DECEMBER 2016

CALCASIEU PARISH
SULFUR DIOXIDE STAKEHOLDERS GROUP

SULFUR DIOXIDE AIR QUALITY MODELING REPORT

Prepared By:

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Project Number 1039-001

PROVIDENCE

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1.0 PROJECT DESCRIPTION

On June 22, 2010, the Environmental Protection Agency (EPA) promulgated a new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS). On May 13, 2014, the EPA proposed a data requirements rule (DRR) to direct state agencies to provide data in order to characterize current air quality in areas of large SO_2 sources. This proposed rule was promulgated on August 21, 2015. The data developed by the state agencies with this rule will be used by the EPA in 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.

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 DRR, the EPA has promulgated multiple modeling and monitoring approaches for use in the attainment designation of areas with large SO_2 sources. On July 5, 2016, the Calcasieu Parish Sulfur Dioxide Stakeholders Group (Group) submitted a protocol to the Louisiana Department of Environmental Quality (LDEQ) to describe how dispersion modeling would be performed in order to demonstrate compliance with the 2010 NAAQS. The protocol methodology conformed to the EPA's August 2016 draft *SO2 NAAQS Designation Modeling Technical Assistance Document* (TAD). The purpose of this report is to provide a detailed discussion of the methods and results of the modeling effort conducted for Calcasieu Parish.

2.0 EXISTING MONITORING SITES

The nearest existing ambient air quality monitoring sites are shown in **Table 2-1**, below. The location of each of the current monitors in relation to the SO2 sources included in this modeling is shown in **Figure 1**.

Table 2-1
Existing SO_2 Monitoring Sites

Site	Latitude	Longitude
LAIA North Monitor	93° 18' 17.00" W	30° 16' 22.00" N
LAIA South Monitor	93° 20' 13.88" W	30° 12' 29.52" N
Westlake Monitor	93° 17' 5.96" W	30° 15' 44.53" N

3.0 POLLUTANT MODELED

The new 1-hour SO_2 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 NAAQS for SO_2.

Table 3-1
National Ambient Air Quality Standard

Pollutant	Primary/ Secondary	Averaging Time	NAAQS ($\mu g/m^3$)	NAAQS (ppb)	Form
SO_2	Primary	1-Hour	196	75	99^{th} percentile of 1-hour daily maximum concentrations, averaged over three years

4.0 AIR DISPERSION MODEL

Version 15181 of the American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) model was used for the analysis. 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 options. 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

Since all sources within the modeling domain are in rural areas, the model was conducted using the rural dispersion option. Therefore, the default 4-hour half-life for exponential decay of sulfur dioxide for urban sources was not used.

The site location map, **Figure 2**, includes the topography of the surrounding area. Based on the site topography, flat terrain was used. No flagpole receptors were used (*i.e.,* receptor heights were set at zero).

The terrain elevation for each modeled receptor was determined utilizing United States Geological Survey (USGS) National Elevation Dataset (NED) data in conjunction with Version 11103 of AERMAP. AERMAP was used to calculate the base elevations of emission sources, buildings, tanks, and receptors.

5.0 BUILDING WAKE EFFECTS (DOWNWASH)

Source proximities were evaluated with respect to nearby structures to determine whether 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 at the facilities. Therefore, building downwash was included[1] in this analysis for each facility from which sources were included in the model.

Version 04274 of EPA's Building Profile Input Processor for PRIME (BPIPPRIM) program was used to evaluate building downwash parameters and the dominant downwash structure associated with each emission source. A site layout has been provided for each facility (**Figures 3 – 8**). Site layouts are based on data provided by the facilities.

6.0 EMISSION SOURCE TYPES

Modeled emission sources included facilities located within Calcasieu Parish with potential facility-wide SO_2 emissions greater than 80 tons per year. 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 the modeling and emissions files submitted to the LDEQ as part of the DRR Modeling Information Request that was due on March 4, 2015 and were based on the years 2012 - 2014. Unauthorized SO_2 discharges that were reported via ERIC were not included in the model since they do not represent allowable emissions. Intermittent emissions sources, such as temporary, non-routine, and emergency sources of SO_2, were removed from the list of emissions sources[1]. For this purpose, intermittent sources were defined as those sources that are permitted to operate less than 500 hours per year. A list of the sources that were modeled and a list of the sources that were excluded, including reasons for exclusion, are included as **Appendix A**. Emissions data is discussed in more detail in Section 8.0.

[1] In accordance with EPA's draft SO_2 NAAQS Designations Modeling Technical Assistance Document updated in August 2016, Section 5.5 – Intermittent Emissions.

7.0 MODELING DOMAINS

Modeled emission sources included facilities located within Calcasieu Parish with potential facility-wide SO_2 emissions greater than 80 tons per year. 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.

8.0 RECEPTOR GRID

The receptors were set on a Cartesian grid at 100-meter spacing from 0 to 20 kilometers from each fenceline within the modeling domain. Receptors were excluded from the model when they fell on public roads, open water, or within the boundaries of existing industrial property, because these locations were prohibitive to establishing fixed monitor sites or were not representative of ambient air accessible to the public. Receptors were excluded using the following methods:

- The roadway shapefile titled State Maintained Highways in Louisiana, Universal Transverse Mercator (UTM) Zone 15 NAD83, LDOTD (2007) provided by the Louisiana Department of Transportation and Development was used to determine the center line of each roadway.
- The waterway shapefile titled TIGER/Line 2006 Second Edition, Water of Louisiana, Geographic NAD83, CENSUS (2006) provided by the U.S. Department of Commerce, U.S. Census Bureau was used to determine the boundaries of waterways. Receptors within these boundaries were excluded.
- Industrial boundaries were provided by the LDEQ during the procurement of source parameters. The BEEST software option to exclude receptors within industrial boundaries was selected.

9.0 METEOROLOGICAL DATA

The Lake Charles surface and upper air (Station Number 3937) National Weather Service (NWS) Station meteorological data for the years 2012 through 2014 were used for this analysis. The profile base elevation of the Lake Charles surface air station is 16 feet.

Appropriate albedo, Bowen ratio, and surface roughness characteristics were calculated using AERSURFACE and Lake Charles NWS data. The site characteristics were calculated in twelve equally spaced wind sectors.

10.0 BACKGROUND DETERMINATION

Modeled ambient air concentrations only reflect the impacts from industrial emission sources. Therefore, to truly assess compliance with the NAAQS, natural "background" concentrations are typically added to the modeled ground-level concentrations. These natural background concentrations include emissions from non-industrial emission sources (*e.g.,* vehicles, recreational watercraft, *etc*.), which are not included in the model. These background concentrations are conservative representations of emissions from natural sources, nearby emission sources other than the emission sources under consideration, and unidentified emission sources. However, the background concentrations may also include industrial emission sources already accounted for in the state inventory. Therefore, adding the background concentrations to the modeled ground-level concentrations should be conservative since impacts from the inventory sources are included in both the maximum modeled ground-level concentration and the background concentration.

EPA has agreed to accept the Shreveport Seasonal Hour of Day Background Matrix from 2012-2014 as background for the SO_2 modeling. Therefore, these background values were used in this analysis.

11.0 MODELING ANALYSIS

Where available, actual 2012 – 2014 hourly emission rates and concurrent hourly stack gas temperatures and hourly stack gas velocities were modeled using the AERMOD model for each emissions source located at a facility in Calcasieu Parish with potential facility-wide SO_2 emissions greater than 80 tons per year. For data that was typically collected using a continuous monitor, short-duration data gaps were found to exist for a time span ranging from a few hours to a few days. For any short-duration data gaps that existed within the hourly data, the larger of the two values that immediately preceded and immediately followed the data gap were used in place of the missing data, yielding a conservative estimate of emissions during the data gap. Due to the short duration of the data gaps, it was assumed that the emissions source would not be capable of increasing production rates within the span of the data gap such that this procedure for filling missing data would produce results lower than the value that the monitor would have recorded. Sources for which emissions data was obtained in this manner will hereafter be referred to as hourly sources.

When no hourly emissions data was available for a given source, emission rates for each hour were modeled at two times the average hourly actual emission rate for the year in question to provide a conservative estimate of actual hourly emissions. The average hourly actual emission rate was taken from the source's annual emissions inventory report submitted via the LDEQ's ERIC system. Modeled stack gas temperature and stack gas velocity were based on information provided in the source's annual emissions inventory report submitted via the LDEQ's ERIC system. Sources for which emissions data was obtained in this manner will hereafter be referred to as non-hourly sources.

Using the data from hourly sources, hourly rate files were prepared for use within AERMOD using the HOUREMIS command.

For hourly sources, some case-by-case adjustments were needed. During the modeling effort, it was discovered that AERMOD was incapable of processing very small emission rates from the hourly file. Documentation could not be found in any existing AERMOD literature that defined the minimum emission rate that could be processed via the HOUREMIS command. Very small emissions rates, which were arbitrarily defined in this modeling effort as emission rates less than 1.00E-10 grams per second (g/s), were set equal to zero in the hourly file to facilitate the modeling effort. Emission rates below this level were not expected to have a significant effect on the final results.

Source parameters for all modeled sources were entered into the AERMOD input files using the SRCPARAM card. These source parameters were obtained from the information submitted via LDEQ's ERIC system. Emission rates for non-hourly sources were entered as a Ptemis parameter on the SRCPARAM card. With this organization structure, AERMOD first attempts to obtain the required emissions, temperature, and velocity rates for a given source from the hourly rate file. If the source is listed in the hourly file, AERMOD uses the data found in the hourly file. If the source is not listed in the hourly file, AERMOD then obtains the required data from the SRCPARAM card. This means that regardless of any SRCPARAM data entered, emissions data from the hourly file will take precedence over any data contained on the SRCPARAM card.

Using this data, the entire parish was modeled against the SO_2 1hr NAAQS. This effort indicates the potential for localized, relatively high concentrations surrounding the Reynolds Metals Company – Lake Charles Carbon Company (LCCC), which is represented in **Figure 6**. As a result, a monitor siting analysis was conducted and submitted under separate cover.

In response to these results, it was also necessary to define an airshed around the LCCC facility. All receptors with modeled concentrations greater than 50% of the SO_2 1hr NAAQS were located and the area encompassed by these receptors was defined as the airshed. This area is roughly bounded to east by Elliott Road, to the south by an unnamed bayou, to the west by Moss Lake, and to the north by Haymark Road/W Gauthier Road. The boundaries of this airshed are shown in greater detail in **Figure 9, Inset A** and is labeled as Airshed 2. Airshed 1 is also represented in this inset and is defined as the remainder of Calcasieu Parish that is not contained in Airshed 2.

Separate modeling analyses were conducted for each of these airsheds. The modeling analysis for Airshed 1 included all sources as discussed in Section 6.0 with no receptors within the boundaries of Airshed 2. The modeling analysis for Airshed 2 included all sources in Section 6.0 except the LCCC sources and only included those receptors contained within Airshed 2.

12.0 MODELING RESULTS

The final modeling result for Airshed 1, which included ambient background concentrations, yielded a maximum predicted concentration of 164.0 $\mu g/m^3$ (62.59 ppb).

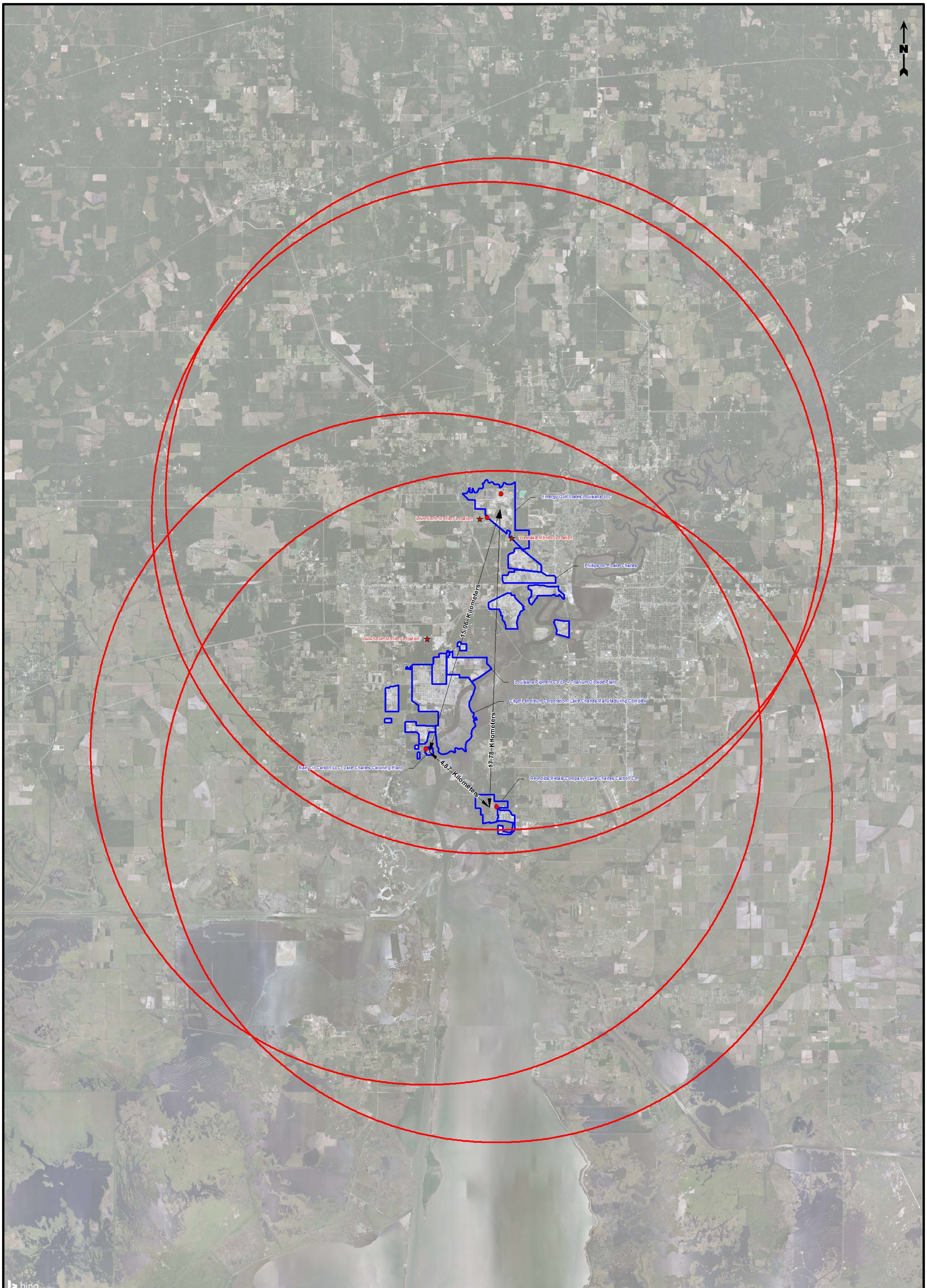
The modeled concentration and the background are below the 75 ppb 1-hour SO_2 NAAQS. Modeling results indicate that the area is in attainment with the 1-hour SO_2 standard.

The final modeling result for Airshed 2 without LCCC sources showed attainment of the standard at all receptors within the airshed. Therefore, it will be necessary to site a monitor within Airshed 2 to determine attainment within this currently unclassifiable airshed. A separate monitor siting analysis was conducted and was submitted under separate cover.

All modeling files used in the analysis are provided on the attached Universal Serial Bus (USB) flash drive.

FIGURE 1

AERIAL MAP



Legend

- Fenceline
- 20 Kilometer Radius
- DRR Facility Location
- SO_2 Monitor Site Location

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.

8,000 4,000 0 8,000
Feet

DRR Source Map

Modeling Report
Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholder Group

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Drawn By	LMM	12/01/16
Checked By	LMH	12/01/16
Approved By	MHF	12/01/16

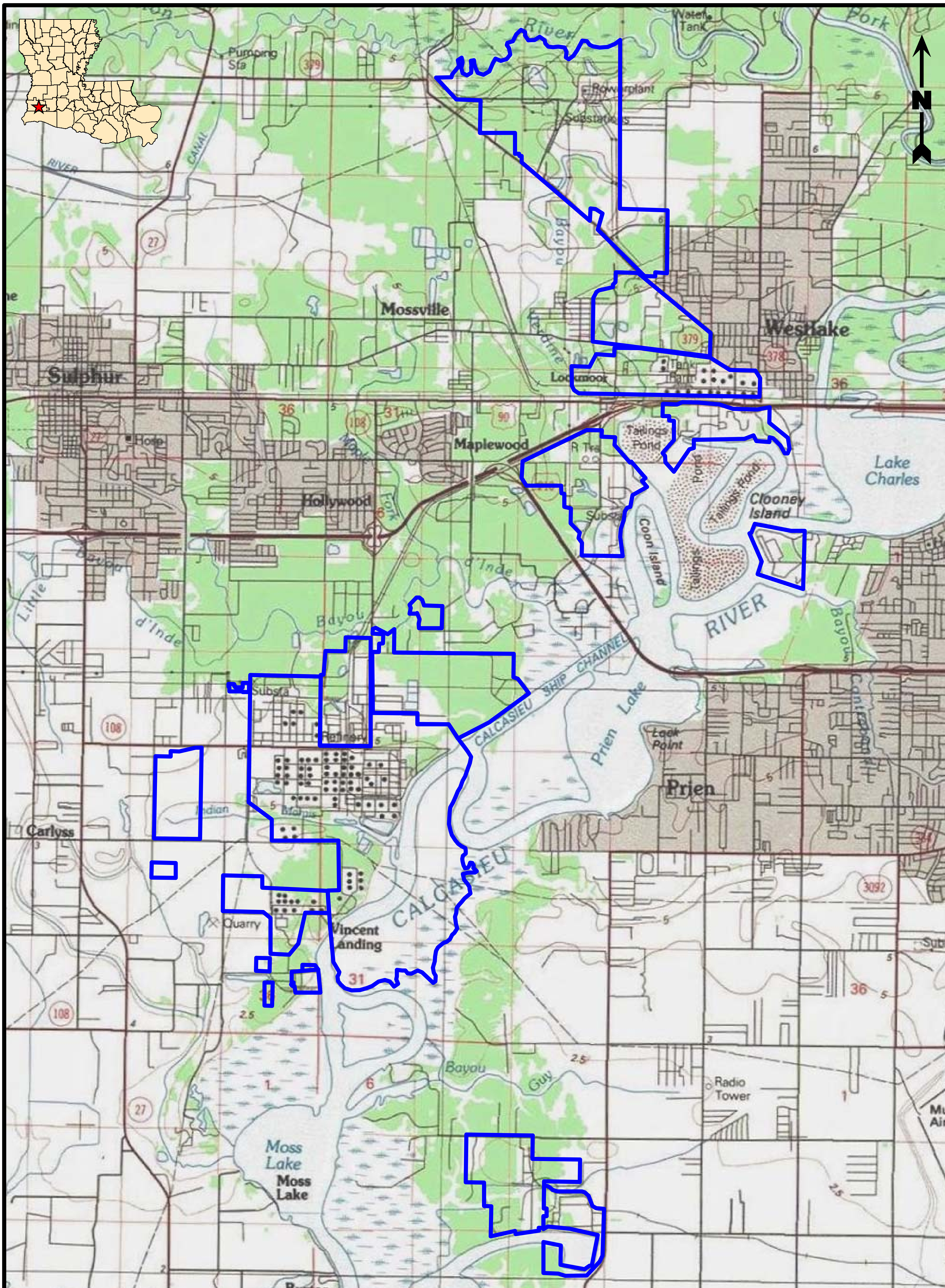
Project Number
1039-001

Drawing Number
1039-001-C021

1
Figure

FIGURE 2

SITE LOCATION MAP



Legend

Property Boundary

Reference

Base map comprised of U.S.G.S. 100K topographic map, "Lake Charles, LA".

1 0.5 0 1 Miles

Site Location Map

Modeling Report
Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholders Group

Drawn By	LMM	12/01/16
Checked By	LMH	12/01/16
Approved By	DD	12/01/16

PROVIDENCE

Project Number
1039-001

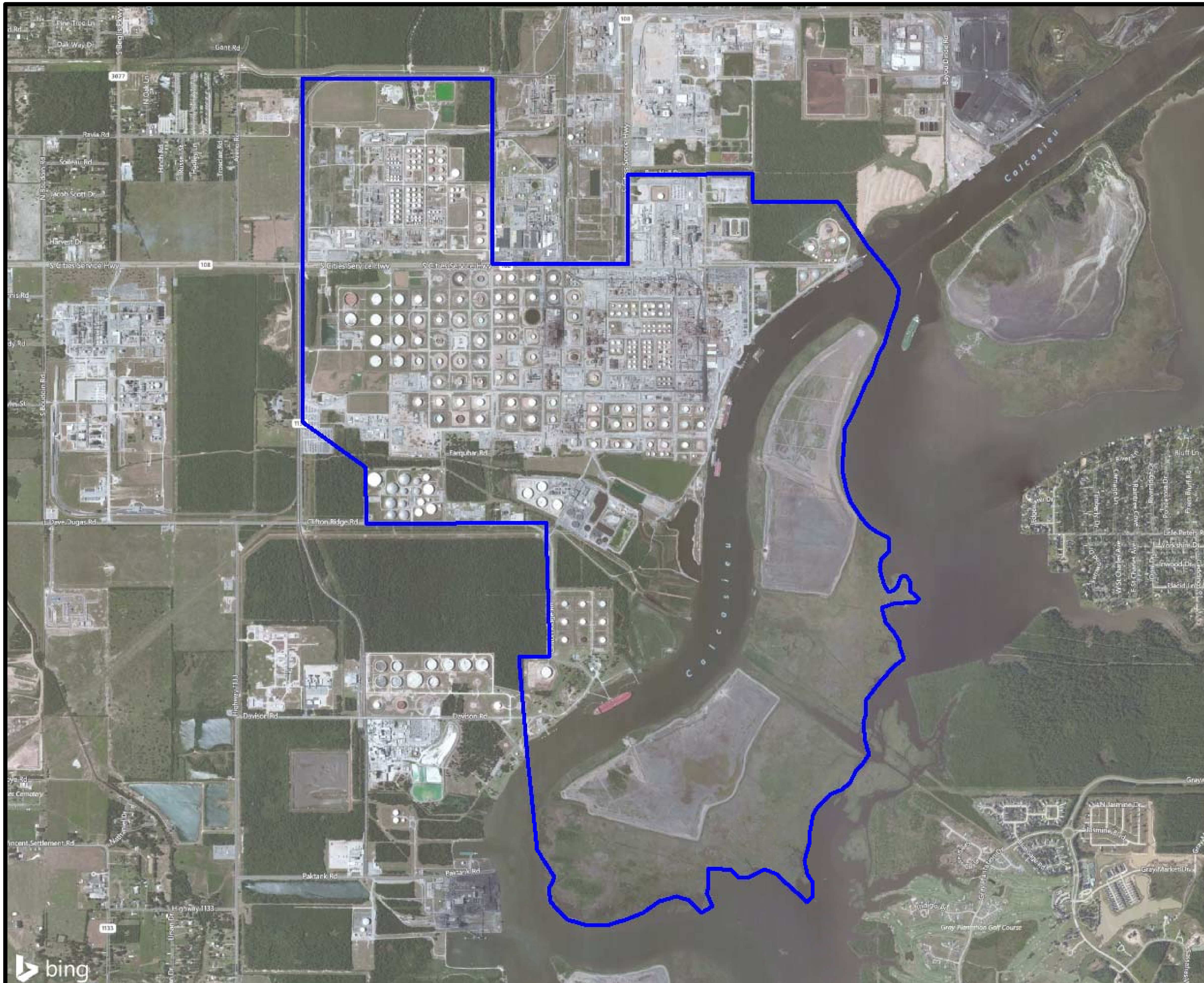
Drawing Number
1039-001-B022

2
Figure

Providence Engineering and Environmental Group LLC

FIGURE 3

SITE LAYOUT – CITGO PETROLEUM CORPORATION



N

Legend

Property Boundary

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.

2,000 1,000 0 2,000
Feet

Site Location Map
Citgo Petroleum Corporation - Lake Charles Manufacturing Complex

Modeling Report

Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholders Group

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Checked By	LMH	12/01/16
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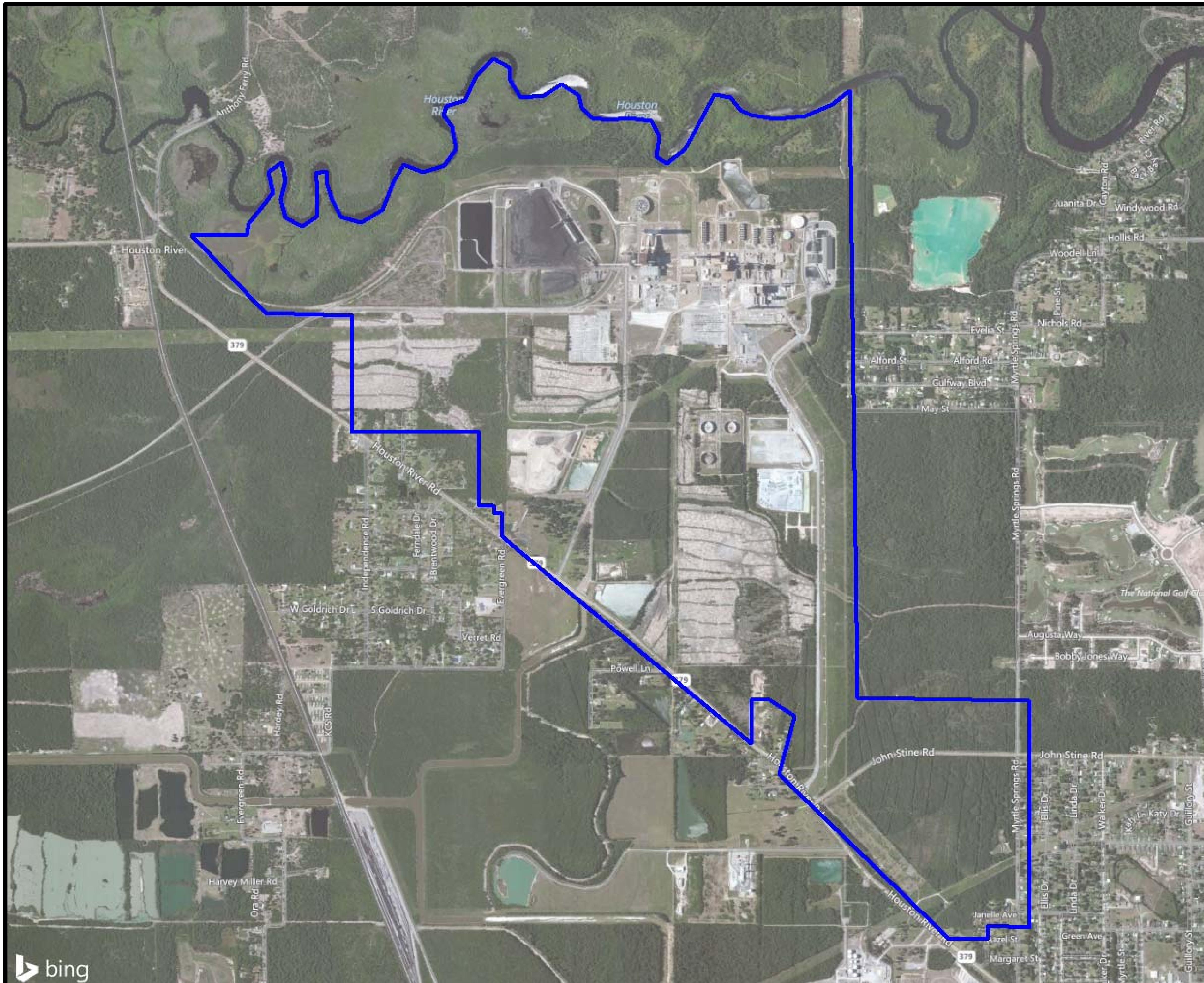
Drawing Number 1039-001-B023

3 Figure

FIGURE 4

SITE LAYOUT – ENTERGY GULF STATES LOUISIANA LLC



N

Legend

Property Boundary

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.

1,500 750 0 1,500 Feet

Entergy Gulf States Louisiana LLC - Nelson Industrial Steam Co. & Entergy Gulf States Louisiana LLC- Roy S Nelson Plant

Modeling Report

Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholders Group

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Drawing Number 1039-001-B024

4 Figure

FIGURE 5

SITE LAYOUT – RAIN CII CARBON LLC

N

Legend

Property Boundary

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.

200 100 0 200 Feet

Site Location Map
Rain CII Carbon LLC - Lake Charles Calcining Plant
Modeling Report
Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholders Group

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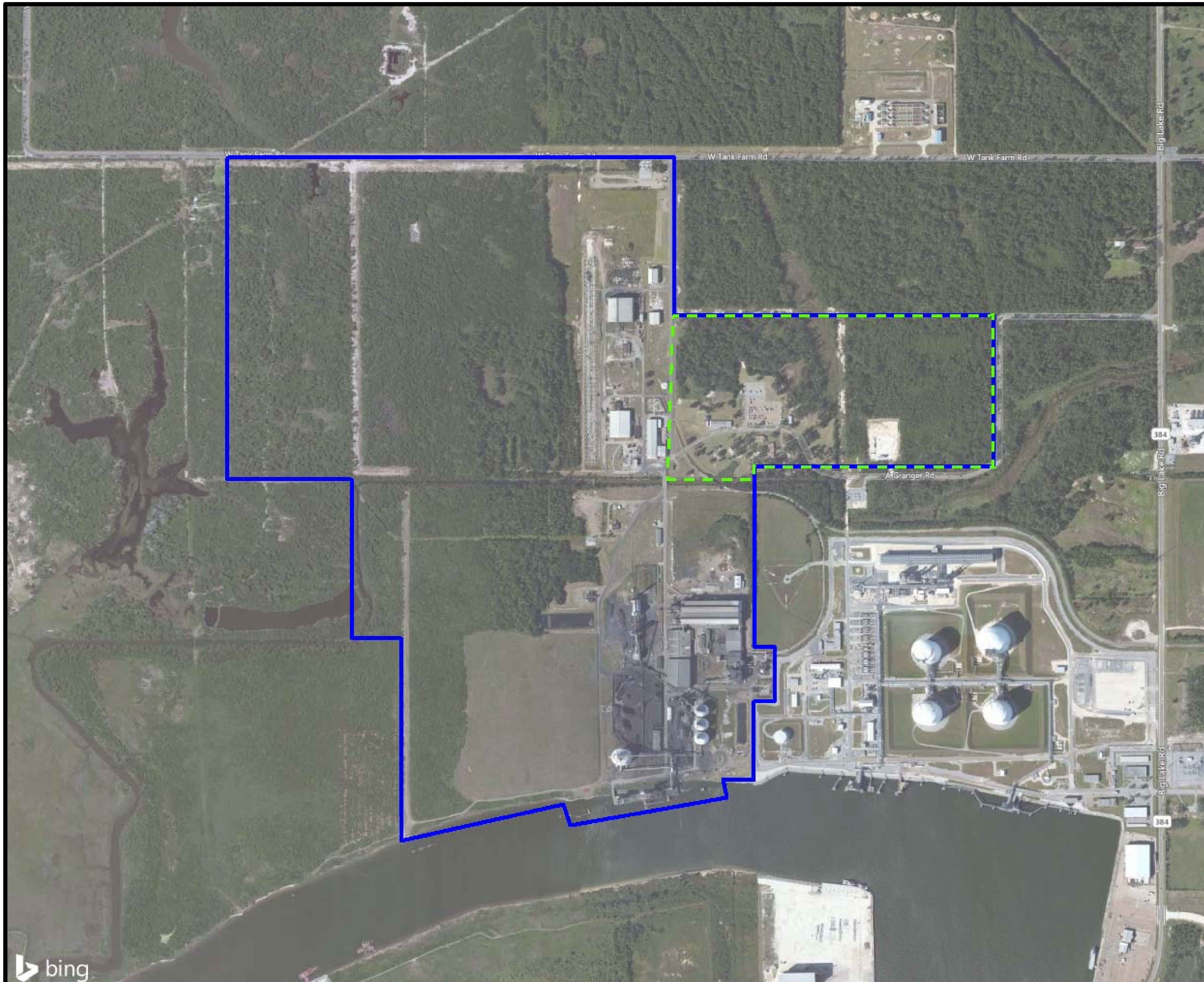
Project Number 1039-001		
Drawing Number 1039-001-B025		
Figure 5		

FIGURE 6

SITE LAYOUT – REYNOLDS METALS COMPANY



N

Legend

Property Boundary

Property Transferred to Separate Industrial Entity in June 2015

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.

800 400 0 800 Feet

Site Location Map
Reynolds Metals Company - Lake Charles Carbon Company

Modeling Report

Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholders Group

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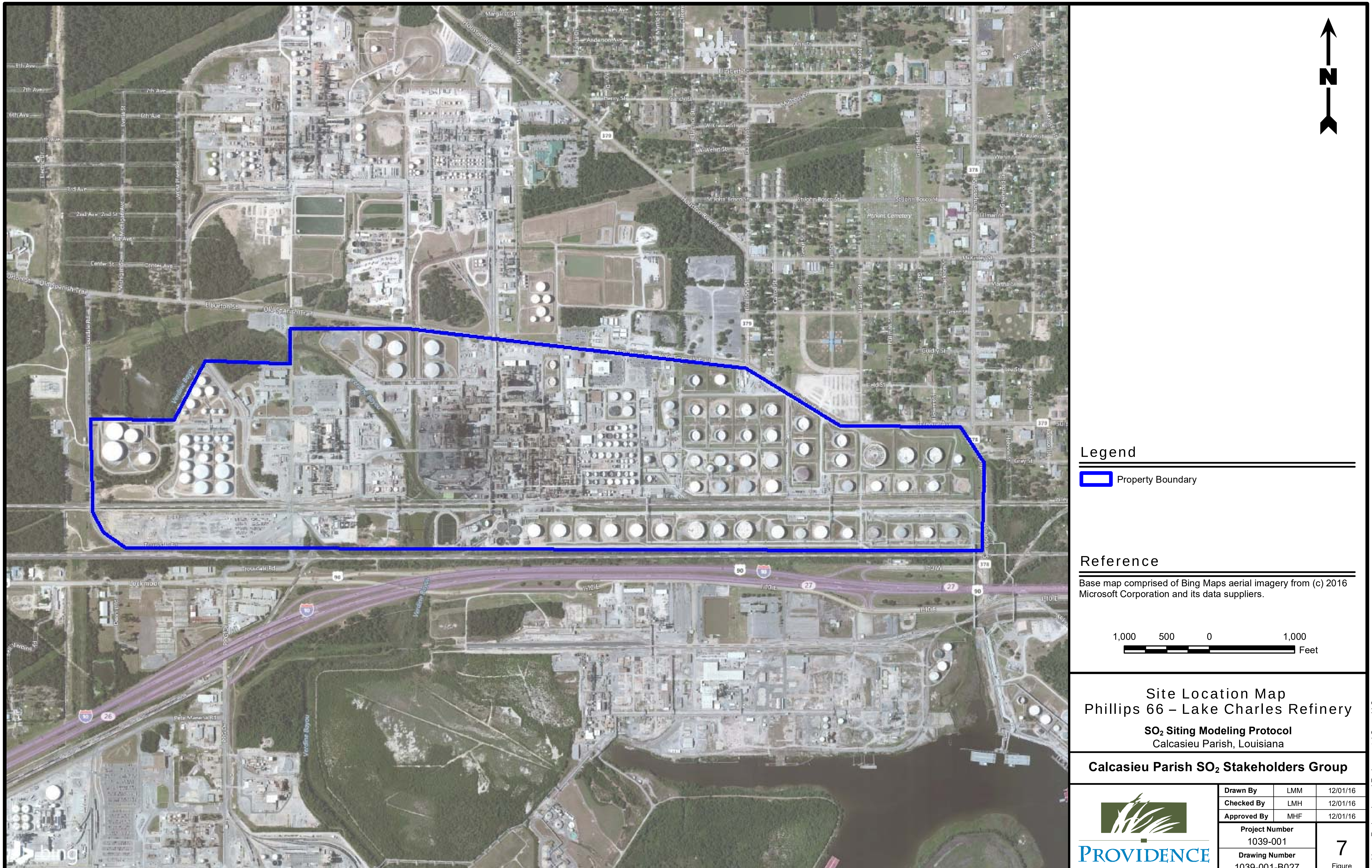
Project Number 1039-001

Drawing Number 1039-001-B026

6 Figure

FIGURE 7

SITE LAYOUT – PHILLIPS 66



N
Legend
Property Boundary
Reference
Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.
1,000 500 0 1,000
Feet
Site Location Map
Phillips 66 – Lake Charles Refinery
SO2 Siting Modeling Protocol
Calcasieu Parish, Louisiana
Calcasieu Parish SO2 Stakeholders Group
PROVIDENCE
Drawn By LMM 12/01/16
Checked By LMH 12/01/16
Approved By MHF 12/01/16
Project Number 1039-001
Drawing Number 1039-001-B027
7
Figure
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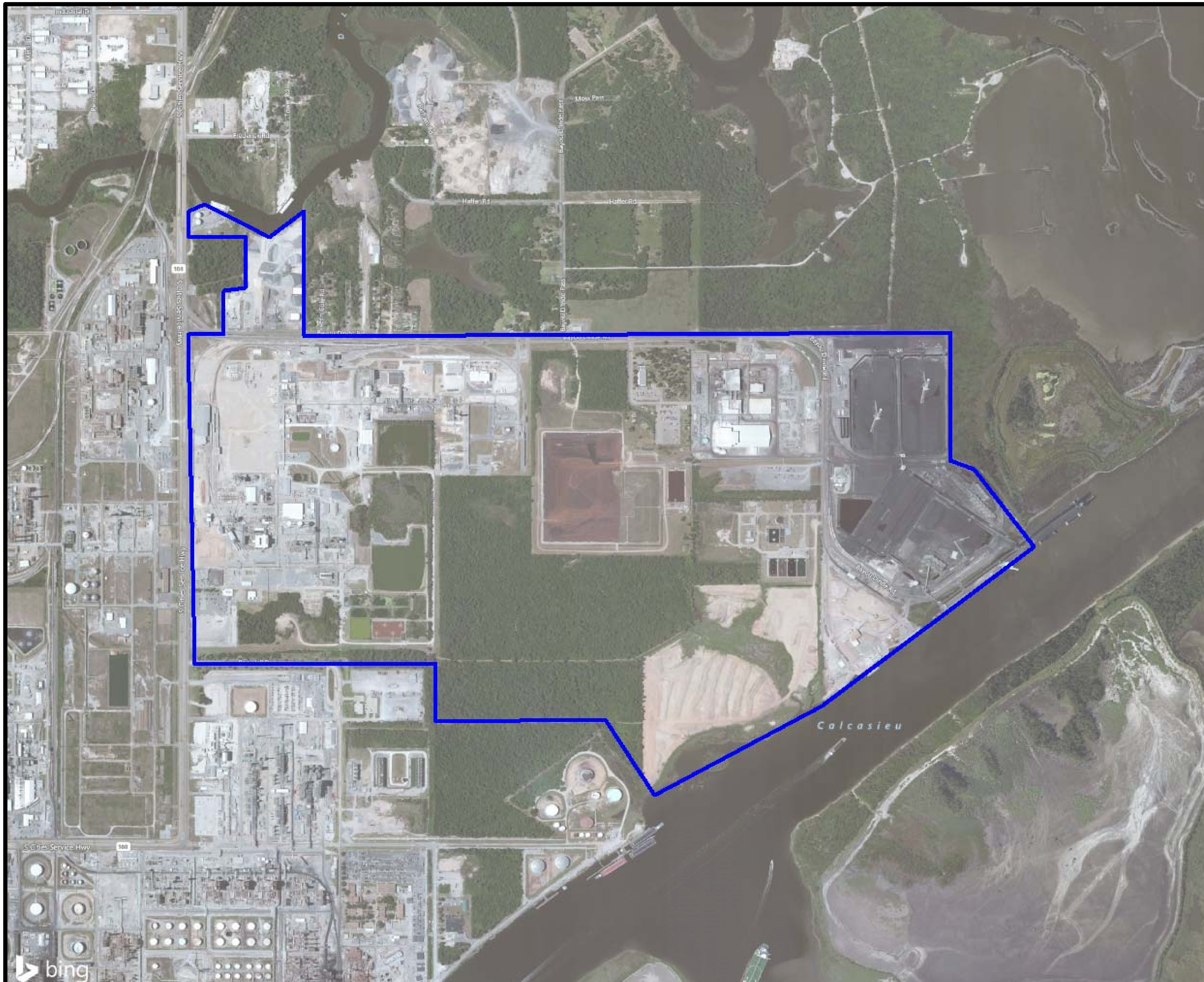
FIGURE 8

SITE LAYOUT – LOUISIANA PIGMENT



N

Legend

Property Boundary

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.

1,000 500 0 1,000
Feet

Site Location Map
Louisiana Pigment Co LP – Titanium Dioxide Plant

Modeling Report

Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholders Group

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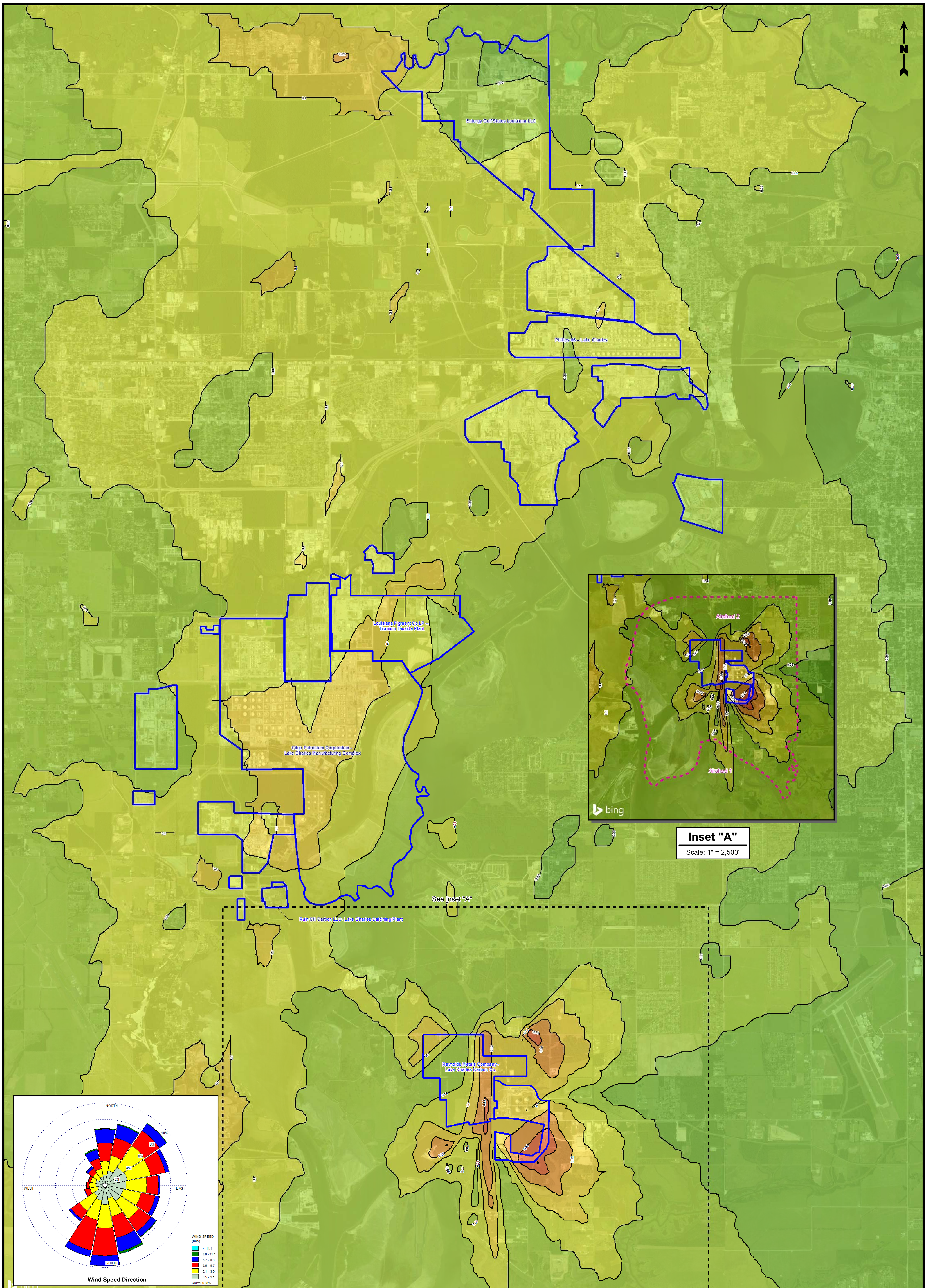
Approved By	MHF	12/01/16
Project Number 1039-001		Figure 8
Drawing Number 1039-001-B028		

FIGURE 9

RESULTS MAP



Legend

Fenceline	
Airshed Area	
NDV Contour (ug/m³)	

NDV (ug/m³)

- 0.02
- 0.04
- 0.06
- 0.08
- 0.1
- 0.12
- 0.14
- 0.16

Reference

Base map comprised of Bing Maps aerial imagery from (c) 2016 Microsoft Corporation and its data suppliers.
Wind speed and direction obtained from National Weather Service Station #3937.

2,500 1,250 0 2,500
Feet

Airsheds

Modeling Report
Calcasieu Parish, Louisiana

Calcasieu Parish SO_2 Stakeholder Group

PROVIDENCE

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Checked By	LMH	12/08/16
Approved By	DD	12/08/16

Project Number 1039-001
Drawing Number 1039-001-C036
Figure 9

APPENDIX A

EMISSION SOURCE PARAMETER

APPENDIX A

LIST OF MODELED SOURCES

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)
Reynolds Metals Company- Lake Charles Carbon Co. All permitted sources of SO_2, as provided by the facility,will be included in the model. No sources will be excluded.			
1	Calciner Kiln and Cooler - Normal Operating Scenario	471433	3331505
3	Butts and Scrap- Drying w/ Dust Collection	471566	3331250
4	Drying with Dust Collection	471693	3331305
5	Thermal Fluid Heater	471646	3331349
6	Anode Baking Furnace - Normal Operating Scenario	471527	3331485
10	Bake Furnace and Storage Operation (Fugitives) -Summary	471581	3331476
11	Bake Furnace and Storage Operation (Fugitives) -Summary	471630	3331476
12	Bake Furnace and Storage Operation (Fugitives) -Summary	471679	3331476
190	THERMAL FLUID HEATER - WEST	471746	3331349
191	THERMAL FLUID HEATER - EAST	471746	3331349
Citgo Petroleum Corporation- Lake Charles Manufacturing Complex The following sources will not be incorporated into the model: GEN559 - intermittent emergency source; INC510 - not a permitted source			
16	Power House Boiler B1C	469263	3338797
17	Power House Boiler B1B	469236	3338788
18	Power House Boiler B1, B1A	469211	3338791
19	Power House Boiler B2	469247	3338773
20	Power House Boiler B2A	469247	3338742
21	Power House Boiler B3, B3B	469232	3338774
22	Power House Boiler B3A, B3C	469232	3338737
23	Power House Boiler B5A	469267	3338768
24	Power House Boiler B5	469267	3338747
25	Coker Blowdown Stack B102 (BD)	469115	3338774
26	3(VIII-A)1 - DC/DA Stack B-602 (Acid Plant, AAT Area)	468366	3338158
28	3(IV)1 - B-1 Flare	469145	3338587
29	3(IV-F)3 - B-4 Flare	469142	3338359
30	3(IX)41 - B-5 Flare	468725	3338785
31	3(IX)42 - B-6 Flare	468725	3338789
32	3(IX)33 - B-7 Flare	468725	3338793
33	3(VI)6 - B-8 Flare	468461	3339018
34	3(IV)2 - B-9 Flare	468461	3339009
35	3(XXII)4 - B-11 Flare	468409	3338432
36	3(XXIII)2 - B-12 Flare	468164	3338047
37	2(202)25 - CB-701	468175	3340710
38	A-Topper Furnace B-4	469130	3339009
39	Topper Furnace B-104	469130	3339034
40	A Cat Steam Superheater Furnace, B-2	468744	3339083
41	B Cat Steam Superheater Furnace, B-2	468836	3339085
42	C Cat Steam Superheater Furnace, B-2	468922	3339082
43	A Cat Feed Preheat Furnace, B-6	468737	3339080
44	B Cat Feed Preheat Furnace, B-6	468824	3339080

APPENDIX A
LIST OF MODELED SOURCES

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)
45	C Cat Feed Preheat Furnace, B-6	468915	3339080
46	3(X)1 A-Reformer B-101 Furnace	468527	3338902
47	3(X)4 Sulfolane B-201 Furnace	468523	3338854
48	3(X)5 Sulfolane B-202 Furnace	468523	3338831
49	Vacuum Furnace B-201	469067	3338914
50	Vacuum Furnace B-2A	469086	3338913
51	Vacuum Furnace B-1	469086	3338890
52	3(I-D)3 Vacuum Furnace B-1 #2	469076	3338890
53	Coker 1 Furnace B-101	469115	3338774
54	Coker 1 Furnace B-201	469084	3338753
55	BLCOH Stabilizer Reboiler, B-101	468596	3339076
56	Feed Prep Furnace B-101 Stack 1	469086	3338875
57	FEED PRED B-101 HEATER, STACK #2	469075	3338875
58	SRF Furnace B-5	469082	3338774
59	3(XVIII-A)1 B-Reformer B-401 Furnace	468524	3338731
60	3(XVIII-A)2 B-Reformer B-406 Furnace	468524	3338723
61	3(XVIII-A)3 B-Reformer B-402 Furnace	468524	3338715
62	3(XVIII-A)4 B-Reformer B-403, 404, 405 Furnaces	468524	3338707
63	3(XXVII-A)1 ISOM B-801 Furnace	468425	3338781
64	3(XVIII)1 ALCOH B-101 Furnace	468528	3338764
65	3(XVIII)2 ALCOH B-102 Furnace	468515	3338745
66	3(X-A)1 BOH B-601 Furnace	468446	3338834
67	3(X-A)2 BOH B-602 Furnace	468446	3338827
68	C Topper Furnace B-1C	469087	3338812
69	C Topper Furnace B-2C	469085	3338802
70	BLCOH Reactor Charge Heater, B-3	468595	3339082
71	3(X)6 A-Reformer B-102, 103, 104, 105, 106 Furnaces	468528	3338862
72	3(XVIII)3 ALCOH B-103 Furnace	468528	3338775
73	Coker II B-201 Furnace	468187	3338768
74	Coker II B-202 Furnace	468187	3338790
75	3(XXVIII)1 Unicracker B-1,2,3,4,5 Furnaces	468239	3338424
76	3(XXII)1 C-Reformer B-501,502,506 Furnaces	468515	3338604
77	3(XXII)2 C-Reformer B-503,504,505 Furnaces	468505	3338643
78	Cat Feed Hydrotreater Recycle Hydrogen Furnace, B-101	468933	3339455
79	Cat Feed Hydrotreater Fractionator Feed Heater, B-102	468918	3339455
80	Furnace B-101	468958	3339248
81	Furnace B-102	468958	3339234
82	Reboiler B-103	468958	3339222
83	Furnace B-201	468958	3339410
84	Furnace B-202	468958	3339397
85	Reboiler B-203	468958	3339385
86	3(XXX)2 Mixed Xylenes B-1001 Furnace	468044	3338448
87	CV-1 B101A	469055	3339429
88	CV-1 B101B	469063	3339429

APPENDIX A
LIST OF MODELED SOURCES

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)
89	CV-1 B102A	469079	3339431
90	CV-1 B102B	469098	3339431
91	3(MISC)5 - AAT Area Fugitives	469060	3338565
92	3(MISC)GEN - Miscellaneous Power Sources	468333	3338640
95	3(IX)12 - Marine Loading Uncontrolled	469373	3338553
99	3(XX-B)1 - Thermal Oxidizer B-407 (AAT Area)	468356	3338155
101	3(XX-K)2-1 - T-803 Sulfur Tank	468226	3338168
102	3(XX-K)2-2 - T-805 Sulfur Tank	468209	3338168
103	3(IX)34 - B-13 Flare ("A"Dock)	469141	3337856
104	3(IX)35 - B-14 Flare ("B/C"Dock)	469216	3338344
105	3(IX)38 - B-700 Wastewater Treatment Plant Flare	468512	3337852
106	3(XXX)1 - Vapor Combustor System - Marine Dock	469953	3339145
107	3(XXII)3 C-Reformer CCR Regenerator Vent	468486	3338663
108	3(X)7 A-Reformer F-102 Regen Vent	468486	3338891
109	3(XVIII-A)5 B-Reformer F-409 Regen Vent	468466	3338713
110	3(XX-K)1-1 - Sulfur Pit - A SRU (AAT Area)	468383	3338057
111	3(XX-K)1-2 - Sulfur Pit - C SRU (AAT Area)	468288	3338187
112	A Cat - Wet Gas Scrubber	468738	3339109
113	B Cat - Wet Gas Scrubber	468824	3339109
114	C Cat - Wet Gas Scrubber	468918	3339109
192	3(XXIX)3 - B-16 Flare	468912	3339527
193	3(XXXIV)10 - B-104 Flare	468982	3339563
194	3(XX-K)1-3 - Sulfur Pit - D SRU (AAT Area)	468288	3338167
195	3(XX-K)1-4 - Sulfur Pit - E SRU (AAT Area)	468296	3338137
Entergy Gulf States Louisiana LLC- Nelson Industrial Steam Co. All permitted sources of SO_2, as provided by the facility,will be included in the model. No sources will be excluded.			
115	Unit 1 Boiler Stack A	472310	3350210
116	Unit 2 Boiler Stack A	472306	3350210
Rain CII Carbon LLC- Lake Charles Calcining Plant All permitted sources of SO_2, as provided by the facility,will be included in the model. No sources will be excluded.			
117	Kiln Stack	467700.5	3335260.3
118	WHB/Baghouse Stack	467764.7	3335329.4
Entergy Gulf States Louisiana LLC- Roy S Nelson Plant All permitted sources of SO_2, as provided by the facility,will be included in the model. No sources will be excluded.			
119	C3A - Unit 3 Boiler Stack A	472265	3350420
122	C3B - Unit 3 Boiler Stack B	472247	3350420
125	C4 - Unit 4 Boiler	472080	3350446
128	C6 - Unit 6 Boiler	471844	3350564
129	C7 - Unit 4 Auxiliary Boiler	472194	3350407

APPENDIX A
LIST OF MODELED SOURCES

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)
Phillips 66 – Lake Charles Refinery			
All permitted sources of SO_2, as provided by the facility,will be included in the model. No sources will be excluded.			
131	EP022 HIGH PRESSURE BOILER (B-5)	473686.3	3345619
132	EP023 HIGH PRESSURE BOILER (B-6)	473672.1	3345619
133	EP109 HIGH PRESSURE BOILER (B-76001)	472994.3	3345714.8
134	EP065 NO. 2 CALCINER STACK	473302.3	3345438
135	EP092 BENZENE WASTE FLARE (API)	473524.6	3345389.4
136	EP041 FCC REGENERATOR	473530.2	3345507
137	EP-251 - Flare for MVRU 2	475596.2	3344594.7
138	EP064 NORTH FLARE	472864.2	3345934
139	EP031 SOUTH FLARE	473339.1	3345301.8
140	EP110 WEST FLARE	473101.2	3345292.9
141	EP006 FCC HEATER (H-6)	473608.3	3345517.9
142	EP008 HEATING OIL BELT HEATER (H-9)	473503.1	3345561.8
143	EP061 THERMAL CRACKER HEATER (H-14)	473632.3	3345501.8
144	EP085 LVT HEATER (H-15)	473492.1	3345561.9
145	EP013 COKER HEATER (H-18)	473383.1	3345564
146	EP017 NO. 2 HDS HEATER (H-24)	473465.1	3345453
147	EP045 PREMIUM COKER HEATER (H-26)	473388.3	3345514.7
148	EP086 PREMIUM COKER HEATER (H-27)	473376.2	3345582.8
149	EP037 NO.3 CRUDE UNIT HEATERS (H-1101)	473535.1	3345645.8
150	EP071 NO 3 VACUUM UNIT HEATER (H-1103)	473589.3	3345638.9
151	EP063 NO 4 HDS HEATER (H-1201)	473480.3	3345635.8
152	EP072 NO 4 HDS HEATER (H-1202)	473476.2	3345728.7
153	EP040 NO. 5 HDS (HYDRODESULFURIZER) (H-1301)	473480.3	3345641.9
154	EP047 SULFURIC ACID AIR HEATER (H-2801)	473697.2	3345845.8
155	EP057 NO 2 COKER HEATER (H-3001)	473360.2	3345630.8
156	EP058 NO 2 COKER HEATER (H-3002)	473360.3	3345655.8
157	EP054 NO 6 HDS HEATER (H-3101)	473416.2	3345764.9
158	EP055 NO 7 HDS HEATER (H-3201)	473414.2	3345744.9
159	EP073 NO 7 HDS HEATER (H-3232)	473421.2	3345744.9
160	EP059 NO 3 REFORMER/HDS HEATERS (H-3801)	473688.1	3345701.8
161	EP067 NO 8 HDS HEATER (H-3951)	473424.2	3345764.9
162	EP143 H-4050 NO. 4 CTU HEATER (H-4050)	473611.2	3345722.9
163	EP221 SZORB PROCESS HEATER (NH-2)	473647.3	3345751.7
164	EP101 HDC H2 HEATER (H-11001)	472872.3	3345550.8
165	EP118 ATMOSPHERIC TOWER HEATER (H-11002)	472886.2	3345550.7
166	EP119 VACUUM TOWER HEATER (H-11003)	472896.1	3345551
167	EP102 HDW/HDF REACTOR CHARGE HEATER (H-12001)	472823.1	3345552.7
168	EP144 HDW/HDF REACTOR CHARGE HEATER (H-12002)	472811.1	3345551.8
169	EP103 HDW/HDF VACUUM CHARGE HEATER (H-12003)	472800.1	3345551.9
170	EP105 HDS CHARGE HEATER (H-16001)	473579.3	3345808.8
171	EP106 1-5 CCR HEATER COMMON STACK (H-16101)	473492.2	3345820.7
172	EP104 CVU FEED HEATER (H-20002)	473484.3	3345758.9

APPENDIX A
LIST OF MODELED SOURCES

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)
173	NO. 2 CTU HEATER (H-30001)	473534.2	3345636.9
174	EP042 SULFURIC ACID UNIT	473726.2	3345428.9
175	EP117 NO 10 CCR REGENERATOR VENT	473507.1	3345813.9
176	EP060 NO 3 REFORMER REGEN VENT	473677.1	3345699.9
177	EP056 SULFUR PLANT	473570.3	3345406.8
178	EP111 LOHC SULFUR PLANT	472845.3	3345424
179	EP232 SZORB CAUSTIC SCRUB REGEN VENT	473591.3	3345779.9
Louisiana Pigment Co LP – Titanium Dioxide Plant All permitted sources of SO_2, as provided by the facility,will be included in the model. No sources will be excluded.			
180	OXYGEN SUPERHEATER W340-AX	470403.5	3340682.5
181	OXYGEN SUPERHEATER W340-BX	470421.7	3340682.8
182	TITANIUM TETRACHLORIDE SUPERHEATER W321-AX	470403.5	3340691.7
183	TITANIUM TETRACHLORIDE SUPERHEATER W321-BX	470421.7	3340672.9
184	CALCINER OFF-GAS SCRUBBER F476	470407.4	3340564.9
185	SPRAY DRYER DUST COLLECTOR F603-A	470374.7	3340513.3
186	SPRAY DRYER DUST COLLECTOR F603-B	470377.6	3340513.3
187	UTILITY BOILER D841-1X (ROUTINE EMISSIONS)	470312.4	3340529.7
188	PROCESS OFF-GAS INCINERATOR STACK	470365.6	3340686.9
189	UTILITY BOILER D841-2X (ROUTINE EMISSIONS)	470312.4	3340524