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Atmospheric Sciences

Modeling Report for South Carolina Electric & Gas Wateree Station and International Paper Eastover Mill

Modeling Report for South Carolina Electric & Gas Wateree Station and International Paper Eastover Mill

Prepared for

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International Paper – Eastover Mill
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Acronyms and Abbreviations

24/7	24 hours per day, 7 days per week
AAQS	Ambient Air Quality Standards
AFS	Air Facility System
AIG	AERMOD Implementation Guide
ASOS	Automated Surface Observing System
BAQ	Bureau of Air Quality
BPIP	Building Profile Input Program
BPIPPRIME	EPA Building Profile Input Program for PRIME
CFR	Code of Federal Regulations
DEM	Digital Elevation Model
DHEC	Department of Health and Environmental Control
DRR	Data Requirements Rule
EPA	United States Environmental Protection Agency
ESP	electrostatic precipitator
FGD	flue gas desulfurization
GEP	Good Engineering Practice
GPM	gallons per minute
g/s	grams per second
hp	horsepower
IP	International Paper
K	Kelvin
kg	kilograms
km	kilometer
kW	kilowatts
lb/hr	pounds per hour
LK	lime kiln
m	meter
µg	microgram
ug/m^3	micrograms per cubic meter
MMBtu/hr	million British thermal units per hour
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NCG	non-condensable gas
NED	National Elevation Dataset
NESHAP	National Emission Standards for Hazardous Air Pollutants
NLCD	National Land Cover Database
NLCD92	USGS National Land Cover Data 1992
NO_2	nitrogen dioxide
PB	power boiler
ppb	parts per billion
PRIME	Plume Rise Model Enhancements
PTE	Potential to Emit
RB	recovery boiler

SCE&G	South Carolina Electric & Gas
SCR	selective catalytic reduction
SO_2	sulfur dioxide
STD	smelt dissolving tank
TAD	*SO_2 NAAQS Designations Modeling Technical Assistance Document*
TPY	tons per year
TRS	total reduced sulfur
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

Limitations

This report summarizes work performed to date and presents the findings resulting from that work. The findings presented herein are made to a reasonable degree of scientific certainty. Exponent reserves the right to supplement this report and to expand or modify opinions based on review of additional material as it becomes available through any additional work or review of additional work performed by others.

1 Project Description

1.1 Purpose

This air quality modeling report, submitted to the South Carolina Department of Health & Environmental Control (DHEC) Bureau of Air Quality (BAQ), provides the procedures and results of a computer dispersion modeling demonstration for use in establishing the area attainment designation for the region surrounding Eastover, South Carolina with respect to the 1-hour National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO_2). The dispersion modeling effort focuses on the area surrounding the South Carolina Electric & Gas (SCE&G) Wateree Station and the International Paper (IP) Eastover Mill, both located in Eastover, in Richland County, South Carolina.

The procedures were designed to be consistent with applicable guidance, including the August 2016 "SO_2 NAAQS Designations Modeling Technical Assistance Document" (TAD) issued in draft form by the United States Environmental Protection Agency (EPA). The procedures were also designed to be consistent with the final Data Requirements Rule (DRR) for the 2010 1-hour SO_2 primary NAAQS. This rule was published in the Federal Register on August 21, 2015[1] and is now codified as 40 CFR 51 Subpart BB.

The current version of the TAD references other EPA modeling guidance documents, including the following clarification memos:

- The August 23, 2010 "*Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard*".

- The March 1, 2011 "*Additional Clarification Regarding Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard*" (hereafter referred to as the "additional clarification memo").

[1] 80 FR 51051

Although the March 1, 2011 additional clarification memo was written primarily for the 1-hour nitrogen dioxide (NO_2) NAAQS, some of the guidance provided therein applies to the 1-hour SO_2 NAAQS after the differences in the form of the standards are taken into account. The modeling procedures also account for guidance provided by modeling staff at DHEC BAQ.

1.2 SCE&G Wateree Station Facility Description

SCE&G Wateree Station is a fossil fuel-fired electric generating plant with a rated capacity of approximately 685 megawatts (MW). SCE&G Wateree Station operates under the terms and conditions of Part 70 Air Quality Permit No. TV-1900-0013 issued by DHEC BAQ. Its permitted emission units consist of:

- two main boilers,
- an auxiliary boiler,
- ash handling operations,
- coal handling operations,
- a carbon burnout plant, and
- limestone and gypsum handling operations.

The permitted emission units that emit SO_2 consist of the two main boilers and the auxiliary boiler. The two main boilers are wall fired units, each with a nominal rating of 3,577.5 million British thermal units per hour (MMBtu/hr). The two main boilers are permitted to fire coal, synfuel, and No. 2 fuel oil. Emissions from each main boiler are controlled by dedicated baghouse and selective catalytic reduction (SCR) systems and by a shared flue gas desulfurization (FGD) system. The two main boilers exhaust to a shared stack. The auxiliary boiler fires No. 2 fuel oil (maximum sulfur content 0.0015% by weight), has a nominal rating of 217.9 MMBtu/hr, and does not have associated emission controls. It exhausts to a dedicated stack.

Emissions of SO_2 from the stack of the two main boilers and the auxiliary boiler stack are included in the modeling analysis. The current Part 70 Air Quality Permit for SCE&G Wateree Station lists the following three intermittent sources of SO_2:

- 541 horsepower (hp) (400 kilowatt (kW)) power block emergency diesel generator,
- 317 hp (236 kW) emergency fire pump diesel engine, and
- 207 hp (154 kW) emergency scrubber quench water pump diesel engine.

Consistent with guidance for sources of intermittent emissions provided in the March 1, 2011 additional clarification memo, these three units were not included in the modeling since they are emergency units, operate intermittently, and do not operate continuously or frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. Table 1 lists the intermittent and insignificant SO_2 sources at SCE&G Wateree Station that were not included in the modeling.

Table 1 SCE&G Wateree Station Intermittent and Insignificant SO_2 Sources

		2013		2014		2015	
Unit ID	**Description**	**Annual SO_2 Emissions (TPY)**	**Operating Hours**	**Annual SO_2 Emissions (TPY)**	**Operating Hours**	**Annual SO_2 Emissions (TPY)**	**Operating Hours**
IA-ENG1	541 hp (400 kW) Power Block Emergency Diesel Generator	0.017	30	0.009	17	0.009	17
IA-ENG2	317 hp (236 kW) Emergency Fire Pump Diesel Engine	0.007	22	0.007	23	0.012	38
IA-ENG3	207 hp (154 kW) Emergency Scrubber Quench Water Pump Diesel Engine	0.005	24	0.024	111	0.003	15
TOTAL		**0.029**		**0.04**		**0.024**	

1.3 IP Eastover Mill Facility Description

IP Eastover Mill is an integrated Kraft pulp and paper mill. It operates under the terms and conditions of Part 70 Air Quality Permit No. TV-1900-0046 issued by DHEC BAQ. Its permitted emission units consist of the following operations:

- Woodyard,
- Pulp mill/oxygen delignification,
- Bleaching,
- Finished products,
- Recausticizing,
- Chemical recovery,
- Power boilers, and
- Miscellaneous.

Permitted sources of SO_2 at the IP Eastover Mill consist of two recovery furnaces, a non-condensable gas (NCG) incinerator, two lime kilns, two smelt dissolving tanks, and two fossil fuel-fired steam generating units. The emissions from these sources exhaust through seven stacks consisting of:

- dedicated stacks for each lime kiln (No. 1 LK and No. 2 LK) and each smelt dissolving tank (No. 1 SDT and No. 2 SDT),
- a stack for the second power boiler (No. 2 PB),
- a stack shared by the second recovery furnace (No. 2 RF) and the NCG incinerator, and
- a stack shared by the first recovery furnace (No. 1 RF) and the first power boiler (No. 1 PB).

The only dedicated SO_2 control device employed at IP Eastover Mill is the NCG Incinerator Scrubber.

Emissions of SO_2 from these seven stacks were included in the modeling analysis. The current Part 70 Air Quality Permit for IP Eastover Mill lists additional emission units which operate intermittently that also may emit SO_2. These consist of miscellaneous portable compressors,

portable generators, portable pumps, and stationary internal combustion engines. These intermittently-operated units were not included in the modeling assessment since they do not operate continuously or frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour ambient SO_2 concentrations. Table 2 lists the intermittent and insignificant SO_2 sources at IP Eastover Mill that were not included in the modeling.

Table 2 IP Eastover Mill Intermittent and Insignificant SO_2 Sources

Unit ID	hp	Description	Max SO_2 (lb/hr)*	2013		2014		2015	
				SO_2 TPY	Hours	SO_2 TPY	Hours	SO_2 TPY	Hours
#2 Fire Water Pump	240	Supplements electric fire water pump.	0.49	0.017	70	0.02	82.5	0.01	28.6
#3 Fire Water Pump	240	Supplements electric fire water pump.	0.49	0.019	80	0.01	35.3	0.01	29.8
#2-2 Mud Tank	22	Emergency agitation in case of power failure	0.04	0.001	28.9	0.0002	7.7	0.0001	5.4
#2-1 Mud Tank	22	Emergency agitation in case of power failure	0.04	0.001	35	0.0002	7.6	0.0001	4.9
#1 Lime Kiln Emergency Drive	22	Emergency kiln rotation in case of power failure	0.04	0.001	44.5	0.001	61.6	0.001	24.3
#2 Lime Kiln Emergency Drive	22	Emergency kiln rotation in case of power failure	0.04	0.0001	5.3	0.0001	4.3	0.001	26
Powerhouse Emergency Generator	77	Emergency power for powerhouse control room 10 kW generator	0.16	0.0001	1.0	0.0001	1.0	0.0001	1.0

* Emissions are based on AP-42 Table 3.3-1 emission factor of 2.05 x 10-3 lb/hp-hr and the rated hp of the unit.

1.4 Location

SCE&G Wateree Station and IP Eastover Mill are both located in Eastover, Richland County, South Carolina. The facilities are located slightly west of the Wateree River, which forms the boundary between Richland County and Sumter County, and to the east of McCords Ferry Road, also referred to as Route 601.

The facilities are situated in generally remote, rural areas with surroundings characterized by woods and fields with no nearby residences. Terrain in this area can be characterized as rolling with some nearby hills but no significant terrain features. The facilities are approximately 135 kilometers (km) northwest (inland) of the nearest coastal area. Figure 1 shows the terrain in the area surrounding the two facilities. Figure 2 shows the land use in the area. Figure 3 shows the area surrounding SCE&G Wateree Station and IP Eastover Mill. A circle with a radius of 10 km centered on a point midway between the two facilities is plotted on Figure 2 and Figure 3 to help establish scale. The distance between SCE&G Wateree Station and IP Eastover Mill is on the order of 6.7 km. Note that some of the plotted circles are terrain following, so that they may appear to have ripples.

Figure 4 shows a close up view of the area surrounding SCE&G Wateree Station, while Figure 5 shows a close up view of the area surrounding IP Eastover Mill. In each figure, a circle with a radius of 1 km centered on the facility is plotted to establish scale.

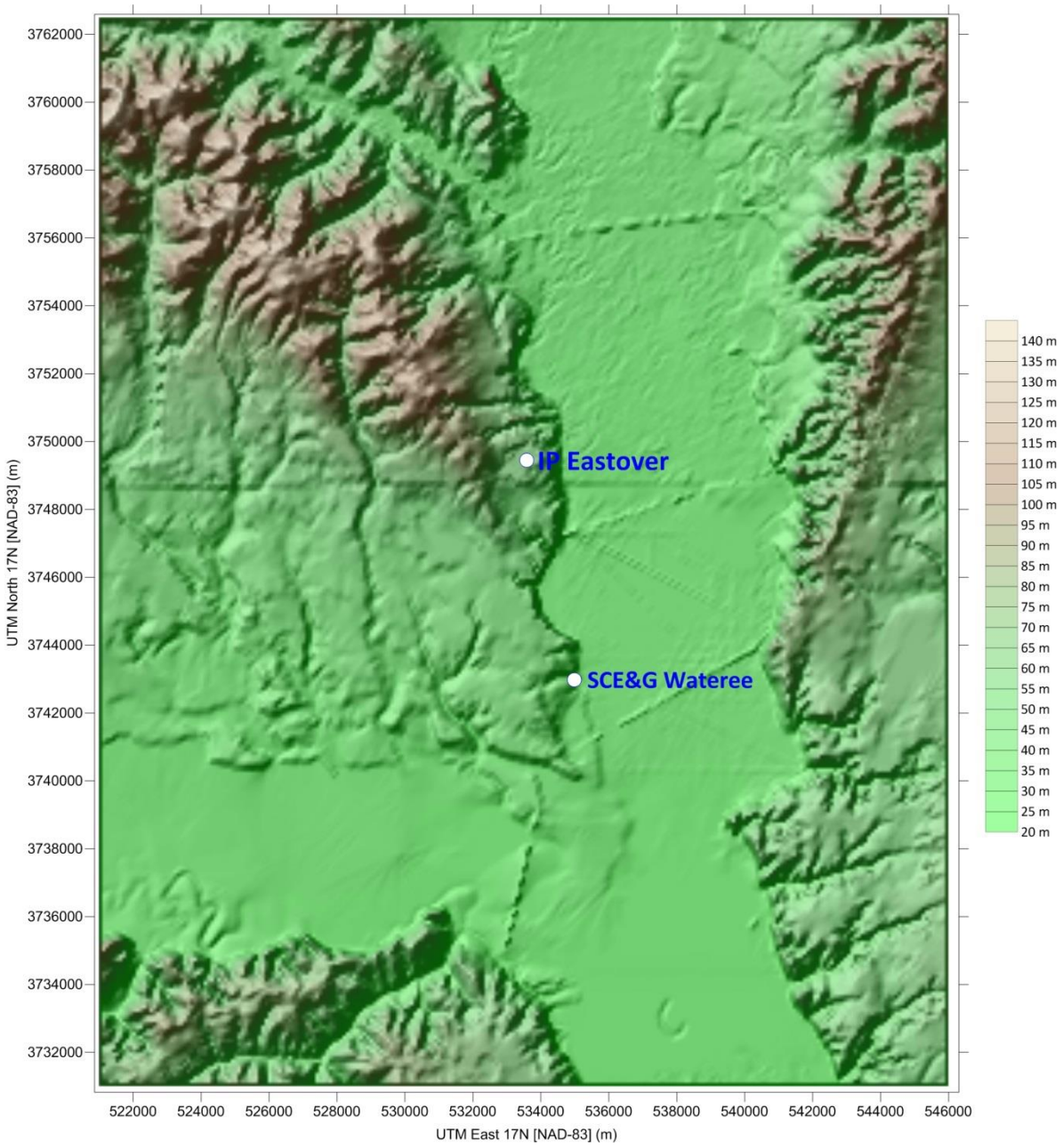

Figure 1 Terrain surrounding SCE&G Wateree Station and IP Eastover Mill

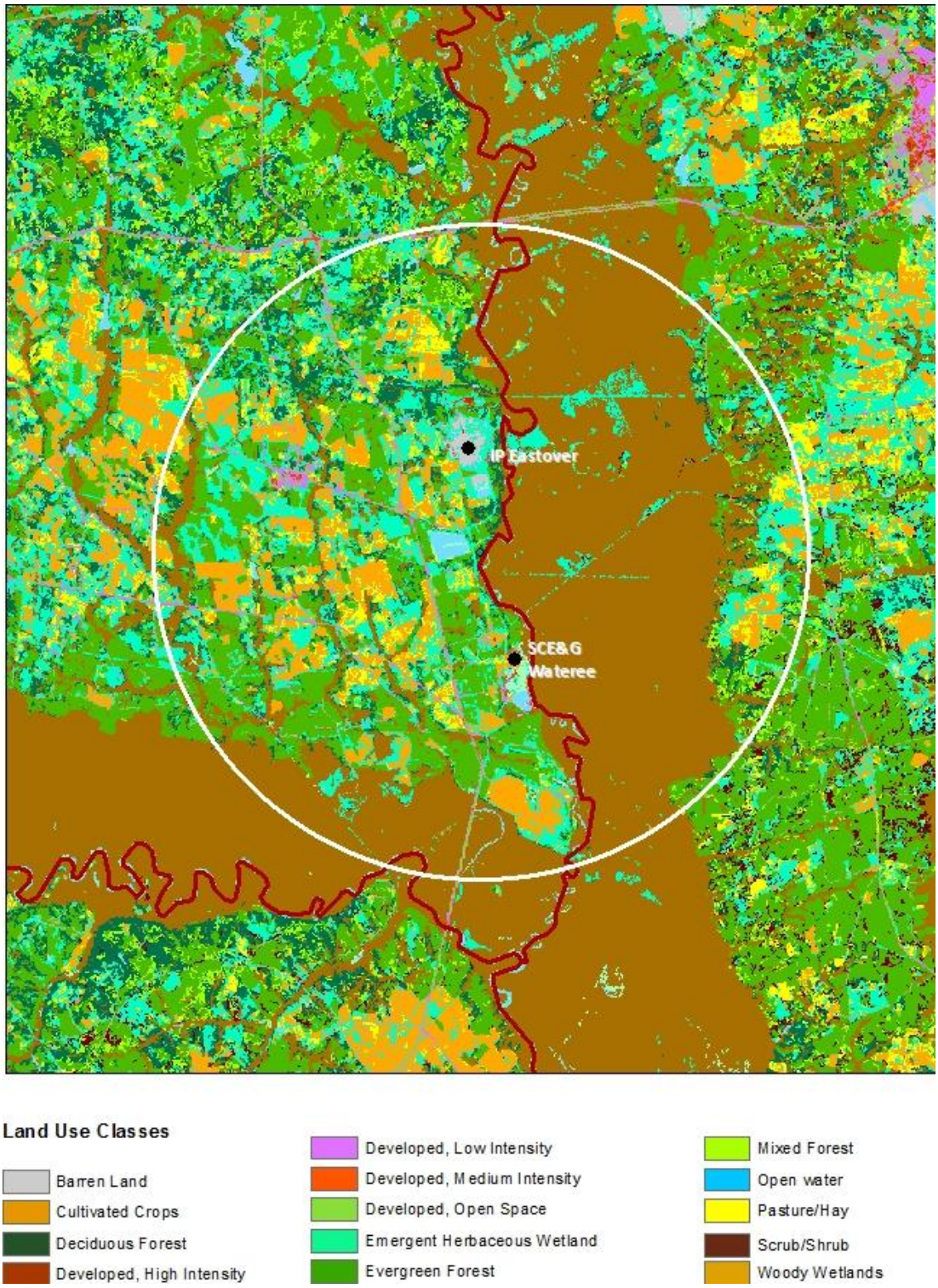

Figure 2 Land use surrounding SCE&G Wateree Station and IP Eastover Mill with 10 km radius circle

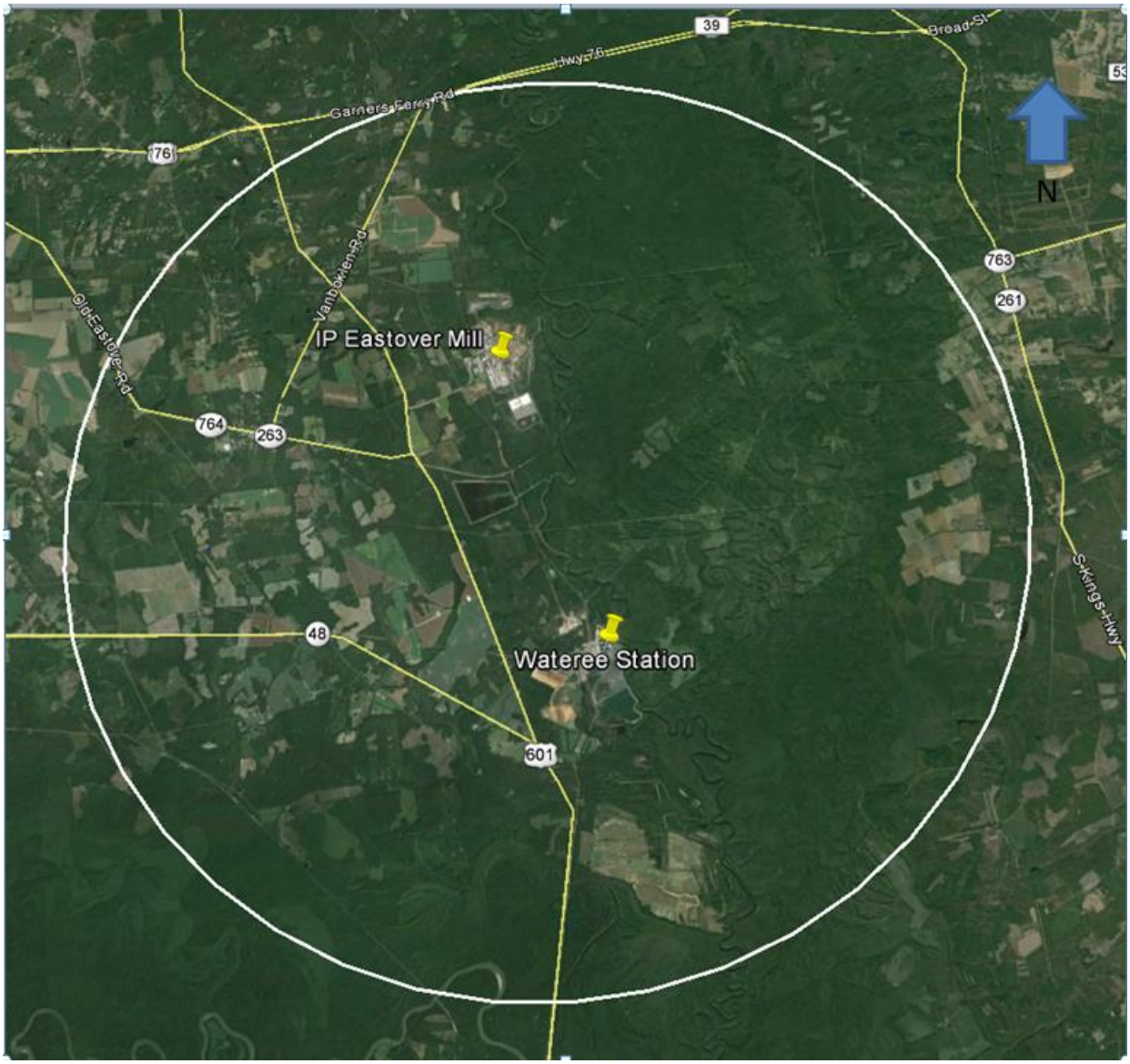

Figure 3 Area surrounding SCE&G Wateree Station and IP Eastover Mill with 10 km radius circle

Figure 4 Area surrounding SCE&G Wateree Station with 1 km radius circle

Figure 5 Area surrounding IP Eastover Mill with 1 km radius circle

1.5 Nearby Facilities

The EPA EnviroMapper[2] web interface was used to help identify stationary sources of air emissions located near SCE&G Wateree Station and IP Eastover Mill. EnviroMapper is linked to EPA's Air Facility System (AFS), which contains emissions and compliance information on stationary air pollution point sources regulated by EPA, state, and local air regulatory agencies. Searches were conducted to identify point sources located within 5 miles of either facility.

The following nearby facilities were identified:

- Kemira/Finnchem 200 Wateree Station Road, a sodium chlorate production facility,
- Kemira/Fennchem 191 Wateree Station Road, a facility that conducts anode coating and metal etching processes,
- Glasscock Company Plant 4, a ready-mix concrete manufacturing facility, and
- Specialty Minerals Inc., a facility that manufactures calcium carbonate and which is collocated at IP Eastover Mill.

Figure 6 shows the approximate location (based on coordinates in AFS) of these nearby facilities relative to SCE&G Wateree Station and IP Eastover Mill. Circles with radii of 1 km and 3 km surrounding each primary facility are also plotted to help establish scale.

Glasscock Company Plant 4 is a minor facility and does not emit SO_2. Therefore, it was eliminated from further consideration. The Kemira facility at 191 Wateree Station Road has no permitted sources of SO_2 emissions and was also eliminated from further consideration.

The Kemira facility at 200 Wateree Station Road accepted a sulfur in oil limit (0.05%) in its Conditional Major Permit to avoid being a major source. The resulting potential to emit from its boilers is 4.98 pounds per hour (lb/hr) or 21.8 tons per year (TPY) on an annual basis. This facility was retained for further consideration.

[2] http://www.epa.gov/emefdata/em4ef.home

The Specialty Minerals, Inc. facility is physically located contiguous to the IP Eastover Mill and produces precipitated calcium carbonate for use in IP's papermaking process. The resulting potential to emit from its carbonators is 2.49 lb/hr (10.91 TPY) on an annual basis. This facility was retained for further consideration.

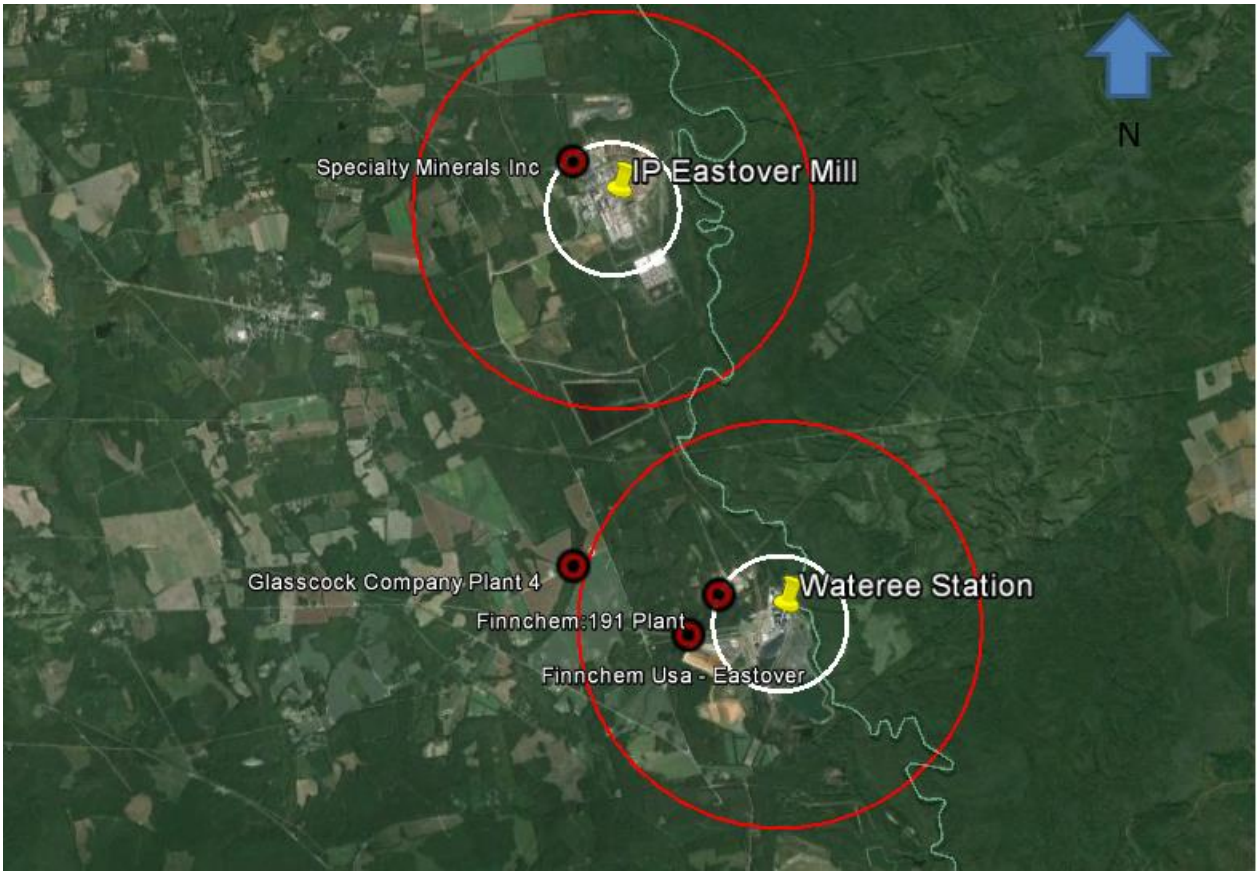

Figure 6 Nearby facilities to SCE&G Wateree Station and IP Eastover Mill with 1 km and 3 km radius circles

2 Model Selection

The most recent version of the EPA AERMOD model (Version 15181) was used for the cumulative impact analysis for determining the appropriate attainment designation of the area surrounding SCE&G Wateree Station and IP Eastover Mill with respect to the 1-hour NAAQS for SO_2. AERMOD is recommended in the EPA *"Guideline on Air Quality Models*" for a wide range of near-field applications in all types of terrain. In addition, AERMOD contains the PRIME building downwash algorithm, which accounts for aerodynamic building downwash effects. AERMOD was used with current regulatory default options to model all sources, except as noted below.

AERMOD was run using the currently non-default option LOWWIND3 with justification submitted to DHEC BAQ in a separate document to supplement this modeling report.

The air quality dispersion modeling analyses account for potential aerodynamic building downwash effects for all modeled stacks at SCE&G Wateree Station and IP Eastover Mill. Building parameters needed by AERMOD to model potential building downwash effects were obtained using the latest version (04274) of the EPA Building Profile Input Program for PRIME (BPIPPRIME).

3 Modeling Domain

3.1 Determination of Sources to Include

3.1.1 Primary Sources

The modeling domain for the Eastover, SC SO_2 attainment area designation modeling analysis focuses on the two primary facilities that are the main subject of this modeling report, namely SCE&G Wateree Station and IP Eastover Mill. Under the DRR, a source subject to its requirements (i.e., an "applicable source") is one with actual SO_2 emissions of 2,000 TPY or more or otherwise identified by an air agency as requiring air quality characterization.[3] These two facilities were identified by DHEC BAQ as having actual SO_2 emissions for the most recent calendar year in excess of 2,000 TPY and thus are large enough to require modeling to help establish the attainment status of the surrounding area with respect to the 1-hour NAAQS for SO_2. At the request of DHEC BAQ, this report was prepared for a joint modeling analysis inclusive of both facilities.

3.1.2 Nearby Sources

The procedures used in identifying other secondary facilities to include explicitly in the dispersion modeling analysis are described below, along with sources excluded from the area designation modeling.

Current modeling guidance in the TAD states that the process of determining which nearby sources to include in the attainment area designation modeling should make use of professional judgment. Guidance in the TAD and in the referenced clarification memos states that the "*number of sources to explicitly model should generally be small*." [4]

[3] In this report, the term "principal source" is used in place of "applicable source" to provide further clarity in distinguishing the applicable sources to the additional sources ("nearby" or "background" sources) that were considered for inclusion in the cumulative impact analysis.

[4] U.S. EPA (2013) p.7

The applicable guidance in the TAD and clarification memos also mentions that any nearby sources that are expected to cause a significant concentration gradient in the vicinity of the primary sources being modeled should be included in the area designation modeling and that the impacts of any other sources should be incorporated via a consideration of background air quality concentrations.

Although some regulatory agencies have informally established minimum source emission rate thresholds below which nearby sources do not need to be explicitly included in the area designation modeling, neither EPA nor DHEC BAQ has yet done so. Consequently, a variety of considerations and technical justifications were used to select the background sources included in the cumulative impact analysis.

3.1.3 Screening Area

For the modeling, a screening area extending 50 km from each of the two primary sources was used to identify other potential nearby sources for inclusion in the analysis. Sources beyond 50 km are very unlikely to cause or contribute to a violation of the NAAQS in the vicinity of the primary sources or to cause a significant concentration gradient in the vicinity of the primary sources.

3.1.4 Screening Procedures – Initial Consideration of Emissions and Proximity

Actual emission rates (when available) and proximity to the primary sources were factors that were considered for including or excluding potential nearby sources within the screening area. Actual emission rates are appropriate for use in determining sources to include or exclude because of the focus of the area designation modeling, i.e., on estimating concentrations that would be actually measured at ambient air quality monitors.

Proximity to the primary sources is also a factor to consider for several reasons. First, the farther away a candidate source is from the primary sources, the less likely it is that the candidate source would have a significant contribution to a predicted violation of the NAAQS

due to the primary sources (or that the primary sources would have a significant contribution to predicted violations caused by the candidate source). In addition, in the additional clarification memo, EPA references a general "rule of thumb" that the distance to a maximum 1-hour predicted impact is typically on the order of 10 times the stack height and that the region of significant concentration gradients in flat terrain is on the same scale. Finally, EPA states that the process of identifying nearby sources to include in a cumulative impact analysis "*should focus on the area within about 10 kilometers of the project location in most cases*" and that the "*routine inclusion of all sources within 50 kilometers…is likely to produce an overly conservative result in most cases.*"[5]

DHEC BAQ provided county-by-county spreadsheets listing current allowable annual emissions for all facilities with air permits. Initial screening was conducted using these data to ensure that all facilities with current air permits would be considered. These data were first processed to identify the facilities that are located within 50 km of either Wateree Station or the Eastover Mill. These facilities are shown in Figure 7.

[5] http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf p.16

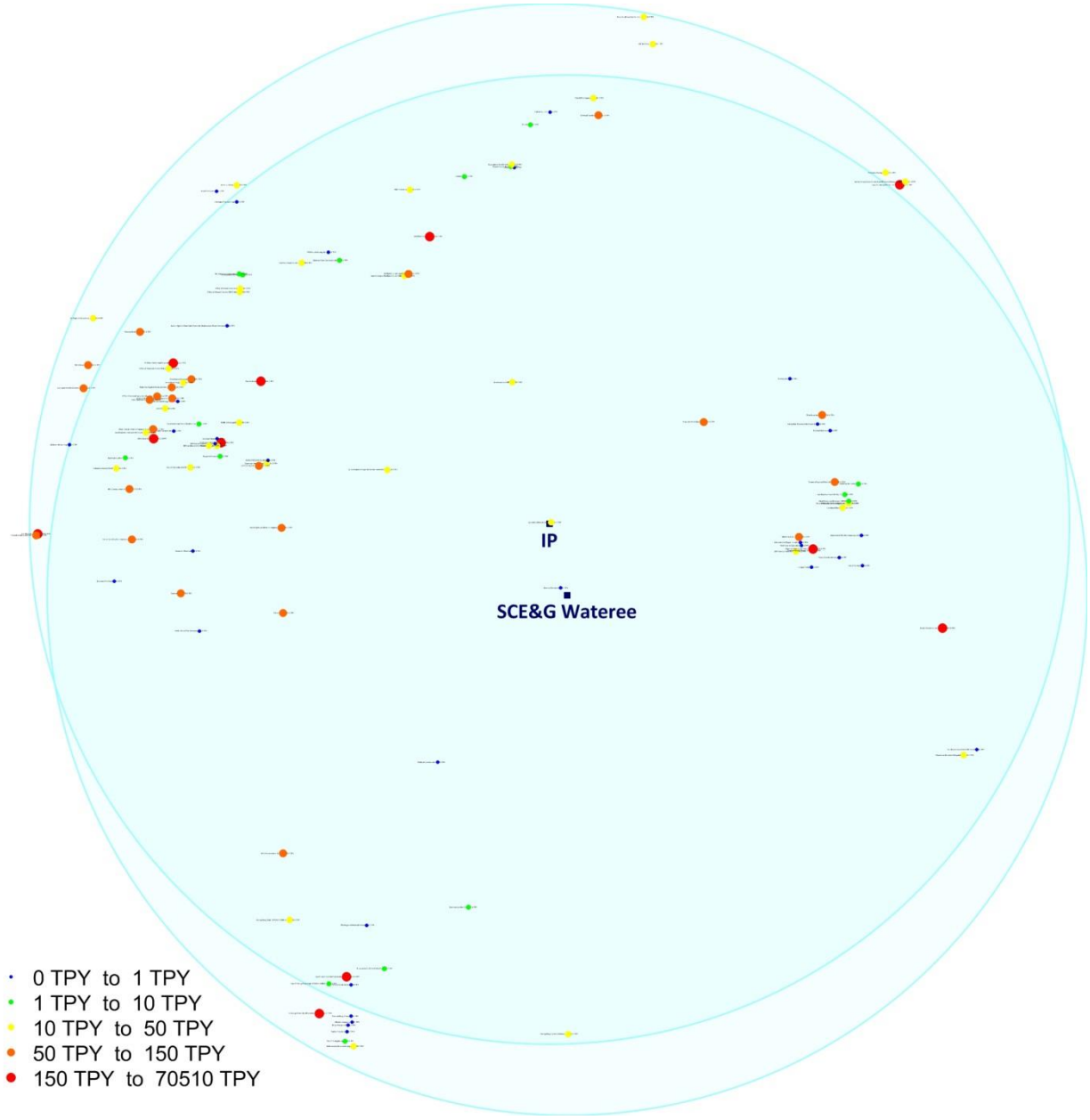

Figure 7 All permitted facilities within 50 km of IP Eastover Mill and SCE&G Wateree

Figure 7 shows that most of the nearby facilities that are candidates for inclusion in the modeling analysis are relatively distant from the primary sources, and some are only within the screening area for one of the two primary sources. Although distance is one factor to consider when selecting sources, the magnitude of their SO_2 emission rates is another.

Actual annual SO_2 emission rates for the years 2012, 2013, and 2014 were obtained from DHEC BAQ for each of the candidate nearby facilities. Figure 8 shows the candidate sources with 2014 emissions greater than 1 TPY and is coded to reflect the actual annual facility-wide emission rate in 2014. The primary sources, each of which has actual annual SO_2 emission rates exceeding 2,000 TPY, are denoted by the large white circles. Invista SARL (Invista) and CMC Steel South Carolina, whose actual annual SO_2 emission rates were between 100 TPY and 1,000 TPY, are depicted by smaller purple circles. Sources with actual annual SO_2 emission rates greater than 10 TPY but less than 100 TPY are depicted by smaller blue circles. Finally, sources with actual annual SO_2 emission rates greater than 1 TPY but less than 10 TPY are depicted by still smaller yellow circles.

Figure 8 shows that the candidate nearby sources with the largest annual SO_2 emission rates, such as Invista and CMC Steel South Carolina, are located in the outer regions of the 50 km screening area.

Figure 9 is a pie chart showing the relative actual SO_2 emissions in 2014 from sources within the screening area. Approximately 92% of the SO_2 emissions are from the two primary sources, SCE&G Wateree Station (~57%) and IP Eastover Mill (~35%). Actual emissions were not available for two nearby facilities discussed earlier, Specialty Minerals, Inc. and Kemira. Consequently, their potential to emit for SO_2 was used instead in constructing the pie chart.

Figure 10 and Figure 11 show the regions within 20 km of SCE&G Wateree Station and IP Eastover Mill, respectively. In each figure, circles with radii of 10 km and 20 km from the primary source are plotted along with locations of nearby sources that had actual emissions exceeding 1 TPY for SO_2. There are no such sources within 20 km of Wateree Station. The only such source within 20 km of IP Eastover Mill is Northeast Landfill, a fairly small source of

SO_2. Figure 10 and Figure 11 do not show the locations of Specialty Minerals, Inc. or Kemira (Finnechem USA). These site locations are shown in Figure 6.

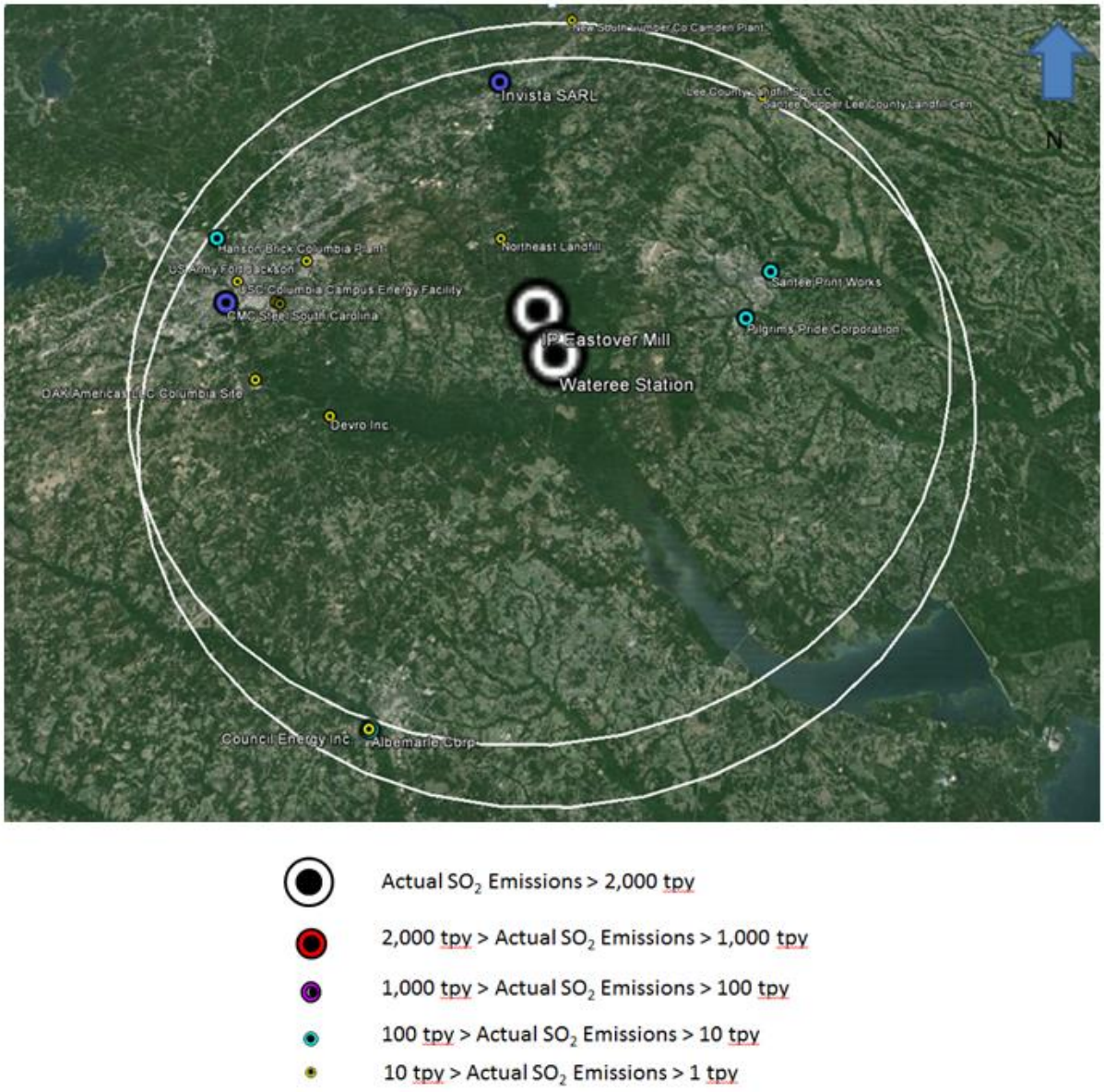

Figure 8 Candidate sources with emissions greater than 1 TPY located within 50 km of the primary sources

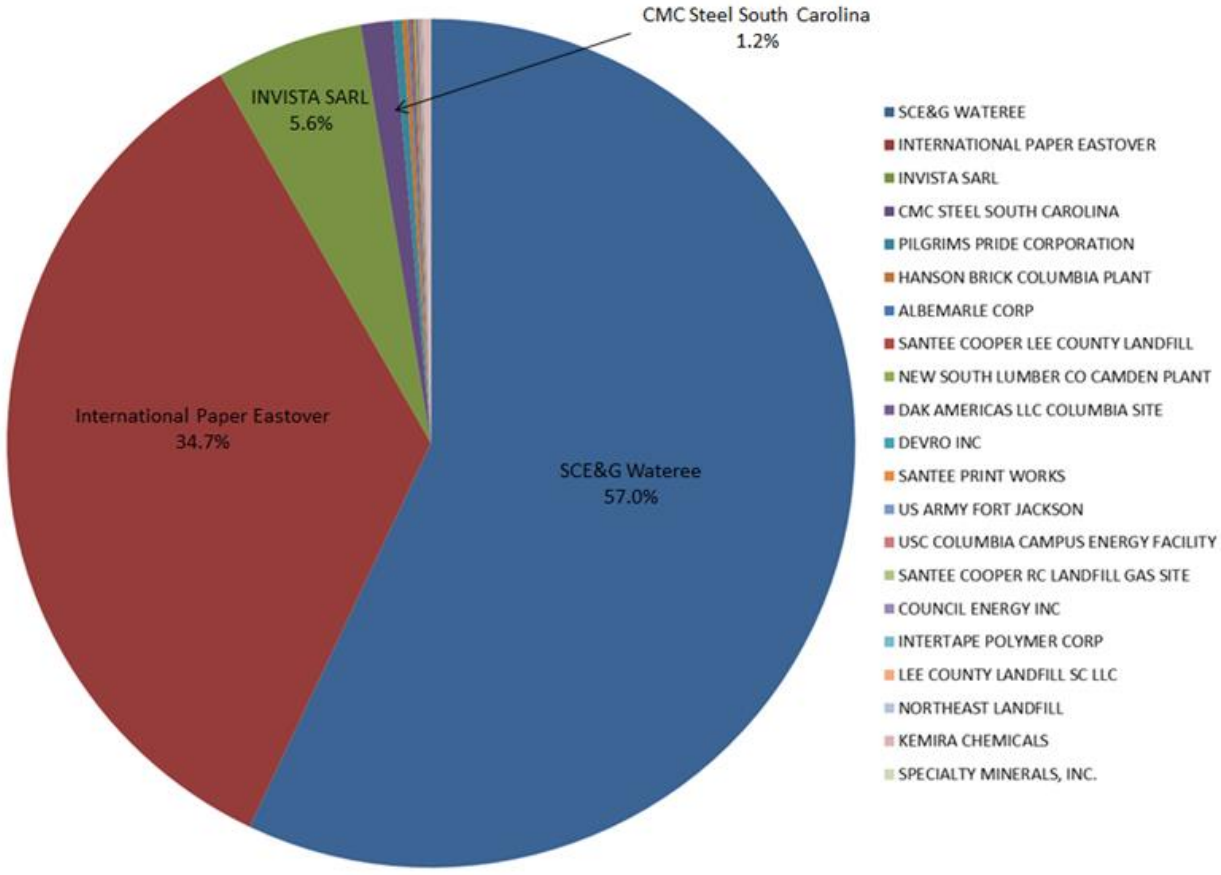

Figure 9 Relative 2014 SO_2 emissions for sources greater than 1 TPY within screening area

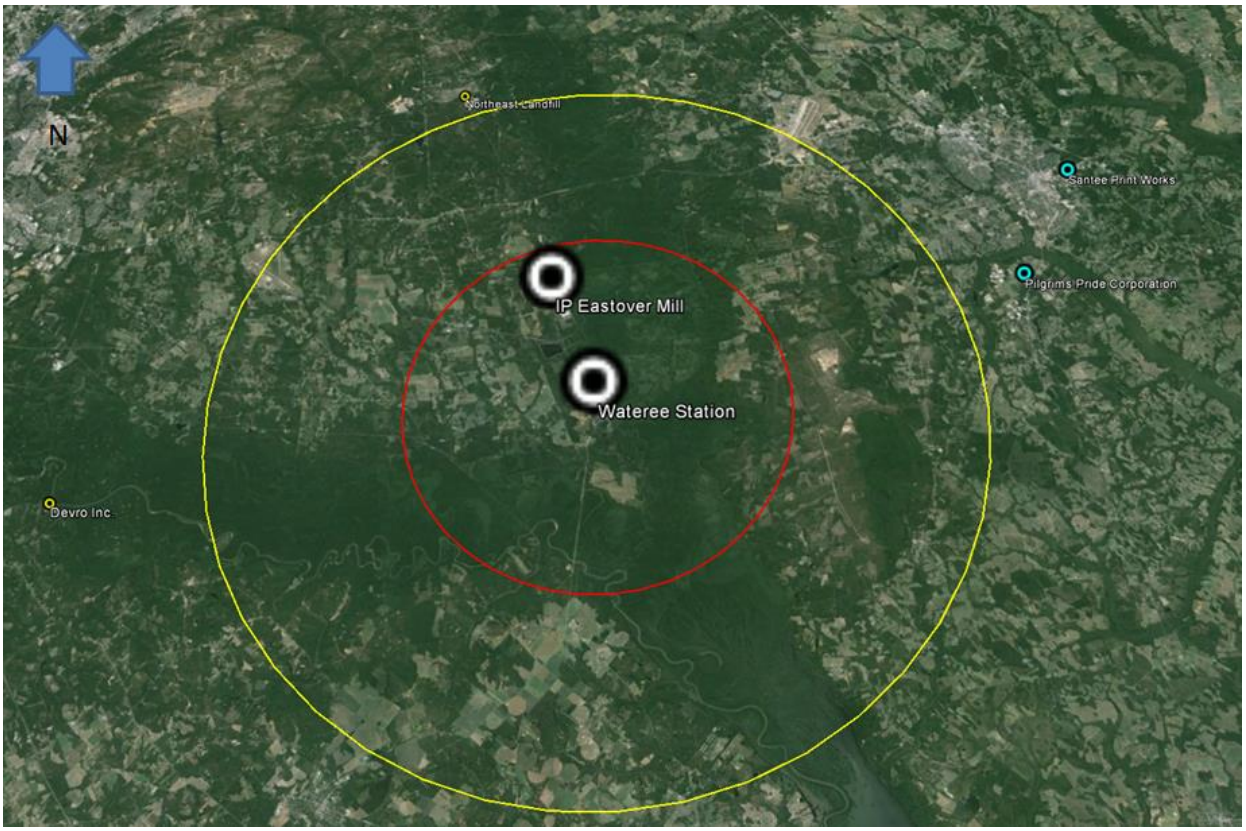

Figure 10 Sources nearest to SCE&G Wateree Station (10 km and 20 km radius circles)

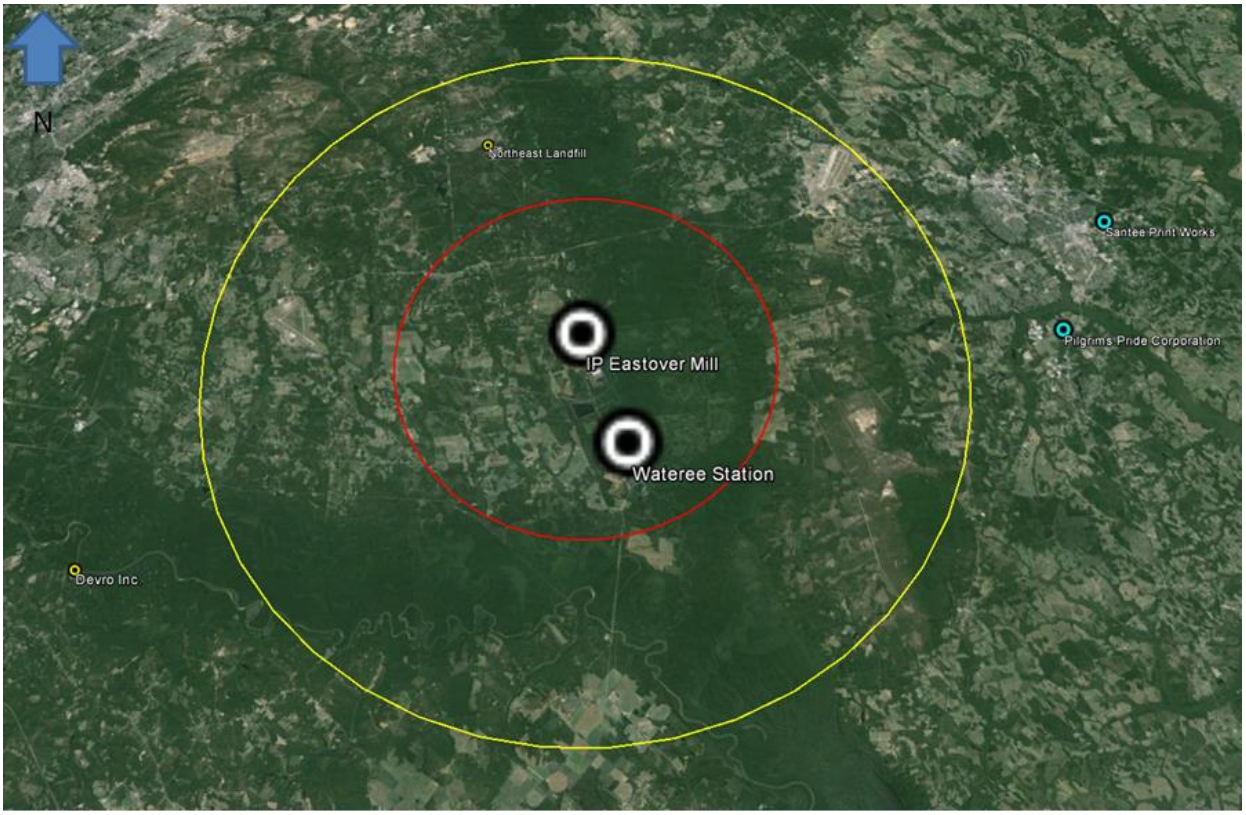

Figure 11 Sources nearest to IP Eastover Mill (10 km and 20 km radius circles)

3.1.5 20D Methodology

Although the initial consideration of emission rates and proximity to the primary sources suggested that few, if any, nearby sources need to be included in the cumulative impact analysis, an objective method was used to exclude some of the sources within the screening area.

A method commonly used and recommended by DHEC BAQ for screening nearby sources for inclusion in a cumulative impact analysis is the "20D" methodology. Originally developed by the North Carolina Department of Environment and Natural Resources, the 20D method allows for candidate nearby sources to be excluded from a cumulative analysis if their facility-wide emission rates, in tons per year, are less than 20D, where D is the distance in km between the candidate nearby source and the primary source. The 20D method was used with facility-wide annual emission rates from 2014 for each candidate source.

Although actual annual emission rates from 2014 were ultimately used in the 20D screening of sources, an initial 20D screening analysis was conducted using current allowable annual emissions provided by DHEC BAQ for facilities with air permits in each county. This initial screening was conducted to ensure that all facilities with current air permits would be considered.

The distances from each off-site facility to Wateree Station and to IP Eastover were calculated, and any facilities more than 50 km from both Wateree Station and IP Eastover were eliminated from further consideration. Table 3 lists all permitted sources within 50 km of either Wateree Station or IP Eastover, allowable annual SO_2 emissions in TPY, the calculated distances from the two principal sources, and the results of the initial 20D screening analyses. All permitted facilities within 50 km of either of the two principal sources are shown in Figure 7.

Next, the 20D methodology using annual allowable emissions was used to determine which facilities to exclude from the cumulative impact analysis. As shown in Table 3, all but six facilities (not including Wateree Station and IP Eastover) were excluded based on annual allowable emissions.

For four of the remaining sources (Santee Printworks, DAK, Columbia Energy Center, and SCE&G Coit), actual annual SO_2 emissions were obtained from information provided by DHEC BAQ. The 20D analysis was then repeated for the remaining facilities using actual annual SO_2 emissions from 2014. Emissions from 2014 are most representative of current operations. The results in Table 3 show that if actual annual facility-wide SO_2 emissions for 2014 are used in the 20D calculations, these four sources can be excluded from the cumulative impact analysis.

Actual annual emissions were not available for two sources, Specialty Minerals, Inc. and Kemira Chemicals.

Specialty Minerals, Inc. is collocated with IP Eastover Mill and will be included in the cumulative impact analysis.

Kemira Chemicals comes close to screening out with 20D when using allowable SO_2 emissions (20D = 20.2 < 21.81 TPY) which are based on a sulfur in oil limit of 0.05%. However, information provided by DHEC BAQ indicates that Kemira Chemicals is firing ultra-low sulfur diesel with a maximum sulfur content of 15 ppm (0.0015%). If the calculations are revised to account for the actual fuel used, the resulting actual SO_2 emission rate of 0.727 TPY allows Kemira Chemicals to screen out with 20D. Therefore, Kemira Chemicals was excluded from the cumulative impact analysis.

Table 3 Summary of 20D Screening Analysis

Company Name	Permit #	County Name	Allowable SO_2 TPY	UTM-17N (NAD83) East (m)	UTM-17N (NAD83) North (m)	Distance from IP (km)	Distance from SCE&G (km)	20D for IP	20D for SCE&G	Based on Allowable Emissions: EXCLUDE for IP	Based on Allowable Emissions: EXCLUDE for SCE&G	2012 Actual SO_2 TPY	2013 Actual SO_2 TPY	2014 Actual SO_2 TPY	Based on 2014 Actual Emissions: EXCLUDE for IP	Based on 2014 Actual Emissions: EXCLUDE for SCE&G
SCE&G Wateree	**1900-0013**	**Richland**	**70,509.24**	**534978.0**	**3742833.5**	**7.0**	**0.0**	**140.7**	**0.0**	**NO**	**NO**	**3531.43**	**5548.07**	**6550.28**	**NO**	**NO**
International Paper - Eastover	**1900-0046**	**Richland**	**15,279.63**	**533448.1**	**3749698.7**	**0.0**	**7.0**	**0.0**	**140.7**	**NO**	**NO**	**3737.48**	**3373.68**	**3315.23**	**NO**	**NO**
Specialty Minerals, Inc.	**1900-0145**	**Richland**	**10.91**	**533447.4**	**3749913.2**	**0.2**	**7.2**	**4.3**	**144.9**	**NO**	**YES**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Santee Print Works	2140-0003	Sumter	2,683.42	562763.5	3753793.2	29.6	29.9	592.0	597.4	NO	NO	0.17	4.70	32.82	YES	YES
DAK	0460-0029	Calhoun	2,683.18	499024.9	3747188.1	34.5	36.2	690.3	724.3	NO	NO	2.61	6.84	5.47	YES	YES
Columbia Energy Center	0460-0024	Calhoun	1,190.05	498364.8	3747719.9	35.1	36.9	702.8	738.8	NO	NO	0.76	2.05	2.00	YES	YES
SCE&G Coit	1900-0132	Richland	1,150.63	495450.0	3757210.0	38.7	42.1	774.7	841.2	NO	NO	0.14	0.14	0.05	YES	YES
Kemira Chemicals	1900-0172	Richland	21.81	534356.4	3743627.2	6.1	1.0	122.8	20.2	YES	NO		0.727		YES	YES
Trinity Industries, Inc.	0460-0023	Calhoun	0.02	522535.0	3726867.0	25.3	20.2	506.1	404.8	YES	YES					
SC Air National Guard-McEntire Joint NGB	1900-0250	Richland	10.21	517688.0	3754987.0	16.6	21.1	332.5	422.7	YES	YES					
Northeast Landfill	1900-0178	Richland	23.70	529700.0	3763388.0	14.2	21.2	283.9	424.4	YES	YES					
Shaw Air Force Base	2140-0004	Sumter	97.60	548122.2	3759592.4	17.7	21.3	354.0	426.0	YES	YES					
EMS Grivory America	2140-0054	Sumter	46.16	556961.2	3747135.2	23.7	22.4	473.0	448.0	YES	YES					
Kiln Direct, Inc.	2140-0142	Sumter	75.78	557257.0	3748537.2	23.8	23.0	476.7	460.0	YES	YES					
International Paper - Sumter	2140-0102	Sumter	0.04	557416.5	3747991.2	24.0	23.0	480.6	460.5	YES	YES					
Textilease Corporation	2140-0117	Sumter	0.33	557488.5	3747701.2	24.1	23.0	482.5	460.6	YES	YES					
Cooper Tools	2140-0022	Sumter	0.03	558462.0	3745602.0	25.3	23.6	506.9	472.9	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

Company Name	Permit #	County Name	Allowable SO_2 TPY	UTM-17N (NAD83) East (m)	UTM-17N (NAD83) North (m)	Distance from IP (km)	Distance from SCE&G (km)	20D for IP	20D for SCE&G	Based on Allowable Emissions: EXCLUDE for IP	Based on Allowable Emissions: EXCLUDE for SCE&G	2012 Actual SO_2 TPY	2013 Actual SO_2 TPY	2014 Actual SO_2 TPY	Based on 2014 Actual Emissions: EXCLUDE for IP	Based on 2014 Actual Emissions: EXCLUDE for SCE&G
Sumter Heat & Power, LLC	2140-0149	Sumter	2.32	558576.0	3747209.0	25.3	24.0	505.0	480.0	YES	YES					
Pilgrims Pride Corporation	2140-0006	Sumter	374.45	558608.7	3747373.0	25.3	24.1	505.4	481.3	YES	YES					
Peace Textile America	2140-0110	Sumter	0.56	561131.0	3746550.0	27.9	26.4	557.2	528.3	YES	YES					
Devro	0460-0003	Calhoun	99.18	507652.0	3741223.2	27.2	27.4	543.1	547.5	YES	YES					
Carolina Filters	2140-0111	Sumter	18.88	561504.0	3751316.0	28.1	27.8	562.0	557.0	YES	YES					
Tuomey Regional Medical	2140-0050	Sumter	56.68	560697.0	3753809.0	27.6	28.0	551.1	559.3	YES	YES					
Westinghouse Electric Company	1900-0050	Richland	86.00	507506.2	3749420.2	25.9	28.3	518.9	565.0	YES	YES					
Carolina Furniture Works, Inc	2140-0014	Sumter	3.93	561675.3	3752603.0	28.4	28.4	567.5	568.6	YES	YES					
Florence Concrete Products	2140-0061	Sumter	25.99	562020.0	3751752.0	28.6	28.5	572.9	569.5	YES	YES					
Nova Molecular Technologies, Inc.	2140-0150	Sumter	35.46	562048.0	3751753.0	28.7	28.5	573.5	570.0	YES	YES					
City of Sumter	2140-0118	Sumter	0.04	563360.0	3745756.0	30.2	28.5	603.4	570.6	YES	YES					
Giant Resource Recovery (GRR!)	2140-0038	Sumter	4.82	562065.5	3751962.2	28.7	28.6	574.1	571.7	YES	YES					
Continental Tire the Americas, LLC	2140-0147	Sumter	0.35	563261.0	3748673.0	29.8	28.9	596.6	577.6	YES	YES					
Caterpillar Precision Pin Products	2140-0125	Sumter	0.01	559070.0	3759371.3	27.4	29.2	547.7	584.4	YES	YES					
Becton-Dickinson	2140-0018	Sumter	0.04	560258.0	3758749.0	28.3	29.9	565.9	597.5	YES	YES					
Garnay, Inc.	2140-0060	Sumter	0.00	556402.0	3763723.0	26.9	29.9	538.0	598.5	YES	YES					
Madison Industries	2140-0047	Sumter	2.32	563001.0	3753630.0	29.8	30.0	596.3	600.6	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

Company Name	Permit #	County Name	Allowable SO_2 TPY	UTM-17N (NAD83) East (m)	UTM-17N (NAD83) North (m)	Distance from IP (km)	Distance from SCE&G (km)	20D for IP	20D for SCE&G	Based on Allowable Emissions: EXCLUDE for IP	Based on Allowable Emissions: EXCLUDE for SCE&G	2012 Actual SO_2 TPY	2013 Actual SO_2 TPY	2014 Actual SO_2 TPY	Based on 2014 Actual Emissions: EXCLUDE for IP	Based on 2014 Actual Emissions: EXCLUDE for SCE&G
CR Jackson Inc	9900-0254	PORTABLE	101.62	559517.0	3760234.0	28.1	30.1	562.3	601.6	YES	YES					
CameronLumber Co	0460-0001	Calhoun	1.76	525501.0	3712935.0	37.6	31.4	752.3	627.3	YES	YES					
American-Italian Pasta	1900-0130	Richland	46.25	506130.0	3755590.0	27.9	31.5	558.9	630.9	YES	YES					
MARS PETCARE US, INC.	1900-0083	Richland	0.96	506217.7	3755888.3	27.9	31.6	558.5	631.7	YES	YES					
Jushi (USA), Ltd.	1900-0284	Richland	86.90	505334.7	3755382.3	28.7	32.2	573.6	643.8	YES	YES					
Santee Cooper Richland Co. Landfill	1900-0224	Richland	12.91	519338.5	3773606.8	27.8	34.5	555.2	690.4	YES	YES					
Richland County Landfill	1900-0148	Richland	94.83	519723.0	3773825.0	27.8	34.5	555.1	690.9	YES	YES					
Starbucks Coffee Company	0460-0027	Calhoun	0.20	499610.7	3739491.3	35.3	35.5	706.9	710.5	YES	YES					
WJBD VA Hospital	1900-0023	Richland	19.97	503456.9	3759519.5	31.6	35.7	631.2	713.3	YES	YES					
Fort Jackson	1900-0016	Richland	504.88	505531.6	3763477.0	31.1	36.0	622.6	719.2	YES	YES					
Hospital Services	1900-0100	Richland	1.45	501599.0	3756274.5	32.5	36.0	650.4	719.7	YES	YES					
Grant Clarendon, Inc	0680-0046	Clarendon	247.04	571067.4	3739758.8	38.9	36.2	778.2	724.4	YES	YES					
Eastman Chemical	0460-0030	Calhoun	0.26	498996.1	3747157.2	34.5	36.2	690.9	724.8	YES	YES					
Anchor Continental	1900-0033	Richland	365.25	501695.8	3757600.6	32.7	36.4	654.4	728.2	YES	YES					
Waste 2 Energy	1900-0263	Richland	12.88	501296.0	3757291.5	33.0	36.7	660.7	733.1	YES	YES					
REA Construction Co	9900-0088	PORTABLE	76.21	507641.0	3718105.0	40.8	36.9	815.9	737.2	YES	YES					
SMI-Owens Steel Company	1900-0176	Richland	0.00	501119.7	3757491.8	33.3	36.9	665.1	737.9	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

Company Name	Permit #	County Name	Allowable SO_2 TPY	UTM-17N (NAD83) East (m)	UTM-17N (NAD83) North (m)	Distance from IP (km)	Distance from SCE&G (km)	20D for IP	20D for SCE&G	Based on Allowable Emissions: EXCLUDE for IP	Based on Allowable Emissions: EXCLUDE for SCE&G	2012 Actual SO_2 TPY	2013 Actual SO_2 TPY	2014 Actual SO_2 TPY	Based on 2014 Actual Emissions: EXCLUDE for IP	Based on 2014 Actual Emissions: EXCLUDE for SCE&G
Sea Hunt Boats	1900-0234	Richland	0.04	501320.0	3757960.0	33.2	36.9	663.5	738.0	YES	YES					
Welchem US	1380-0017	Kershaw	184.57	521759.3	3777410.7	30.1	37.0	601.5	740.4	YES	YES					
The Regional Medical Center	1860-0063	Orangeburg	0.53	515723.2	3711213.0	42.4	37.0	847.4	740.4	YES	YES					
Carben	9900-0447	PORTABLE	76.21	497844.0	3743087.0	36.2	37.1	724.3	742.7	YES	YES					
IBP Carolina Cooled Meats	1900-0144	Richland	23.54	500556.2	3757274.3	33.8	37.3	675.1	746.6	YES	YES					
City of Columbia WWTP	1900-0021	Richland	12.70	498722.5	3755202.0	35.2	38.3	703.2	766.1	YES	YES					
Clemson Univ. Livestock Lab	1900-0048	Richland	6.92	513082.2	3776527.4	32.6	39.0	651.4	780.1	YES	YES					
Associated Asphalts Columbia, LLC	9900-0025	PORTABLE	6.26	499559.0	3759400.0	35.3	39.1	705.0	782.0	YES	YES					
Husqvarna Outdoor Products	1860-0043	Orangeburg	2.16	517380.3	3707046.3	45.6	39.9	911.6	797.6	YES	YES					
FN Manufacturing, Inc.	1900-0052	Richland	0.20	512027.5	3775896.5	33.8	40.2	676.8	805.0	YES	YES					
Carolina Ceramics, Inc.	1900-0007	Richland	19.99	509448.6	3774857.1	34.8	41.0	695.4	819.1	YES	YES					
Orangeburg Dept. of Public Utilities	1860-0073	Orangeburg	34.43	508301.0	3711707.0	45.6	41.0	911.2	819.9	YES	YES					
Consolidated Systems Inc	1900-0040	Richland	0.14	497152.3	3758716.3	37.4	41.0	748.0	820.5	YES	YES					
Clarendon Memorial Hospital	0680-0024	Clarendon	18.92	573123.0	3727549.5	45.4	41.1	908.8	821.9	YES	YES					
Shawmut	1380-0073	Kershaw	0.01	529884.0	3784042.0	34.5	41.5	690.6	830.4	YES	YES					
Unimin	1380-0016	Kershaw	1.89	525100.0	3783180.0	34.5	41.5	690.1	830.8	YES	YES					
PowerSecure, Inc.	1380-0062	Kershaw	4.16	529538.0	3784117.0	34.6	41.6	692.8	832.8	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

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Providence Hospital	1900-0061	Richland	69.69	498817.1	3763689.3	37.4	41.7	747.0	834.9	YES	YES					
Jarden Applied Materials (Formerly Shakespeare Monofilament)	1900-0036	Richland	0.03	502282.0	3768819.0	36.6	41.8	731.3	835.3	YES	YES					
Kawashima Textile USA	1380-0048	Kershaw	12.87	529638.0	3784321.0	34.8	41.8	696.6	836.6	YES	YES					
USC Central Energy Facilities	1900-0143	Richland	0.65	497549.7	3761555.9	37.8	41.8	756.1	837.0	YES	YES					
HBD Industries	1380-0018	Kershaw	46.43	519881.3	3781913.4	35.0	41.9	699.1	837.9	YES	YES					
Southwoods Lumber & Millwork	0680-0005	Clarendon	0.57	574369.0	3728097.0	46.3	42.1	925.5	841.1	YES	YES					
Orangeburg County Biomass	1860-0123	Orangeburg	11.52	535055.0	3700750.0	49.0	42.1	979.5	841.7	YES	YES					
Lanier Construction Company	9900-0035	PORTABLE	67.45	493137.0	3748295.0	40.3	42.2	806.7	843.9	YES	YES					
Benedict College	1900-0211	Richland	26.02	498042.1	3763372.3	38.0	42.3	759.1	845.2	YES	YES					
South Carolina State University	1860-0065	Orangeburg	279.40	513786.0	3706257.0	47.7	42.3	953.7	845.4	YES	YES					
Office of General Services energy fac.	1900-0162	Richland	131.05	497000.0	3761842.0	38.4	42.5	768.4	849.4	YES	YES					
CMC Steel SC	1560-0087	Lexington	317.02	495229.9	3757965.9	39.1	42.5	782.0	850.6	YES	YES					
ALSCO	1900-0239	Richland	27.99	496331.0	3760863.0	38.8	42.6	775.2	852.9	YES	YES					
Cactus Family Farms	1860-0007	Orangeburg	0.04	514190.0	3705481.0	48.2	42.7	964.6	855.0	YES	YES					
Sloan Construction Company-Cayce	9900-0060	PORTABLE	76.21	495154.0	3758872.0	39.4	42.9	787.6	858.6	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

Company Name	Permit #	County Name	Allowable SO_2 TPY	UTM-17N (NAD83) East (m)	UTM-17N (NAD83) North (m)	Distance from IP (km)	Distance from SCE&G (km)	20D for IP	20D for SCE&G	Based on Allowable Emissions: EXCLUDE for IP	Based on Allowable Emissions: EXCLUDE for SCE&G	2012 Actual SO_2 TPY	2013 Actual SO_2 TPY	2014 Actual SO_2 TPY	Based on 2014 Actual Emissions: EXCLUDE for IP	Based on 2014 Actual Emissions: EXCLUDE for SCE&G
Office of General Service DHEC lab	1900-0109	Richland	23.91	503495.0	3772060.0	37.4	43.0	747.6	859.2	YES	YES					
Palmetto Baptist Medical Center	1900-0044	Richland	112.51	496930.0	3762909.0	38.8	43.0	776.7	860.4	YES	YES					
Office of General Services	1900-0197	Richland	14.87	503550.5	3772416.5	37.5	43.2	751.0	863.2	YES	YES					
REA Construction Co	9900-0083	PORTABLE	127.02	492890.0	3753120.0	40.7	43.3	814.0	866.5	YES	YES					
Southeastern Concrete Products	1560-0063	Lexington	46.65	494475.0	3758564.0	40.0	43.5	799.4	869.0	YES	YES					
Diamond Pet Food	1560-0050	Lexington	0.18	491447.0	3744269.0	42.4	43.6	847.0	871.1	YES	YES					
City of Orangeburg Dept of Public Utilities	1860-0117	Orangeburg	1.44	512050.0	3705591.0	49.0	43.7	980.5	874.7	YES	YES					
Office of General Services Cola. Bldg.	1900-0161	Richland	74.36	495555.0	3762058.0	39.9	43.9	797.2	877.2	YES	YES					
Providence Northeast	1900-0202	Richland	9.99	503762.0	3773727.0	38.2	43.9	763.8	878.4	YES	YES					
Richland Memorial Hospital	1900-0062	Richland	213.74	497097.3	3765249.3	39.5	44.0	790.7	880.3	YES	YES					
Office of General Service DHEC	1900-0104	Richland	23.23	496666.0	3764710.0	39.7	44.1	794.5	882.4	YES	YES					
The Ritedose Corporation	1900-0137	Richland	8.37	503455.5	3773800.0	38.5	44.2	769.5	883.8	YES	YES					
Columbia Farms	1560-0121	Lexington	130.09	494809.1	3761710.3	40.5	44.4	809.3	887.7	YES	YES					
Backman Lumber	1560-0188	Lexington	1.00	492474.0	3756110.0	41.5	44.5	829.5	890.6	YES	YES					
Columbia Farms/OSI LP	1560-0115	Lexington	31.62	491623.0	3755101.0	42.2	45.1	843.5	901.1	YES	YES					
Federal Mogul Corp	1860-0094	Orangeburg	0.05	514185.2	3702462.9	51.0	45.4	1020.2	908.2	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

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Invista	1380-0003	Kershaw	3.93	531441.7	3788160.1	38.5	45.5	770.3	909.3	YES	YES					
Okonite Company	1860-0082	Orangeburg	0.06	514276.2	3701893.9	51.5	45.9	1030.1	917.5	YES	YES					
Mars Petcare US	1860-0090	Orangeburg	0.11	513914.2	3701597.0	51.9	46.3	1038.3	926.1	YES	YES					
DeRoyal Textiles	1380-0019	Kershaw	61.76	538003.4	3789042.5	39.6	46.3	792.1	926.2	YES	YES					
Oak-Mitsui, Inc.	1380-0038	Kershaw	0.19	533318.0	3789377.0	39.7	46.6	793.6	931.5	YES	YES					
SI Group (formerly Albemarle)	1860-0004	Orangeburg	167.68	511129.4	3702734.3	52.0	46.7	1040.0	933.1	YES	YES					
Trinity Industries	1860-0110	Orangeburg	0.02	513824.0	3700985.0	52.5	46.9	1050.4	937.8	YES	YES					
City of Orangeburg	1860-0085	Orangeburg	8.79	513640.2	3700074.0	53.4	47.8	1068.6	955.8	YES	YES					
Gulbrandsen Manufacturing	1860-0080	Orangeburg	32.94	514451.0	3699565.0	53.6	47.9	1072.2	957.8	YES	YES					
Kendall Company	1380-0001	Kershaw	36.66	537505.6	3790722.9	41.2	48.0	824.5	959.1	YES	YES					
Hanson Brick	1900-0010	Richland	97.17	493891.3	3768240.8	43.7	48.3	873.7	966.2	YES	YES					
Intertape Polymer Corp.	1900-0274	Richland	0.04	503222.0	3780724.0	43.3	49.4	866.3	988.8	YES	YES					
Akebono Brake Corp.	1560-0133	Lexington	0.82	487140.0	3757380.0	46.9	50.0	938.8	1000.0	YES	YES					
Lexington Medical Center	1560-0055	Lexington	122.07	488461.0	3762835.0	46.9	50.6	937.3	1012.7	YES	YES					
Arclin Surfaces	1900-0093	Richland	20.89	503192.2	3782356.4	44.5	50.7	890.4	1014.4	YES	YES					
Lee County Landfill SC, Inc	1540-0029	Lee	197.06	566932.0	3782360.0	46.8	50.8	935.5	1016.5	YES	YES					
Palmetto Paving	9900-0478	PORTABLE	17.08	565595.0	3783533.0	46.7	50.9	933.4	1018.6	YES	YES					

Table 3 (Cont'd.) Summary of 20D Screening Analysis

Company Name	Permit #	County Name	Allowable SO_2 TPY	UTM-17N (NAD83) East (m)	UTM-17N (NAD83) North (m)	Distance from IP (km)	Distance from SCE&G (km)	20D for IP	20D for SCE&G	Based on Allowable Emissions: EXCLUDE for IP	Based on Allowable Emissions: EXCLUDE for SCE&G	2012 Actual SO_2 TPY	2013 Actual SO_2 TPY	2014 Actual SO_2 TPY	Based on 2014 Actual Emissions: EXCLUDE for IP	Based on 2014 Actual Emissions: EXCLUDE for SCE&G
CR Jackson	9900-0036	PORTABLE	101.62	488894.0	3765056.0	47.1	51.2	942.5	1023.2	YES	YES					
US Silica, Inc.	1560-0005	Lexington	295.21	484067.6	3748816.0	49.4	51.3	987.8	1025.2	YES	YES					
Columbia Silica Sand, Inc	1560-0037	Lexington	65.26	483900.0	3748686.0	49.6	51.4	991.2	1028.2	YES	YES					
Santee Cooper Lee County Landfill Gas to Energy Facility	1540-0031	Lee	17.04	567509.6	3782655.4	47.4	51.4	947.9	1028.4	YES	YES					
Hueck Foils, Inc.	1900-0146	Richland	0.05	501275.0	3781767.0	45.4	51.5	908.5	1029.9	YES	YES					
SC Dept of Corrections	1900-0121	Richland	28.29	489370.0	3769550.0	48.3	52.9	966.8	1057.1	YES	YES					
SRE Kershaw	1380-0077	Kershaw	30.13	543200.0	3795916.0	47.2	53.7	944.7	1074.3	YES	YES					
New South Lumber Co. Inc.	1380-0025	Kershaw	13.86	542330.0	3798504.0	49.6	56.2	992.1	1123.1	YES	YES					

Based on experience and best professional judgment, all other sources in the screening area, besides the two primary sources (SCE&G Wateree Station and IP Eastover Mill) and Specialty Minerals, Inc. were excluded from the cumulative impact analysis.

3.2 Receptor Grid

A Cartesian (rectangular) receptor network was used for the cumulative impact analysis for attainment area designation purposes. The network, described below, includes a series of nested grids roughly centered on each primary facility (SCE&G Wateree Station and IP Eastover Mill).

An inner grid of approximately 10,000 receptors with a spacing of 100m extends outward from each primary facility boundary to a distance of approximately 1 km and covers an area of approximately 7 km x 16.5 km. An intermediate grid of approximately 3,000 receptors with a spacing of 250m extends from the outer edge of the 100m spaced receptor grid out to a distance of approximately 5 km from the two facilities, and the outer boundary covers an area of approximately 15 km x 21 km. An outer grid of approximately 2,000 receptors with a spacing of 500m extends from the outer edge of the 250m spaced receptor grid out to a distance of approximately 10 km from the two facilities, and the outer boundary covers an area of approximately 25 km x 31 km. Receptors within the boundaries of SCE&G Wateree Station or IP Eastover Mill were excluded.

Additionally, receptors at a spacing of no greater than 25m were placed along each of the primary facility property boundaries, with approximately 350 receptors along the Wateree Station property boundary and approximately 1,250 receptors along the Eastover Mill property boundary. The property boundaries are defined in a manner consistent with prior modeling analyses that have been submitted to DHEC BAQ.

The resulting total number of receptors is approximately 17,000. A plot of the proposed receptor grid is shown in Figure 12. The receptor resolution used in the modeling meets or exceeds that recommended in DHEC BAQ guidance and in the TAD.

A close-up view of the SCE&G Wateree Station modeled ambient air boundary is shown in Figure 13. The ambient air boundary is comprised of the physical barrier of the Wateree River and fencing that is controlled/patrolled by security that is on-site 24 hours per day, 7 days per week (24/7). This ambient air boundary is the same as the ambient air boundary used in previous air dispersion modeling demonstrations.

A close-up view of the IP Eastover Mill modeled ambient air boundary is shown in Figure 14. The ambient air boundary is comprised of physical barriers, fencing, signage, and areas that are controlled/patrolled by mill security that is on-site 24/7. The Eastover property is large and diverse. In addition to paper manufacturing, the facility includes an integrated woodyard, extensive log storage, and an onsite landfill. Non-industrial land use within the property includes the employee training center, landscaped areas, agricultural fields, forestry test plots, and actively managed forestlands. The mill site is home to an extensive wildlife population. The Eastover Mill ambient air boundary includes all of these areas. Each portion of the ambient air boundary is described in more detail below.

The eastern portion of the ambient air boundary runs along the Wateree River. The river represents a physical barrier that restricts public access to the mill property which leads directly to the river bank. Along the river bank there is a sharp embankment with dense underbrush that is difficult to navigate and that acts as a strong deterrent to public access to mill property. Signs are installed at areas potentially accessible to the public and on the railroad right of way.

The southern portion of the ambient air boundary runs along a railroad that traverses the mill property from the river all the way to state highway 601. The mill owns property on both sides of the railroad right of way. The railroad also represents a physical barrier that restricts public access. The railroad right of way includes a steep embankment up from the Wateree River on the east side of the right of way along with a locked gate and no trespassing signs at the intersection of state highway 601. North of the railroad, there are locked gates, drainage canals, berms, and dense forest and underbrush in areas that are difficult to navigate, all of which act as strong deterrents to public access to mill property.

The southwestern portion of the ambient air boundary runs along state highway 601 from the railroad to the main plant entrance road. The mill property runs right up to state highway 601. This portion of the ambient air boundary is controlled by a locked gate and drainage canals that impede public access. There is also a considerable amount of plant personnel (including security) that patrol the main plant entrance 24/7. Trespassers along this portion of the ambient air boundary would be escorted off mill property by plant security.

The northwestern and northern portion of the ambient air boundary runs from the main plant entrance on state highway 601 north and around to the Wateree River. The mill owns multiple land parcels in this area, which are primarily dedicated to forestry and wildlife management. Public access to this area is controlled by a combination of physical barriers (including drainage canals, fencing, soil embankments, i.e. dense forest and underbrush), installed controls (fencing, locked gates and No Trespassing signs), and surveillance/patrol by mill security. These barriers make it difficult (and unlawful) for the public to gain access and spend prolonged amounts of time on the mill property. The adjacent properties owned by others are primarily forest lands and several residential properties; receptors will be placed on all adjacent properties.

Receptors were also placed at the location of the two nearest ambient SO_2 monitors (Parklane and Congaree Bluff).

Guidance in Section 4.2 of the TAD indicates that receptors are not required in areas, such as water bodies, where placement of a monitor would not be feasible. To be conservative, receptors in such areas were not excluded.

The AERMAP preprocessor (Version 11103) was used to obtain receptor elevations and hill heights for the receptors modeled in AERMOD. AERMAP was run with 30 meter National Elevation Dataset (NED) Digital Elevation Model (DEM) GeoTIFF format files obtained from the U.S. Geological Survey (USGS).

The modeling uses a Universal Transverse Mercator (UTM) coordinate system. Coordinates are in Zone 17N and the datum is NAD83.

The receptor grid was sized such that there are no predicted SO_2 concentrations near or above the NAAQS at any receptors near the edge of the grid. The receptor spacing is no greater than 100m in all areas where total predicted concentrations (including background concentrations) are within 10% of the NAAQS.

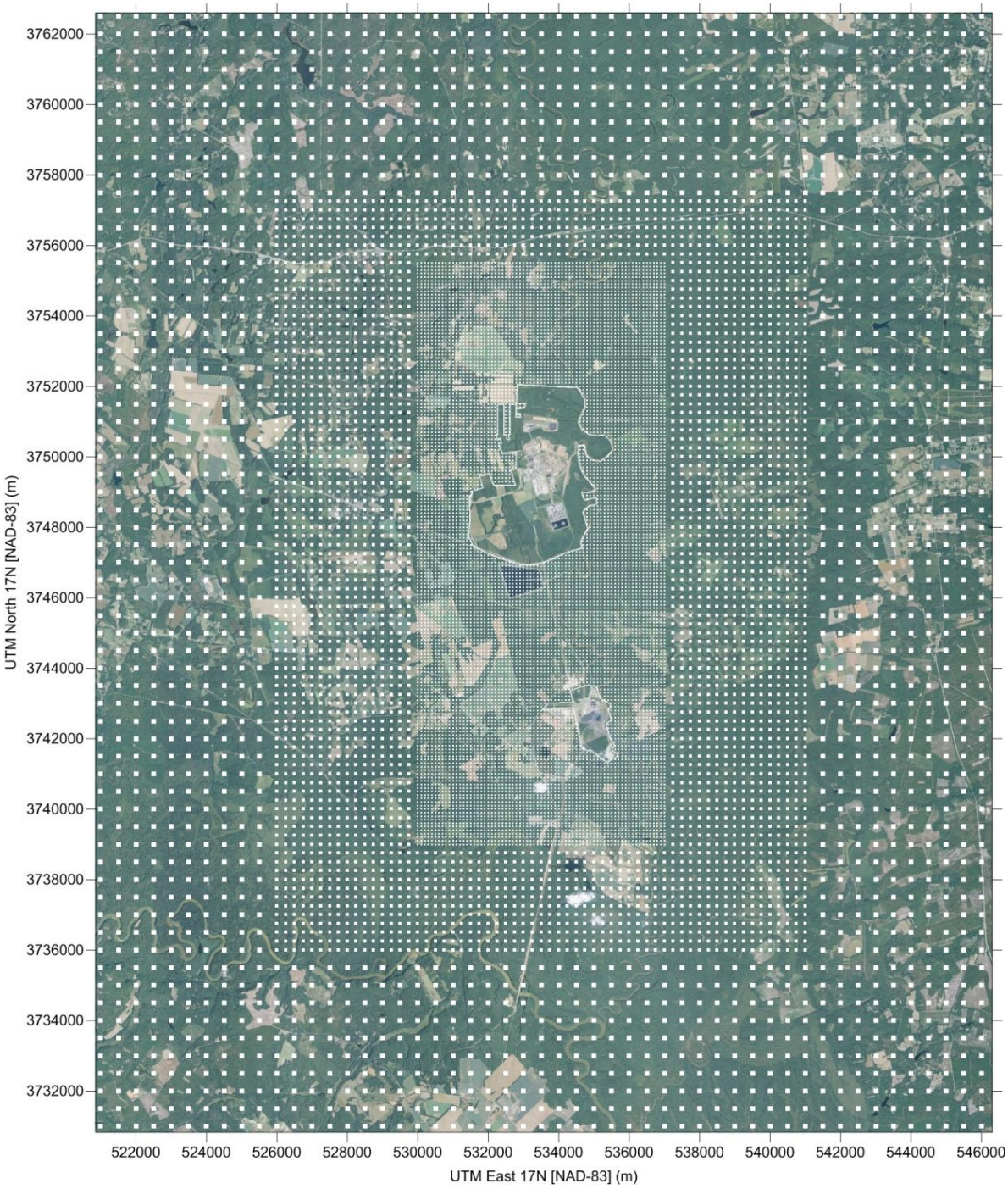


Figure 12 Plot of Cartesian and property boundary receptors

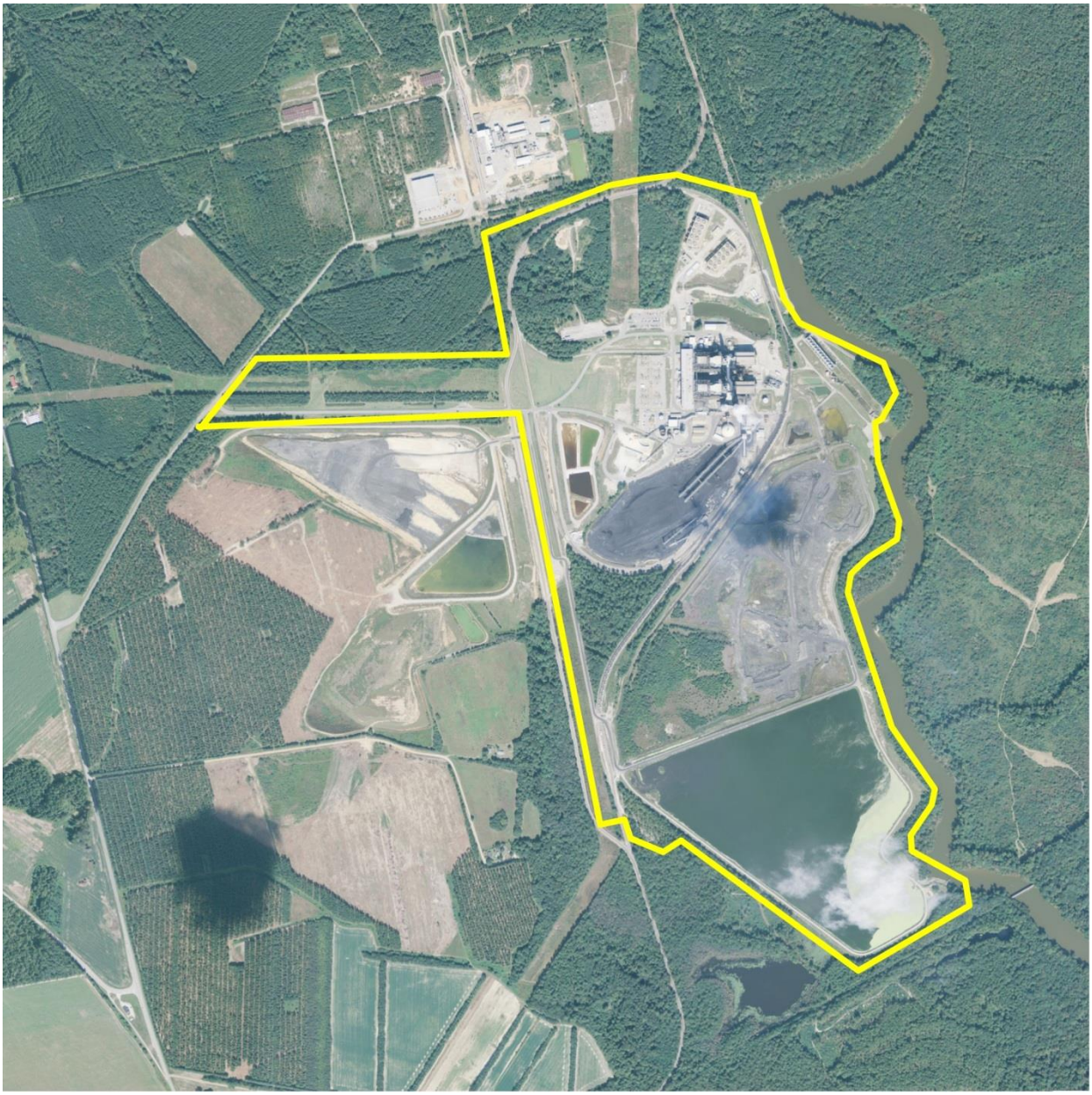


Figure 13 SCE&G Wateree Station ambient air boundary

Figure 14 IP Eastover Mill ambient air boundary

4 Emission Rates and Source Characterization

The emission rates used in the modeling analysis are listed below in Sections 4.1 and 4.2.

4.1 SCE&G Wateree Station Source Data

Table 4 SCE&G Wateree Station SO_2 Emission Rates and Source Parameters

Stack ID	SO_2 Emission Rate (lb/hr)	SO_2 Emission Rate (g/s)	Stack Height (m)	Exit Velocity (m/s)	Stack Diameter (m)	Stack Temperature (K)
UB12	3,271.77	412.24	111.16	16.30	8.53	327.00
AB1	0.33	0.04	13.72	21.34	0.10	605.37

Table 4 provides the SO_2 emission rates and stack parameters used for modeling SCE&G Wateree Station. The modeled emission rate of 3,271.77 lb/hr for UB12 is lower than the maximum controlled potential to emit (PTE) of 3,339.5 lb/hr but is expected to be higher than any future actual emissions. The emission rate listed for AB1 represents uncontrolled PTE based on combusting No. 2 fuel oil with 0.0015% sulfur content by weight.

The stack height of 111.16m listed for UB12 is the GEP formula stack height that was determined from a GEP analysis. The actual stack height (121.92m) exceeds the GEP formula stack height. UB12 was modeled using GEP formula stack height.

SCE&G Wateree Station includes three emergency generators. These are described in Table 1, are intermittent SO_2 emission sources, and were not included in the modeling per the March 1, 2011 additional clarification memo.

4.2 IP Eastover Mill Source Data

Table 5 IP Eastover Mill SO_2 Emission Rates and Source Parameters

Stack ID	SO_2 Emission Rate (lb/hr)	SO_2 Emission Rate (g/s)	Stack Height (m)	Exit Velocity (m/s)	Stack Diameter (m)	Stack Temperature (K)
371A	11.04	1.39	53.89	10.70	1.31	329.82
372A	15.84	2.00	53.89	21.31	1.80	518.15
381C	4.20	0.53	75.99	6.49	1.40	349.26
382B	9.36	1.18	75.99	8.41	1.80	350.93
381A/501A	696.00	87.69	86.11	17.19	4.11	459.26
382A/331A	640.44	80.69	141.09	15.51	4.30	460.93
502A	971.00	122.34	141.09	20.79	2.90	464.82
96SRC*	0.83	0.105	16.80	12.53	0.60	344.30
97SRC*	0.83	0.105	16.80	12.53	0.60	344.30
98SRC*	0.83	0.105	16.80	12.53	0.60	344.30

* Carbonator sources from Specialty Minerals, Inc.

4.2.1 Minor Contributors

The SO_2 emission rates for IP Eastover Mill presented in Table 5 represent the maximum potential emission rates for sources 371A (No. 1 Lime Kiln), 372A (No. 2 Lime Kiln), 381C (No. 1 Smelt Dissolving Tank), and 382B (No. 2 Smelt Dissolving Tank). These four stacks are relatively small emission sources.

Table 5 includes emissions from the three carbonators operated by Specialty Minerals, Inc. These sources (96SRC, 97SRC and 98SRC) operate within the IP Eastover Mill property and were included in the modeling. The stack heights modeled are shown in Table 5 and are the

actual heights for each of these stacks. All of these stack heights are less than the GEP formula height.

Table 2 lists the annual emission rates and hours of operation over the last three years (2013-2015) for the insignificant stationary SO_2 emissions sources at the mill. The years 2013-2015 were used, as hourly runtime data were not available for 2012. As shown in Table 2, these sources have very low SO_2 emission rates and operate very infrequently. Therefore, they should not have any appreciable effect on 1-hour SO_2 ambient concentrations and were not included in the modeling. The only sources at the mill that were included in the modeling are shown in Table 5.

The IP Eastover mill includes two different systems for controlling NCG emissions to comply with regulatory requirements. The kraft pulping process generates total reduced sulfur (TRS) NCG that are odorous and require collection and treatment under the federal New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants (NESHAP) programs. These TRS compounds are treated by thermal oxidation, which converts the TRS compounds into SO_2. At IP Eastover Mill, the majority of TRS gases are collected into the Concentrated NCG System. Other TRS gases are collected into the Dilute NCG System. The treatment devices for these systems are binary; an NCG System can be treated in either one or the other but not simultaneously in both.

The remaining three stacks (381A/501A, 382A/331A, and 502A) have larger SO_2 emission rates and multiple operating modes that must be considered in order to correctly characterize the impact of facility emissions on ambient SO_2 concentrations.

4.2.2 Stack 381A/501A

The stack 381A/501A is a combined stack serving No. 1 Recovery Furnace (381A) and No. 1 Power Boiler (501A). The No. 1 Power Boiler is the primary control device for the mill's Dilute NCG System and does not have add-on SO_2 controls. The emission rate presented in Table 5 for source 381A is the maximum short-term emission rate for this unit allowed by the mill's Title V Permit. There are two contributions to the SO_2 emission rate for source 501A (the

No. 1 Power Boiler): combustion of dilute NCGs (which generates SO_2 from the oxidation of TRS compounds) and combustion of fuel.

In 2016, IP completed a significant project that reduced SO_2 emissions from No. 1 Power Boiler. DHEC construction permit No. 1900-0046-DN was issued to convert No. 1 Power Boiler from coal and residual oil to 100% natural gas only. With the startup of this project in December 2016, coal is no longer used as a fuel at the IP Eastover Mill and natural gas is the sole fuel for No.1 Power Boiler. Consequently, the emissions rate from fuel combustion assumes that the boiler is operating at its maximum heat input rate when firing natural gas.

Including SO_2 emissions from the combustion of Dilute NCGs in the No. 1 Power Boiler is the worst case from an ambient impacts perspective because this stack is much shorter (280 feet) than the stack for the backup dilute NCG treatment device, the No. 2 Power Boiler (460 feet). Neither source has an SO_2 scrubber. Model runs confirmed this assumption and are available on request.

Table 6 IP Eastover Dilute NCG Treatment Location

Dilute NCG Treatment Location	Stack Height (ft)
No. 1 Power Boiler	280
No. 2 Power Boiler	460

4.2.3 Stack 382A/331A

The stack 382A/331A is a combined stack serving No. 2 Recovery Furnace (382A) and the NCG Incinerator (331A). The NCG Incinerator is the primary treatment device for the mill's Concentrated NCG System and is equipped with a packed-column SO_2 scrubber. For source 382A (the No. 2 Recovery Furnace), the modeled emission rate of 640.44 lb/hr is lower than the maximum short-term emission rate of 666 lb/hr allowed by the facility's Title V Permit but is expected to be higher than any future actual emissions. Zero SO_2 emission contribution is included in Table 5 from source 331A (the No. 2 NCG Incinerator) because it is more

conservative in terms of offsite emission impacts to assume that the incinerator is not operating and the concentrated NCG normally processed in this unit is being combusted in the backup incineration point (Source 502A, the No. 2 Power Boiler), because the backup incineration point is not equipped with add-on SO_2 controls. Model runs confirmed this assumption and are available on request.

Table 7 IP Eastover Concentrated NCG Treatment Location

Concentrated NCG Treatment Location	SO_2 Control Device	Stack Height (ft)
NCG Incinerator	Packed Column Caustic Scrubber	460
No. 2 Power Boiler	No add-on control	460

4.2.4 Stack 502A

The stack 502A serves No. 2 Power Boiler. The No. 2 Power Boiler is the backup treatment device for the mill's Concentrated NCG System and the Dilute NCG System and as noted above does not have add-on SO_2 controls. There are three contributions to the SO_2 emission rate for source 502A: fuel burning, concentrated NCG combustion, and rectified methanol combustion. For fuel burning, the emissions rate assumes that the unit is operating at its maximum heat input rate (500 MMBtu/hr) burning the worst-case fuel from an SO_2 emissions rate generation perspective (tire-derived fuel) at the short term emission rate allowed by the Title V Permit. The contribution from concentrated NCG combustion utilizes the maximum short-term emissions rate for this unit included in the facility's Title V permit, and the contribution for methanol combustion assumes that the unit is burning methanol at a maximum rate of 4 GPM.

4.3 Urban vs. Rural Determination

The DHEC BAQ land use GIS tool was utilized to determine if a 3 km area surrounding each facility should be classified as rural or urban for the purposes of this modeling analysis. The DHEC BAQ land use GIS tool makes use of 2001 National Land Cover Database (NLCD) data and was applied separately for IP Eastover Mill and SCE&G Wateree Station.

Table 8 shows the percent land use for different land use categories within 3 km of each facility. The area surrounding both facilities is predominately rural and the non-developed land use classes total about 71% for both IP Eastover Mill and SCE&G Wateree Station. Therefore, the rural option was selected in AERMOD.

Table 8 Land use percentage within 3 km of IP Eastover Mill and SCE&G Wateree Station

Land use Class	IP Eastover Mill	SCE&G Wateree Station
Open water	17.55%	17.36%
Developed, Open Space	4.80%	4.50%
Developed, Low Intensity	8.88%	9.17%
Developed, Medium Intensity	10.38%	10.25%
Developed, High Intensity	4.99%	4.94%
Barren Land	1.93%	0.02%
Deciduous Forest	5.60%	1.07%
Evergreen Forest	5.85%	10.40%
Mixed Forest	0.07%	0.08%
Scrub/Shrub	0.16%	0.13%
Grassland/Herbaceous	11.86%	6.18%
Pasture/Hay	1.90%	1.79%
Cultivated Crops	4.12%	3.08%
Woody Wetlands	16.15%	24.74%
Emergent Herbaceous	5.76%	6.30%

5 Meteorological Data

5.1 Overview

The modeling was performed utilizing the three most recent years of meteorological data, 2012 through 2014. DHEC BAQ provided the AERMOD-ready meteorological input files for this analysis based on the most representative station. AERMOD was run using the AERMET dataset run with current default options.

IP Eastover Mill and SCE&G Wateree Station are both located approximately 40 km east-southeast of Columbia, South Carolina in Richland County, right on the Richland and Sumter County line. DHEC BAQ guidance recommends the following meteorological data sets for sources in these counties:

- Richland County – surface meteorological data from Columbia Metropolitan Airport along with concurrent upper air observations from Greensboro, North Carolina's Piedmont Triad International Airport.
- Sumter County – surface meteorological data from Florence Regional Airport along with concurrent upper air observations from Greensboro, North Carolina's Piedmont Triad International Airport.

In order to determine which meteorological data set is most suitable for modeling, the following factors relative to IP Eastover Mill and SCE&G Wateree Station were examined:

- proximity,
- representativeness of winds,
- representativeness of terrain, and
- representativeness of land use.

5.2 Proximity

Figure 15 shows the location of IP Eastover Mill and SCE&G Wateree Station relative to the Columbia Metropolitan Airport and the Florence Regional Airport. Circles of radius 20km and 50km are included to help establish scale. The Columbia Metropolitan Airport is located approximately 45 km to the west-northwest of the facilities. The Florence Regional Airport is located approximately 90 km to the east-northeast of the facilities. Columbia Metropolitan Airport is clearly much closer to the facilities and is preferred on that basis.

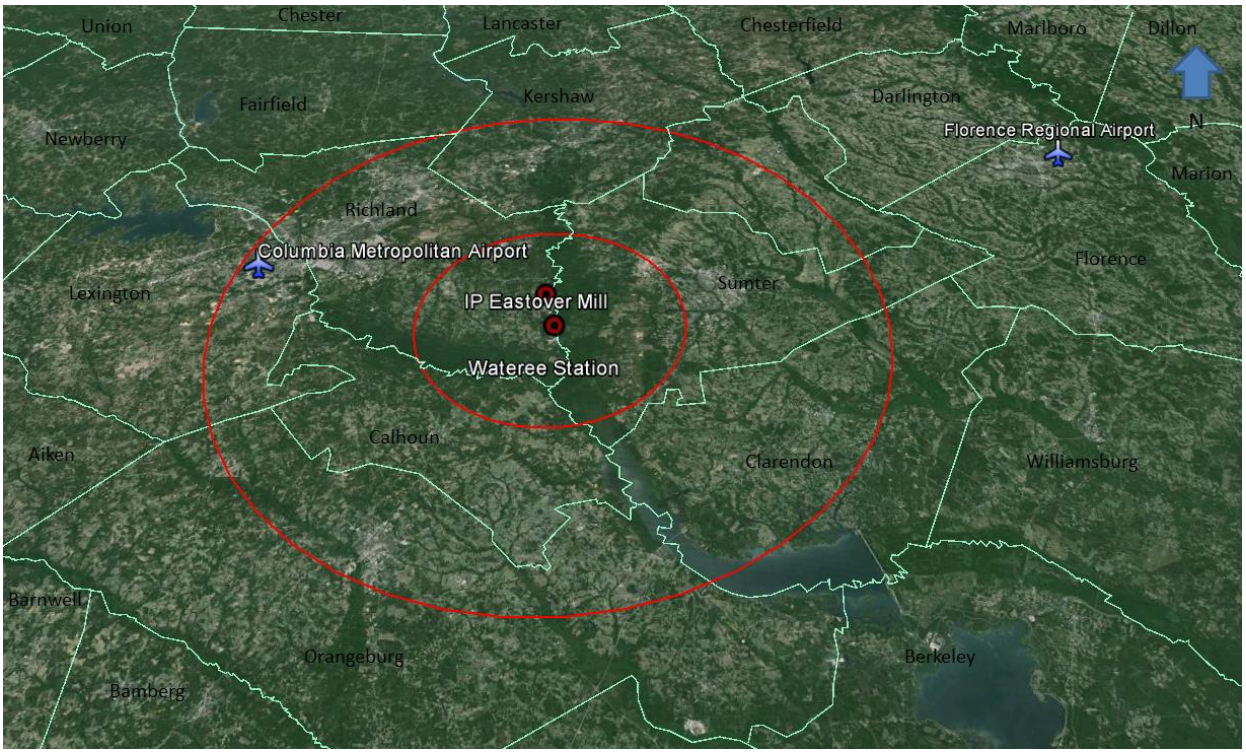


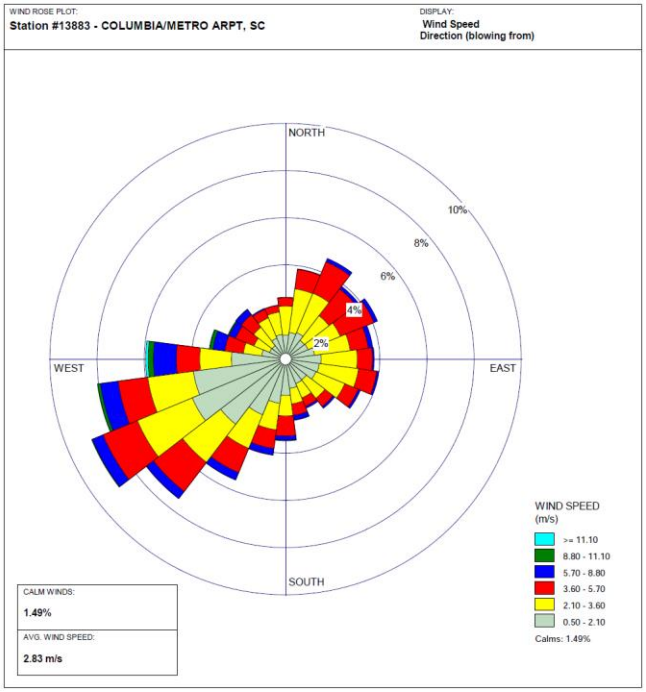
Figure 15 Location of IP Eastover Mill and SCE&G Wateree Station relative to nearby airports

5.3 Representativeness of Winds

Figure 16 shows 3-year (2012-2014) wind roses for the Columbia Metropolitan and Florence Regional Airports. These wind roses incorporate use of the available 1-minute Automated Surface Observing System (ASOS) data for each airport. The wind rose patterns at these two sites are somewhat similar. Columbia Metropolitan has more of a westerly component to the southerly winds, whereas Florence Regional's southerly winds are more aligned with southwesterly winds. The wind speeds are also similar, with Columbia Metropolitan registering a 2.83 m/s annual average wind speed over the three years (2012-2014), and Florence Regional averaging 3.16 m/s over the same time period. Since the facilities are much closer to the Columbia Metropolitan Airport, and there are no significant terrain features nearby, the winds at Columbia Metropolitan Airport are more representative for the two facilities.

During the three year period of 2012-2014 proposed for modeling, both airports have data capture percentages of about 96% on an annual basis. Both airports also report a very low frequency of calm winds with Columbia Metropolitan at 1.39% and Florence Regional at 1.59% over the three year period. The low frequency of calm winds is largely attributable to the use of the 1-minute ASOS data.

Columbia Metropolitan 2012-2014



Florence Regional 2012-2014

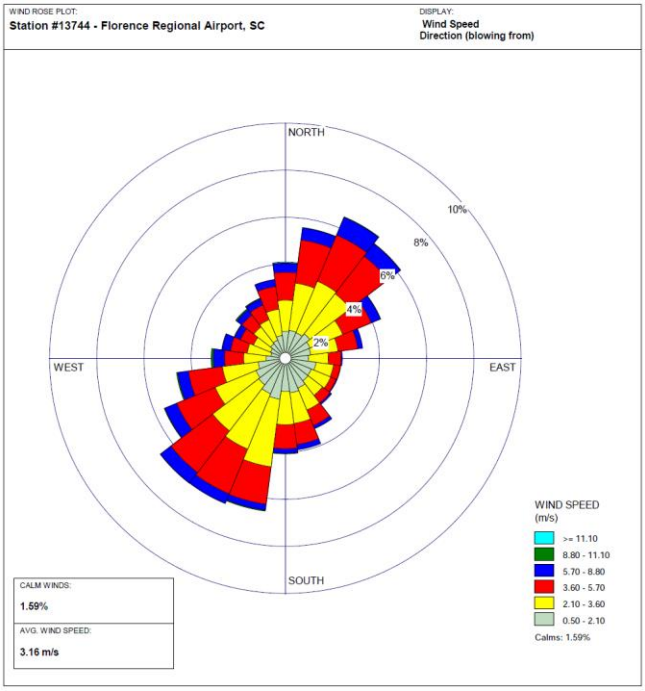


Figure 16 Wind roses for nearby airports

5.4 Representativeness of Terrain

IP Eastover Mill and SCE&G Wateree Station are both located in a broad river valley with largely flat terrain between and surrounding the two facilities. The terrain in the area surrounding Columbia Metropolitan Airport is similarly flat. The elevations at Columbia Metropolitan Airport, IP Eastover Mill, and SCE&G Wateree Station are comparable, and there are no significant elevation changes in the terrain between them. Therefore, Columbia Metropolitan Airport is representative of the terrain surrounding IP Eastover Mill and SCE&G Wateree Station.

5.5 Representativeness of Land Use

AERMET requires specification of site characteristics including surface roughness, albedo, and Bowen ratio. These parameters and their representativeness between the application site and measurement site are an important consideration when selecting a meteorological data set to use for modeling as these parameters are used as inputs to AERMET, and eventually AERMOD, to help characterize the dispersion in the atmospheric boundary layer.

AERSUFACE was used to help compare these land use parameters for the areas surrounding IP Eastover Mill, SCE&G Wateree Station, Columbia Metropolitan, and Florence Regional Airports. AERSURFACE is a tool developed by EPA (EPA, 2008) that can be used to determine the site land use characteristics based on digitized land cover data in accordance with the recommendations in the AERMOD Implementation Guide (AIG) (EPA, 2009). AERSURFACE incorporates look-up tables of representative surface characteristic values by land cover category and seasonal category.

The revised AIG provides the following recommendations for determining the site characteristics:

1. The determination of the surface roughness length should be based on an inverse distance weighted geometric mean for a default upwind distance of 1 km relative to the measurement site. Surface roughness length may be varied by sector to account for

variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.

2. The determination of the Bowen ratio should be based on a simple unweighted geometric mean (i.e., no direction or distance dependency) for a representative domain, with a default domain defined by a 10 km by 10 km region centered on the measurement site.

3. The determination of the albedo should be based on a simple unweighted arithmetic mean (i.e., no direction or distance dependency) for the same representative domain as defined for Bowen ratio, with a default domain defined by a 10 km by 10 km region centered on the measurement site.

The current version of AERSURFACE (Version 13016) supports the use of land cover data from the USGS National Land Cover Data 1992 archives (NLCD92). The NLCD92 archive provides data at a spatial resolution of 30m based upon a 21-category classification scheme applied over the continental U.S. Figure 17 depicts the NLCD92 data within 1 km of: Columbia Metropolitan Airport, Florence Regional Airport, IP Eastover Mill, and SCE&G Wateree Station. Figure 17 shows that there are some differences in the land use at the four sites. As such, AERSURFACE was run to quantify what these differences mean in terms of actual inputs to AERMET and AERMOD.

AERSURFACE was applied for a single 1 km sector around each site as depicted in Figure 17 using average moisture conditions and default seasonal classifications. The results of the three AERSURFACE runs are presented in Table 9. Table 9 shows the annual average albedo and Bowen ratio values are generally similar except that the Bowen ratio is a bit lower for IP Eastover Mill and SCE&G Wateree Station in comparison to the two airports. The surface roughness, however, is different. This is a common result because there are typically fewer roughness elements surrounding the anemometer at an airport than at an industrial site. In addition, the surface roughness may be a bit underestimated for the two industrial sites as the 1992 NLCD data does not accurately portray the land use around the facilities themselves. We believe that the surface roughness around the airports may also be understated because the

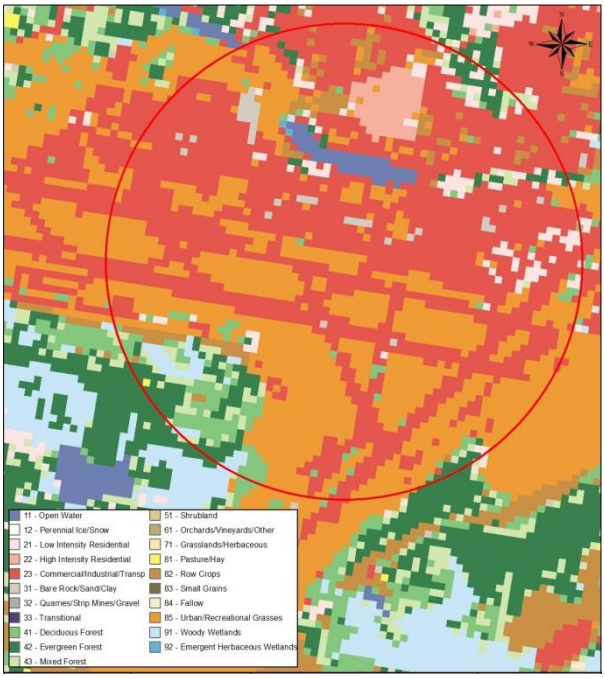
grassy areas surrounding each airport (within 1 km) are characterized as "Urban/Recreational Grasses" consistent with mowed and manicured lawns. It is more likely that the grassy areas surrounding the airport are closer to natural grasslands such as those used for grazing. This would support a higher surface roughness of 0.01 to 0.1 meters consistent with the AERSURFACE category for "Grasslands/Herbaceous" as opposed to 0.01 to 0.02 meters for "Urban/Recreational Grasses".

Based on the factors discussed above, notably the much closer proximity and slightly higher surface roughness, the modeling utilized data from Columbia Metropolitan Airport along with concurrent upper air observations from Greensboro, NC for the three year period, 2012-2014.

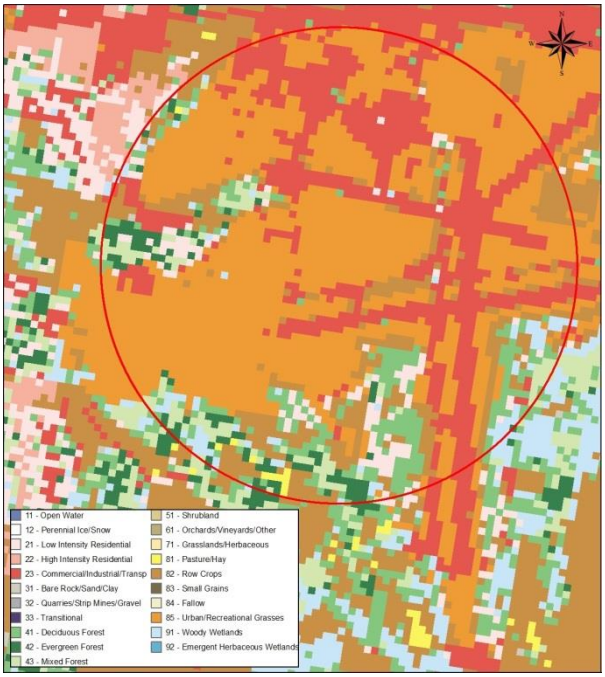
Table 9 Land use comparison for IP Eastover Mill, SCE&G Wateree Station, and two nearby airports

	Annual Average Land Use		
Site	Albedo	Bowen	z_o
Columbia Metropolitan	0.16	0.69	0.049
Florence Regional	0.16	0.58	0.042
Eastover	0.15	0.36	0.308
Wateree	0.15	0.31	0.148

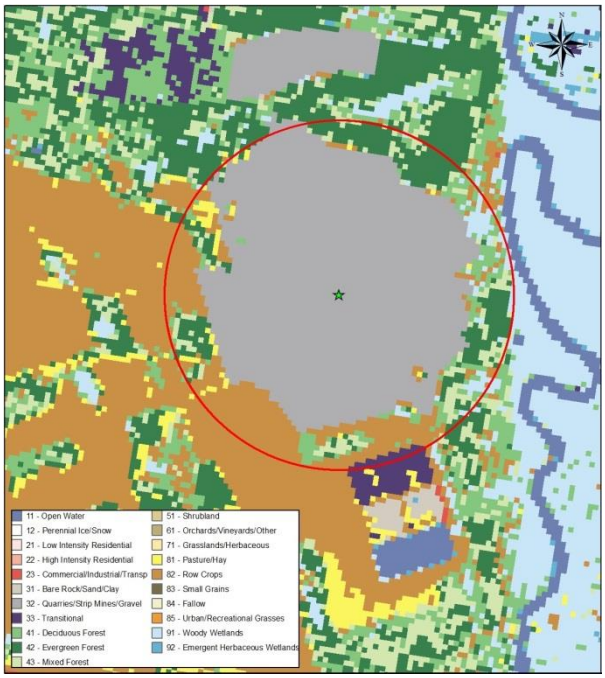
Columbia Metropolitan 1-km Land Use



Florence Regional 1-km Land Use



IP Eastover Mill 1-km Land Use



SCE&G Wateree Station 1-km Land Use

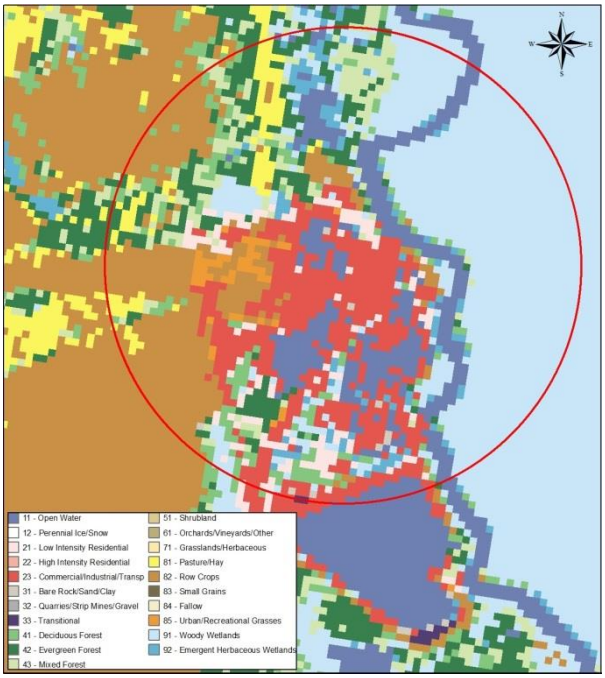


Figure 17 Land use surrounding IP Eastover Mill, SCE&G Wateree Station, and the two nearby airports

6 Background Monitoring Data

6.1 Overview

Ambient air quality data are used to represent the contribution of non-modeled sources to the total ambient air pollutant concentrations. In order to determine compliance with the 1-hour SO_2 NAAQS, the modeled design concentration must be added to a measured ambient background concentration to estimate the total design concentration. This total design concentration is then compared to the NAAQS to determine compliance.

For this analysis, we have considered data from two nearby monitors: Congaree Bluff (Site ID: 450790021; Address: 1850 South Cedar Creek Road) and Parklane (Site ID: 450790007; Address: 8311 Parklane Road). Figure 18 shows the location of IP Eastover Mill, SCE&G Wateree Station, and the Congaree Bluff and Parklane monitors.

Design concentrations for the period of 2012 through 2014 are provided for each of the monitors in Table 10. The design concentrations are based on the 99th percentile of the peak daily 1-hour SO_2 concentrations averaged over three years.

In order to determine which monitor is most appropriate to use for the ambient background concentration in this analysis, we considered several factors including proximity, data quality, and influence from nearby sources.

Table 10 1-hour SO_2 Design Concentrations for the Congaree Bluff and Parklane Monitors

Monitor	Year	Annual Data Capture		99th Percentile Concentration	Design Concentration (3-year average)	
		hours	%		ppb	µg/m^3
Congaree Bluff	2012	8548	98%	11 ppb	19	51
	2013	8650	99%	22 ppb		
	2014	1280	15%	25 ppb		
Parklane	2012	8315	95%	10 ppb	12	31
	2013	8667	99%	10 ppb		
	2014	8676	99%	15 ppb		

6.2 Proximity

As shown in Figure 18, the Congaree Bluff monitor is located approximately 15 km west-southwest of IP Eastover Mill and SCE&G Wateree Station. The Parklane monitor is located approximately 40 km west-northwest of these two facilities. The Congaree Bluff monitor is clearly affected by emissions from IP Eastover Mill and SCE&G Wateree Station when prevailing winds are in the direction from these facilities towards the monitor due to its close proximity to these two facilities. Additional discussion of nearby source influence on the Congaree Bluff monitor is provided below.

6.3 Data Quality

In addition to the design value concentrations, Table 10 summarizes the number of annual 1-hour observations for each of the three years. All three years for the period 2012-2014 for the Parklane monitor show excellent data capture exceeding 95%. The Congaree Bluff monitor shows excellent data capture for 2012 and 2013, exceeding 98%, but data capture for 2014 is poor at about 15%. The Congaree Bluff monitor is missing data from around March 2014 through early December 2014.

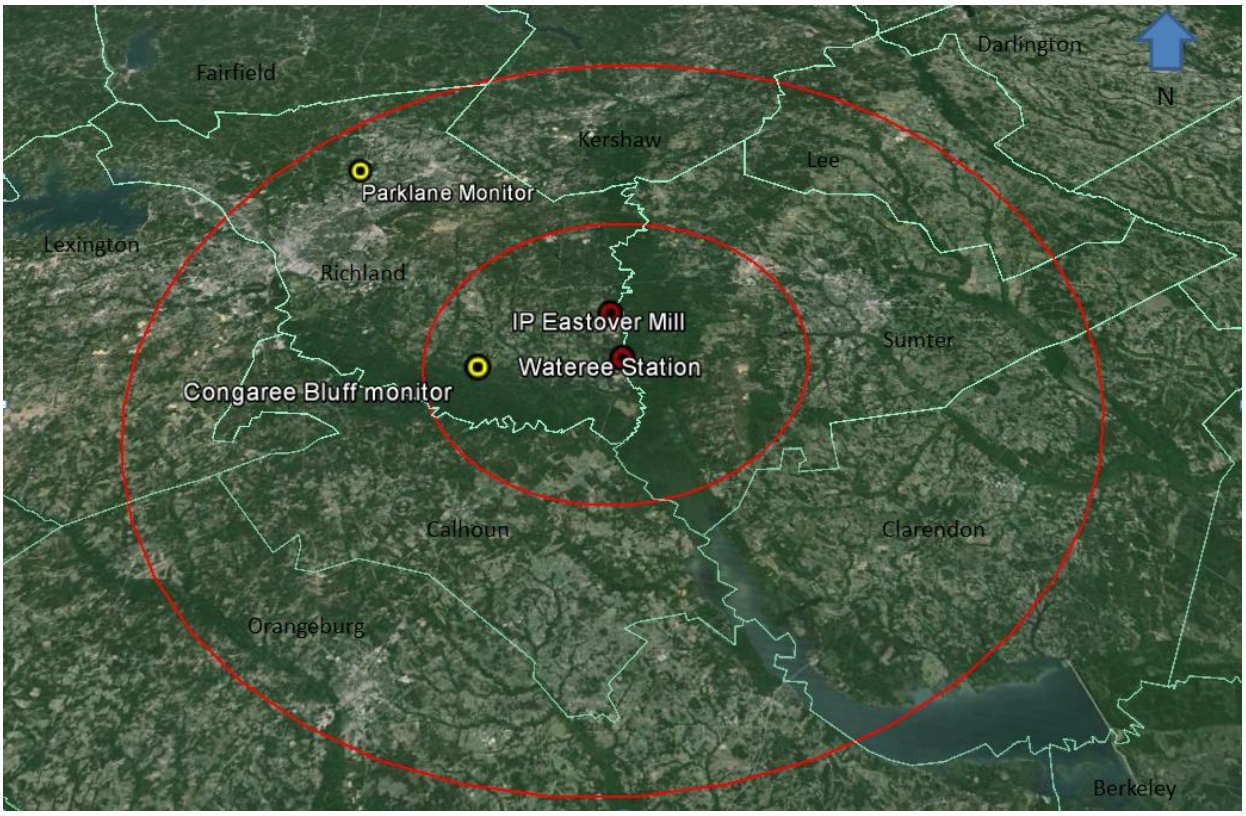


Figure 18 Location of nearby monitors in relation to IP Eastover Mill and SCE&G Wateree Station

6.4 Nearby Source Influence

As stated, the Congaree Bluff monitor is strongly influenced by SO_2 emissions from both IP Eastover Mill and SCE&G Wateree Station. The two facilities are very close to the Congaree Bluff monitor and the observations clearly show higher concentrations when the winds blow from a direction (from the east-northeast) that would have favorable transport from IP Eastover Mill and SCE&G Wateree Station to the Congaree Bluff monitor. This is clearly evident in Figure 19, which shows a pollution rose of the Congaree Bluff monitor for the 2012-2014 period of time. The pollution wind rose incorporated wind data from Columbia Metropolitan Airport.

A pollution rose for the Parklane monitor (also shown in Figure 19) was produced for the 2012-2014 period using wind data from Columbia Metropolitan Airport. The observed concentrations

at the Parklane monitor show very little influence from IP Eastover Mill and SCE&G Wateree Station under favorable transport winds (from the southeast). The Parklane monitor does show a spike in monitored concentrations when winds are blowing from the southwest, likely due to influence from SCE&G McMeekin Station, which is located about 24 km to the west-southwest of the monitor and is currently coal-fired.

Overall, we believe the Parklane monitor is the best choice to use for the ambient background concentrations for the 1-hour SO_2 NAAQS analysis. Use of the Congaree Bluff monitor would result in double-counting impacts from IP Eastover Mill and SCE&G Wateree Station, since both sources are included in the modeled component of the total estimated design concentration (modeled + monitored background). In addition, data capture from the Congaree Bluff monitor is inadequate for 2014, while the Parklane monitor has strong data capture for all three years. Use of the Parklane monitor for 2012-2014 provides a conservative measure of ambient background SO_2 for this model application as these data are still influenced by SO_2 emissions from the SCE&G McMeekin Station. These emissions were reduced dramatically in March 2016 when the SCE&G McMeekin Station ceased to operate on coal and fully converted to natural gas.

Consistent with EPA guidance in their March 1, 2011 clarification memo, seasonal and hour-of-day varying background concentrations for 2012-2014 from the Parklane monitor, were used in the modeling and are listed in Table 11.

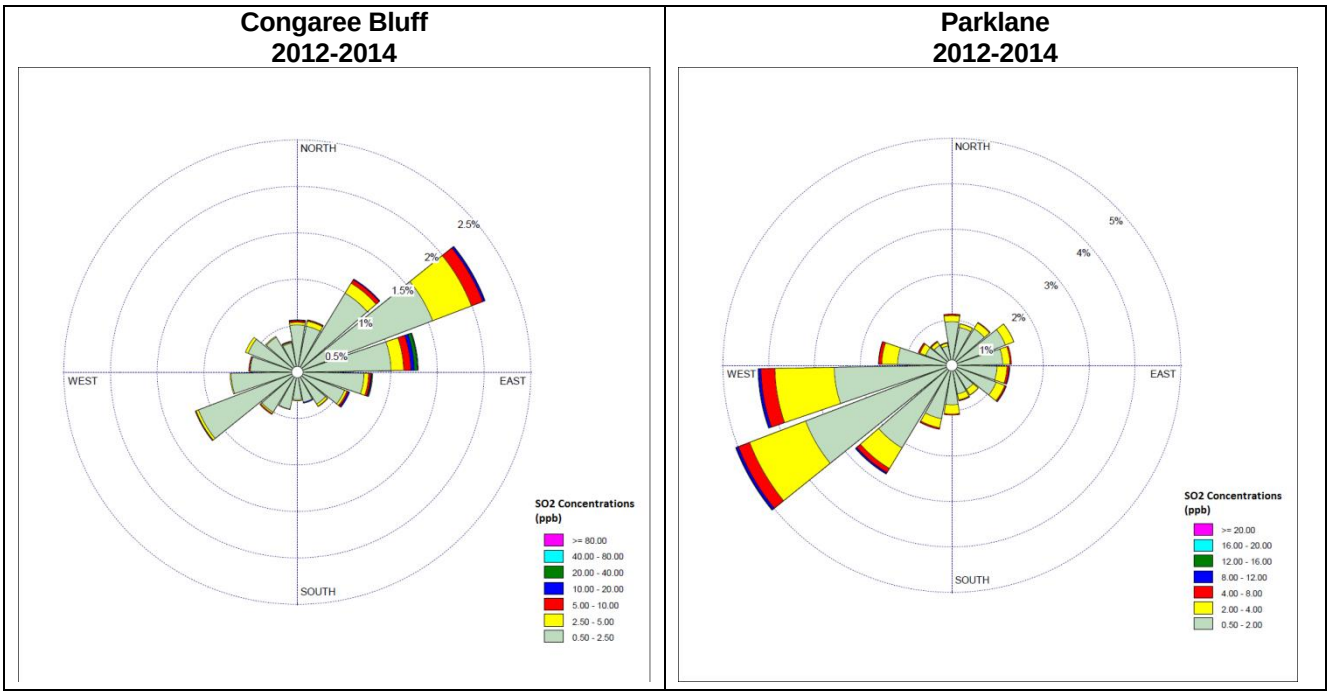


Figure 19 Pollution roses for the Congaree Bluff and Parklane monitors (2012-2014)

Table 11 Time-varying 1-hour SO_2 Concentrations by Season and Hour-of-day for the Parklane Monitor for 2012-2014

Hour of Day	Season 1	Season 2	Season 3	Season 4
Start Time	Dec-Jan-Feb ($\mu g/m^3$)	Mar-Apr-May ($\mu g/m^3$)	Jun-Jul-Aug ($\mu g/m^3$)	Sep-Oct-Nov ($\mu g/m^3$)
0	13.95	6.98	3.49	3.49
1	6.98	5.23	4.36	4.36
2	6.98	6.10	5.23	3.49
3	9.59	7.85	3.49	3.49
4	6.98	5.23	4.36	4.36
5	8.72	6.10	2.62	4.36
6	6.98	6.98	2.62	5.23
7	9.59	8.72	8.72	6.98
8	11.33	9.59	11.33	9.59
9	14.82	15.69	13.95	11.33
10	16.57	13.95	13.08	12.21
11	9.59	8.72	10.46	9.59
12	12.21	5.23	8.72	6.98
13	11.33	5.23	8.72	5.23
14	9.59	6.10	6.98	6.10
15	12.21	7.85	6.98	7.85
16	11.33	8.72	7.85	5.23
17	10.46	8.72	7.85	6.10
18	10.46	8.72	6.98	5.23
19	10.46	8.72	9.59	6.10
20	9.59	7.85	4.36	5.23
21	9.59	6.10	5.23	5.23
22	15.69	6.10	5.23	3.49
23	16.57	6.98	3.49	3.49

7 Modeling Results

The three-year averaged, 4th high, maximum daily, one-hour SO_2 predicted total concentrations for IP Eastover Mill and SCE&G Wateree Station are in compliance at all modeled receptors with the NAAQS value of 75 parts per billion (ppb) (approximately 196.0 $\mu g/m^3$). The controlling predicted three -year averaged, 4th high, maximum daily, one-hour SO_2 impact is shown below in Table 12. The maximum total design concentration occurs along the northwestern boundary of the IP Eastover Mill plant boundary in an area with 100-meter spaced receptors. Figure 20 shows the overall pattern and locations of the design concentrations (modeled plus ambient background).

Table 12 Controlling 3-year Average 4th-High Maximum Daily 1-hour SO_2 Predicted Concentration

Pollutant and Averaging Period	IP Eastover Mill Contribution ($\mu g/m^3$)	SCE&G Wateree Station Contribution ($\mu g/m^3$)	Modeled Background Contribution ($\mu g/m^3$)	Monitored Background Contribution ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2 1-hour	97.6	88.4	0.3	9.6	195.9	196.0

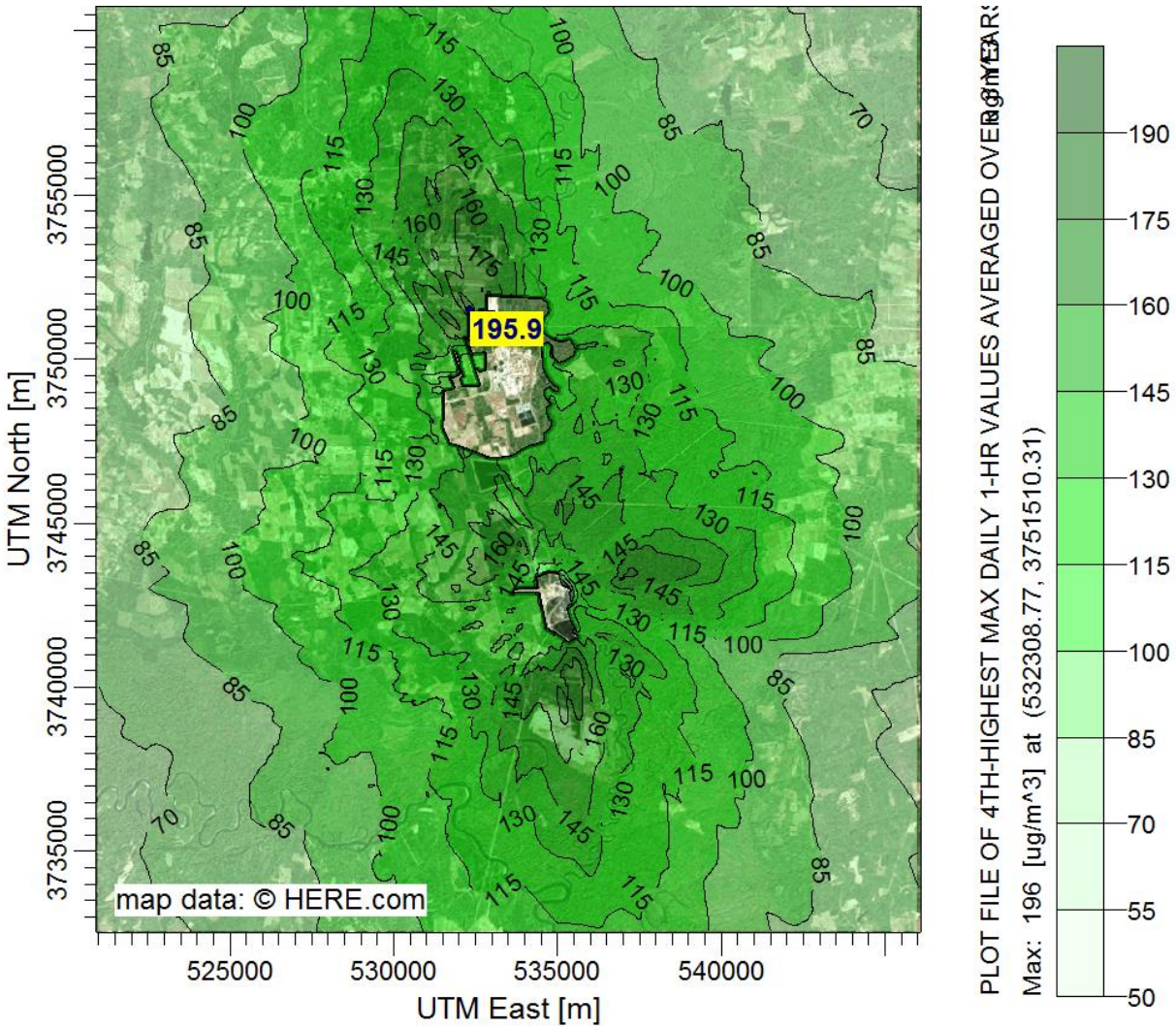


Figure 20 Isopleth Map of three-year averaged, 4th high, maximum daily, one-hour SO_2 predicted total concentrations for IP Eastover Mill and SCE&G Wateree Station

8 Conclusion

The air quality modeling analysis presented in this report demonstrates that the region surrounding SCE&G Wateree Station and IP Eastover Mill in Eastover, South Carolina is in attainment with respect to the 1-hour NAAQS for SO_2. Additionally, this analysis was performed using modeled emissions that are expected to be higher than any future actual emissions. Therefore, the area should be classified as "attainment" with respect to the 1-hour NAAQS for SO_2.

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