

Plant Scherer Dispersion Modeling for the 2010 1-Hour SO₂ NAAQS

August 24, 2015

Plant Scherer is a stationary source located in Monroe County whose 2012 emissions were greater than 16,000 tons of SO₂ in 2012. Therefore, the area surrounding Plant Scherer has been identified for early designation. Plant Scherer is located in Juliette, GA, just north of Macon and approximately 70 miles south of Atlanta. Georgia Power has submitted a dispersion modeling report and related modeling files prepared by AECOM, Inc. to support this early designation. Georgia EPD reviewed the modeling report and files to ensure that the dispersion modeling has been conducted in accordance with the final Data Requirements Rule (DRR) and Modeling Technical Assistance Document (TAD) using the most recently available information.

This report discusses the procedures used to review the supporting dispersion modeling and the modeling results are summarized.

INPUT DATA

Meteorological Data – Since no on-site meteorological data was available, the hourly meteorological data of surface and upper air observations from the Middle Georgia Regional Airport located in Macon, GA (surface) and the Peachtree City, GA (upper) NWS stations for the period of 2012-2014 were used in this modeling. The data were compiled and provided by GA EPD. The AERMET processor (14134) was used to convert the NWS data into AERMOD model-ready meteorological data files using the AERSURFACE surface characteristics evaluation utility (13016). Values of the surface characteristics (albedo, Bowen ratio, and surface roughness) surrounding the Macon, GA NWS surface station and the project site were derived for each of twelve 30-degree sectors over four seasons, in accordance with the contemporaneous AERMOD Implementation Guide (09078). GA EPD compared the above AERSURFACE generated surface characteristics, and found no significant differences in the albedo and Bowen ratio for the two sites. However, significant differences in the surface roughness were observed. Therefore, a meteorological dataset with the project site surface characteristics was used in the modeling.

Source Data – Plant Scherer is an electric power generation plant including four sub-critical pulverized coal-fired boilers (Units 1-4). Each unit is equipped with selective catalytic reduction (SCR), cold-side electrostatic precipitator (ESP), activated carbon injection (ACI), baghouse, and wet flue gas desulfurization (FGD) (scrubber) systems. Units 1-2 exhaust to an 870-foot scrubber stack and units 3-4 exhaust to an 847-foot scrubber stack. During normal operations, the units exhaust through the scrubber stacks. However, there are some periods of time during which a scrubber is not in operation. In these cases, the units exhaust through one of two 1000-foot stacks that were in existence prior to installation of the scrubbers. Each stack is equipped with two flues, one flue per unit as shown in Table 2-1 of the modeling report submitted by Georgia Power. The equivalent stack diameter was used along with the combined flow rate to calculate a representative equivalent stack exit velocity. Actual hourly emissions, temperatures, and flow rates for the most recent three calendar years (2012-2014) were modeled. Emission and flow rates (SCFM) for each hour are the same as those reported to EPA Clean Air Markets Division (EPA CAMD) under the Acid Rain Program using continuous emissions monitoring systems (CEMS) certified according to 40 CFR Part 75. Figures 1-3 show the hourly SO₂ emission rates (g/s) that were modeled through each stack in 2012, 2013, and 2014.

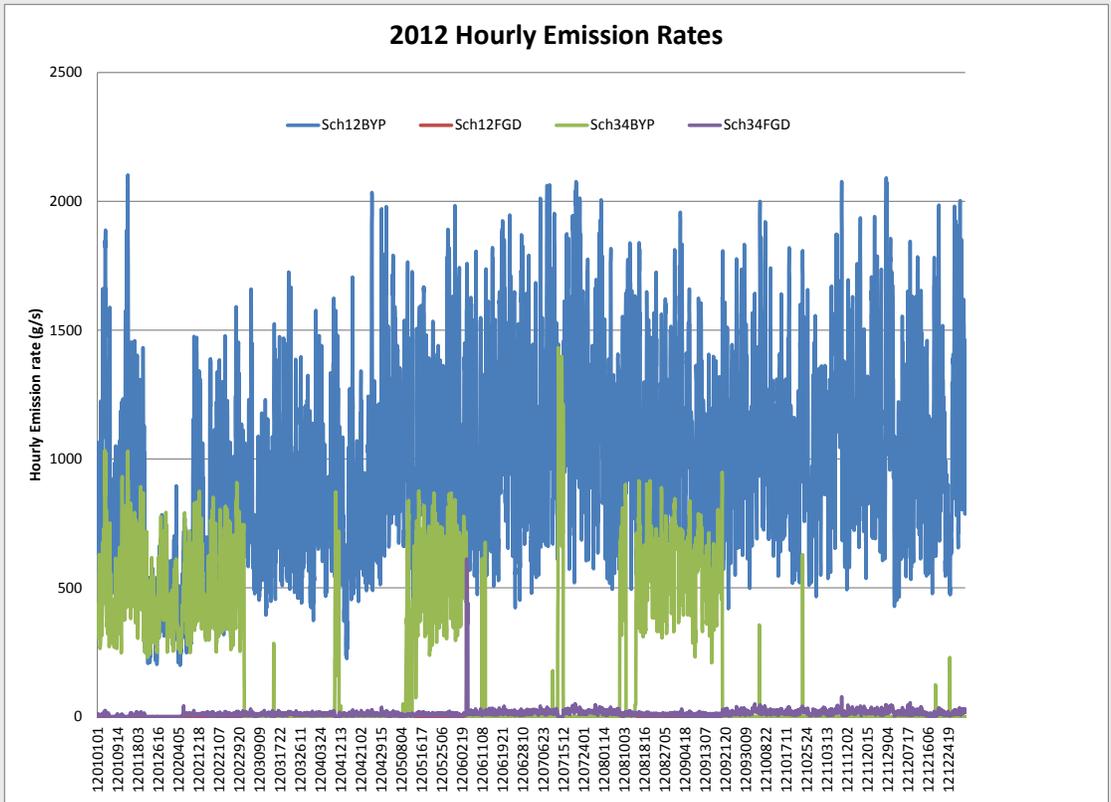


Figure 1. Hourly (2012) SO₂ emission rates (g/s) that were modeled through each stack.

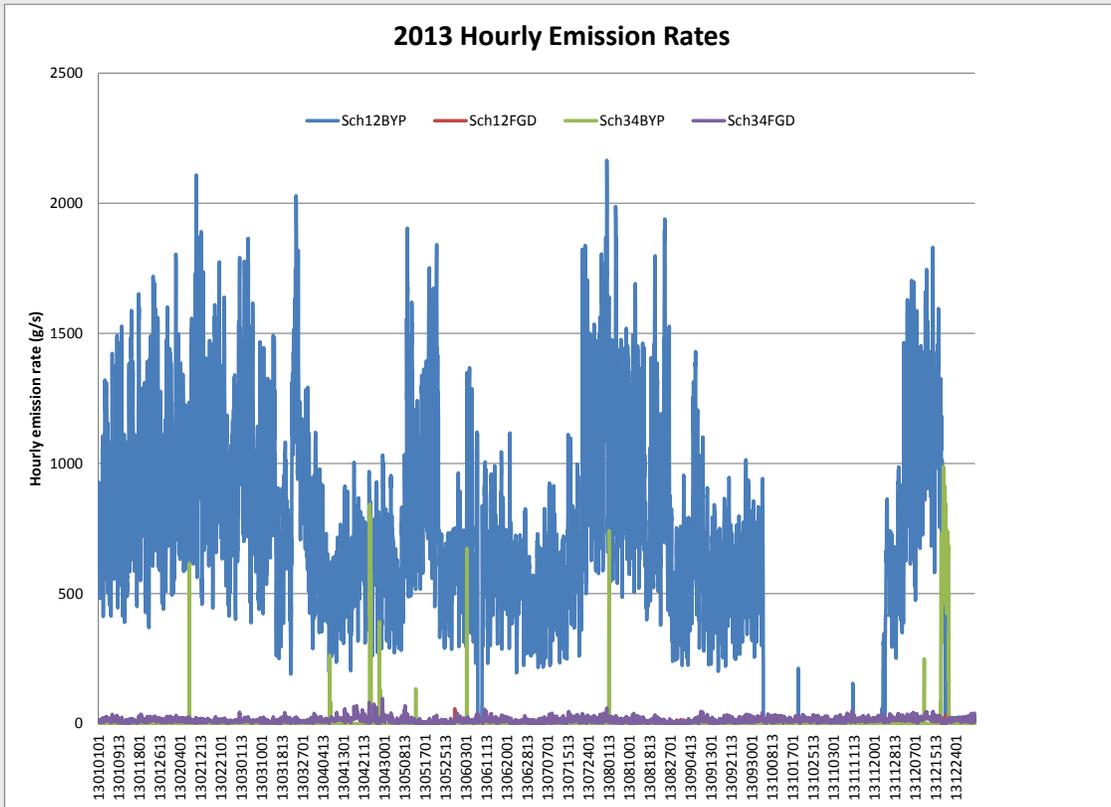


Figure 2. Hourly (2013) SO₂ emission rates (g/s) that were modeled through each stack.

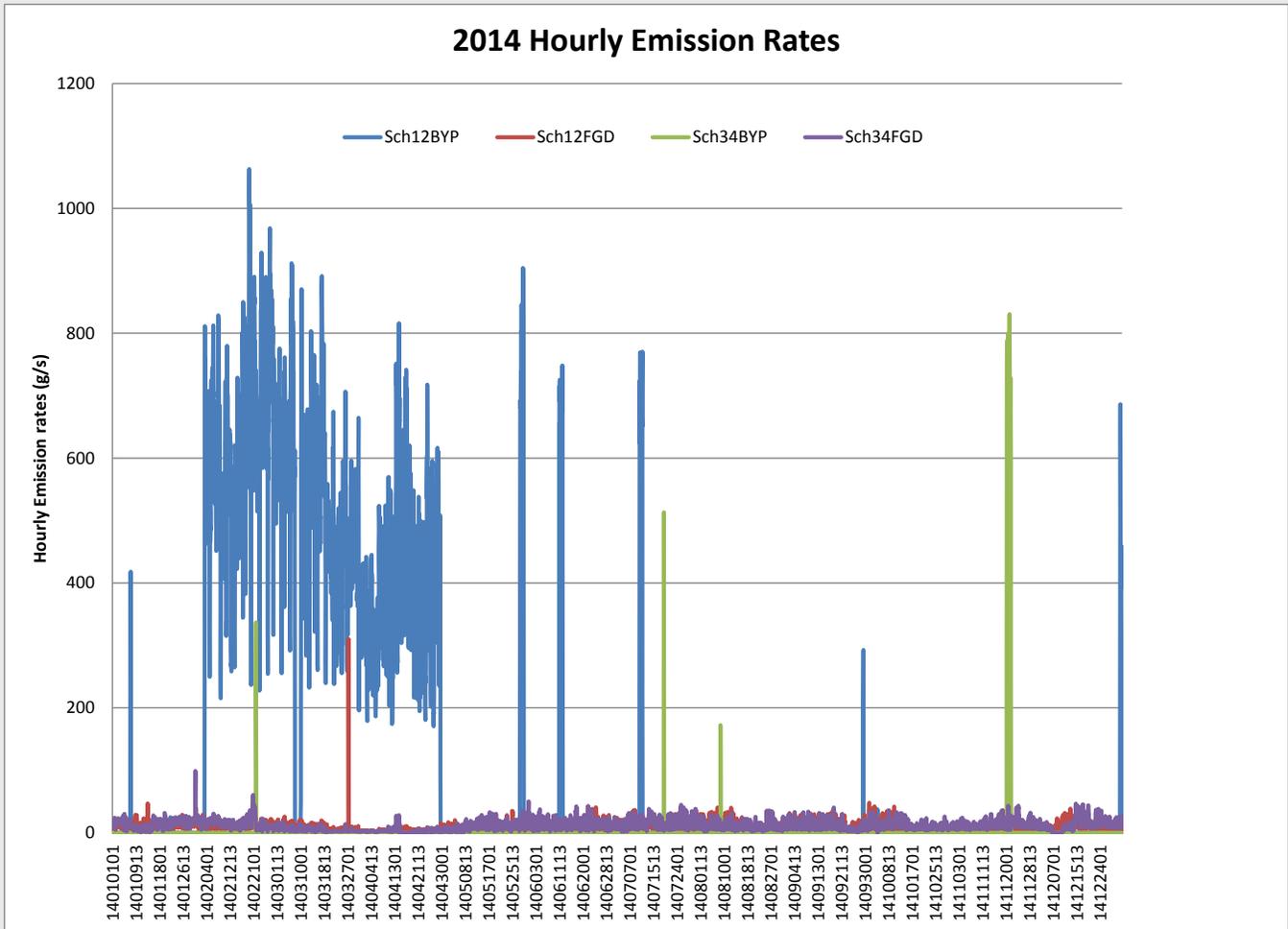


Figure 3. Hourly (2014) SO₂ emission rates (g/s) that were modeled through each stack.

During 2012-2014, Plant Scherer installed SO₂ scrubbers on Units 1-4. Table 1 contains a summary of the scrubber installation dates and in-service dates for Plant Scherer.

Table 1. Scrubber installation dates and in-service dates for Plant Scherer

	First Flow Date	In-Service Date
Unit 1	December 2013	May 2014
Unit 2	May 2013	August 2013
Unit 3	January 2011	March 2011
Unit 4	May 2012	September 2012

The emissions coming out of the scrubbers will emit from one of the 847-foot scrubber stacks, while the emissions that have not been scrubbed will emit from one of the 1000-foot bypass stacks. It is critical to model the appropriate emissions (scrubbed vs. not scrubbed) with the appropriate stack (scrubber stack vs. bypass stack). The modeling presented here appropriately matched emissions with the appropriate stack. However, the modeling submitted by the Sierra Club did not. The Sierra Club modeling modeled all emissions (scrubbed and not scrubbed) out of the scrubber stack. Clearly, this is not appropriate and will lead to unrealistically high modeled design values since uncontrolled SO₂ emissions are modeled out of

the shorter and cooler (less plume rise) stacks. As a result, the Sierra Club modeling shows modeled violations of the SO₂ NAAQS while the Georgia Power modeling shows that the modeled design value is 36% below the NAAQS.

Receptor Locations – A Cartesian receptor grid extending to approximately 20 km from Plant Scherer was used in the modeling analysis to assess ground-level SO₂ concentrations. The discrete receptors were placed according to the following configuration based on the center of the plant:

- 0 km – 2km → 100 meters apart
- 2 km – 3 km → 250 meters apart
- 3 km – 10 km → 500 meters apart
- 10 km – 20 km → 1,000 meters apart

This domain is sufficient to capture the maximum impact. All receptor locations are represented in the Universal Transverse Mercator projections, Zone 17, North American Datum 1983.

Terrain Elevation – Terrain data from USGS 1-sec National Elevation Dataset (NED) CONUS were extracted to obtain the elevations of all sources and receptors by AERMAP terrain processor (version 11103). The resulting elevation data were verified by comparing contoured receptor elevations with USGS 7.5-minute topographic map contours. The area in the vicinity of Plant Scherer is generally characterized as simple terrain relative to the Units 1-4 scrubbed and bypass stacks.

Building Downwash – The effects of building downwash were incorporated into the AERMOD analysis. Direction-specific building parameters required by AERMOD were developed using the BPIP PRIME utility (version 04274).

Offsite Emission Inventory – Figure 4 contains a spatial map of annual 2013 SO₂ emissions (TPY) from offsite sources near Plant Scherer. Table 2 contains a detailed list of facilities within 70 km from Plant Scherer and the emission (TPY)/distance (km), or Q/d. In April 2015, Plant Branch permanently shut down. All the remaining Q/d values are less than 20. Therefore, no offsite sources were explicitly modeled and the impact from those sources is captured in the background concentration.

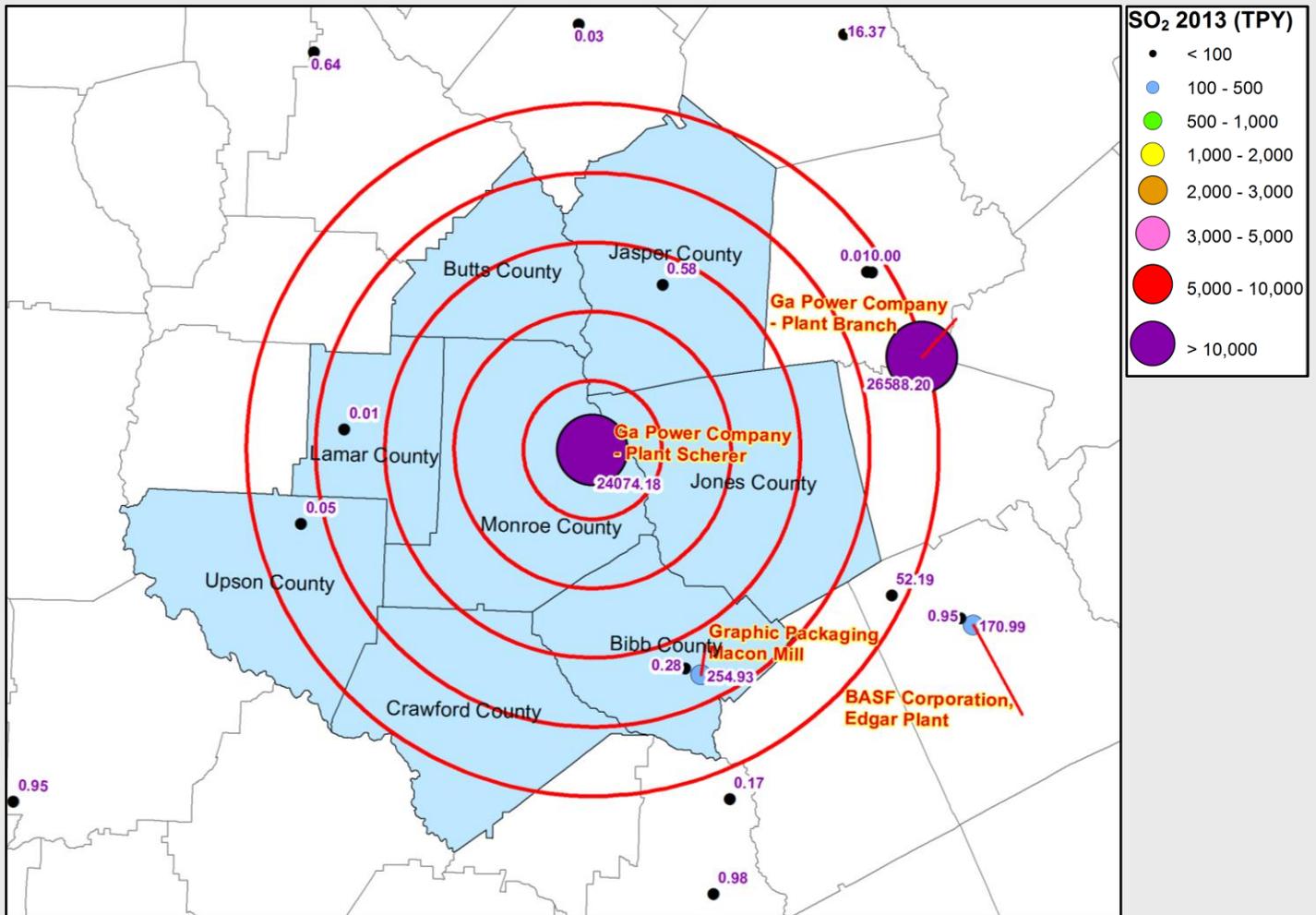


Figure 4. Map of annual 2013 SO₂ emissions (TPY) from offsite sources near Plant Scherer. Red circles are placed in 10 km increments out to 50 km.

Table 2. List of facilities within 70 km from Plant Scherer and the emission (TPY)/distance (km), or Q/d.

AIRS ID	Facility Name	Latitude	Longitude	2013 SO ₂ (TPY)	d (km)	Q/d
20700008	Ga Power Company - Plant Scherer	33.061300	-83.806600	24,074.18	0.00	N/A
23700008	Ga Power Company - Plant Branch - CLOSED	33.192280	-83.300030	26,588.20	49.47	537.4692
02100001	Graphic Packaging Macon Mill	32.772590	-83.630140	254.93	36.04	7.0740
31900009	BASF Corporation, Edgar Plant	32.845278	-83.212500	170.99	60.51	2.8257
31900004	BASF Corporation, Gordon Plant	32.880833	-83.338880	52.19	48.10	1.0850
15900012	Georgia-Pacific - Monticello MDF	33.277962	-83.705024	0.58	25.84	0.0225
31900013	BASF Corporation, Toddville Plant	32.853056	-83.232220	0.95	58.48	0.0162
15300042	Mid-Georgia Cogen LP	32.486363	-83.602836	0.98	66.58	0.0147
02100030	Armstrong World Industries Inc	32.779326	-83.655409	0.28	34.33	0.0083
15300033	USAF Robins Air Force Base	32.610890	-83.581620	0.17	54.23	0.0031
29300022	Quad Graphics, Inc.	32.953880	-84.253890	0.05	43.49	0.0011
21700024	Pactiv Corp	33.614360	-83.845866	0.03	61.48	0.0005
29700036	Goodyear Tire & Rubber Company	33.651598	-83.698217	0.03	66.27	0.0005
17100005	Jordan Forest Products	33.078380	-84.191190	0.01	35.98	0.0003
23700131	Horton Homes Inc	33.300833	-83.380833	0.01	47.79	0.0002
23700132	Horton Vans Inc	33.301670	-83.388890	0.00	47.22	0.0000

1-HOUR SO₂ NAAQS ASSESSMENT

As part of the 1-hour SO₂ NAAQS analysis, ambient background was added to modeled concentrations to assess compliance with the 1-hour SO₂ NAAQS. The 1-hour SO₂ background concentration for Monroe County of 30.3 µg/m³ (11.6 ppb) was obtained from the PSD background file located on the GA EPD website (<http://epd.georgia.gov/air/documents/ssppmodeling-georgia-background-data>). The total SO₂ concentrations are calculated as the sum of the modeled design concentration from Plant Scherer and the ambient background concentration. The modeled design concentration was calculated by AERMOD (version 14134) using actual hourly emissions from 2012-2014 and reflects the three-year average of the 99th percentile ranked daily maximum 1-hour SO₂ concentration. The modeling results for the 1-hour SO₂ NAAQS are presented in Table 3 and show the 4th highest modeled daily maximum 1-hour SO₂ concentration averaged over three years is 48 ppb. This value is well below the NAAQS level of 75 ppb. Figure 5 shows a google earth map for Plant Scherer. As seen in Figure 6, the 4th high daily maximum 1-hour SO₂ concentration averaged over 3-years for SO₂ was located at approximately 3.6 kilometers west of Plant Scherer.

Table 3. Summary of highest 1-hour SO₂ modeled impacts averaged over 3 model years.

Rank	3-year Average (ppb)	2012 (ppb)	2013 (ppb)	2014 (ppb)	Receptor (lat, log)	Distance from Plant Scherer (km)
1st High	66	76	70	54	33.0328, -83.8357	4.09
2nd High	55	69	61	36	33.0639, -83.8554	4.47
3rd High	51	68	48	36	33.0645, -83.8490	3.95
4th High	48	68	44	31	33.0627, -83.8458	3.57

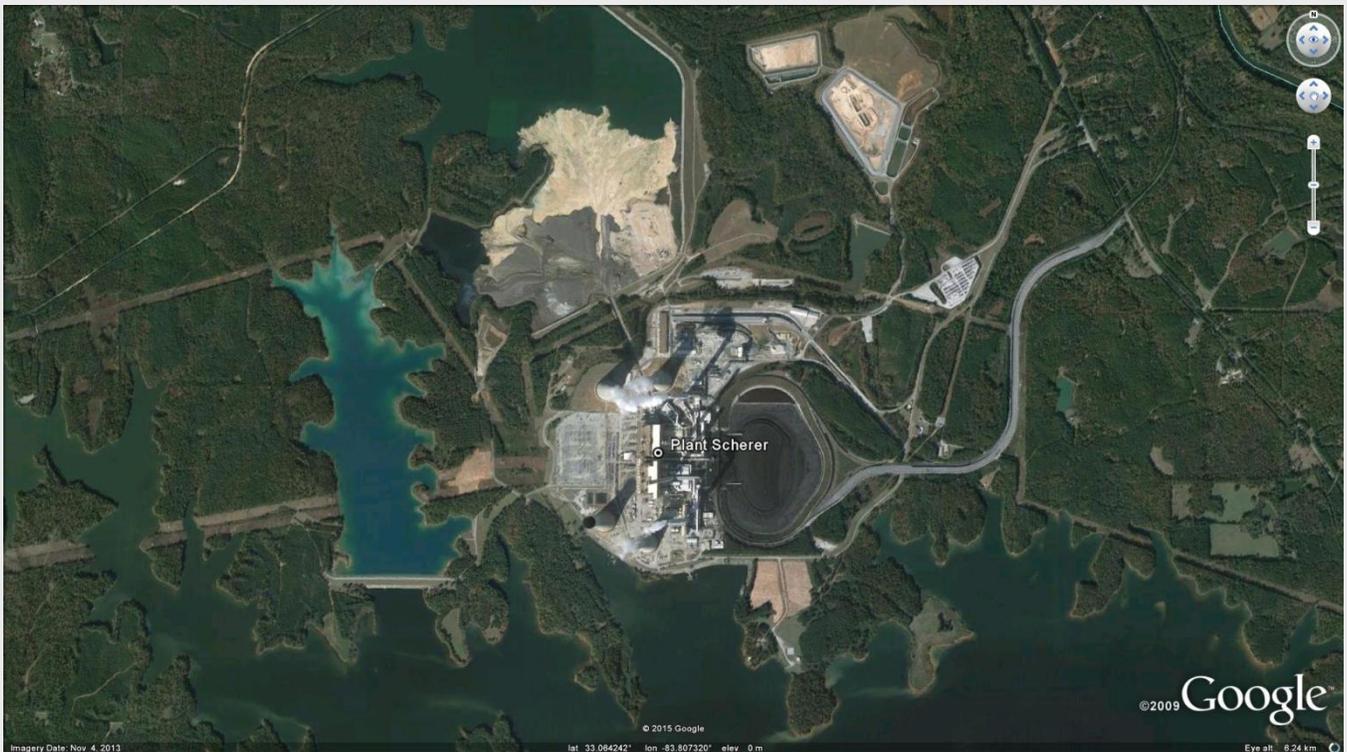


Figure 5. Google Earth Map for Georgia Power's Plant Scherer.

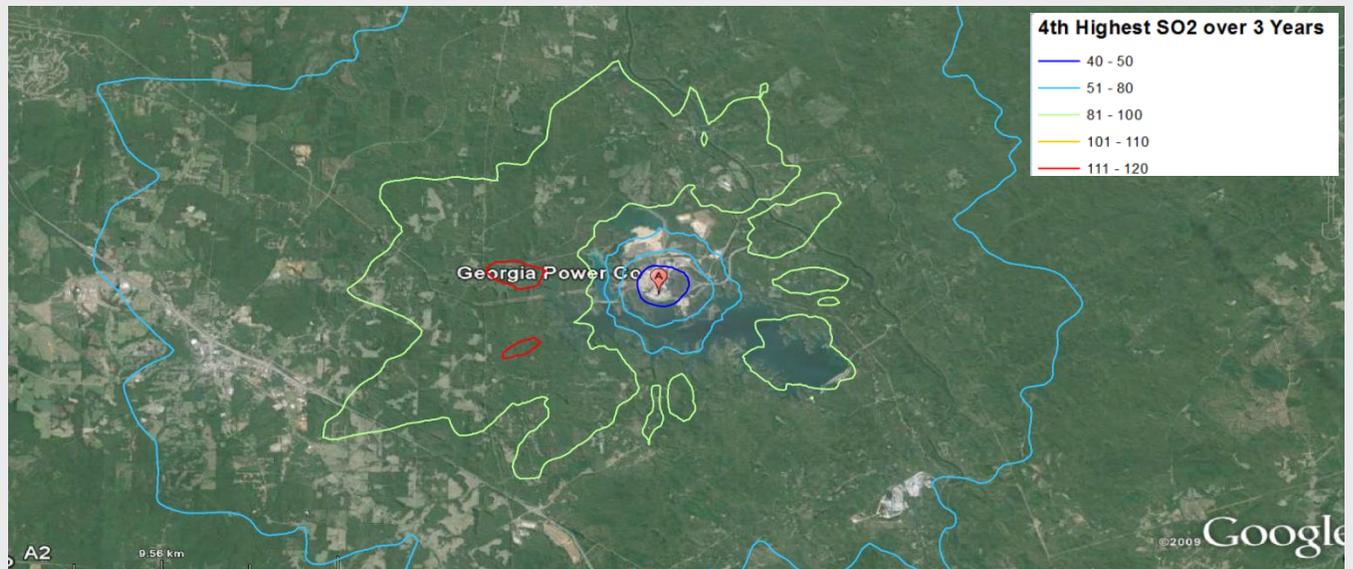


Figure 6. Spatial plot of the 4th highest daily maximum 1-hour SO₂ concentration averaged over 3 years.

CONCLUSIONS

The Plant Scherer dispersion modeling for the 1-hour SO₂ NAAQS designations has been conducted in accordance with the final Data Requirements Rule (DRR) and Modeling Technical Assistance Document (TAD) using the most recently available information. Based on the modeling analysis, SO₂ emissions from Plant Scherer do not cause or contribute to any violations of the 1-hour SO₂ NAAQS. Besides Plant Scherer, there are no other sources of SO₂ in Monroe County. In addition, there are no large sources of SO₂ in or nearby any of the neighboring counties (Bibb, Jones, Jasper, Butts, Lamar, Upson, and Crawford). Therefore, Georgia EPD is recommending the following counties be designed unclassifiable/attainment for the 2010 1-hour SO₂ NAAQS:

- Monroe County,
- Bibb County,
- Jones County,
- Jasper County,
- Butts County,
- Lamar County,
- Upson County, and
- Crawford County.