

## DMU Modeling Review Report – PSD

### General Information

Application #	802465
AIRS #	077-00001
Applicant	Georgia Power – Plant Yates Expansion
Application Receipt Date	12/8/2023
Modeling Review Request Date	NA
Assigned SSPP PM1	Cynthia Dorrough
Assigned Permit Engineer	Renee Brown
Date of Review Report Submission	5/1/2024
Assigned DMU Modeler	Ryan Gallagher <i>RG</i>
Approved by DMU PM1	5/1/2024 <i>BK</i>
List of Reviewed Pollutants	PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> , and CO

### Review Summary

Are the modeled concentrations of all pollutants below SIL for Class I and Class II areas?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
If “No” for the question above, list all pollutants whose modeled impacts were greater than or equal to the applicable SIL.	Class II 1-hour NO <sub>2</sub> Class II 24-hour PM <sub>2.5</sub>	
If cumulative modeling (i.e., Increment and NAAQS) is performed, are all pollutant below their applicable PSD Increment thresholds and NAAQS?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
If “No” for the question above, list all pollutants whose modeled impacts were greater than applicable PSD Increment threshold and/or NAAQS.		
Did the AQRV analysis show compliance?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

**NOTE: Emissions and stack parameters used in the SIL modeling and subsequent PSD analyses were selected from the worst-case load analysis results shown in Tables 5 and 6 below.**

## Modeling Results

**Table 1. Class II Significant Impact Levels Modeling**

Pollutant	Averaging Period	Max Modeled Conc. ( $\mu\text{g}/\text{m}^3$ )	Secondary Impact ( $\mu\text{g}/\text{m}^3$ )*	Total ( $\mu\text{g}/\text{m}^3$ )	SIL ( $\mu\text{g}/\text{m}^3$ )	SIA (km)	Receptor UTM Zone: 16	
							Easting (meter)	Northing (meter)
PM <sub>10</sub>	24-hour	2.132	N/A	2.132	5	N/A	694,000.00	3,703,523.00
	Annual	0.079	N/A	0.079	1	N/A	695,404.98	3,704,272.44
PM <sub>2.5</sub>	24-hour	<b>1.3929</b>	0.0627	<b>1.46</b>	1.2	1.7	695,500.00	3,803,523.00
	Annual	0.07902	0.0012	0.0802	0.13	N/A	695,404.98	3,704,272.44
NO <sub>2</sub>	1-hour**	<b>15.01</b>	N/A	<b>15.01</b>	7.5	16.9	691,784.00	3,703,684.00
	Annual	0.43101	N/A	0.43101	1	N/A	691,900.00	3,703,723.00
CO	1-hour	432.68	N/A	432.68	2000	N/A	691,400.00	3,702,823.00
	8-hour	230.20	N/A	230.20	500	N/A	694,000.00	3,703,523.00

\* Secondary PM<sub>2.5</sub> impacts were estimated with the MERP approach using the project NO<sub>x</sub> and SO<sub>2</sub> emissions at the proposed facility.

\*\* The DMU expanded the 100-meter spaced 1-hour NO<sub>2</sub> modeling receptor grid to include the entire significant impact area (SIA). The refined grid resulted in a similar max concentration but produced a slightly larger SIA.

**Table 2. Class I Significant Impact Levels Modeling**

Pollutant	Averaging Period	Max Modeled Conc. ( $\mu\text{g}/\text{m}^3$ )	Secondary Impact ( $\mu\text{g}/\text{m}^3$ )*	Total ( $\mu\text{g}/\text{m}^3$ )	SIL ( $\mu\text{g}/\text{m}^3$ )	Receptor UTM Zone: 16	
						Easting (meter)	Northing (meter)
PM <sub>10</sub>	24-hour	0.10789	--	0.10789	0.3	719,140.48	3,660,592.01
	Annual	0.00383	--	0.00383	0.2	727,039.38	3,666,020.78
PM <sub>2.5</sub>	24-hour	0.10789	0.02785	0.1357	0.27	719,900.00	3,661,021.73
	Annual	0.00383	0.00050	0.0043	0.03	727,039.38	3,666,020.78
NO <sub>2</sub>	Annual	0.00541	--	0.00541	2.5	727,039.38	3,666,020.78

\* Secondary PM<sub>2.5</sub> impacts were estimated with the MERP approach using the NO<sub>x</sub> and SO<sub>2</sub> emissions at the proposed facility. The applicant used the most conservative Class II MERPs for the class I SIL. The DMU followed the distance-based Class I MERP approach.

**Table 3. NAAQS Modeling**

Pollutant	Averaging Period	Max Modeled Conc. ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ )	Secondary Impact ( $\mu\text{g}/\text{m}^3$ )*	Total ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )	Receptor UTM Zone: <u>16</u>	
							Easting (meter)	Northing (meter)
PM <sub>2.5</sub>	24-hour	1.086	16.2	0.88	18.166	35.0	695,600.00	3,703,623.00
NO <sub>2</sub>	1-hour**	151.645	30.30	--	182.95	188.7	703,284.00	3,695,484.00

\* The applicant converted the maximum 1-hour short term NO<sub>x</sub> emissions directly to TPY for the Tenaska Georgia Generating Station (TGGS) facility, one of the sources in the regional inventory. The DMU used the long-term emissions from the inventory as the basis for the offsite MERPS, consistent with the way the other facilities in the regional emissions inventory were analyzed. The DMU obtained a lower PM<sub>2.5</sub> secondary impact as a result.

\*\* The applicant included a facility in the 1-hour NO<sub>2</sub> inventory that was confirmed with SSPP to have ceased operation in 2016. After the DMU removed two exceeding receptors that were located inside the property of a separate inventory facility, all other receptors were below the NAAQS.

**Table 4. Class II PSD Increment Modeling**

Pollutant	Averaging Period	Max Modeled Conc. ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ )	Secondary Impact ( $\mu\text{g}/\text{m}^3$ )	Total ( $\mu\text{g}/\text{m}^3$ )	PSD Increment ( $\mu\text{g}/\text{m}^3$ )	Receptor UTM Zone: <u>16</u>	
							Easting (meter)	Northing (meter)
PM <sub>2.5</sub>	24-hour	1.203*	--	0.063	1.266	9	695,500.00	3,703,623.00

\*DMU determined that the inventory sources that the applicant included in their modeling were not increment consumers.

**Table 5. Load Analysis: Natural Gas**

Pollutant	Averaging Period	SIL	Natural Gas Load Scenarios*							
			MECL	75%	100%	SU	SD	SU +WC	SD +WC	SU + SD +WC
PM <sub>10</sub>	24-hour	5.0	0.288	0.294	0.278	0.246	0.053	0.376	0.307	--
	Annual	1.0	0.007	0.008	0.007	0.0005	0.00011	--	--	0.008
PM <sub>2.5</sub>	24-hour	1.2	0.288	0.294	0.278	0.246	0.053	0.376	0.307	--
	Annual	0.13	0.007	0.008	0.007	0.0005	0.00011	--	--	0.008
NO <sub>2</sub>	1-hour	7.5	2.164	2.495	2.658	<b>13.467</b>	1.844	<b>14.631</b>	4.280	--
	Annual	1.0	0.011	0.012	0.011	0.005	0.001	--	--	0.017
CO	1-hour	2000	2.184	2.358	2.521	113.115	38.299	114.291	40.610	--
	8-hour	500	1.082	1.068	1.020	56.020	18.968	56.496	19.902	--

\* MECL: Minimum emissions compliance level; It represents the lowest operating load. SU: startup. SD: shutdown. WC: the worst-case of normal operating load; It can be MECL, 75% load, or 100% load.

NOTE:

- 1) For short term averaging periods, startup and shutdown represented maximum one-hour emissions. Both the startup and shutdown processes occur in less than one hour. To calculate the maximum 1-hour emissions, all emissions from a startup or shutdown event were included and then summed with the emissions of normal operations for the remaining minutes of the hour. They were modeled with separate collocated stacks with the assigned parameters for each mode of operation.
- 2) For the annual averaging period, the worst-case normal operation was modeled with collocated startup and shutdown stacks.
- 3) Location data for maximum modeled concentrations are not available because the applicant modeled the domain maximum cumulative concentration of all three combustion turbines. This explains why the highest values in Table 5 for 1-hour NO<sub>2</sub> are not same as those values in Table 1.
- 4) WC = worst case of normal operating load (MECL, 75%, or 100%) combined with the impacts of a startup or shutdown event. For annual scenarios: startup, shutdown and worst-case normal operations were combined. For 1-hour NO<sub>2</sub> and 1-hour CO, it was 100% load. For CO 8-hr it was MECL. For all other pollutants and averaging periods WC equaled 75% load.

**Table 6. Load Analysis: Fuel Oil (This is the worst case scenario.)**

Pollutant	Averaging Period	SIL	Fuel Oil Load Scenarios*							
			MECL	75%	100%	SU	SD	SU +WC	SD +WC	SU + SD +WC
PM <sub>10</sub>	24-hour	5.0	0.728	0.756	0.721	1.973	1.424	2.111	1.991	--
	Annual	1.0	0.017	0.018	0.018	0.004	0.003	--	--	0.023
PM <sub>2.5</sub>	24-hour	1.2	0.728	0.756	0.721	<b>1.973</b>	<b>1.424</b>	<b>2.111</b>	<b>1.991</b>	--
	Annual	0.13	0.017	0.018	0.018	0.004	0.003	--	--	0.023
NO <sub>2</sub>	1-hour	7.5	4.918	5.342	5.349	<b>19.844</b>	6.385	<b>20.825</b>	<b>10.396</b>	--
	Annual	1.0	0.025	0.026	0.025	0.008	0.003	--	--	0.0035
CO	1-hour	2000	3.355	3.687	3.614	431.40	162.973	432.08*	165.74	--
	8-hour	500	1.785	1.848	1.679	229.55	86.72	229.89*	88.121	--

\* MECL: Minimum emissions compliance level; It represents the lowest operating load. SU: startup. SD: shutdown. WC: worst case of normal operating load; It can be MECL, 75% load, or 100% load.

NOTE:

- 1) For short term averaging periods, startup and shutdown represented maximum one-hour emissions. Both the startup and shutdown processes occur in less than one hour. To calculate the maximum 1-hour emissions, all emissions from a startup or shutdown event were included and then summed with the emissions of the corresponding worst case normal operations for the remaining minutes of the hour. For the remaining project: startup and normal operations were modeled concurrently for short term averaging periods through separate collocated stacks with their scenario specific parameters.
- 2) For the annual averaging period, the worst-case normal operation stack was modeled with collocated startup and shutdown stacks for each combustion turbine.
- 3) Location data for maximum modeled concentrations are not available because the applicant summed the domain maximum contributions to produce a cumulative concentration from all three combustion turbines. This explains why the highest values in Table 6 for 24-hour PM<sub>2.5</sub> and 1-hour NO<sub>2</sub> are not same as those values in Table 1.
- 4) WC = worst case of normal operating load (MECL, 75%, and 100%) combined with the impacts of a startup or shutdown event. For annual scenarios: startup, shutdown and worst-case normal operations were combined. For 1-hour NO<sub>2</sub>, it was 100% load. For all other pollutants and averaging periods WC equaled 75% load.

**Table 7. Additional Analysis**

<b>Analysis</b>	<b>Results</b>
Ozone Impact	The project impact of ozone is 1.67 ppb that exceeds the ozone SIL (1 ppb). The DMU calculated this value using MERPs from the Tallapoosa, Alabama hypothetical source. The design value at the Douglasville monitor (63 ppb) was selected for the background concentration to assess the cumulative impact for ozone. The sum of the facility impact (1.67 ppb) and the background concentration (63 ppb) is 64.67 ppb that is below the ozone NAAQS of 70 ppb.
Significant Monitoring Concentration	No preconstruction monitoring is required for annual NO <sub>2</sub> as the maximum modeled concentration is below its respective SIL and does not exceed the significant monitoring concentration.
AQRV	No adverse comments were received from the applicable FLMs. During its review, the DMU confirmed that Q/D values for all Class I areas within 300 km were less than 10. This analysis demonstrates that the expected project impact on Class I AQRVs will be negligible.
Others	A Class II visibility analysis showed that impacts to the nearest Class II area would be below the sky-based screening criteria during the hours it is open to the public. (See Table 8 for details). Soils and vegetation analysis showed no detrimental effects. Economic growth analysis showed no detrimental effects.

**Table 8. Level 2 VISCREEN Results: Chattahoochee Bend State Park**

<b>Background</b>	<b>Theta</b>	<b>Azimuth</b>	<b>Distance</b>	<b>Alpha</b>	<b>Delta E</b>		<b>Contrast</b>	
					<b>Criteria</b>	<b>Plume</b>	<b>Criteria</b>	<b>Plume</b>
SKY	10	160	11.9	9	2.18	2.030	0.05	0.019
	140				2.00	0.736	0.05	-0.023

\*VISCREEN was run using a level 2 analysis for the worst-case fuel oil operating scenario, which consists of maximum 100% load 1-hour emission rates of filterable particulate matter, NO<sub>x</sub>, and primary SO<sub>4</sub>. The class II area that is located within the project's largest SIA was Chattahoochee Bend State Park which restricts public access to sunrise to sunset each day. Only the worst-case daytime stability classifications were considered (6 AM to 6 PM). The angle range of wind speeds that can impact the Class II area were large due to the State Park's proximity to the facility. VISCREEN assumes steady state wind vectors which would not necessarily hold true in too large a wind direction sector. Wind directions were categorized into two adjacent 22.5-degree sectors from which the worst-case daytime stability class was selected. The analysis of KATL surface data file from 2017-2021 determined the worst-case scenario to be stability class D with the wind speed 3 m/s. There are no class I protected integral scenic vistas or terrain views in the area, therefore the TERRAIN results were not considered.