception of the modeled sources, the Westlake monitor is not located in a heavily industrial area, based on aerial photography.

FIGURE 1
WEST LAKE MONITOR



The 2012 through 2014 monitoring data and wind direction data were provided by LDEQ. In order to determine the most representative background concentration, wind directions from modeled sources that would impact the monitor were excluded from the analysis. This step removed or limited contributions from the modeled point sources which would result in double-counting emissions. Values from impacted sectors were removed from background calculations in accordance with TCEQ's *Air Quality Modeling Guidelines* (APDG 6232v2, Revised 04/15). An impacted value, as defined in the guidance document, is a monitored value measured during a period when the wind was blowing from a 90-degree sector centered on a line between the monitor and the potentially impacting source.

Of the remaining non-impacted values, the 99th percentile of 1-hr daily maximum concentrations was selected for each year and averaged over the 3-year period. This yielded a background concentration of 14.37 ppm.

The Westlake monitor serves as a representative monitor for this analysis because it accounts for the true sulfur dioxide concentration in the study area. The Westlake monitor has a similar land use profile and a mixture of industrial areas and residential areas, as the entire modeling domain. Given the regional nature of sulfur dioxide concentrations, this monitor should be representative of the study area.

9.0 MODELING RESULTS

The final modeling result yielded a predicted concentration of 168.6 µg/m^3 (59.77 ppb.) The predicted concentration was added to the background concentrations and compared to the appropriate NAAQS.

59.77 ppb (modeled concentration) + 14.37 ppb (calculated background) <75 ppb (NAAQS)

The modeled concentration and the background are below the 75 ppb 1-hour SO_2 NAAQS. Modeling results indicate that the area is in attainment with the 1-hour SO_2 standard.

FIGURE 2

SO_2 SOURCES IN CALCASIEU PARISH

APPENDIX A

LIST OF MODELED SOURCES

APPENDIX A
LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Reynolds	2-02	Calciner Kiln and Cooler - Normal Operating Scenario	471433	3331505	174	2000	65	14	4547.88
	2-02a	Calciner Kiln and Cooler - Alternate Operating Scenario	471433	3331505	174	2000	65	14	40.67
	3-07	Butts and Scrap- Drying w/ Dust Collection	471566	3331250	30	200	66	4.5	0.00
	4-02	Drying with Dust Collection	471693	3331305	90	250	76.9	2.6	0.00
	4-24	Thermal Fluid Heater	471646	3331349	30	600	34	1.5	0.00
	5-01	Anode Baking Furnace - Normal Operating Scenario	471527	3331485	125.5	147	32	8	332.62
	5-01a-1	Anode Bake Furnace- Alternate Operating Scenario	471527	3331485	125.5	147	32	8	0.76
	5-01a-2	Anode Bake Furnace- Alternate Operating Scenario	471551	3331484	125.5	147	32	8	0.01
	5-01a-3	Anode Bake Furnace- Alternate Operating Scenario	471551	3331484	125.5	147	32	8	0.18
	5-13-1	Bake Furnace and Storage Operation (Fugitives) -Summary	471581	3331476	38.6811	-459.67	0.00328	3.28	0.06
	5-13-2	Bake Furnace and Storage Operation (Fugitives) -Summary	471630	3331476	38.6811	-459.67	0.00328	3.28	0.06
	5-13-3	Bake Furnace and Storage Operation (Fugitives) -Summary	471679	3331476	38.6811	-459.67	0.00328	3.28	0.06
	6-14	Kiln Emergency Drive Generator	471449.3	3331406.046	35.33333	1138.73	148.969	0.166667	0.00
	6-15	Water Well Emergency Drive Generator	471393	3331700	10	1111.73	195.2301	0.5	0.00
	6-16	Kiln Backup Generator 1	471438	3331347	8.5	1133.33	76.39438	0.333333	0.00
Citgo	BLR077	Power House Boiler B1C	469263	3338797	80.5	375	38.4	9	49.55
	BLR078	Power House Boiler B1B	469236	3338788	74.3	465	31.9	8	43.54
	BLR079	Power House Boiler B1, B1A	469211	3338791	125	430	17.2	14.5	86.64
	BLR080	Power House Boiler B2	469247	3338773	92.5	400	10.1	9.5	12.36
	BLR081	Power House Boiler B2A	469247	3338742	92.5	400	10.2	9.5	13.95
	BLR082	Power House Boiler B3, B3B	469232	3338774	75	680	23.3	8	0.00
	BLR083	Power House Boiler B3A, B3C	469232	3338737	75	670	12.6	8	10.03
	BLR135	Power House Boiler B5A	469267	3338768	100	300	32.3	6.3	16.91
	BLR136	Power House Boiler B5	469267	3338747	100	300	33.2	6.3	0.36
	CKR199	Coker Blowdown Stack B102 (BD)	469115	3338774	65	672	0.3	1.5	0.02
	DCA058	3(VIII-A)1 - DC/DA Stack B-602 (Acid Plant, AAT Area)	468366	3338158	250	180	0.3	5	135.60
	DCA058	3(VIII-A)1 - DC/DA Stack B-602 (Acid Plant, AAT Area)	468366	3338158	250	180	0.3	5	0.28
	FLR150	3(IV)1 - B-1 Flare	469145	3338587	211	1832	0.2	3.5	0.43
	FLR151	3(IV-F)3 - B-4 Flare	469142	3338359	230	1832	0.5	3	0.65
	FLR152	3(IX)41 - B-5 Flare	468725	3338785	200	1832	0.1	5	633.83
	FLR153	3(IX)42 - B-6 Flare	468725	3338789	200	1832	0.1	4	51.45
	FLR154	3(IX)33 - B-7 Flare	468725	3338793	200	1832	0.1	3.5	2.62
	FLR155	3(VI)6 - B-8 Flare	468461	3339018	220	1832	0.2	3	445.76
	FLR156	3(IV)2 - B-9 Flare	468461	3339009	215	1832	0.3	4	1.96
	FLR164	3(XXII)4 - B-11 Flare	468409	3338432	215	1832	0.3	3	0.05
	FLR165	3(XXIII)2 - B-12 Flare	468164	3338047	220	1832	0.1	3	3.72
	FLR169	2(202)25 - CB-701	468175	3340710	202	1832	0.1	3	0.00

APPENDIX A
LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Citgo	FRN025	A-Topper Furnace B-4	469130	3339009	100	366	36.5	7.1	35.58
(Cont.)	FRN026	Topper Furnace B-104	469130	3339034	100	265	43.8	7.1	43.92
	FRN045	A Cat Steam Superheater Furnace, B-2	468744	3339083	56	800	3.9	2.8	0.52
	FRN046	B Cat Steam Superheater Furnace, B-2	468836	3339085	56	800	9.8	2.8	0.48
	FRN047	C Cat Steam Superheater Furnace, B-2	468922	3339082	56	800	5.4	2.8	0.59
	FRN048	A Cat Feed Preheat Furnace, B-6	468737	3339080	114	760	4.9	7	2.42
	FRN049	B Cat Feed Preheat Furnace, B-6	468824	3339080	89.5	755	17.1	4.1	2.93
	FRN050	C Cat Feed Preheat Furnace, B-6	468915	3339080	114.4	750	11.3	7	2.83
	FRN062	3(X)1 A-Reformer B-101 Furnace	468527	3338902	80	700	30.5	3	0.20
	FRN063	3(X)4 Sulfolane B-201 Furnace	468523	3338854	106	665	26.6	5.5	1.32
	FRN064	3(X)5 Sulfolane B-202 Furnace	468523	3338831	85	520	16.8	5.7	0.99
	FRN065	Vacuum Furnace B-201	469067	3338914	155	780	28.9	5.5	9.20
	FRN066	Vacuum Furnace B-2A	469086	3338913	70	780	7.5	6	3.60
	FRN067	Vacuum Furnace B-1	469086	3338890	100	840	3.8	5.5	4.61
	FRN068	3(I-D)3 Vacuum Furnace B-1 #2	469076	3338890	100	840	3.5	5.5	4.61
	FRN069	Coker 1 Furnace B-101	469115	3338774	155	750	13	7	10.23
	FRN070	Coker 1 Furnace B-201	469084	3338753	152.5	670	14.2	7	11.01
	FRN071	BLCOH Stabilizer Reboiler, B-101	468596	3339076	100	664	14.7	3	1.82
	FRN072	Feed Prep Furnace B-101 Stack 1	469086	3338875	100	645	14.8	5.5	7.44
	FRN073	FEED PRED B-101 HEATER, STACK #2	469075	3338875	100	645	14.8	5.5	7.44
	FRN074	SRF Furnace B-5	469082	3338774	115.5	580	7.2	5.6	3.76
	FRN084	3(XVIII-A)1 B-Reformer B-401 Furnace	468524	3338731	101.3	787	24.4	5.7	0.88
	FRN085	3(XVIII-A)2 B-Reformer B-406 Furnace	468524	3338723	98.3	750	22.4	5.7	0.79
	FRN086	3(XVIII-A)3 B-Reformer B-402 Furnace	468524	3338715	98.3	792	22.6	5.7	0.79
	FRN087	3(XVIII-A)4 B-Reformer B-403, 404, 405 Furnaces	468524	3338707	173.4	650	20.2	13.8	5.18
	FRN088	3(XXVII-A)1 ISOM B-801 Furnace	468425	3338781	100	600	31	2.2	0.14
	FRN090	3(XVIII)1 ALCOH B-101 Furnace	468528	3338764	91.5	875	23.3	4.8	0.48
	FRN091	3(XVIII)2 ALCOH B-102 Furnace	468515	3338745	91.5	726	30.6	4.2	0.51
	FRN092	3(X-A)1 BOH B-601 Furnace	468446	3338834	63	1010	25.2	3.5	0.32
	FRN093	3(X-A)2 BOH B-602 Furnace	468446	3338827	63	880	34.5	3.5	0.50
	FRN094	C Topper Furnace B-1C	469087	3338812	100	745	13.6	8	11.53
	FRN095	C Topper Furnace B-2C	469085	3338802	120	850	14.8	7	9.37
	FRN098	BLCOH Reactor Charge Heater, B-3	468595	3339082	100.7	664	6	4	1.36
	FRN107	3(X)6 A-Reformer B-102, 103, 104, 105, 106 Furnaces	468528	3338862	93	400	43.5	6.2	1.43
	FRN129	3(XVIII)3 ALCOH B-103 Furnace	468528	3338775	92.4	700	36.8	3.3	0.49
	FRN139	Coker II B-201 Furnace	468187	3338768	150	300	15.8	7.5	3.08
	FRN140	Coker II B-202 Furnace	468187	3338790	160	300	14.9	7.5	3.02

APPENDIX A
LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Citgo	FRN141	3(XXVIII)1 Unicracker B-1,2,3,4,5 Furnaces	468239	3338424	150	325	31.6	8	3.56
(Cont.)	FRN144	3(XXII)1 C-Reformer B-501,502,506 Furnaces	468515	3338604	200	320	43.5	7	1.29
	FRN145	3(XXII)2 C-Reformer B-503,504,505 Furnaces	468505	3338643	250	290	41.5	13.2	6.66
	FRN177	Cat Feed Hydrotreater Recycle Hydrogen Furnace, B-101	468933	3339455	150	713	11.4	7.2	8.73
	FRN178	Cat Feed Hydrotreater Fractionator Feed Heater, B-102	468918	3339455	124	713	4.6	6	2.44
	FRN266	Furnace B-101	468958	3339248	180	600	7.6	4.2	4.03
	FRN267	Furnace B-102	468958	3339234	180	600	4.3	4.2	1.96
	FRN268	Reboiler B-103	468958	3339222	180	600	11.3	3.7	2.31
	FRN269	Furnace B-201	468958	3339410	180	600	7.7	4.2	2.39
	FRN270	Furnace B-202	468958	3339397	180	600	6.2	4.2	2.25
	FRN271	Reboiler B-203	468958	3339385	180	600	11.6	3.7	2.55
	FRN521	3(XXX)2 Mixed Xylenes B-1001 Furnace	468044	3338448	212	400	41.3	7.2	3.26
	FRN562	CV-1 B101A	469055	3339429	175	450	8.3	8.3	10.57
	FRN563	CV-1 B101B	469063	3339429	175	450	8.5	8.3	10.35
	FRN564	CV-1 B102A	469079	3339431	175	450	22.2	6.9	17.05
	FRN565	CV-1 B102B	469098	3339431	175	450	22	6.9	19.22
	FUG245	3(MISC)5 - AAT Area Fugitives	469060	3338565	5	77	0.00328	100	0.48
	GEN558	3(MISC)GEN - Miscellaneous Power Sources	468333	3338640	10	77	0.3	0.3	0.05
	GEN559	3(MISC)Gen EMERG ¿ Emergency Stationary Internal Combustion Er	468400	3338400	10	77	0.3	0.3	0.03
	INC510	EMISSIONS FROM INCIDENTS	468333	3338640	10	77	0.00328	100	0.10
	LDL213	3(IX)12 - Marine Loading Uncontrolled	469373	3338553	30	77	0.00328	100	0.07
	MSC567	GC 17 FOR AAT AREA	469060	3338565	5	77	0.00328	100	4.92
	MSC569	GC17 FOR REFORMER AREA	468482	3338738	5	77	0.00328	100	2.07
	MSC571	GC17 FOR POWER THERMAL AREA	469068	3339087	5	77	0.00328	100	20.51
	THX158	3(XX-B)1 - Thermal Oxidizer B-407 (AAT Area)	468356	3338155	127	1200	2.1	5.8	0.01
	THX158	3(XX-B)1 - Thermal Oxidizer B-407 (AAT Area)	468356	3338155	127	1200	2.1	5.8	0.91
	TNK803	3(XX-K)2-1 - T-803 Sulfur Tank	468226	3338168	20	77	0.003	3.4	0.07
	TNK805	3(XX-K)2-2 - T-805 Sulfur Tank	468209	3338168	20	77	0.003	3.4	0.07
	VCS166	3(IX)34 - B-13 Flare ("A"Dock)	469141	3337856	75	1832	15.5	0.8	0.01
	VCS167	3(IX)35 - B-14 Flare ("B/C"Dock)	469216	3338344	100	1832	2.5	2	0.03
	VCS176	3(IX)38 - B-700 Wastewater Treatment Plant Flare	468512	3337852	50	1832	1.7	1.7	53.54
	VCS527	3(XXX)1 - Vapor Combustor System - Marine Dock	469953	3339145	50	1500	0.2	8	0.00
	VNT146	3(XXII)3 C-Reformer CCR Regenerator Vent	468486	3338663	135	344	36.4	0.8	0.41
	VNT546	3(X)7 A-Reformer F-102 Regen Vent	468486	3338891	40	100	20	0.5	0.05
	VNT547	3(XVIII-A)5 B-Reformer F-409 Regen Vent	468466	3338713	40	100	20	0.5	0.02
	VNT613	3(XX-K)1-1 - Sulfur Pit - A SRU (AAT Area)	468383	3338057	20	77	0.5	0.5	0.00
	VNT614	3(XX-K)1-2 - Sulfur Pit - C SRU (AAT Area)	468288	3338187	20	77	0.5	0.5	0.00

APPENDIX A
LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Citgo	WGS537	A Cat - Wet Gas Scrubber	468738	3339109	223	150	39.9	8	1.56
(Cont.)	WGS538	B Cat - Wet Gas Scrubber	468824	3339109	223	150	39.8	8	3.80
	WGS539	C Cat - Wet Gas Scrubber	468918	3339109	223	150	40.9	8	5.87
Entergy	C1	Unit 1 Boiler Stack A	472310	3350210	425	270	92.4	9	3534.73
	C2	Unit 2 Boiler Stack A	472306	3350210	425	270	92.4	9	3301.22
Rain	RLP006	Kiln Stack	467700.5	3335260.3	200	1959	57.4	17	1879.00
	RLP037	WHB/Baghouse Stack	467764.7	3335329.4	199	215	91.457	8	3591.00
Entergy	C3A	C3A - Unit 3 Boiler Stack A	472265	3350420	196	301	50	10	0.21
	C3B	C3B - Unit 3 Boiler Stack B	472247	3350420	196	301	50	10	0.21
	C4	C4 - Unit 4 Boiler	472080	3350446	400	300	90	19	5.05
	C6	C6 - Unit 6 Boiler	471844	3350564	500	277	99	23	11455.40
	C7	C7 - Unit 4 Auxiliary Boiler	472194	3350407	75	776	25.2	6	0.01
Phillips 66	B00005	EP022 HIGH PRESSURE BOILER (B-5)	473686.3	3345619	50	475	54.1	5.5	1.04
	B00006	EP023 HIGH PRESSURE BOILER (B-6)	473672.1	3345619	56	475	58.8	6	1.55
	B76001	EP109 HIGH PRESSURE BOILER (B-76001)	472994.3	3345714.8	150	325	120.2	6	1.04
	CAL2	EP065 NO. 2 CALCINER STACK	473302.3	3345438	213	380	44	10	135.26
	FAPI	EP092 BENZENE WASTE FLARE (API)	473524.6	3345389.4	45	1832	60.1	0.5	0.01
	FCC	EP041 FCC REGENERATOR	473530.2	3345507	185	605	132.9	6	170.94
	FMVRU2	EP-251 - Flare for MVRU 2	475596.2	3344594.7	60	1000	68	12	0.89
	FNORTH	EP064 NORTH FLARE	472864.2	3345934	250	1340	327	3.5	3.82
	FSOUTH	EP031 SOUTH FLARE	473339.1	3345301.8	250	1340	81.8	3.5	0.08
	FWEST	EP110 WEST FLARE	473101.2	3345292.9	380	1832	15.2	4.5	16.16
	H00006	EP006 FCC HEATER (H-6)	473608.3	3345517.9	114	800	19.6	6	0.51
	H00009	EP008 HEATING OIL BELT HEATER (H-9)	473503.1	3345561.8	126	900	15	6.7	0.33
	H00014	EP061 THERMAL CRACKER HEATER (H-14)	473632.3	3345501.8	113	300	11.2	7.8	0.76
	H00015	EP085 LVT HEATER (H-15)	473492.1	3345561.9	94.8	577	12.32	3.2	0.07
	H00018	EP013 COKER HEATER (H-18)	473383.1	3345564	105	650	16	7.42	0.36
	H00024	EP017 NO. 2 HDS HEATER (H-24)	473465.1	3345453	55	900	18	5	0.29
	H00026	EP045 PREMIUM COKER HEATER (H-26)	473388.3	3345514.7	120	375	18.2	5	0.18
	H00027	EP086 PREMIUM COKER HEATER (H-27)	473376.2	3345582.8	180	600	34.8	4	0.08
	H01101	EP037 NO.3 CRUDE UNIT HEATERS (H-1101)	473535.1	3345645.8	150	325	22.4	8.5	2.18
	H01103	EP071 NO 3 VACUUM UNIT HEATER (H-1103)	473589.3	3345638.9	195	400	16	6.6	0.43
	H01201	EP063 NO 4 HDS HEATER (H-1201)	473480.3	3345635.8	99	450	17.7	3.9	0.23
	H01202	EP072 NO 4 HDS HEATER (H-1202)	473476.2	3345728.7	115	450	18.4	4.9	0.30
	H01301	EP040 NO. 5 HDS (HYDRODESULFURIZER) (H-1301)	473480.3	3345641.9	99	450	16.5	3.9	0.24
	H02801	EP047 SULFURIC ACID AIR HEATER (H-2801)	473697.2	3345845.8	77	800	5.9	3	0.01
	H03001	EP057 NO 2 COKER HEATER (H-3001)	473360.2	3345630.8	165	375	13.8	8	0.98

APPENDIX A

LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Phillips66	H03002	EP058 NO 2 COKER HEATER (H-3002)	473360.3	3345655.8	165	375	13.8	8	1.02
(Cont.)	H03101	EP054 NO 6 HDS HEATER (H-3101)	473416.2	3345764.9	100	925	19.9	3	0.11
	H03201	EP055 NO 7 HDS HEATER (H-3201)	473414.2	3345744.9	100	925	36.2	3	0.12
	H03232	EP073 NO 7 HDS HEATER (H-3232)	473421.2	3345744.9	100	800	26.9	3	0.13
	H03801	EP059 NO 3 REFORMER/HDS HEATERS (H-3801)	473688.1	3345701.8	289	375	19.5	10	1.17
	H03951	EP067 NO 8 HDS HEATER (H-3951)	473424.2	3345764.9	100	925	17.5	3	0.06
	H04050	EP143 H-4050 NO. 4 CTU HEATER (H-4050)	473611.2	3345722.9	171	364	21.5	8.5	1.19
	H05401	EP221 SZORB PROCESS HEATER (NH-2)	473647.3	3345751.7	126	900	14.93	6.7	0.24
	H11001	EP101 HDC H2 HEATER (H-11001)	472872.3	3345550.8	161.3	461	21.8	4.9	0.21
	H11002	EP118 ATMOSPHERIC TOWER HEATER (H-11002)	472886.2	3345550.7	120	462	23.34	4.04	0.11
	H11003	EP119 VACUUM TOWER HEATER (H-11003)	472896.1	3345551	120	423	21.22	3.5	0.07
	H12001	EP102 HDW/HDF REACTOR CHARGE HEATER (H-12001)	472823.1	3345552.7	120	473	24.3	3.2	0.08
	H12002	EP144 HDW/HDF REACTOR CHARGE HEATER (H-12002)	472811.1	3345551.8	120	473	24.3	3.2	0.13
	H12003	EP103 HDW/HDF VACUUM CHARGE HEATER (H-12003)	472800.1	3345551.9	120	438	22.69	3.88	0.18
	H16001	EP105 HDS CHARGE HEATER (H-16001)	473579.3	3345808.8	120	635	24.3	2.25	0.07
	H16101	EP106 1-5 CCR HEATER COMMON STACK (H-16101)	473492.2	3345820.7	253	434	30.4	10.5	1.79
	H20002	EP104 CVU FEED HEATER (H-20002)	473484.3	3345758.9	205.25	347	21.2	7.1	0.76
	H30001	NO. 2 CTU HEATER (H-30001)	473534.2	3345636.9	171	364	17.3	8.5	1.29
	SAP	EP042 SULFURIC ACID UNIT	473726.2	3345428.9	150	170	17	4	24.14
	SREF10	EP117 NO 10 CCR REGENERATOR VENT	473507.1	3345813.9	150	100	14.23	0.5	13.60
	SREF3	EP060 NO 3 REFORMER REGEN VENT	473677.1	3345699.9	93	846	33.2	0.5	1.91
	SRU12	EP056 SULFUR PLANT	473570.3	3345406.8	200	480	133	6	72.52
	SRU45	EP111 LOHC SULFUR PLANT	472845.3	3345424	150	499	54.65	3.54	97.17
	SSZRCV	EP232 SZORB CAUSTIC SCRUB REGEN VENT	473591.3	3345779.9	126	600	1.06	0.33	28.91
LA Pigment	S88121	OXYGEN SUPERHEATER W340-AX	470403.5	3340682.5	109.6	572	77.01	0.83	0.31
	S88122	OXYGEN SUPERHEATER W340-BX	470421.7	3340682.8	109.6	572	77.01	0.83	0.27
	S88131	TITANIUM TETRACHLORIDE SUPERHEATER W321-AX	470403.5	3340691.7	109.6	572	154.42	0.83	0.57
	S88132	TITANIUM TETRACHLORIDE SUPERHEATER W321-BX	470421.7	3340672.9	109.6	572	154.42	0.83	0.55
	S88150	CALCINER OFF-GAS SCRUBBER F476	470407.4	3340564.9	97.8	167	58.47	1.67	0.59
	S88221	SPRAY DRYER DUST COLLECTOR F603-A	470374.7	3340513.3	107.6	213	75.45	3	1.50
	S88222	SPRAY DRYER DUST COLLECTOR F603-B	470377.6	3340513.3	107.6	213	75.45	3	1.19
	S88350	UTILITY BOILER D841-1X (ROUTINE EMISSIONS)	470312.4	3340529.7	79.8	329	94.54	2.75	4.66
	S88-90	PROCESS OFF-GAS INCINERATOR STACK	470365.6	3340686.9	251	363	6.64	8.83	590.75
	S90351	UTILITY BOILER D841-2X (ROUTINE EMISSIONS)	470312.4	3340524	79.8	329	94.54	2.75	4.59

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LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Sasol	ALU-GB-552	ALU-GB-552 Niro Spray Dryer and Product Recovery	473443	3346664	80	215	62.2	4.8	0.20
	ALU-BA-1	Alumina Calciner No. 1 Combustion Vent	473517	3346754	50	250	34.5	0.83	0.01
	ALU-XGB-2	Drytec Dryer Dust Collector	473445	3346758	97	235	63.4	3.8	0.08
	Facility	Research and development facility	473193	3346713	1	70	3.28E-03	100	0.03
	ETH-BA-201	Feed Dryer Regenerator	472809	3346405	75	1050	18	2.5	0.08
	ETH-BA-401	Acetylene / Propadiene Converter Regenerator	472809	3346405	72	1050	14	2	0.01
	ETH-EGF	ETH-EGF Enclosed Ground Flare Pilot & Purge Gas Emissions	473086	3346621	96	1832	65.6	1.986	0.02
	ETH-F-501	ETH-F-501 Ethylene Unit Elevated Flare Pilot & Purge Gas Emissions	473203	3346788	130	1832	65.6	0.712	0.01
	NPU-F-801	NPU-F-801 NPU Flare Pilot, Purge, MO-V9, & W9-2	473604	3346076	150	431	65.6	0.718	0.01
	Non-AIMS	ETO-FL-10341 ETO Elevated Flare Pilot & Purge	473197	3346361	60	1800	65.6	0.723	0.01
	Non-AIMS	ETO-FL-10342 ETO Vapor Combustor Unit (VCU) Pilot & Purge	473247	3346160	45	1800	65.6	1.899	0.03
	Non-AIMS	NPU-F-801 NPU Flare Other Process Vents	473604	3346076	150	431	65.6	0.718	3.50
	ETH-BA-101	Ethylene Cracking Furnace	473801	3346363	90	400	71	11.5	1.04
	ETH-BA-102	Ethylene Cracking Furnace	473801	3346363	90	400	71	11.5	1.01
	ETH-BA-103	Ethylene Cracking Furnace	473801	3346363	90	400	71	11.5	1.02
	ETH-BA-104	Ethylene Cracking Furnace	473801	3346363	90	400	71	11.5	0.98
	ETH-BA-105	Ethylene Cracking Furnace	473801	3346363	90	400	71	11.5	0.99
	ETH-BA-106	Ethylene Cracking Furnace	473801	3346363	90	400	71	11.5	0.95
	ETH-BA-107	Ethylene Cracking Furnace	472771	3346414	132	450	28	5	1.16
	STM-B7-901	Utility Steam Boiler No. 1	472936	3346384	50	300	46.5	6.5	1.31
	STM-B7-902	Utility Steam Boiler No. 2	472936	3346384	50	300	46.5	6.5	0.99
	STM-B7-903	Utility Steam Boiler No. 3	472936	3346384	50	300	46.5	6.5	1.00
	ALU-BA-2	Alumina Calciner No. 2 Combustion Vent	473513	3346727	50	250	34.5	0.83	0.02
	NPU-H-3	Process Heater	473482	3346059	60	580	19.6	3.5	0.13
	NPU-H-2	Process Heater	473482	3346021	72.5	640	17	5	0.21
	NPU-H-102	Process Heater	473482	3346028	72.5	640	17	4.8	0.23
	NPU-H-101	Process Heater	473482	3346041	63.5	581	15	4.8	0.18
	ETH-EGF	Enclosed Ground Flare Process Offgas Emissions	473086	3346621	96	1832	65.6	1.986	0.89
	ETH-F-501	Ethylene Unit Elevated Flare Process Offgas Emissions	473203	3346788	130	1832	65.6	0.712	0.15
	ALC-BA-801	OLD HOT OIL HEATER	473264	3346365	101.5	750	22	4.5	0.03
	ALC-BA-802	HOT OIL HEATER	473251	3346366	90	640	13	5	0.06
	ALC-ECU-3	EMISSION COMBUSTION UNIT #3	473189	3346466	40	1800	3.28E-03	3.279856	0.01
	ALC-F-801	ALCOHOL UNIT FLARE PROCESS VENT COMBUSTION	473236	3346362	150	1832	65.6	2.907	0.10
	ALC-H6-404	SSO Column Heater	473162	3346673	60	600	6.3	2.5	0.03
	ENG-G3-001	ENG G3-001 Administration Generator (Diesel)	473636	3346670	10	200	111.82	0.33	0.07
	ENG-G12-001	ENG G12-001 ECHO Generator (Diesel)	473117	3346829	10	200	339.56	0.33	0.01
	ENG-E-129	ENG E-129 Fire Water Pump (Diesel)	472754	3346355	10	200	237.06	0.33	0.13

APPENDIX A
LIST OF MODELED SOURCES

Facility	Facility Source ID	Source Description	East UTM (m)	North UTM (m)	Height (ft)	Exit Temp (°F)	Exit Velocity (ft/sec)	Exit Diameter (ft)	2013 SO2 (tpy)
Sasol	ENG-E-130	ENG E-130 Fire Water Pump (Diesel)	472902	3346467	10	200	237.06	0.33	0.13
(Cont.)	ENG-G7-906	ENG G7-906 Ethylene Plant Generator (Diesel)	472826	3346590	10	200	339.56	0.33	0.01
	ENG-G6-001	ENG G6-001 ETO/Alcohol Generator (Diesel)	473378	3346466	10	200	507.99	0.33	0.01
	ENG-G10-001	ENG G10-001 ASU Generator (Diesel)	472977	3346350	10	200	507.99	0.33	0.01
	ENG-L6-56	ENG L6-56 Radio Tower Generator (Diesel)	473202	3346163	10	200	9.03	0.33	0.01
	ENG-E6-806	ENG Firewater Pump 3 E6-806 (Diesel)	472754	3346355	10	200	223.51	0.33	0.13
	ENG-N6-802	ENG Firewater Pump 4 N6-802 (Diesel)	472902	3346467	10	200	180.62	0.33	0.10
	ENG-L-653	ENG L-653 LAB Compressor (Diesel)	472950	3346946	10	200	126.43	0.33	2.51
	LAB-LH-1	PACOL Charge Heater H-201	472878	3346831	161	416	30	4.6	0.30
	LAB-LH-3	Hot Oil Heater H-601	472869	3346807	183	530	11	8.5	3.97
	LAB-LF-1	LAB-LF-1 - LAB Unit Flare Pilot & Purge	473091	3347044	130	1500	65.6	1.96	0.07
	Non-AIMS	LAB-LF-1 - LAB Unit Flare Process Vents	473091	3347044	130	1500	65.6	1.96	0.18