PROJECT REPORT

The Procter & Gamble Paper Products Company

PSD CONSTRUCTION AND OPERATING PERMIT APPLICATION

Volume II – Dispersion Modeling Analysis

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June 2013

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1.1. EXECUTIVE SUMMARY

Sterling Energy Assets (Sterling) plans to construct a woody biomass cogeneration facility at Procter and Gamble's Paper Products Plant (P&GPP) located in Albany, Georgia. Once constructed, P&GPP will assume contractual responsibility for operation of the cogeneration facility. The cogeneration plant will be considered part of the existing P&GPP site under the Prevention of Significant Deterioration (PSD) and Title V programs by virtue of being on contiguous property, under common control, and assuming the first two digits of the SIC code for P&GPP's manufacturing operations by virtue of its support to P&GPP operations.

The P&GPP Albany facility is an existing PSD Major Source, currently operating under Title V permit number 2676-095-0071-V-02-1. Approximately 50 percent of the steam to be produced by Sterling's 1,037 MMBtu/hr circulating fluid bed (CFB) boiler will be used to generate power for the electrical grid. The remainder of the steam will be supplied to the adjacent P&GPP operations to replace steam currently produced by an existing permitted 216 MMBtu/hr heat input biomass boiler (ID No. B002), which will be decommissioned following the shakedown period associated with the cogeneration plant. The residual steam to be used for process heating will be used to replace process heat generated from natural gas combustion in existing permitted duct burners as a backup. There will be no physical changes to the production equipment that can increase production capacity or utilization and the use of steam for heating will only maintain existing production capacity. P&GPP will continue to maintain the capacity to use the natural gas duct burners and backup natural gas boiler for process heating during periods of downtime of the cogeneration boiler.

The proposed project will require a Prevention of Significant Deterioration (PSD) permit. The existing P&GPP facility is a major stationary source with respect to Title V and emissions increases from the proposed project will exceed the respective PSD significant emission rates thresholds for carbon monoxide (CO), sulfur dioxide (SO_2), oxides of nitrogen (NO_X), particulate matter with an aerodynamic diameter of 10 microns (PM_{10}), PM with an aerodynamic diameter of 2.5 microns ($PM_{2.5}$), and greenhouse gases (CO_2e).[1]

Following EPD policy, Trinity Consultants (Trinity), on behalf of P&GPP, prepared and submitted a dispersion modeling protocol on May 3, 2013 which was subsequently approved on May 17, 2013 (included as Appendix A to this report).[2] This modeling report presents the results of the modeling analyses which were performed as part of the PSD application. The modeling was conducted in accordance with the methodologies presented in the approved protocol and demonstrates that the Significant Impact Level (SIL) was not exceeded for any triggered pollutant.

1.2. REPORT ORGANIZATION

The remainder of this report is organized as follows:

- Section 2 provides the facility and project description,
- Section 3 discusses the PSD modeling requirements for the project,
- Section 4 describes the modeling methodology and data resources utilized in the analysis,
- Section 5 presents the dispersion modeling results,
- Section 6 presents the additional impacts analysis,

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1 CO_2e is carbon dioxide equivalents calculated as the sum of the six well-mixed GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) with applicable global warming potentials per 40 CFR 98 applied.

2 Letter from James Boylan (EPD) to Jonathan Hill (Trinity) dated May 17, 2013.

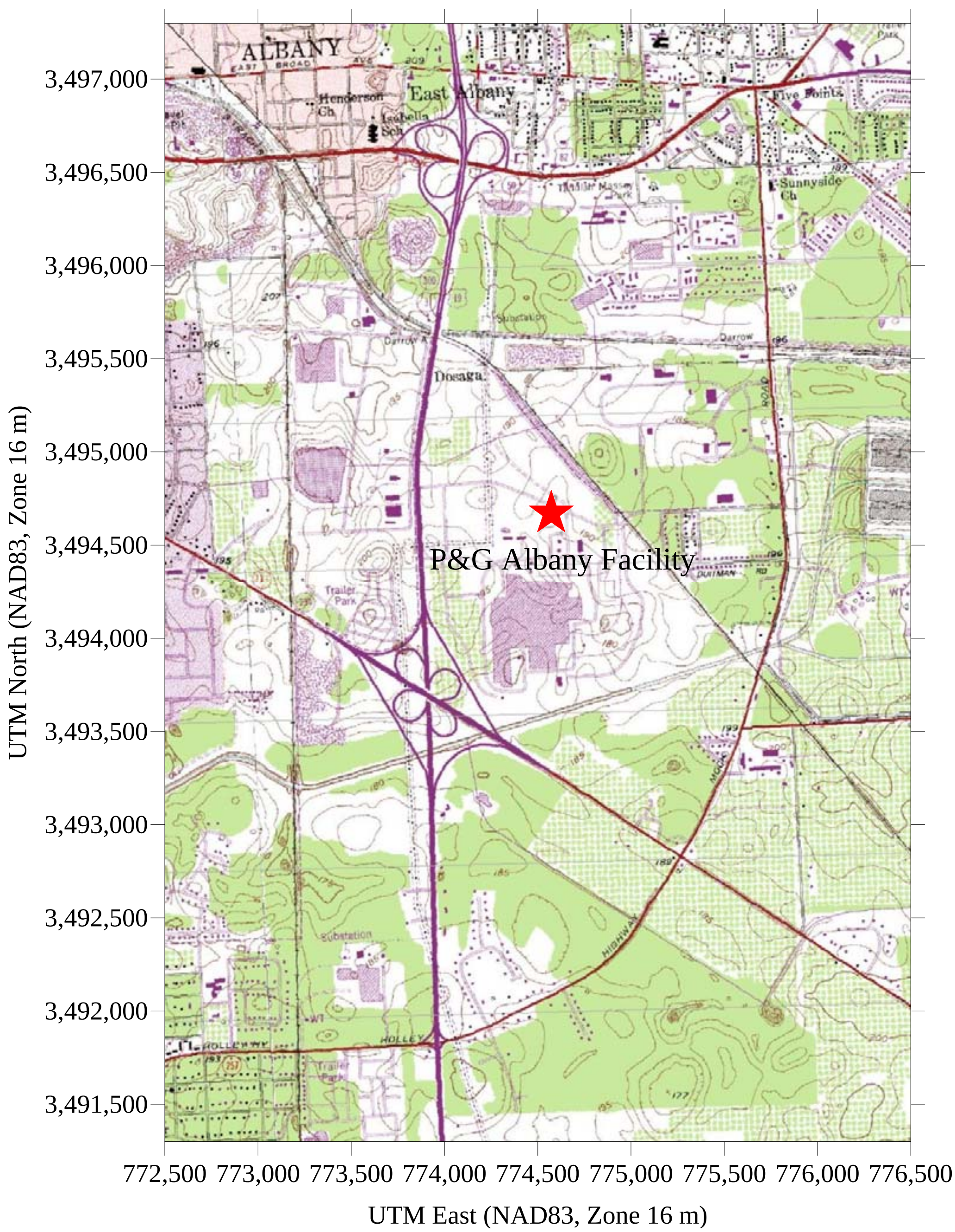
- Section 7 discusses the toxic air pollutant modeling,
- Appendix A contains the approved modeling protocol,
- Appendix B contains the Class I Area Notification Letters,
- Appendix C contains the Existing P&GPP Albany Site Layout, and
- Appendix D contains the electronic modeling files

This section describes the location of P&GPP's Albany, GA facility in relation to the surrounding area along with a discussion of the proposed boiler project.

2.1. FACILITY LOCATION

Figure 2-1 provides a map of the area surrounding the Albany property. The approximate central Universal Transverse Mercator (UTM) coordinates of the facility are 774.6 kilometers (km) east and 3,494.7 km north in Zone 16 (NAD 83).

FIGURE 2-1. FACILITY LOCATION



2.2. PROJECT DESCRIPTION

Pre-chipped wood will be delivered to the site via dump trucks utilizing P&GPP's private paved road. Per EPD guidance, paved roadways do not need to be included in the modeling analysis. Raw material trucks will transfer chips at a truck tipping station into a hopper that is enclosed on the sides to effectively shield the dumping operation from the effects of wind. To eliminate emissions from the dumping process itself, a water spray system will be employed over the top of the chip receiving bin. From the bin, wood chips will be transferred using a series of enclosed conveyors to the storage pile. It should be noted that prior to transfer to storage, a small fraction of oversized wood will be screened and diverted through an enclosed electric hogger for size reduction.

Wood chips will be transferred to the wood pile using a telescoping rubber chute conveyor that is equipped with water sprays at the outlet. The drop distance to the pile will be minimized by maintaining the rubber chutes near the interface with the pile such that emissions from the transfer are negligible. Wood chips from the pile will be conveyed to the boiler using a subsurface underground reclaim chain that feeds the chips to the enclosed conveyors feeding the boiler. Given the "closed-system" being utilized for material delivery and handling, the modeling analysis will include those sources with clearly discernable emission points (stacks) and wind erosion from the open biomass storage pile.

The CFB boiler will be controlled to emission levels established in Volume I of this PSD permit application. At this time it is believed that the air pollution control systems to be employed will, at a minimum, consist of baghouse control for PM, selective non-catalytic reduction (SNCR) for NO_x abatement and sorbent injection for acid gas abatement.

Bottom ash and flayash will be handled in a manner that will not result in any emissions to the atmosphere and are discussed in detail in Volume I of this permit application. As such, those ash handling operations were not included in the modeling analysis.

3. PSD MODELING REQUIREMENTS

This section describes the modeling requirements, methodology and data resources that were used to complete the analyses for the proposed new biomass boiler project. Dispersion modeling was required due to the emissions of several pollutants exceeding their respective PSD significant emission rates (SER). The modeling was performed in order to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and PSD increment thresholds established under the PSD program.

3.1. PSD APPLICABILITY

Part C of Title I of the Clean Air Act, 42 U.S.C. §§7470-7492, is the statutory basis for the PSD program. U.S. EPA has codified PSD definitions, applicability, and requirements in 40 CFR Part 52.21. PSD is one component of the federal New Source Review (NSR) permitting program applicable in areas that are designated in attainment of the NAAQS. Dougherty County, where the existing facility is located, is currently designated as unclassifiable or in attainment for all criteria pollutants.[3]

P&GPP is an existing major stationary source under the PSD regulations and the proposed project will be a major modification with emissions increases of CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ exceeding their respective PSD significant emissions rates. Thus, the proposed project will trigger PSD permitting requirements and the associated modeling analyses.

3.2. PSD MODELING ANALYSES

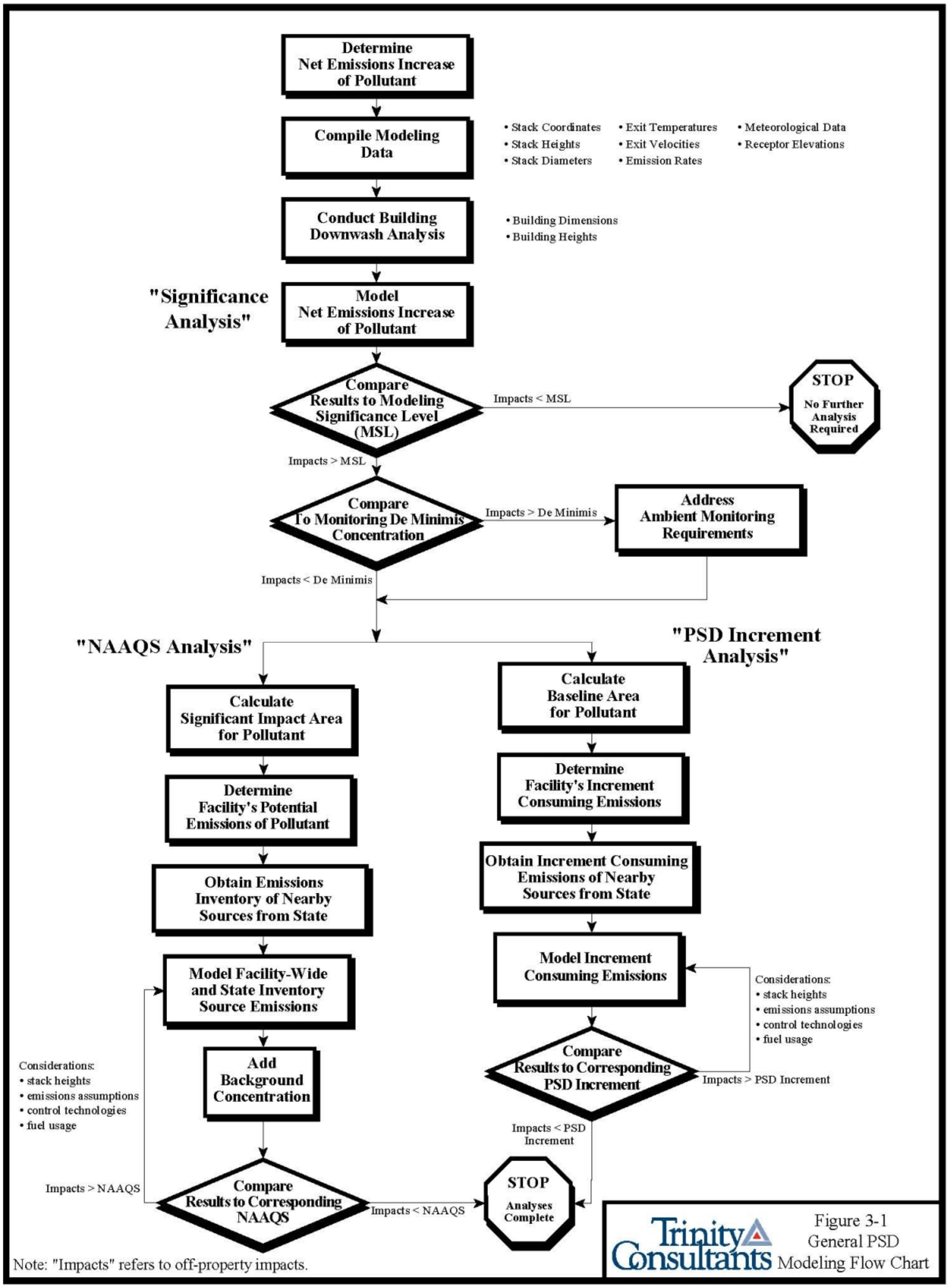
Trinity has prepared this modeling report to describe the modeling methodologies and data resources that were used to demonstrate that the proposed project at the Albany facility will not cause or contribute to exceedances of the NAAQS or PSD Increment, as applicable, for CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ and that no other adverse impacts at Class II areas are attributable to the Albany facility. The dispersion modeling analyses was conducted in accordance with the following guidance documents:

- U.S. EPA's *Guideline on Air Quality Models* 40 CFR 51, Appendix W (Revised, November 9, 2005)
- U.S. EPA's *AERMOD Implementation Guide* http://www.epa.gov/scram001/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf
- U.S. EPA's *New Source Review Workshop Manual* (Draft, October, 1990)
- U.S. EPA, Office of Air Quality Planning and Standards, Memorandum from Mr. Tyler Fox to Regional Air Division Directors. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard* (March 1, 2011)
- *Georgia Air Dispersion Modeling Guidance* (April 23, 2012)
- Georgia's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (June 21, 1998)
- *Georgia EPD PSD Permit Application Guidance Document* (September, 2012)

A summary of the tasks that are performed in a standard PSD air quality modeling analysis is presented in the flow chart provided as Figure 3-1.

[3] 40 CFR §81.311

Figure 3-1. General PSD Modeling Flowchart



Each of the three principle steps for completing the Class II Area modeling analysis, the Significance Analysis, the NAAQS Analysis, and the PSD Increment Analysis, are described below.

3.3. SIGNIFICANCE ANALYSIS

The Significance Analysis is conducted to determine whether the emissions associated with the proposed new construction could cause a significant impact upon the area surrounding the facility. “Significant” impacts are defined by ambient concentration thresholds commonly referred to as the SIL. P&GPP will model the “project” for significance. The “project” will consist of the new boiler and associated emission sources (e.g., biomass storage pile) combined with the shutdown of the existing P&GPP biomass boiler and storage pile. It should be noted that P&GPP is not is not intending to “net out” of PSD using the biomass boiler and associated source shutdowns, rather P&GPP utilized the NO_x emission decreases to reflect the net emissions change in air dispersion modeling in order to determine whether the modification to the site exceeds a relevant SIL. Table 3-1 lists the SIL, NAAQS, and PSD Increments for all relevant NSR regulated pollutants for this project.

Table 3-1. Significant Impact Levels, NAAQS, Class II PSD Increments, and Significant Monitoring Concentrations for Relevant NSR Regulated Pollutants

Pollutant	Averaging Period	PSD SIL ($\mu g/m^3$)	Primary and Secondary NAAQS ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)
CO	1-hour	2,000	40,000 (35 ppm)[1]	--	--
	8-hour	500	10,000 (9 ppm)[1]	--	575
SO_2	1-hour	7.8[2]	196 (75 ppb)[3]	--	--
	3-hour	25	1,300 (0.5 ppm)[1]	512	--
	24-hour[4]	5	365 (0.14 ppm)[1]	91	13
	Annual[4]	1	80 (0.03 ppm)[5]	20	--
NO_2	1-hour	7.5[6]	188 (100 ppb)[7]	--	--
	Annual	1	100 (0.053 ppm)[5]	25	14
PM_{10}	24-hour	5	150[8]	30	10
$PM_{2.5}$	24-hour	1.2[9]	35	9[10]	--
	Annual	0.3[9]	12	4[10]	--

1 Not to be exceeded more than once per year.

2 No 1-hr SO_2 SIL has been promulgated by U.S. EPA. The proposed SIL is based on the interim 1-hr SO_2 SIL of 3 ppb (7.8 $\mu g/m^3$ in U.S. EPA's recent 1-hr SO_2 NAAQS implementation guidance memo (U.S. EPA Office of Air Quality Planning and Standards Memorandum from Stephen D. Page, Director Office of Air Quality Planning and Standards to U.S. EPA Regional Air Division Directors entitled "Guidance Concerning the Implementing of the 1-hrSO_2 NAAQS for the Prevention of Significant Deterioration Program", August 23, 2010).

3 The 3-year average of the 99th percentile of the daily maximum 1-hr average.

4 Effective August 23, 2010 U.S. EPA revoked the 24-hr and Annual SO_2 NAAQS (75 FR 35520, *Primary National Ambient Air Quality Standards for Sulfur Dioxide*, June 22, 2010).

5 Annual arithmetic average.

6 No 1-hr NO_2 SIL has been promulgated by U.S. EPA. The proposed 1-hr NO_2 SIL is based interim 1-hr NO_2 SIL in U.S. EPA's recent 1-hr NO_2 NAAQS implementation guidance memo (U.S. EPA Office of Air Quality Planning and Standards Memorandum from Anna Marie Wood, Acting Director Air Quality Policy Division to U.S. EPA Regional Air Division Directors entitled "General Guidance for Implementing the 1-hr NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hr NO_2 Significant Impact Level", June 28, 2010).

7 The 3-year average of the 98th percentile of the daily maximum 1-hr average.

8 Not to be exceeded more than three times in 3 consecutive years.

9 U.S. EPA promulgated $PM_{2.5}$ SILs, Significant Monitoring Concentrations (SMCs), and PSD Increments on October 20, 2010 (75 FR 64864, *Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC); Final Rule*). The SILs and SMCs became effective on December 20, 2010 (i.e., 60 days after the rule was published in the Federal Register) but the U.S. Court of Appeals decision on January 22, 2013 vacated the SMC and remanded the SIL values back to U.S. EPA for reconsideration. The SIL values shown are still considered appropriate in cases where existing monitoring data shows sufficient space between the background and NAAQS.

10 The above mentioned court decision did not impact the promulgated increment thresholds for $PM_{2.5}$.

The highest modeled ambient concentration result for all given years of modeled data for each pollutant is then compared to the SIL level shown in Table 3-1 to determine if the ambient air impact is significant. However, in the case of 1-hour NO_2, 1-hour SO_2, and 24-hour $PM_{2.5}$ evaluations, EPA guidance states that the applicant should determine the maximum 1-hr NO_2 and SO_2 concentration and the maximum 24-hour $PM_{2.5}$ concentration at each receptor per year, then average those values on a receptor-specific basis over the 5 years of meteorological data prior to comparing with the appropriate SIL.[4] For a pollutant where impacts over all averaging periods are less than the applicable SIL when emissions from only the project are modeled, then further analyses (NAAQS and PSD Increment) are not required for that pollutant. If, however, modeled impacts are greater than the SIL for any averaging period, a full NAAQS and PSD Increment analysis would be required for that pollutant and averaging period to demonstrate that the project neither causes nor contributes to any exceedances. As shown is section 5, all modeled impacts are less than their respective SIL and as such, no NAAQS or PSD increment modeling was required.

3.4. AMBIENT MONITORING REQUIREMENTS

In addition to determining whether the applicant can forego further modeling analyses, the PSD Significance Analysis is also used to determine whether the applicant is exempt from ambient monitoring requirements. To determine whether pre-construction monitoring should be considered, the maximum impacts attributable to the proposed project are assessed against significant monitoring concentrations (SMC). The SMC for the applicable averaging periods for CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ are provided in 40 CFR §52.21(i)(5)(i) and are listed in Table 3-1. A pre-construction air quality analysis using continuous monitoring data may be required for pollutants subject to PSD review per 40 CFR §52.21(m). If either the predicted modeled impact from an emissions increase or the existing ambient concentration is less than the SMC, an applicant may be exempt from pre-construction ambient monitoring. P&GPP proposes to use existing ambient monitor data in lieu of pre-construction monitoring requirements. The January 2013 U.S. Court of Appeals decision vacated the $PM_{2.5}$ SMC thresholds, however, the presence of an ambient monitor less than 10 km from the facility, in the same industrial area as the Albany facility would certainly constitute representative data for the area.[5]

3.5. BACKGROUND CONCENTRATIONS

As previously described, the model impacts were all below the SIL and as such, no NAAQS modeling, including the ambient background levels was conducted. Table 3-2 presents the monitoring values provided by EPD which demonstrate that the project area is in attainment with all applicable NAAQS standards. The PM2.5 background value also demonstrates that the promulgated SIL still provides adequate protection of the NAAQS.

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[4] U.S. EPA, Office of Air Quality Planning and Standards, Memorandum from Mr. Tyler Fox to Regional Air Division Directors. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard* (March 1, 2011)

[5] http://www.cadc.uscourts.gov/internet/opinions.nsf/3964717CAD7BDA0085257AFB0055425F/$file/10-1413-1416378.pdf

Table 3-2. Ambient Monitoring Data for the Albany, GA Site

Pollutant	Background Monitor	Averaging Period	Background Concentration[1] (μg/m³)
$PM_{2.5}$	Turner Elementary Albany, GA	24-Hour Annual	27.8 11.7
PM_{10}	Regional Background	24-Hour	38.0
NO_2	Paulding County Yorkville, GA	1-Hour Annual	32.1 5.0
SO_2	Columbus Airport Columbus, GA	1-Hour 3-Hour 24-Hour Annual	27.5 33.5 13.7 3.4
CO	Paulding County Yorkville, GA	1-Hour 8-Hour	703.0 596.0

[1] Background Concentrations provided in email from Jim Boylan (EPD) to Jon Hill (Trinity) on May 17, 2013

3.6. NAAQS ANALYSIS

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of a pollutant in the atmosphere, which define the "levels of air quality that the EPA judges are necessary, with an adequate margin of safety, to protect the public health."[6] Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The primary NAAQS are shown in Table 3-1 for CO, NO_X, SO_2, PM_{10}, and $PM_{2.5}$. Since CO does not have a secondary NAAQS, Table 3-1 only shows secondary NAAQS for SO_2, NO_X, PM_{10}, and $PM_{2.5}$. In the NAAQS analysis, the potential emissions from all emission units at the facility combined with the maximum allowable emissions of sources included in the NAAQS inventory will be modeled together to compute the cumulative impact.

The objective of the NAAQS Analysis is to demonstrate through air quality modeling that emissions from the facility do not cause or contribute to an exceedance of the NAAQS at any ambient location at which the impact from the proposed project is greater than the SIL. The modeled cumulative impacts are added to appropriate background concentrations and assessed against the applicable NAAQS as listed in Table 3-1 to demonstrate compliance.

As shown in Section 5, modeled impacts were below all SILs and as such, P&GPP was not required conduct full impact NAAQS modeling demonstrations.

[6] 40 CFR §50.2(b).

3.7. PSD INCREMENT ANALYSIS

The PSD regulations were enacted primarily to "prevent significant deterioration" of air quality in areas of the country where the air quality was better than the NAAQS. To achieve this goal, the EPA established PSD Increments for NO_2, SO_2, PM_{10}, and $PM_{2.5}$.[7] The PSD Increments are divided into Class I, II, and III Increments. This modeling report is not intended to specifically address any Class I modeling procedures other than the increment screening procedure described later in this report. The Class II PSD Increments for NO_2, SO_2, PM_{10}, and $PM_{2.5}$ are listed in Table 3-1. No Class III air quality areas have been established, and no 1-hr NO_2 or 1-hr SO_2 PSD Increments have been promulgated; therefore, no PSD Increment Analysis would be required for these pollutants and averaging periods. As shown in Section 5, modeled impacts were below all SILs and as such, P&GPP was not required to conduct any additional PSD increment modeling demonstrations.

3.8. OZONE AMBIENT IMPACT ANALYSIS

Elevated ground-level ozone concentrations are the result of photochemical reactions among various chemical species. These reactions are more likely to occur under certain ambient conditions (e.g., high ground-level temperatures, light winds, and sunny conditions). The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_X and VOC emissions from both anthropogenic (e.g., mobile and stationary sources) and natural sources (e.g., vegetation). While the facility will not directly emit ozone, the facility will emit both NO_X and VOC at levels that are greater than the PSD SER for ozone precursors. While the project does trigger PSD review for ozone via exceeding the SER for both NO_X and VOC, P&GPP did not conduct any modeling for ozone for several reasons.[8] First, modeling of ozone using reactive plume models is rarely conducted on a source-by-source basis in the Southeast given the extensive effort required to properly estimate impacts. Second, the region is generally NO_2 limited with regard to ozone formation. Lastly, EPD and other Region 4 states have only very rarely assessed single source impacts on ozone in PSD air quality analyses.

As an alternative to modeling, P&GPP evaluated ambient ozone concentrations and the attainment status of the surrounding area. The nearest, most representative ozone monitor to the Albany facility is located in Leslie, GA, roughly 25 miles from the project site. This ozone monitor is in the same climatological pattern and topographic setting as the Albany site. Table 3-3 presents the most recent 3 years of ozone monitoring data from the Leslie-Union High School monitor. As shown, the area is in attainment with respect to the 8-hour ozone standard of 0.075 ppm. The monitor has also shown a decreasing trend in concentrations over the past 3 years.

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[7] The $PM_{2.5}$ PSD Increments became effective on October 20, 2011 (i.e., one year after the date of promulgation).

[8] Ozone is the regulated pollutant for PSD, and emissions of NO_X and VOC are the relevant pollutants whose emissions result in triggering PSD for ozone. Emissions of either NO_X or VOC exceeding the SER trigger PSD for ozone.

Table 3-3. Ambient Ozone Data from Leslie, GA Monitoring Site

Year	Monitor Concentration (ppm)
2010	0.069
2011	0.066
2012	0.065
3-year Average	**0.067**

Given the modeled insignificance for the proposed project, the limited influence of emissions from an individual facility on ozone formation, and the compliance margin present at the monitor, the proposed project would not jeopardize the NAAQS-compliance status of the area with respect to ozone.

3.9. CLASS I AREA ANALYSIS

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. The Federal Land Managers (FLM) have the authority to protect air quality related values (AQRVs), and to consider in consultation with the permitting authority whether a proposed major emitting facility will have an adverse impact on such values. AQRVs for which PSD modeling is typically conducted include visibility and deposition of sulfur and nitrogen.

Table 3-4 shows the potential emissions of visibility-affecting and acidic pollutants (VAP) from the proposed Albany facility. Table 3-5 details the Class I areas located at a distance of less than 300 km from the site.

Table 3-4. Preliminary Summary of Visibility-Affecting Pollutant Emissions

Pollutant	Facility-Wide Maximum 24-Hour Emission Increases[2] (lb/hr)	Flag 2010 Approach Annual Emissions[2] (Q - tpy)
NO_x	77.78	340.68
SO_2	20.76	90.93
PM_{10}[1]	26.96	118.08
H_2SO_4	-	-
Total	**125.50**	**549.69**

[1] The PM_{10} rate shown includes all filterable and condensable particulate matter.

[2] Flag2010 approach: $Q = [NO_x+SO_2+PM_{10}+H_2SO_4]*8760/2000$

Table 3-5. Summary of Class I Areas within 300 KM of the Albany Facility

Class I Area	Federal Land Manager	Distance (D in km)	Sum of Annualized Emissions (Q in tpy)	FLAG 2010 Q/D
Bradwell Bay (FL)	USFS	154	550	3.58
St. Marks (FL)	USFWS	157		3.51
Okefenokee (GA)	USFWS	168		3.27
Wolf Island (GA)	USFWS	265		2.07

When considering the ratio of emissions to Class I distance (i.e., Q/D) for this project, it is unlikely that any FLM will require a full AQRV analysis. Table 3-4 shows the preliminary Q/D for all Class I areas within 300 km from the proposed facility. The preliminary Q/D values are less than 4; these values are based on the maximum 24-hour emission rate from each affected source. The FLM's AQRV Work Group (FLAG) 2010 guidance states that a Q/D value of ten (10) or less indicates that AQRV analyses should not be required.[9] P&GPP will provide the final Q/D analysis and contact the FLMs in consultation with EPD to seek formal concurrence that a Class I area modeling analysis is not warranted for the proposed project.

In addition to the AQRV review, P&GPP was also required to assess Class I PSD Increment consumption at the affected Class I areas. P&GPP conducted this analysis by placing an arc of receptors in AERMOD at a distance of 50 km in the direction of each affected area. The results of that analysis are included in Section 5 of this report.

[9] U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. 2010. Federal land managers' air quality related values work group (FLAG): phase I report—revised (2010). Natural Resource Report NPS/NRPC/NRR—2010/232. National Park Service, Denver, Colorado.

4. CLASS II MODELING METHODOLOGY

This section of the modeling protocol describes the modeling procedures and data resources utilized in the Class II Area air quality modeling analyses. The techniques proposed for the air quality analysis are consistent with current EPA guidance as well as *Georgia EPD Guidelines.*

4.1. MODEL SELECTION

Dispersion models predict downwind pollutant concentrations by simulating the evolution of the pollutant plume over time and space given data inputs. These data inputs include the quantity of emissions and the initial conditions of the stack exhaust to the atmosphere. According to the *Guideline*, the extent to which a specific air quality model is suitable for the evaluation of source impacts depends on (1) the meteorological and topographical complexities of the area; (2) the level of detail and accuracy needed in the analysis; (3) the technical competence of those undertaking such simulation modeling; (4) the resources available; and (5) the accuracy of the database (i.e., emissions inventory, meteorological, and air quality data). Taking these factors under consideration, P&GPP used the AERMOD modeling system to represent all emissions sources at the facility. AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near-field (i.e., source receptor distances of less than 50 km), and is the recommended model in the *Guideline*.

The latest version (12345) of the AERMOD modeling system was used to estimate maximum ground-level concentrations in all Class II Area analyses conducted for this application. AERMOD is a refined, steady-state, multiple source, Gaussian dispersion model and was promulgated in December 2005 as the preferred model for use by industrial sources in this type of air quality analysis.[10] The AERMOD model has the Plume Rise Modeling Enhancements (PRIME) incorporated in the regulatory version, so the direction-specific building downwash dimensions used as inputs are determined by the Building Profile Input Program, PRIME version (BPIP PRIME), version 04274.[11] BPIP PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents, while incorporating the PRIME enhancements to improve prediction of ambient impacts in building cavities and wake regions.[12]

The AERMOD modeling system is composed of three modular components: AERMAP, the terrain preprocessor; AERMET, the meteorological preprocessor; and AERMOD, the control module and modeling processor. AERMAP is the terrain pre-processor that is used to import terrain elevations for selected model objects and to generate the receptor hill height scale data that are used by AERMOD to drive advanced terrain processing algorithms. National Elevation Dataset (NED) data available from the United States Geological Survey (USGS) were utilized to interpolate surveyed elevations onto user specified receptor grids and buildings and sources in the absence of more accurate site-specific (i.e., site surveys, GPS analyses, etc.) elevation data.

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[10] 40 CFR Part 51, Appendix W–*Guideline on Air Quality Models*, Appendix A.1– AMS/EPA Regulatory Model (AERMOD).

[11] Earth Tech, Inc., *Addendum to the ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model*, Concord, MA.

[12] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised),* Research Triangle Park, North Carolina, EPA 450/4-80-023R, June 1985.

AERMET generates a separate surface file and vertical profile file to pass meteorological observations and turbulence parameters to AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the meteorological site shown to be representative of the application site.

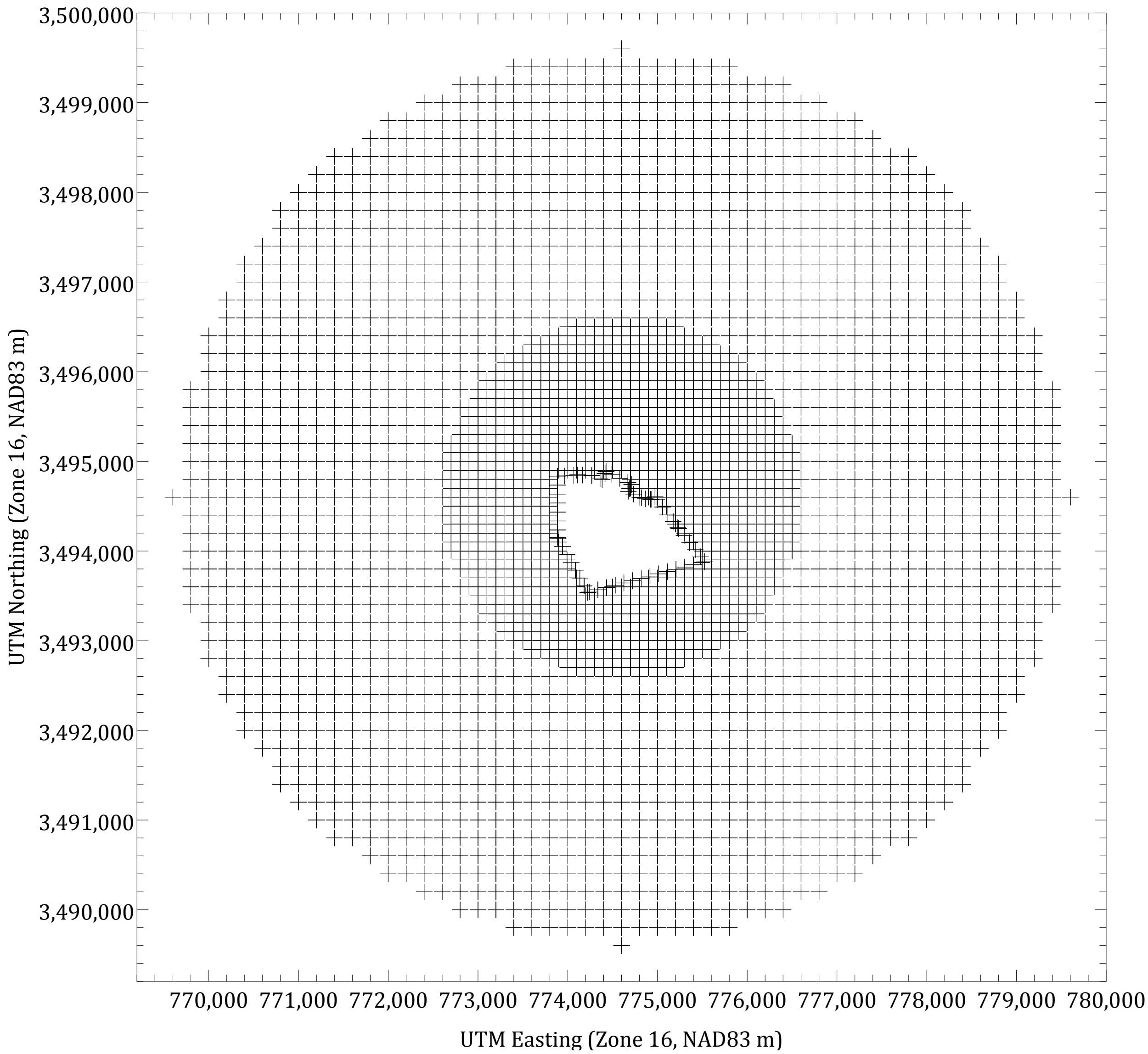
Trinity used the *BREEZE*®-AERMOD software, developed by Trinity Consultants, to assist in developing the model input files for AERMOD. This software program incorporates the most recent versions of AERMOD (dated 12345) and AERMAP (dated 11103) to estimate ambient impacts from the modeled sources in the Class II area. Using the procedures outlined in the *Guideline* as a reference, the AERMOD dispersion modeling for P&GPP was performed using all regulatory default options.

4.2. RECEPTOR GRID AND COORDINATE SYSTEM

Modeled concentrations were calculated at receptors placed along the facility fenceline and on a Cartesian receptor grid. Fenceline receptors were spaced no further than 100 meters (m) apart as specified in the Georgia EPD guidance document.[13] Beyond the fenceline, receptors were spaced 100 m apart in a Cartesian grid extending out to a distance of 2 km. A coarser, 200 m spaced grid, extending out to 5 km was also included to ensure that the maximum impacts were captured in the model and that they occurred within the 100 m grid. Figure 4-1 illustrates the modeled receptor grid.

[13] *Georgia EPD PSD Permit Application Guidance Document, September 2012*

Figure 4-1. Modeled Receptor Grid



The "ambient air" boundary for this permitting project is the entire area under controlled access at the Albany site. Controlled access is generally ensured by fencing, however, there are two small areas of the P&GPP facility that are not continuously fenced, at either end of a privately owned road that bisects the P&GPP property (which is situated in a rural area outside Albany). The fenceline for the facility was extended north of this road and will at that point essentially encircle the facility only allowing access into the facility through the roadway or other manned security checkpoints along the fenceline. Signage clearly indicating that the road is traversing private property will be posted at the entrance. This road is routinely observed by security and P&GPP employees to ensure that unauthorized egress into the facility does not occur. P&GPP's security detail has observed that one to two vehicles per hour may use this road as a pass through to access other industrial facilities east of the site, but current procedures ensure that no unauthorized vehicles/persons are entering the fenced area for any extended period of time (more than 1 hour).

The extent of the new fenceline (the portion north of the access road) is shown in Figure 4-2. The black line indicates the current fenceline and the red line shows the area where the fence will be extended.

Figure 4-2. Extended Fenceline at the P&GPP Albany Facility

Receptor elevations required by AERMOD were determined using the AERMAP terrain preprocessor (version 11103). AERMAP also calculates hill height parameters required by AERMOD. Terrain elevations from the USGS 1 arc second NED were used for AERMAP processing.

In all modeling analysis data files, the location of emission sources, structure, and receptors were represented in the UTM coordinate system. The Albany facility is located at approximately 774.6 km east and 3,494.7 km north in Zone 16 (NAD 83). The electronic input and output files used in the AERMAP analysis are included on the CD-ROM in Appendix D.

4.3. METEOROLOGICAL DATA

Site-specific dispersion models require a sequential hourly record of dispersion meteorology representative of the region within which the source is located. In the absence of site-specific measurements, the EPA guidelines recommend the use of readily available data from the closest and most representative National Weather Service (NWS) station. Regulatory air quality modeling using AERMOD requires five years of quality-assured meteorological data that includes hourly records of the following parameters:

- Wind speed
- Wind direction
- Air temperature
- Micrometeorological Parameters (e.g., friction velocity, Monin-Obukhov length)
- Mechanical mixing height
- Convective mixing height

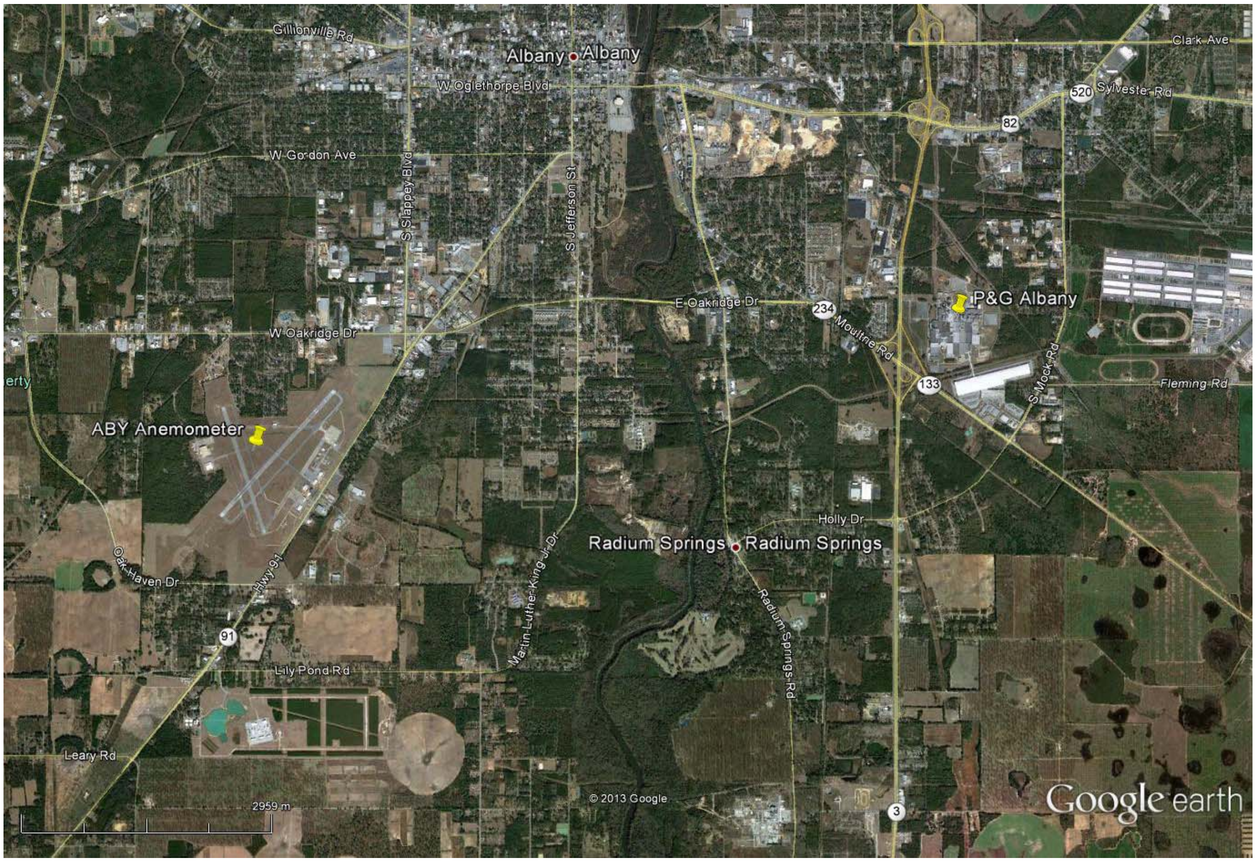
The first three of these parameters are directly measured by monitoring equipment located at typical surface observation stations. The friction velocity, Monin-Obukhov length, and mixing heights are derived from characteristic micrometeorological parameters and from observed and correlated values of cloud cover, solar insulation, time of day and year, and latitude of the surface observation station. Surface observation stations form a relatively dense network, are almost always found at airports, and are typically operated by the NWS. Upper air stations are fewer in number than surface observing points since the upper atmosphere is less sensitive to local effects caused by terrain or other land influences and is therefore less variable. The NWS operates virtually all available upper air measurement stations in the United States.

P&GPP downloaded 2007-2011 AERMOD-ready meteorological data files for the Albany, GA NWS surface station (KABY) and the Tallahassee, FL upper air site (KTLH) from EPD's website.[14] These files, including the 1-minute ASOS wind observations, have been processed by EPD using the latest version of AERMET (12345). As such, no AERMET processing was required to be performed by P&GPP. The height of the meteorological profile base (met station elevation above sea-level, used in computation of the potential temperature) of 58 m, was provided by EPD.

The meteorological data from the Albany airport is very representative of the conditions at the Albany facility. The meteorological and application sites are in very close proximity (~ 8 km), as shown in Figure 4-3.

[14] http://www.georgiaair.org/airpermit/html/sspp/modeling/aermetdata.htm.

Figure 4-3. Proximity of Albany Meteorological Site and P&GPP Facility



In addition to the short distance, the meteorological and application site are both located just outside the Albany, GA urban area, at the same base elevation, in very similar topographic settings. The 2007-2011 meteorological data years represent a very recent and complete period of record.

Comparing the surface characteristics between the meteorological and project sites, the Bowen ratios and albedos are very similar. The surface roughness at the project site is greater than that at the meteorological site on average, across all wind sectors. When considering the close proximity of the Albany meteorological site, located less than 10 km from the project site, and the cancelling effects on the concentrations from the lower surface roughness and higher wind speed at the airport, the applicant concludes that the meteorological data for Albany would provide the representative and conservative ambient concentrations for the project location.

4.4. REPRESENTATION OF EMISSION SOURCES

4.4.1. Source Types and Parameters

The AERMOD dispersion model allows for emission units to be represented as point, area, or volume sources. In addition to the clearly defined stack locations, the modeling also included storage piles represented as area sources. Table 4-1 presents the modeled sources and locations. Source B002 is the existing biomass boiler which will be shutdown as part of the project. The boiler was included as a negative source in the NO_x SIL modeling

Table 4-1. Modeled Source Locations

Model ID	Description	UTM-E (m)	UTM-N (m)	Elevation (m)
B004	New Biomass Boiler	774,671.0	3,494,643.6	57.4
B002	Shutdown Biomass Boiler	774,400.9	3,494,398.8	58.5
CLT1A	Cooling Tower Cell 1	774,566.0	3,494,634.3	56.4
CLT1B	Cooling Tower Cell 2	774,566.0	3,494,627.6	56.4
CLT1C	Cooling Tower Cell 3	774,565.9	3,494,621.0	56.3
CLT1D	Cooling Tower Cell 4	774,566.0	3,494,614.5	56.2
FLYASH	Ash Storage Silo Vent	774,459.5	3,494,695.6	57.8
DSISILO	Sorbent Silo Vent	774,509.7	3,494,715.7	57.5
NEWBMPIL	New Biomass Storage Pile	774,337.5	3,494,659.7	57.1

For point sources with unobstructed vertical releases (of which all project point sources will be), it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) in the modeling analyses. Table 4-2 presents the stack parameters for all modeled point sources.

Table 4-2. Modeled Stack Parameters

Source ID	Stack Height (m)	Stack Temperature (K)	Exit Velocity[1] (m/s)	Stack Diameter (m)
B004	65.00	435.93	18.35	3.66
B002	38.10	340.93	12.37	1.62
CLT1A	7.01	298.15	2.50	2.50
CLT1B	7.01	298.15	2.50	2.50
CLT1C	7.01	298.15	2.50	2.50
CLT1D	7.01	298.15	2.50	2.50
FLYASH	18.29	0.00	6.10	0.31
DSISILO	12.19	0.00	6.10	0.14

[1] Exit Velocity shown is for full load case. Actual modeled velocities differ for those pollutants where reduced load scenario yielded max impacts.

Per EPD guidance, the release height for the area source was set to a height of one-half of the normal pile height.[15] Wind erosion emissions can emanate from anywhere throughout the depth of the pile, as such,

[15] http://www.georgiaair.org/airpermit/downloads/sspp/modeling/quarryguideline_august2012.pdf

an initial vertical dimension (sigma-z) will be set to the average pile height/2.15, per U.S. EPA Guidance for estimating sigma-z for a surface-based source. Table 4-3 presents the source parameters for the new biomass storage pile.

Table 4-3. Modeled Area Source Parameters

Source ID	Release Height (m)	Pile Radius (m)	Initial Vert. Dimension (m)
NEWBMPIL	13.72	57.91	12.76

4.4.2. Modeled Emission Rates

Table 4-4 presents the emission rates for each of the modeled sources and pollutants. Multiple rates are shown for SO_2 and CO based on the results of the boiler load analysis. The existing boiler, B002, will be shutdown as part of the project. The NO_x emissions were used as a negative rate in the SIL modeling, whereas the other pollutant analyses did not include the shutdown emissions. Detailed emission calculations associated with the shutdown of B002 are included in Volume I, Appendix C of this application.

Table 4-4. Modeled Emission Rates

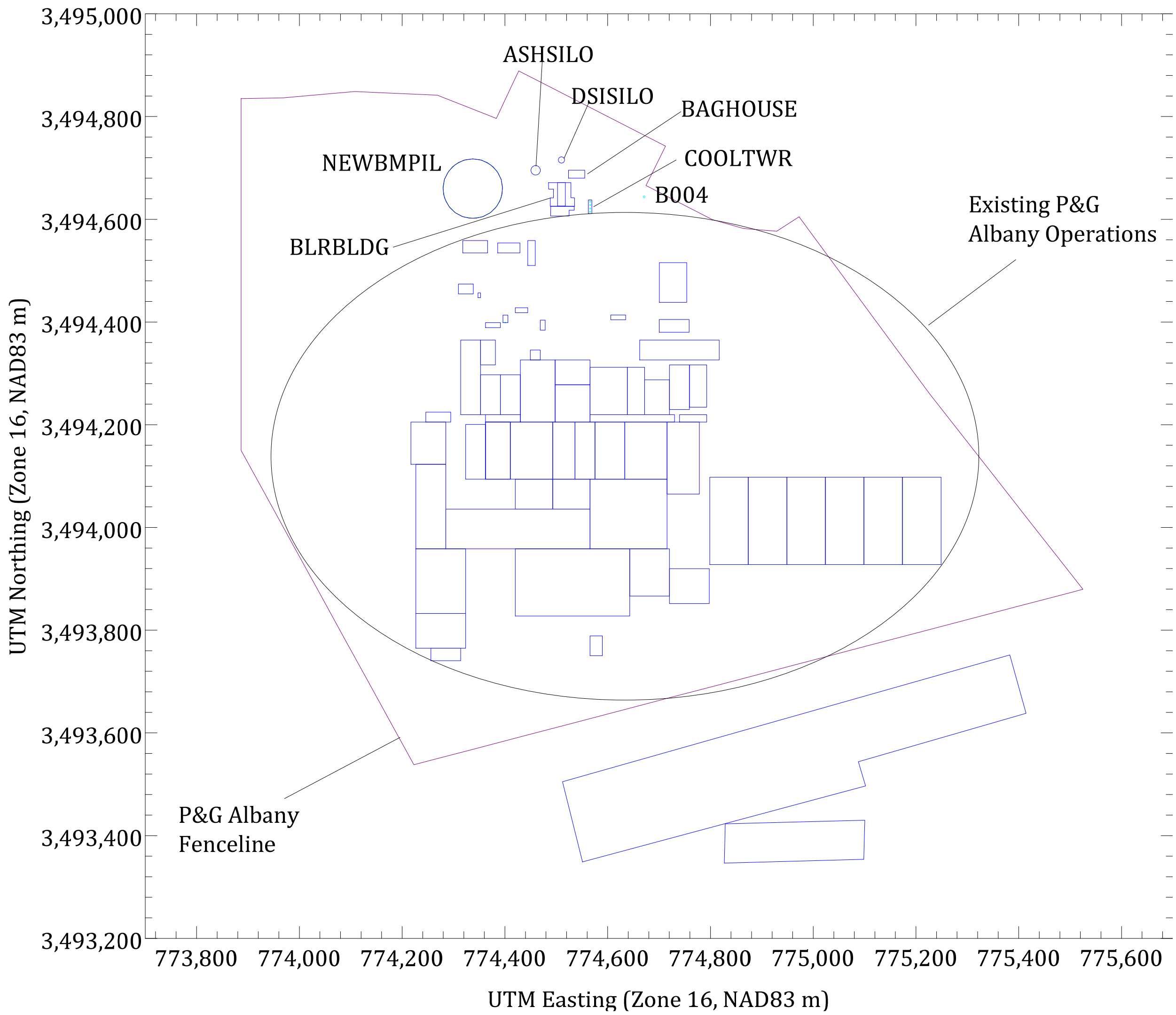
Model ID	Modeled Emission Rates						
	$PM_{2.5}$ (g/s)	PM_{10} (g/s)	NO_x (g/s)	SO_2 - 3-Hour (g/s)	SO_2 - LT (g/s)	CO - 1 Hour (g/s)	CO - 8 Hour (g/s)
B004	3.40E+00	3.40E+00	9.88E+00	1.31E+00	2.62E+00	1.31E+01	9.80E+00
B002[a]	-	-	-4.77E+00	-	-	-	-
CLT1A	3.35E-06	8.90E-04	-	-	-	-	-
CLT1B	3.35E-06	8.90E-04	-	-	-	-	-
CLT1C	3.35E-06	8.90E-04	-	-	-	-	-
CLT1D	3.35E-06	8.90E-04	-	-	-	-	-
FLYASH	5.40E-03	5.40E-03	-	-	-	-	-
DSISILO	1.08E-03	1.08E-03	-	-	-	-	-
NEWBMPIL[b]	5.77E-08	3.85E-07	-	-	-	-	-

[a] Emission rate for shutdown source based on the average of 2011-2012 actual emissions

[b] Area Source Emission Rates are expressed per unit area ($g/s/m^2$)

The site layout for the new boiler complex in relation to the existing Albany site is shown in Figure 4-4.

Figure 4-4. Site Layout for the Albany Facility



Appendix C contains a more detailed site layout diagram for the existing P&GPP Albany operations.

4.5. BUILDING DOWNWASH ANALYSIS

AERMOD incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithms. Direction specific building parameters required by AERMOD were calculated using the BPIP-PRIME preprocessor (version 04274).

4.5.1. GEP Stack Height Analysis

EPA has promulgated stack height regulations that restrict the use of stack heights in excess of "Good Engineering Practice" (GEP) in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations.

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure. The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis are determined using BPIP. In general, the lowest GEP stack height for any source is 65 meters by default.[16] None of the proposed emission units at the Albany facility will exceed GEP height and as such, building downwash effects were considered for all point source emissions.

The electronic input and output files used in the BPIP analysis are included on the CD-ROM in Appendix D.

4.6. NO_2 MODELING APPROACH

EPA's *Guideline on Air Quality Models (Guideline)*, in 40 CFR Part 51, Appendix W, recommends a tiered approach for modeling annual average NO_2 from point sources. The *Guideline* provides that:

a) *A tiered screening approach is recommended to obtain annual average estimates of NO_2 from point sources for New Source Review analysis, including PSD... For Tier 1 ... use an appropriate Gaussian model to estimate the maximum annual average concentration and assume a total conversion of NO to NO_2. If the concentration exceeds the NAAQS and/or PSD Increments for NO_2, proceed to the 2^{nd} level screen.*

b) *For Tier 2 (2^{nd} level) screening analysis, multiply the Tier 1 estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default).*

c) *For Tier 3 (3rd level) analyses, a detailed screening method may be selected on a case-by-case basis. For point source modeling, detailed screening techniques such as the Ozone Limiting Method may also be considered.*

d) P&GPP will begin by utilizing the Ambient Ratio Method (ARM), or Tier 2 approach, which has evolved from previous representations of the oxidation of nitric oxide (NO) by ambient ozone and other photochemical oxidants to form nitrogen dioxide (NO_2 – the regulated ambient pollutant). The ARM is an approach contained in Section 6.2.3 of EPA's the *Guideline*.

EPA issued a memo on March 1, 2011 providing additional clarifications regarding application of Appendix W modeling guidance for the 1-hr NO_2 NAAQS.[17] Per the memo, EPA recommends the use of 0.80 as a default ambient ratio for the 1-hour NO_2 standard under the Tier 2 approach. Based on this updated EPA guidance, P&GPP utilized 0.80 as the ambient NO_2:NO_X ratio. P&GPP also utilized a ratio of 0.80 in the annual analysis for consistency, which is more conservative than the 0.75 ratio recommended in the *Guideline*.

4.7. BOILER STARTUP

P&GPP intends to operate the boiler continuously at maximum capacity following startup. The only planned exceptions would be due to major maintenance events, which are predicted to occur no more

[16] 40 CFR §51.100(ii)

[17] U.S. EPA, Region 4, Memorandum from Mr. Tyler Fox to Regional Air Division Directors. Research Triangle Park, North Carolina. March 1, 2011.

than two times per year. Natural gas will be combusted at a heat input rate of approximately 200 MMBtu/hr (approximately 20% of maximum load) during startup until such time that the control devices are fully operational, at which point wood will be introduced into the boiler (approximately 6 hours into the cycle). As a result, emissions will remain well below permitted levels until full boiler heat input is achieved. Further, startups will occur very infrequently over the course of a year and will constitute very few hours or operation.

Once the boiler is fully operational, it is possible that some fluctuation in loads may occur due to steam demand and other external factors. Since the stack parameters may vary under reduced boiler loads, P&GPP conducted modeling analyses for 50%, 75% and 100% load cases in order to determine the worst-case scenario for each pollutant and averaging period. The modeling was conducted for the same meteorological period as the remainder of the analyses (2007-2011). Table 4-5 shows the modeled load scenarios and associated stack flows. The stack temperature remains constant across these scenarios.

Table 4-5. Stack Flow under Varying Load Conditions

Load Scenario	Stack Gas Flow (acfm)	Exit Velocity (m/s)	Emission Rate (g/s)
50% Load	204,300	9.18	0.50
75% Load	306,450	13.76	0.75
100% Load	408,600	18.35	1.00

The results of the boiler load analysis are presented in Section 5 of this report.

4.8. SECONDARY $PM_{2.5}$ FORMATION

The U.S. EPA's recent draft $PM_{2.5}$ modeling guidance, describes a variety of methods that can be utilized to account for secondary particulate formation.[18] However, those methods are very case-specific and as of yet, have not been formalized in a final guidance document. The U.S. EPA's 2010 memo, *Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS,* states that the SIL modeling analysis need only consider direct (primary) $PM_{2.5}$ emissions. Even when considering the potential for secondary formation, the modeled impacts for precursor pollutants NO_2 and SO_2 were below their respective SIL, and as such, any secondary particulate formation would be negligible in the case of this project.

[18] U.S. EPA, *Draft Guidance for $PM_{2.5}$ Permit Modeling*, March 4, 2013

This section presents the modeling results for all of the PSD analyses conducted for the proposed project. As shown all modeled impacts are below their respective SIL and as such, the project will not cause or contribute to any violation of a NAAQS or PSD Increment standard. The electronic input and output files used in the AERMOD analyses are included on the CD-ROM in Appendix D.

5.1. BOILER LOAD ANALYSIS RESULTS

Table 5-1 presents the results for each of the modeled load scenarios. As shown, the 100% load scenario is the worst-case for the 1-hour, 24-hour and annual averaging periods. The 3-hour averaging period yielded maximum impacts under the 50% load scenario and as such, that configuration was carried forward into the 3-hour SO_2 SIL modeling. The 8-hour averaging period yielded maximum impacts under the 75% load scenario and as such, that configuration was carried forward into the 8-hour CO SIL modeling.

Table 5-1. Normalized Load Analysis Results

Load Scenario	Averaging Period	Modeled Impact ($\mu g/m^3$)	Worst-Case Scenario? (Yes/No)
50% Load	1-Hour	1.108	No
	3-Hour	0.804	**Yes**
	8-Hour	0.620	No
	24-Hour	0.217	No
	Annual	0.028	No
75% Load	1-Hour	1.357	No
	3-Hour	0.770	No
	8-Hour	0.643	**Yes**
	24-Hour	0.244	No
	Annual	0.031	No
100% Load	1-Hour	1.562	**Yes**
	3-Hour	0.799	No
	8-Hour	0.639	No
	24-Hour	0.270	**Yes**
	Annual	0.034	**Yes**

5.2. CLASS II SIL MODELING RESULTS

Table 5-2 presents the modeled impacts for the Class II SIL analyses. As shown, the concentrations are below the Class II SIL for all triggered pollutants and averaging periods.

Table 5-2. Class II SIL Modeling Results

Pollutant	Averaging Period	UTM-E (m)	UTM-N (m)	Date/Time	Modeled Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceeds SIL? (Yes/No)
$PM_{2.5}$[1]	24-Hour	774,491.6	3,494,855.7	2007-2011	0.95	1.2	No
	Annual	774,491.6	3,494,855.7	2007-2011	0.14	0.3	No
PM_{10}	24-Hour	774,700.0	3,494,700.0	08112024	1.58	5.00	No
	Annual	774,491.6	3,494,855.7	2010	0.26	1.00	No
SO_2	1-Hour	776,300.0	3,494,100.0	2007-2011	2.81	7.8	No
	3-Hour	775,500.0	3,494,600.0	08030812	1.05	25	No
	24-Hour	775,500.0	3,494,800.0	07060324	0.71	5	No
	Annual	775,300.0	3,494,800.0	2011	0.09	1	No
NO_2	1-Hour	775,400.0	3,494,500.0	2007-2011	7.27	7.5	No
	Annual	776,800.0	3,494,400.0	2009	0.01	1	No
CO	1-Hour	776,000.0	3,494,700.0	08011310	20.41	2,000	No
	8-Hour	775,600.0	3,494,400.0	07041516	8.41	500	No

[1] The U.S. Court of Appeals decision on January 22, 2013 remanded the SIL values back to U.S. EPA for reconsideration. The SIL values shown are still considered appropriate in cases where existing monitoring data shows sufficient space between the background and NAAQS which is the case for the nearest ambient monitor in Albany, GA.

5.3. CLASS I SIL RESULTS

Table 5-3 presents the impacts for the Class I SIL screening analysis. As previously discussed, the modeling was conducted for arcs of receptors in the direction of affected Class I areas, at a distance of 50km in AERMOD. The modeled concentrations were all below their respective Class I SIL and as such, Class I increment was shown to be protected in a very conservative manner. The impacts presented consist of the maximum concentration in any individual year; no averaging across the receptors and/or years was performed.

Table 5-3. Class I SIL Results

Pollutant	Averaging Period	UTM-E (m)	UTM-N (m)	Date/Time	Modeled Concentration (μg/m^3)	Class I SIL (μg/m^3)	Exceeds SIL? (Yes/No)
$PM_{2.5}$	24-Hour	813,964.8	3,463,896.3	11011224	0.068	0.07	No
	Annual	813,964.8	3,463,896.3	2010	0.004	0.06	No
PM_{10}	24-Hour	813,964.8	3,463,896.3	11011224	0.068	0.32	No
	Annual	813,964.8	3,463,896.3	2010	0.004	0.16	No
SO_2	3-Hour	811,721.5	3,461,222.9	07011912	0.099	1.00	No
	24-Hour	813,964.8	3,463,896.3	11011224	0.052	0.20	No
	Annual	813,964.8	3,463,896.3	2010	0.003	0.10	No
NO_2	Annual	813,964.8	3,463,896.3	2010	0.011	0.10	No

This section describes the additional impacts analyses that were performed in support of the PSD permit application. The required additional impacts evaluations include a growth analysis, a soil and vegetation analysis, and a plume visibility analysis.

6.1. GROWTH ANALYSIS

The proposed project includes the replacement of an existing biomass boiler at the site. There will not be any significant increase in production at the facility or any other associated change that will require additional workers or resources in the area, with the exception of temporary contract workers onsite during construction.

6.2. SOIL AND VEGETATION ANALYSIS

To assess soil and vegetation impacts, the modeling results from were assessed against the secondary NAAQS standards and EPA's soils/vegetation screening guidelines. Representative background concentrations were added to the modeled impacts and then compared to values from the EPA document, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (EPA 450/2-81-078), 1981. Table 6-1 presents the results of the analysis.

Table 6-1. Soil and Vegetation Modeling Results

Pollutant	Averaging Period	Total Concentration[1] (µg/m³)	Vegetation Sensitivity[2] Sensitive (µg/m³)	Intermediate (µg/m³)	Resistant (µg/m³)	Secondary NAAQS (µg/m³)	Minimum Threshold (µg/m³)	Exceeds Threshold? (Yes/No)
CO[3]	1-Week	604.41	1,800,000	-	18,000,000	-	1,800,000	No
NO_2[4]	4-Hour	39.4	3,760	6,400	16,920	-	3,760	No
	8-Hour	39.4	3,760	7,520	15,040	-	3,760	No
	1-Month	39.4	-	564	-	-	564	No
	Annual	5.0	-	94	-	100	94	No
PM_{10}[5]	24-Hour	39.6	-	-	-	150	150	No
	Annual	38.3	-	-	-	50	50	No
$PM_{2.5}$	24-Hour	28.8	-	-	-	35	35	No
	Annual	11.8	-	-	-	15	15	No

1 Results from the Significance Analysis with background added.
2 Screening Concentrations based on Table 3.1 *A Screening Procedure for Impact of Air Pollution Sources on Plants, Soil and Animals, USEPA, Dec. 12, 1980.*
3 1-Week Average is conservatively estimated by the 8-hour SIL modeling results.
4 4-Hour, 8-Hour and Monthly Averages are conservatively estimated by the 1-hour SIL modeling results
5 Annual results are based on the SIL analysis only and conservatively include the 24-hour background.

6.3. PLUME VISIBILITY ANALYSIS

As discussed in the previous section, all modeled impacts were below their respective SIL and as such, no plume visibility analysis was required.

7. TOXIC AIR POLLUTANT MODELING

The evaluation of ambient impacts of toxic pollutant emissions will be submitted under separate cover in accordance to the Georgia's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (June 21, 1998), which was issued by the EPD Air Protection Branch pursuant to the provisions of GRAQC §391-3-1-.02(2)(a)3(ii).

According to the *Guideline*, dispersion modeling should be completed for potentially toxic pollutants having quantifiable emission increases. The *Guideline* infers that a pollutant is identified as a toxic pollutant if any of the following toxicity-determined values have been established for that pollutant. The *Guideline* specifies that the resources used to develop the long-term and short-term acceptable ambient concentrations (AAC) of toxic air pollutants should be referenced in the priority schedule shown following.

- EPA Integrated Risk Information System (IRIS) reference concentration (RfC) or unit risk;
- Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL);
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV);
- National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL); and
- Lethal Dose – 50% (LD50) Standards.

P&GPP will be submitting a detailed toxics modeling report under separate cover. The modeling will be conducted in AERMOD, using the existing setup, methodology and data resources discussed in this document. The toxics report will also detail the process for identifying all TAP included in the analysis.

APPENDIX A – APPROVED MODELING PROTOCOL

Georgia Department of Natural Resources

Environmental Protection Division • Air Protection Branch
4244 International Parkway • Suite 120 • Atlanta • Georgia 30354
404/363-7000 • Fax: 404/363-7100
Judson H. Turner, Director

May 17, 2013
Mr. Jonathan Hill
Trinity Consultants
Tel: 919-462-9693
jhill@trinityconsultants.com

Subject: **Review of PSD Air Dispersion Modeling Protocol**
Procter and Gamble Paper Products Plant, Albany, Dougherty County, Georgia

Dear Mr. Hill:

We have reviewed the air quality dispersion modeling protocol dated on May, 3, 2013, which addressed the proposed modeled conformance of a new biomass boiler application of the Procter and Gamble Paper Product Plant (P&G) in Albany, Dougherty County, Georgia, with applicable air quality standards. We find that it generally conforms to the procedures and guidelines we use to assess Prevention of Significant Deterioration (PSD) and air toxic impact modeling projects. However, we do have the following comments:

1. Class I Increment Analysis: EPA/EPD retain purview over Class I Increment consumption, so both agencies should get a copy of any project correspondence you may have with any FLM. If the project is not required to assess Air Quality Related Values at any Class I area, you may use the Class I area Significance screening involving AERMOD. The receptors are about 1-km evenly spaced on the arc of a distance of 50km from the P&G towards the Class I areas. If screening modeling indicates the project will exceed applicable Significance levels at any Class I area, such screening modeling must be repeated using CALPUFF, for which a protocol should be prepared. Such Increment Significance screening modeling should not employ building downwash, nor should it include the assessment of fugitive emissions.

2. Air Toxics: Air toxics modeling should be conducted in accordance with the GA EPD Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions, 1998. Air toxics modeling may use either AERMOD, version 12345, with downwash, or ISCST3, version 02035 without downwash. Air toxics model receptors should extend to at least 2 km outward from the project site, and there must be sufficient receptors to resolve the Maximum Ground-Level Concentration (MGLC). If any receptors are located at terrain elevations in excess of the lowest stack height in the model, AERMOD must be used to assess impacts at those receptors. The SCREEN3 model should not be used without specific justification, due to the number of sources and the range of source emission characteristics at the site. The air toxics modeling must be conducted to involve all on-site sources of the same pollutant. Georgia EPD no longer requires derivation of Acceptable Ambient Concentrations (AACs) from NIOSH LD_{50} threshold concentration data.

   The EPD Permitting Program advises the applicant to refer the Attachment 9 at the following link for the list of the air toxics contaminants required to be assessed:
   http://www.georgiaair.org/airpermit/html/permits/psd/dockets/greenenergy/facilitydocs.htm
   Please review the AACs values at the applicable averaging periods to ensure they have not been updated with more recent values.

3. Class II criteria pollutant dispersion modeling should use the latest version 12345 of AERMOD. Standards (referred to here as pre-2008) discussed in the draft 1990 New Source Review Workshop Manual should be evaluated using that draft guidance. Other, more recent standards (post-2007, i.e., 1-hr NO_2, 1-hr SO_2, and, annual and 24-hr PM2.5 should be evaluated using the guidance memos listed at the EPA web: http://www.epa.gov/ttn/scram/guidance_clarificationmemos.htm. The emissions modeled in the significant analysis are suggested to reflect the net emission changes for this application, e.g., the difference between the future potential emission and the base actual emission for the new boiler.

   As provided in the AERMOD User's Guide, any DEFAULT option may be employed in the modeling. Use of Non-Default options (i.e., Tier 3 analysis for 1-hour NO2 NAAQS compliance) is subject to individual approval, preferably from EPA. Please note that the Class II NAAQS for annual PM2.5 is 12 $\mu g/m^3$, not 15 $\mu g/m^3$ listed in Table 1 of the protocol, and the significant monitoring concentration of 24-hour PM2.5 was vacated.

   The Draft Guidance for PM2.5 Permit Modeling (March 04, 2013) suggests that secondary PM2.5 formation should be evaluated if the emissions of the PM2.5 precursors (NOx and/or SO2) are greater than the significant emission rate (SER) of 40 tons per year. However, since this guidance is still draft and open to public comments, we recommend following the EPA Guidance memo "Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS" (March 23, 2010) which states that the modeling for comparison with the PM2.5 Significant Impact Level (SIL) should only include the primary or direct PM2.5 emissions from the facility. If you choose to quantify the PM2.5 impacts from secondary formation, GA EPD recommends the use of conservative offset ratio of 5:1 for SO2 to PM2.5 and 10:1 for NOx to PM2.5.

4. Offsite Inventory, NAAQS and Increment Issues: If the project is significant for any averaging period of any criteria pollutants with their emissions greater than their respective SERs, a refined air quality analysis (both NAAQS and Increment if applicable) will be required. Please document all sources of information used to compile any offsite inventories compiled for the project. Please carefully distinguish between NOx and NO_2, and provide your definition of NO_2, in the air quality modeling report. Please follow the generic inventory development and receptor placement guidance in the Georgia EPD PSD Permit Application Guidance Document (September, 2012). The minor source baseline date (MSBD) for the annual NO2 is May 5, 1988, statewide, and this application will trigger the MSBD of PM2.5 for Dougherty County.

   The Permitting Program will also review and, if acceptable, approve your on- and off-site emissions inventories including the stack parameters and emission rates. Rather than use average, or typical, emissions data, we would prefer that you identify missing inventory information and allow EPD the opportunity to provide the information to you or confirm that it is missing and approve your specific missing data handling technique.

5. Ambient Concentrations: The project 1- and 8-hr background ambient concentrations of CO are 703 and 596 $\mu g/m^3$, respectively (Paulding Co. monitor, 2012). The annual NO_2 background ambient concentration is 5.0 $\mu g/m^3$, as a 5-yr average of the annual max, Paulding Co. monitor, 2012. The 1-hr NO_2 background ambient concentration (2010-2012) is 32.1 $\mu g/m^3$, based on the March 1, 2011 EPA memo indicating the 98th %-ile of the daily maximum 1-hr concentration over a 3-yr period (Paulding Co. monitor, 2008-2010). The 3-yr average of the daily 98th percentile concentrations of PM2.5 at the Turner Elementary School, Albany (2010-2012) is 27.8 $\mu g/m^3$, the annual average PM2.5 concentration at that

site is (2010-2012) is 11.7 μg/m^3. The 24-hr PM10 regional background ambient concentrations is 38 μg/m^3. The 1-hr, 3-hr, 24-hr, and annual average SO_2 ambient concentrations are 27.5 μg/m^3, 33.5 μg/m^3, 13.7 μg/m^3, and 3.4 μg/m^3 (Columbus Airport, 2008-2012 for 3-hr, 24-hr, and annual, and 2010-2012 for 1-hr averaging period).

6. General Modeling considerations: Please use the applicable procedure cited in the current version of the AERMOD Implementation Guide to address any horizontal emissions and/or rain-capped stacks in the models. Please use BPIP PRIME (version 04274) to assess building downwash dimensions and GEP stack heights. Stacks of heights equal to, or in excess of GEP height should be modeled using the GEP height. Please use AERMAP (version 11103) to assess all model receptor elevations above sea level with the USGS NED database (all model coordinates, including building corners, should be referenced using the NAD83 datum). Please assess source base elevations using AERMAP, if appropriate, otherwise, use plant grade elevations. For all criteria pollutant modeling, please use AERMOD (version 12345). AERMOD meteorological data set (for the period 2007-2011) can be obtained at (http://www.georgiaair.org/airpermit/html/sspp/modeling/aermetdata.htm). The data was compiled from Albany, GA NWS surface station and Tallahassess, FL upper air observations. The applicant is expected to provide the meteorological data representative analysis.

7. Model Receptors: For the pre-2008 air quality standards, the extent of the receptors modeled should be 100m at the fence-line and out to 2km from the primary project emission source, 250m from 2 km to 5 km, and 500m beyond 5km to 10 km, or the extent of the largest SIA. All design concentrations and all concentrations equal to or greater than 90% of the design concentrations should be resolved at the 100-m or less grid resolution. The receptors in the significant impact analysis should have at least one 100-m spaced receptor located farther from the project than the farthest receptor showing a concentration greater than or equal to the respective SIL. For the post-2007 air quality standards, please follow the EPA guidance memo referred in Section 3. In addition to the facility fence line, receptors also need to be placed with at least 100m spacing on the roads across the facility with public access.

   GA EPD approves the privately owned road (discussed at p.15 of the protocol, May 3, 2013) as non-ambient air. We request that a facility plot showing the existing and anticipated fenceline for this project be submitted in the permit application. Any areas outside the proposed facility fenceline will be considered ambient air.

8. Preconstruction Monitoring Evaluation: the applicant should submit the Monitoring *De Minimis* concentration comparison and Ozone Impact Analysis to determine whether the proposed facility is required to conduct preconstruction monitoring for the applicable criteria pollutants and/or ozone. Please check the Georgia EPD PSD Permit Application Guidance Document (September 2012) for details.

9. Additional Impacts: All additional impacts studies will be limited to no more than the largest significant impact distance from the project site. Additional impacts studies do not include National Monuments, unless specifically requested by a Federal Land Manager. Please check the Georgia EPD PSD Permit Application Guidance Document (September, 2012) for details.

10. Worst-Case Scenario Determination: The applicant is expected to conduct modeling analysis for the alternative operating scenarios (e.g., startup, 25%, 50%, 75%, and 100% load cases) to determine the worse-case scenario, and use that scenario to conduct the air impact

modeling assessment for this project. Please submit such alternative operating scenarios analysis to GA EPD for review prior to the full analysis.

Please refer to GA EPD PSD Guidance Document Appendix A and B for completeness of your application. If EPA issues any guidance, or models which you believe may affect the modeling of this project subsequent to this protocol approval letter, please contact EPD to verify the ability to incorporate such guidance or models in the assessments of this application. If you have specific questions on issues that develop after you receive this protocol approval letter, please contact EPD too. This protocol approval is valid for 6 months from today, unless otherwise stipulated. If you have any question, please contact Yan Huang at Yan.Huang@dnr.state.ga.us or 404-363-7072.

Sincerely,

James Boylan

James Boylan, Ph.D.
Manager, Data & Modeling Unit
Georgia Department of Natural Resources
Environmental Protection Division - Air Protection Branch

Attachments: Generally Applicable Modeling References

Generally Applicable Modeling References

1990, Draft New Source Review Workshop Manual.

1995, SCREEN3 Model User's Guide, EPA-454/B-95-004, model version 96043.

1995, USER'S GUIDE FOR THE INDUSTRIAL SOURCE COMPLEX (ISC3) DISPERSION MODELS, VOLUME I - USER INSTRUCTIONS, VOLUME II – DESCRIPTION OF MODEL ALGORITHMS. EPA-454/B-95-003a & b, September, 1995.

1998, Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions, Revised June 21, 1998, Georgia Environmental Protection Division (GA EPD), http://www.georgiaair.org/airpermit/downloads/otherforms/infodocs/toxguide.pdf

2002, USER INSTRUCTIONS FOR THE REVISED ISCST3 MODEL (dated 02035), Feb 4, 2002.

2004, USER'S GUIDE FOR THE AERMOD TERRAIN PREPROCESSOR (AERMAP, version 04300), Under Revision, EPA-454/B-03-003, October 2004.

2004, USER'S GUIDE FOR THE AMS/EPA REGULATORY MODEL – AERMOD, Under Revision, (EPA-454/B-03-001, September 2004) (version 04300)

2004, USER'S GUIDE TO THE BUILDING PROFILE INPUT PROGRAM (BPIP), updated to include the PRIME algorithm (BPIPPRM, version 04274, EPA-454/R-93-038, (Revised April 21, 2004), (Electronic copy only). See also bpiprz1.txt, changes to the BPIPPrm utility.

2005, 40 CFR 51, Appendix W, Guideline on Air Quality Models

2009, AERMOD IMPLEMENTATION GUIDE, Last Revised: March 19, 2009

2010, Guidance Concerning the Implementation of the 1-hour NO2 NAAQS for the Prevention of Significant Deterioration Program, EPA Memorandum from Stephen D. Page, Director, OAQPS, to EPA Regional Air Division Directors, June 29, 2010.

2010, Guidance Concerning the Implementation of the 1-hour SO2 NAAQS for the Prevention of Significant Deterioration Program, EPA Memorandum from Stephen D. Page, Director, OAQPS, to EPA Regional Air Division Directors, August 23, 2010.

2010, Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS, EPA Memorandum from Stephen D. Page, Director, OAQPS, to EPA Regional Modeling Contacts and selected OAQPS Personnel, March 23, 2010.

2010, Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM2.5)--Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC), Final rule, Federal Register vol. 75, No. 202, pgs. 64863-64907, October 20, 2010.

2011, ADDENDUM, March, 2011, to USER'S GUIDE FOR THE AERMOD TERRAIN PREPROCESSOR (AERMAP version 11103), EPA-454/B-03-003, October 2004.

2011, ADDENDUM, USER'S GUIDE FOR THE AMS/EPA REGULATORY MODEL – AERMOD, (EPA-454/B-03-001, September 2004), March 2011 (version 11103)

2011, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, EPA Memorandum from Stephen D. Page, Director, OAQPS, to EPA Regional Air Division Directors, March 1, 2011.

2012, Georgia EPD PSD Permit Application Guidance Document, GA EPD, http://www.georgiaair.org/airpermit/html/sspp/psd_guidance_document.htm

2012, Interim Dispersion Modeling Guidance, Last Revised April 23, 2012, GA EPD (georgiaair.org), http://www.georgiaair.org/airpermit/downloads/sspp/modeling/airdispmodelguidance_april2012.pdf

2013, Draft Guidance for PM2.5 Permit Modeling, http://www.epa.gov/ttn/scram/guidance/guide/Draft_Guidance_for_PM25_Permit_Modeling.pdf

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May 3, 2013

Ms. Yan Huang
Georgia Environmental Protection Division
Air Protection Branch
4244 International Parkway, Suite 120
Atlanta, GA 30354

RE: Procter and Gamble – Albany, GA Facility
PSD Modeling Protocol
Application for New Biomass Boiler

Dear Ms. Huang:

Sterling Energy Assets (Sterling) plans to construct a woody biomass cogeneration facility at Procter and Gamble's (P&G's) Paper Products Plant located in Albany, Georgia. Once constructed, P&G will assume contractual responsibility for operation of the cogeneration facility. The cogeneration plant will be considered part of the existing P&G site under the Prevention of Significant Deterioration (PSD) and Title V programs by virtue of being on contiguous property, under common control, and assuming the first two digits of the SIC code for P&G's manufacturing operations by virtue of its support to P&G operations.

The P&G Albany facility is an existing PSD Major Source, currently operating under Title V permit number 2676-095-0071-V-02-1. Approximately 50 percent of the steam to be produced by Sterling's approximate 1,000 MMBtu/hr circulating fluid bed (CFB) boiler will be used to generate power for the electrical grid. The remainder of the steam will be supplied to the adjacent P&G operations to replace steam currently produced by an existing permitted 216 MMBtu/hr heat input biomass boiler (ID No. B002), which will be decommissioned following the shakedown period associated with the cogeneration plant. The residual steam to be used for process heating will be used to replace process heat generated from natural gas combustion in existing permitting duct burners as a backup. There will be no physical changes to the production equipment that can increase production capacity or utilization and the use of steam for heating will only maintain existing production capacity. P&G will continue to maintain the capacity to use the natural gas duct burners and backup natural gas boiler for process heating during periods of downtime of the cogeneration boiler.

The proposed project will require a Prevention of Significant Deterioration (PSD) permit. The existing P&G facility is a major stationary source with respect to Title V and emissions increases from the proposed project will exceed the respective PSD significant emission rates thresholds for carbon monoxide (CO), sulfur dioxide (SO_2), oxides of nitrogen (NO_X), particulate matter with an aerodynamic diameter of 10 microns (PM_{10}), PM with an aerodynamic diameter of 2.5 microns ($PM_{2.5}$), and greenhouse gases (CO_2e).[1] P&G is planning on submittal of a PSD construction permit application to the Georgia Environmental Protection Division (EPD) approximately in late May 2013.

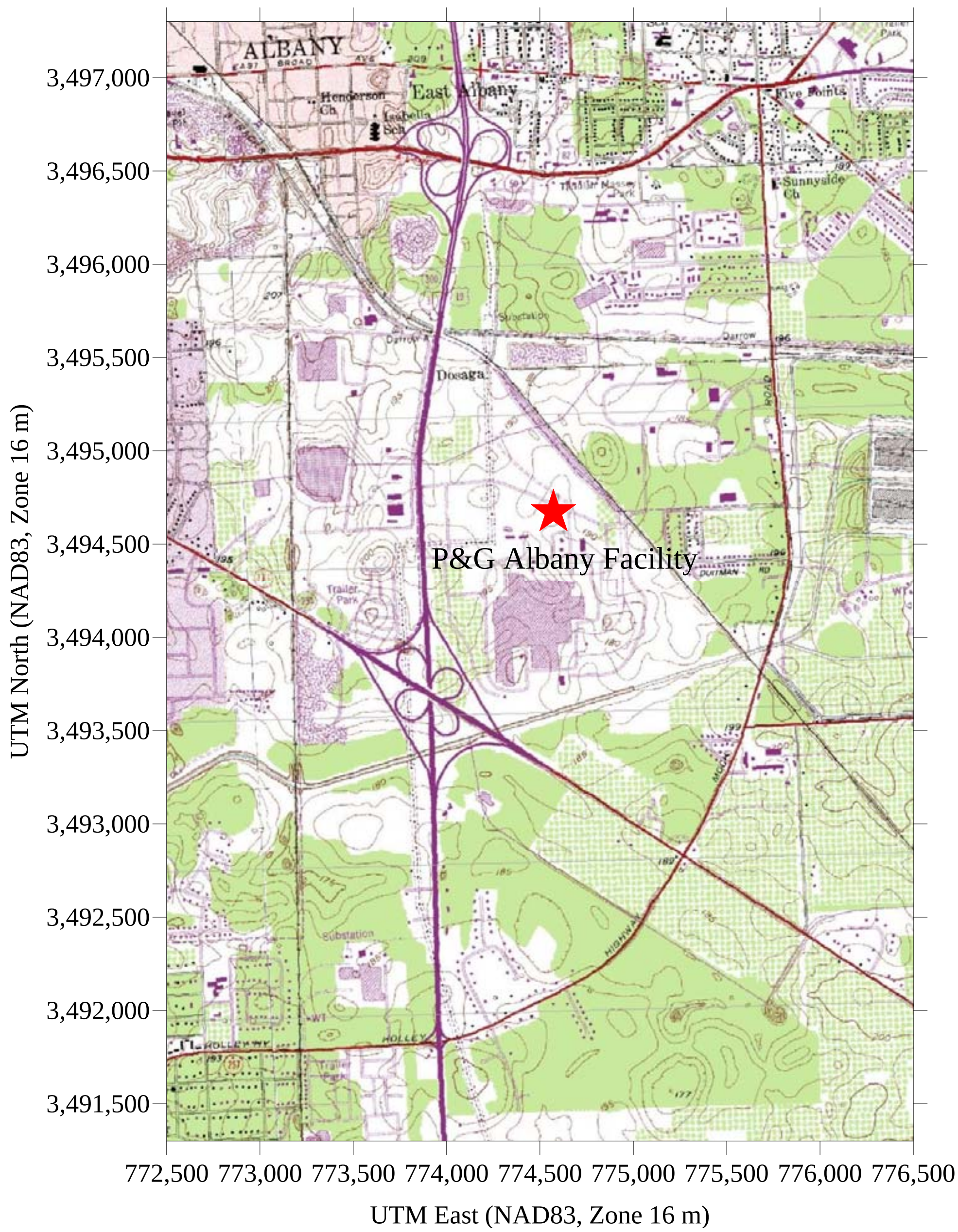
[1] CO_2e is carbon dioxide equivalents calculated as the sum of the six well-mixed GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) with applicable global warming potentials per 40 CFR 98 applied.

Following EPD policy, a dispersion modeling protocol has been prepared. On behalf of P&G, Trinity Consultants (Trinity) has prepared this dispersion modeling protocol describing proposed methodologies and data resources for the project. This protocol includes a brief description of the proposed project, an overview of the required PSD and State modeling analyses, and a description of the methodology proposed to be used in the modeling analyses. The analyses discussed below include evaluations of National Ambient Air Quality Standards (NAAQS), PSD Increment, additional impacts analyses for visibility and non-air quality impacts, as well as the ambient impact assessment of toxic air pollutant (TAP) emissions.

PROJECT DESCRIPTION

Figure 1 provides a map of the area surrounding the Albany property. The approximate central Universal Transverse Mercator (UTM) coordinates of the facility are 774.6 kilometers (km) east and 3,494.7 km north in Zone 16 (NAD 83).

FIGURE 1. FACILITY LOCATION



Pre-chipped wood will be delivered to the site via dump trucks utilizing P&G's private paved road. Per EPD guidance, paved roadways do not need to be included in the modeling analysis.[2] Raw material trucks will transfer chips at a truck tipping station into a hopper that is enclosed on the sides to effectively shield the dumping operation from the effects of wind. To eliminate emissions from the dumping process itself, a water spray system will be employed over the top of the chip receiving bin. From the bin, wood chips will be transferred using a series of enclosed conveyors to the storage pile. It should be noted that prior to

[2] Georgia EPD, *Georgia EPD PSD Permit Application Guidance Document*, September 2012

transfer to storage, a small fraction of oversized wood will be screened and diverted through an enclosed electric hogger for size reduction.

Wood chips will be transferred to the wood pile using a telescoping rubber chute conveyor that is equipped with water sprays at the outlet. The drop distance to the pile will be minimized by maintaining the rubber chutes near the interface with the pile such that emissions from the transfer are negligible. Wood chips from the pile will be conveyed to the boiler using a subsurface underground reclaim chain that feeds the chips to the enclosed conveyors feeding the boiler. Given the "closed-system" being utilized for material delivery and handling, the modeling analysis will include those sources with clearly discernable emission points (stacks) and wind erosion from the open biomass storage pile.

The CFB boiler will be controlled to emission levels established in the PSD permit application. At this time it is believed that the air pollution control systems to be employed will, at a minimum, consist of baghouse control for PM, selective non-catalytic reduction (SNCR) for NO_x abatement and sorbent injection for acid gas abatement.

Bottom ash and flayash will be handled in a manner that will not result in any emissions to the atmosphere and will be discussed in detail in the permit application submitted for this project. As such, those ash handling operations will not be included in the modeling analysis.

PSD APPLICABILITY

Part C of Title I of the Clean Air Act, 42 U.S.C. §§7470-7492, is the statutory basis for the PSD program. U.S. EPA has codified PSD definitions, applicability, and requirements in 40 CFR Part 52.21. PSD is one component of the federal New Source Review (NSR) permitting program applicable in areas that are designated in attainment of the NAAQS. Dougherty County, where the existing facility is located, is currently designated as unclassifiable or in attainment for all criteria pollutants.[3]

P&G is an existing major stationary source under the PSD regulations and the proposed project will be a major modification with emissions increases of CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ exceeding their respective PSD significant emissions rates. Thus, the proposed project will trigger PSD permitting requirements and the associated modeling analyses.

PSD MODELING ANALYSES

Trinity has prepared this modeling protocol to describe the modeling methodologies and data resources that will be used to demonstrate that the proposed project at the Albany facility does not cause or contribute to exceedances of the NAAQS or PSD Increment, as applicable, for CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ and that no other adverse impacts at Class II areas are attributable to the Albany facility. The dispersion modeling analyses will be conducted in accordance with the following guidance documents:

- U.S. EPA's *Guideline on Air Quality Models* 40 CFR 51, Appendix W (Revised, November 9, 2005)
- U.S. EPA's *AERMOD Implementation Guide* http://www.epa.gov/scram001/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf
- U.S. EPA's *New Source Review Workshop Manual* (Draft, October, 1990)

[3] 40 CFR §81.311

- U.S. EPA, Office of Air Quality Planning and Standards, Memorandum from Mr. Tyler Fox to Regional Air Division Directors. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard* (March 1, 2011)
- *Georgia Air Dispersion Modeling Guidance* (April 23, 2012)
- Georgia's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (June 21, 1998)
- *Georgia EPD PSD Permit Application Guidance Document* (September, 2012)

A summary of the tasks that are performed in a standard PSD air quality modeling analysis is presented in the flow chart provided as Figure 2.

Each of the three principle steps for completing the Class II Area modeling analysis, the Significance Analysis, the NAAQS Analysis, and the PSD Increment Analysis, are described below.

Significance Analysis

The Significance Analysis is conducted to determine whether the emissions associated with the proposed new construction could cause a significant impact upon the area surrounding the facility. "Significant" impacts are defined by ambient concentration thresholds commonly referred to as the SIL. P&G will model the "project" for significance. The "project" will consist of the new boiler and associated emission sources (e.g., biomass storage pile) combined with the shutdown of the existing P&G biomass boiler and storage pile. As discussed earlier, several natural gas-fired sources at the site will be idled while the cogeneration boiler is being used. However, P&G is conservatively excluding the natural gas heating source decreases from the analysis to maintain full flexibility for their use during periods of cogeneration plant downtime. It should be noted that P&G is not is not intending to "net out" of PSD using the biomass boiler and associated source shutdowns, rather P&G is proposed to utilize those emission decreases to reflect the net emissions change in air dispersion modeling to determine whether the modification to the site exceeds a relevant SIL. Table 1 lists the SIL, NAAQS, and PSD Increments for all relevant NSR regulated pollutants for this project.

Figure 2. General PSD Modeling Flowchart

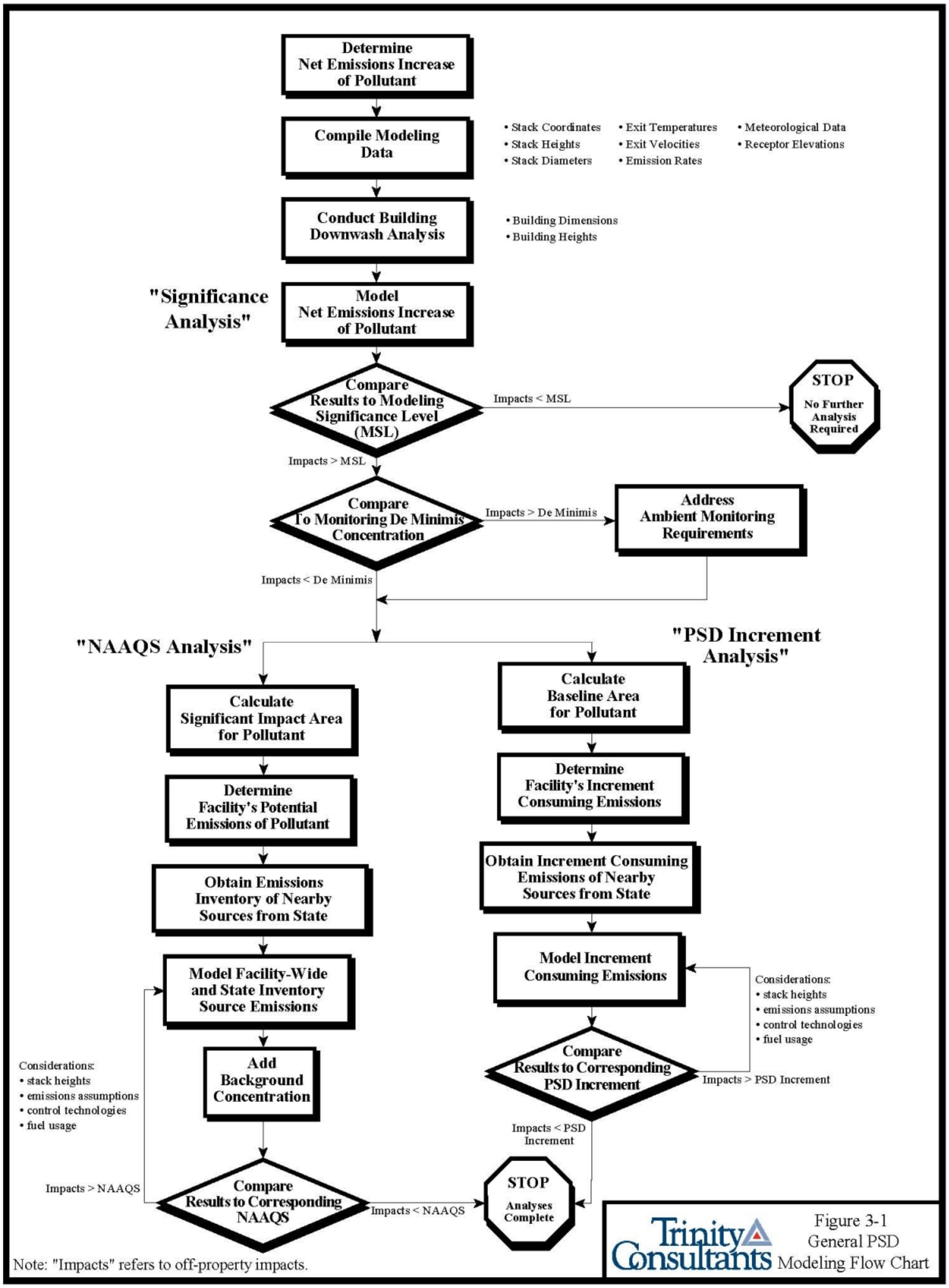


Table 1. Significant Impact Levels, NAAQS, Class II PSD Increments, and Significant Monitoring Concentrations for Relevant NSR Regulated Pollutants

llutant	Averaging Period	PSD SIL $\mu g/m^3$)	Primary and Secondary NAAQS ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)
	1-hour	2,000	40,000 (35 ppm)[1]	--	--
	8-hour	500	10,000 (9 ppm)[1]	--	575
2	1-hour	7.8[2]	196 (75 ppb)[3]	--	--
	3-hour	25	1,300 (0.5 ppm)[1]	512	--
	24-hour[4]	5	365 (0.14 ppm)[1]	91	13
	Annual[4]	1	80 (0.03 ppm)[5]	20	--
X	1-hour	7.5[6]	188 (100 ppb)[7]	--	--
	Annual	1	100 (0.053 ppm)[5]	25	14
10	24-hour	5	150[8]	30	10
2.5	24-hour	1.2[9]	35	9[10]	4
	Annual	0.3[9]	15	4[10]	--

1 Not to be exceeded more than once per year.

2 No 1-hr SO_2 SIL has been promulgated by U.S. EPA. The proposed SIL is based on the interim 1-hr SO_2 SIL of 3 ppb (7.8 $\mu g/m^3$ in U.S. EPA's recent 1-hr SO_2 NAAQS implementation guidance memo (U.S. EPA Office of Air Quality Planning and Standards Memorandum from Stephen D. Page, Director Office of Air Quality Planning and Standards to U.S. EPA Regional Air Division Directors entitled "Guidance Concerning the Implementing of the 1-hrSO_2 NAAQS for the Prevention of Significant Deterioration Program", August 23, 2010).

3 The 3-year average of the 99th percentile of the daily maximum 1-hr average.

4 Effective August 23, 2010 U.S. EPA revoked the 24-hr and Annual SO_2 NAAQS (75 FR 35520, *Primary National Ambient Air Quality Standards for Sulfur Dioxide*, June 22, 2010).

5 Annual arithmetic average.

6 No 1-hr NO_2 SIL has been promulgated by U.S. EPA. The proposed 1-hr NO_2 SIL is based interim 1-hr NO_2 SIL in U.S. EPA's recent 1-hr NO_2 NAAQS implementation guidance memo (U.S. EPA Office of Air Quality Planning and Standards Memorandum from Anna Marie Wood, Acting Director Air Quality Policy Division to U.S. EPA Regional Air Division Directors entitled "General Guidance for Implementing the 1-hr NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hr NO_2 Significant Impact Level", June 28, 2010).

7 The 3-year average of the 98th percentile of the daily maximum 1-hr average.

8 Not to be exceeded more than three times in 3 consecutive years.

9 U.S. EPA promulgated $PM_{2.5}$ SILs, Significant Monitoring Concentrations (SMCs), and PSD Increments on October 20, 2010 (75 FR 64864, *Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC); Final Rule*). The SILs and SMCs became effective on December 20, 2010 (i.e., 60 days after the rule was published in the Federal Register) but the U.S. Court of Appeals decision on January 22, 2013 vacated the SMC and remanded the SIL values back to U.S. EPA for reconsideration. The SIL values shown are still considered appropriate in cases where existing monitoring data shows sufficient space between the background and NAAQS.

10 The above mentioned court decision did not impact the promulgated increment thresholds for $PM_{2.5}$.

The highest modeled ambient concentration result for all give years of modeled data for each pollutant is then compared to the SIL level shown in Table 2 to determine if the ambient air impact is significant. However, in the case of 1-hour NO_2, 1-hour SO_2, and 24-hour $PM_{2.5}$ evaluations, EPA guidance states that the applicant should determine the maximum 1-hr NO_2 and SO_2 concentration and the maximum 24-hour $PM_{2.5}$ concentration at each receptor per year, then average those values on a receptor-specific basis over the 5 years of meteorological data prior to comparing with the appropriate SIL. For a pollutant where impacts over all averaging periods are less than the applicable SIL when emissions from only the project are modeled, then further analyses (NAAQS and PSD Increment) are not required for that pollutant. If, however, modeled impacts are greater than the SIL for any averaging period, a full NAAQS and PSD Increment analysis is required for that pollutant and averaging period to demonstrate that the project neither causes nor contributes to any exceedances. The geographic extent to which significant impacts occur is used to define the significantly impacted receptors within which compliance with the NAAQS and PSD Increments must be demonstrated.

Ambient Monitoring Requirements

In addition to determining whether the applicant can forego further modeling analyses, the PSD Significance Analysis is also used to determine whether the applicant is exempt from ambient monitoring requirements. To determine whether pre-construction monitoring should be considered, the maximum impacts attributable to the proposed project are assessed against significant monitoring concentrations (SMC). The SMC for the applicable averaging periods for CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ are provided in 40 CFR §52.21(i)(5)(i) and are listed in Table 1. A pre-construction air quality analysis using continuous monitoring data may be required for pollutants subject to PSD review per 40 CFR §52.21(m). If either the predicted modeled impact from an emissions increase or the existing ambient concentration is less than the SMC, an applicant may be exempt from pre-construction ambient monitoring. If the Significance Analysis shows ambient impacts exceeding the SMC, P&G proposes to use existing ambient monitor data in lieu of pre-construction monitoring requirements. The January 2013 U.S. Court of Appeals decision vacated the $PM_{2.5}$ SMC thresholds, however, the presence of an ambient monitor less than 10 km from the facility, in the same industrial area as the Albany facility would certainly constitute representative data for the area.[4]

Background Concentrations

P&G anticipates modeling all triggered pollutants below their respective SIL and as such, no full impact NAAQS analyses will be required. Should preliminary model impacts exceed the SIL, Trinity will work with the Georgia EPD in establishment of the proper background values to be used in the NAAQS modeling analyses.

Significant Impact Area and NAAQS/PSD Increment Inventories

As previously discussed, P&G is not anticipating model impacts in excess of the SIL and as such, no regional inventory development will be required. In the event that a modeling SIL is exceeded, Trinity will work with EPD to develop appropriate regional source inventories. In general, for any off-site impact calculated in the PSD Significance Analysis that is greater than the SIL for a given pollutant, the radius of the significant impact area (SIA) is determined. The SIA encompasses a circle centered on the facility with

[4] http://www.cadc.uscourts.gov/internet/opinions.nsf/3964717CAD7BDA0085257AFB0055425F/$file/10-1413-1416378.pdf

a radius extending out to either 1) the farthest location where the emissions increase of a pollutant from the project causes a significant ambient impact (i.e., modeled impact above the SIL on a high first high basis) , or (2) a distance of 50 km, whichever is less. All sources of the affected pollutant(s) within 50 km of the facility are assumed to potentially contribute to ground-level concentrations within the SIA and are evaluated for possible inclusion in the NAAQS and PSD Increment analyses.

To develop the PM_{10}/$PM_{2.5}$, and annual NO_2 inventories, all sources within a distance of 50 km of the edge of a SIA are assumed to potentially contribute to ground-level concentrations within the SIA and will be evaluated for possible inclusion in the NAAQS and PSD Increment analyses. The specifics of inventory development are described below.

The PM_{10}/$PM_{2.5}$ regional source inventory will be compiled using the procedures provided by Georgia EPD.[5] The annual NO_2 inventory will also developed in a similar manner.

For these facilities within 50 km of the SIA, the "20D" screening process will be applied to exclude insignificant sources.[6] In this process, regional sources whose potential emissions (tpy) were less than 20 times the distance to the edge of the SIA (in km) were eliminated since they can be presumed to have negligible contributions to receptors in the SIA. Regional sources located within close proximity to each other (2 km, per Georgia EPD guidance) will be evaluated cumulatively in the 20D analysis to determine whether the combined "source" was still appropriate to exclude.

If model impacts of either NO_2 or SO_2 exceed their respective SIL, development of the inventory for the 1-hr NAAQS modeling will be discussed with EPD given recent U.S. EPA guidance indicating that traditional PSD methods are overly conservative for the new 1-hour NAAQS.[7]

If required, a separate emissions inventory for evaluation of PSD increment will likely not be developed for the project. It will be assumed that a "worst-case" scenario for evaluation of increment would involve use of the developed NAAQS inventory, and compare results to the increment standards.

NAAQS Analysis

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of a pollutant in the atmosphere, which define the "levels of air quality that the EPA judges are necessary, with an adequate margin of safety, to protect the public health."[8] Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The primary NAAQS are shown in Table 2 for CO, NO_X, SO_2, PM_{10}, and $PM_{2.5}$. Since CO does not have a secondary NAAQS, Table 2 only shows secondary NAAQS for SO_2, NO_X, PM_{10}, and $PM_{2.5}$. In the NAAQS analysis, the potential emissions from all emission units at the facility combined with the maximum allowable

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[5] Georgia EPD, *Georgia EPD PSD Permit Application Guidance Document*, September 2012

[6] Federal Register, Volume 57, No. 45, March 6, 1992, p. 8079.

[7] U.S. EPA, Office of Air Quality Planning and Standards, Memorandum from Mr. Tyler Fox to Regional Air Division Directors. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard* (March 1, 2011)

[8] 40 CFR §50.2(b).

emissions of sources included in the NAAQS inventory will be modeled together to compute the cumulative impact.

The objective of the NAAQS Analysis is to demonstrate through air quality modeling that emissions from the facility do not cause or contribute to an exceedance of the NAAQS at any ambient location at which the impact from the proposed project is greater than the SIL. The modeled cumulative impacts are added to appropriate background concentrations and assessed against the applicable NAAQS as listed in Table 2 to demonstrate compliance.

The following modeling results for each PSD triggering pollutant and averaging period will be used to determine the design concentration in the NAAQS Analysis:

- Maximum-modeled annual arithmetic mean impact from the full five years of meteorological data to demonstrate compliance with the annual SO_2 and NO_2 standards,
- Modeled five-year average of the 98th percentile (H8H) modeled 24-hr concentration and annual average on a receptor-by-receptor basis, to demonstrate compliance with the 24-hr and annual $PM_{2.5}$ standards, respectively.
- Highest-second-high (H2H) modeled concentration over the five year meteorological period is compared to the NAAQS to demonstrate compliance with the 1-hr and 8-hr CO and the 3-hr and 24-hr SO_2 standards,
- The 24-hr PM_{10} standard is not to be exceeded more than 3 times in any consecutive 3 year period, meaning that generally the highest sixth-high (H6H) modeled concentration over the full five years of meteorological data is compared against the NAAQS. However, the highest second-high concentrations may be used as a more conservative approach to avoid the long model run times associated with running all five meteorological years within one model.
- Maximum five-year average of the 98th percentile (H8H) modeled daily maximum1-hr concentration, on a receptor-by-receptor basis, to demonstrate compliance with the 1-hr NO_2 standard.
- Maximum five-year average of the 99th percentile (H4H) modeled daily maximum 1-hr concentration, on a receptor-by-receptor basis, to demonstrate compliance with the 1-hr SO_2 standard.

As previously discussed, modeled impacts are anticipated to remain below all SILs and as such, P&G does not anticipate full impact NAAQS modeling demonstrations. If required, and the above approach indicates modeled NAAQS violations, P&G will use the culpability tools in AERMOD to demonstrate that the proposed project will not contribute (impacts below the SIL) for any of those violations.

PSD Increment Analysis

The PSD regulations were enacted primarily to “prevent significant deterioration” of air quality in areas of the country where the air quality was better than the NAAQS. To achieve this goal, the EPA established PSD Increments for NO_2, SO_2, PM_{10}, and $PM_{2.5}$.[9] The PSD Increments are divided into Class I, II, and III Increments. This modeling protocol is not intended to specifically address any Class I modeling procedures other than the increment screening procedure described later in this protocol. The Class II PSD Increments for NO_2, SO_2, PM_{10}, and $PM_{2.5}$ are listed in Table 2. No Class III air quality areas have been established, and no 1-hr NO_2 or 1-hr SO_2 PSD Increments have been promulgated; therefore, no PSD

[9] The $PM_{2.5}$ PSD Increments became effective on October 20, 2011 (i.e., one year after the date of promulgation).

Increment Analysis is required for these pollutants and averaging periods. Since all short-term PSD Increments are not to be exceeded more than once per year, the highest-second-high modeled impacts for SO_2, PM_{10}, and $PM_{2.5}$ from among the five meteorological years modeled will be compared against the short-term increments. The highest annual average SO_2, $PM_{2.5}$, and NO_x impacts will be compared against the annual increments.

The sum of the PSD Increment concentration and a baseline concentration defines a "reduced" ambient standard, either lower than or equal to the NAAQS that must be met in a designated attainment area. Significant deterioration is said to have occurred if the *change* in emissions occurring since a baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions "consume" more than the available PSD Increment).

The determination of whether an emissions change at a given source consumes or expands increment is based on the source definition (major or minor for PSD) and the time the change occurs in relation to baseline dates. The major source baseline date for SO_2 and PM_{10} is January 6, 1975, the major source baseline date for NO_X is February 8, 1988 and the major source baseline date for $PM_{2.5}$ is October, 20, 2010. Increases or decreases in actual emissions at major sources after the major source baseline date as a result of construction of a new source, a physical or operational change (i.e., modification) to an existing source, or shutdown of an existing source affect the available increment, and therefore, must be included in an increment analysis. Actual emission changes at minor sources only affect increment after the minor source baseline date (MSBD), which is set at the date the first complete PSD permit application is submitted in a county. For SO_2 and PM_{10}, the MSBD for Dougherty County is established as of July 6, 1979. P&G requests that EPD provide the MSBDs for NO_x and $PM_{2.5}$ (if established) for Dougherty County, in the event that an increment analysis is required for this project.[10]

To demonstrate compliance with the Class II Increments, potential emissions from the facility along with a conservative estimate of the "increment-affecting emissions" from PSD inventory sources will be modeled and assessed cumulatively against the PSD Increments. EPD guidance on development of regional inventory data will be followed.

As previously discussed, modeled impacts are anticipated to remain below all SILs and as such, P&G does not anticipate full impact increment modeling demonstrations. If required, and the above approach indicates modeled increment violations, P&G will use the culpability tools in AERMOD to demonstrate that the proposed project will not contribute (impacts below the SIL) for any of those violations.

Ozone Ambient Impact Analysis

Elevated ground-level ozone concentrations are the result of photochemical reactions among various chemical species. These reactions are more likely to occur under certain ambient conditions (e.g., high ground-level temperatures, light winds, and sunny conditions). The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_X and VOC emissions from both anthropogenic (e.g., mobile and stationary sources) and natural sources (e.g., vegetation). While the facility will not directly emit ozone, the facility will emit both NO_X and VOC at levels that are greater than the PSD SER for ozone precursors. While the project does trigger PSD review for ozone via exceeding the

[10] http://www.georgiaair.org/airpermit/downloads/sspp/psdresources/minor_source_baseline_dates.pdf

SER for both NO_X and VOC, P&G proposes that no modeling be required for ozone for several reasons.[11] First, modeling of ozone using reactive plume models is rarely conducted on a source-by-source basis in the Southeast given the extensive effort required to properly estimate impacts. Second, the region is generally NO_2 limited with regard to ozone formation. Lastly, EPD and other Region 4 states have only very rarely assessed single source impacts on ozone in PSD air quality analyses. As an alternative to modeling, P&G will complete a qualitative assessment of the impact of the proposed Albany facility on ambient ozone concentrations and the attainment status of the surrounding area, utilizing procedures as provided in EPD guidance.

Class I Area Analysis

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. The Class I areas within 300 km are summarized in Table 4. The Federal Land Managers (FLM) have the authority to protect air quality related values (AQRVs), and to consider in consultation with the permitting authority whether a proposed major emitting facility will have an adverse impact on such values. AQRVs for which PSD modeling is typically conducted include visibility and deposition of sulfur and nitrogen.

Table 3 shows the preliminary potential emissions of visibility-affecting and acidic pollutants (VAP) from the proposed Albany facility. Table 4 details the Class I areas located at a distance of less than 300 km from the Albany facility.

Table 3. Preliminary Summary of Visibility-Affecting Pollutant Emissions

Pollutant	Facility-Wide Maximum 24-Hour Emission Increases[2] (lb/hr)	Flag 2010 Approach Annual Emissions[2] (Q - tpy)
NO_x	62.10	272.00
SO_2	20.70	90.67
PM_{10}[1]	9.30	40.73
H_2SO_4	-	-
Total	**92.10**	**403.40**

[1] The PM_{10} rate shown includes all filterable and condensable particulate matter.

[2] Flag2010 approach: $Q = [NO_x+SO_2+PM_{10}+H_2SO_4]*8760/2000$

[11] Ozone is the regulated pollutant for PSD, and emissions of NO_X and VOC are the relevant pollutants whose emissions result in triggering PSD for ozone. Emissions of either NO_X or VOC exceeding the SER trigger PSD for ozone.

Table 4. Summary of Class I Areas within 300 KM of the Albany Facility

Class I Area	Distance (D in km)	Sum of Annualized Emissions (Q in tpy)	FLAG 2010 Q/D
St. Marks (FL)	157	403	2.58
Okefenokee (GA)	168		2.40
Wolf Island (GA)	265		1.52

When considering the ratio of emissions to Class I distance (e.g., Q/D) for this project, it is unlikely that any FLM will require a full AQRV analysis. Table 4 shows the preliminary Q/D for all Class I areas within 300 km from the proposed facility. The preliminary Q/D values are less than 3; these values are based on the maximum 24-hour emission rate from each affected source. The FLM's AQRV Work Group (FLAG) 2010 guidance states that a Q/D value of ten or less indicates that AQRV analyses should not be required.[12] P&G will provide the final Q/D analysis and contact the FLMs in consultation with EPD to seek formal concurrence that a Class I area modeling analysis is not warranted for the proposed project.

In addition to the AQRV analysis, P&G is also required to assess Class I PSD Increment consumption at the affected Class I areas. P&G anticipates this evaluation will be done by placing an arc of receptors in AERMOD at a distance of 50 km in the direction of each affected area, to demonstrate impacts below the Class I SIL. This Class I increment "screening" procedure was originally proposed by EPA Region 4 and has been used in several recent PSD applications to fulfill the Class I increment modeling requirement. Should the screening impacts exceed the Class I SIL values, Trinity will work with EPD to determine alternative Class I increment evaluations.

CLASS II MODELING METHODOLOGY

This section of the modeling protocol describes the modeling procedures and data resources utilized in the Class II Area air quality modeling analyses. The techniques proposed for the air quality analysis are consistent with current EPA guidance as well as *Georgia EPD Guidelines.*

Model Selection

Dispersion models predict downwind pollutant concentrations by simulating the evolution of the pollutant plume over time and space given data inputs. These data inputs include the quantity of emissions and the initial conditions of the stack exhaust to the atmosphere. According to the *Guideline*, the extent to which a specific air quality model is suitable for the evaluation of source impacts depends on (1) the meteorological and topographical complexities of the area; (2) the level of detail and accuracy needed in the analysis; (3) the technical competence of those undertaking such simulation modeling; (4) the resources available; and (5) the accuracy of the database (i.e., emissions inventory, meteorological, and air quality data). Taking these factors under consideration, P&G will use the AERMOD modeling system to

[12] U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. 2010. Federal land managers' air quality related values work group (FLAG): phase I report—revised (2010). Natural Resource Report NPS/NRPC/NRR—2010/232. National Park Service, Denver, Colorado.

represent all emissions sources at the facility and regional inventory sources, where required. AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near-field (i.e., source receptor distances of less than 50 km), and is the recommended model in the *Guideline*.

AERMOD

The latest version (12345) of the AERMOD modeling system will be used to estimate maximum ground-level concentrations in all Class II Area analyses conducted for this application. AERMOD is a refined, steady-state, multiple source, Gaussian dispersion model and was promulgated in December 2005 as the preferred model for use by industrial sources in this type of air quality analysis.[13] The AERMOD model has the Plume Rise Modeling Enhancements (PRIME) incorporated in the regulatory version, so the direction-specific building downwash dimensions used as inputs are determined by the Building Profile Input Program, PRIME version (BPIP PRIME), version 04274.[14] BPIP PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents, while incorporating the PRIME enhancements to improve prediction of ambient impacts in building cavities and wake regions.[15]

The AERMOD modeling system is composed of three modular components: AERMAP, the terrain preprocessor; AERMET, the meteorological preprocessor; and AERMOD, the control module and modeling processor. AERMAP is the terrain pre-processor that is used to import terrain elevations for selected model objects and to generate the receptor hill height scale data that are used by AERMOD to drive advanced terrain processing algorithms. National Elevation Dataset (NED) data available from the United States Geological Survey (USGS) are utilized to interpolate surveyed elevations onto user specified receptor grids and buildings and sources in the absence of more accurate site-specific (i.e., site surveys, GPS analyses, etc.) elevation data.

AERMET generates a separate surface file and vertical profile file to pass meteorological observations and turbulence parameters to AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the meteorological site shown to be representative of the application site.

Trinity will use the *BREEZE*®-AERMOD software, developed by Trinity Consultants, to assist in developing the model input files for AERMOD, respectively. This software program incorporates the most recent versions of AERMOD (dated 12345) and AERMAP (dated 11103) to estimate ambient impacts from the modeled sources in the Class II area. Using the procedures outlined in the *Guideline* as a reference, the AERMOD dispersion modeling for P&G will be performed using all regulatory default options.

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[13] 40 CFR Part 51, Appendix W–*Guideline on Air Quality Models*, Appendix A.1– AMS/EPA Regulatory Model (AERMOD).

[14] Earth Tech, Inc., *Addendum to the ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model*, Concord, MA.

[15] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised)*, Research Triangle Park, North Carolina, EPA 450/4-80-023R, June 1985.

Receptor Grid and Coordinate System

Modeled concentrations will be calculated at receptors placed along the facility fenceline and on a Cartesian receptor grid. Fenceline receptors will be spaced no further than 100 meters apart as specified in the Georgia EPD guidance document.[16] Beyond the fenceline, receptors will be spaced 100 meters apart in a Cartesian grid extending out to a distance sufficient to resolve the maximum concentration. Should any modeled impacts exceed the SIL, the grid will be sufficiently large to ensure that the full SIA is captured. Any subsequent NAAQS and PSD increment analyses will be performed for only those receptors within the SIA for which the Albany facility is significant.[17]

P&G is proposing that the "ambient air" boundary for this permitting project is the entire area under controlled access at the Albany site. Controlled access is generally ensured by fencing, however, there are two small areas of the P&G facility that are not continuously fenced, at either end of a privately owned road that bisects the P&G property (which is situated in a rural area outside Albany). The anticipated fenceline for this project will extend north of this road and will at that point essentially encircle the facility only allowing access into the facility through the roadway or other manned security checkpoints along the fenceline. Signage clearly indicating that the road is traversing private property will be posted at the entrance. This road is routinely observed by security and P&G employees to ensure that unauthorized egress into the facility does not occur, however, P&G is prepared to implement more formal measures such as hourly patrols as necessary once the boiler has commenced operation. P&G's security detail has observed that one to two vehicles per hour may use this road as a pass through to access other industrial facilities east of the site, but current procedures in place (as well as future procedures that may be implemented) ensure that no unauthorized vehicles/persons are entering the fenced area for any extended period of time (more than 1 hour). The exact extent of the new fenceline (the portion north of the access road) will be clearly delineated in the modeling section of the permit application.

Receptor elevations required by AERMOD will be determined using the AERMAP terrain preprocessor (version 11103). AERMAP also calculates hill height parameters required by AERMOD. Terrain elevations from the USGS 1 arc second NED will be used for AERMAP processing.

In all modeling analysis data files, the location of emission sources, structure, and receptors will be represented in the UTM coordinate system. The Albany facility is located at approximately 774.6 km east and 3,494.7 km north in Zone 16 (NAD 83).

Meteorological Data

Site-specific dispersion models require a sequential hourly record of dispersion meteorology representative of the region within which the source is located. In the absence of site-specific measurements, the EPA guidelines recommend the use of readily available data from the closest and most representative National Weather Service (NWS) station. Regulatory air quality modeling using AERMOD requires five years of quality-assured meteorological data that includes hourly records of the following parameters:

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[16] *Georgia EPD PSD Permit Application Guidance Document, September 2012*

[17] This approach is consistent with the recent memorandum from Tyler Fox (EPA), *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, to Regional Air Division Directors*. March 1, 2011.

- Wind speed
- Wind direction
- Air temperature
- Micrometeorological Parameters (e.g., friction velocity, Monin-Obukhov length)
- Mechanical mixing height
- Convective mixing height

The first three of these parameters are directly measured by monitoring equipment located at typical surface observation stations. The friction velocity, Monin-Obukhov length, and mixing heights are derived from characteristic micrometeorological parameters and from observed and correlated values of cloud cover, solar insulation, time of day and year, and latitude of the surface observation station. Surface observation stations form a relatively dense network, are almost always found at airports, and are typically operated by the NWS. Upper air stations are fewer in number than surface observing points since the upper atmosphere is less vulnerable to local effects caused by terrain or other land influences and is therefore less variable. The NWS operates virtually all available upper air measurement stations in the United States.

P&G downloaded 2007-2011 AERMOD-ready meteorological data files for the Albany, GA NWS surface station (KABY) and the Tallahassee, FL upper air site (KTLH) from EPD's website.[18] These files, including the 1-minute ASOS wind observations, have been processed by EPD using the latest version of AERMET (12345). As such, no AERMET processing was required to be performed by P&G. The height of the meteorological profile base (met station elevation above sea-level, used in computation of the potential temperature) was provided by EPD.

The meteorological data from the Albany airport is very representative of the conditions at the Albany facility. The meteorological and application sites are in very close proximity (~ 8 km), as shown in Figure 3.

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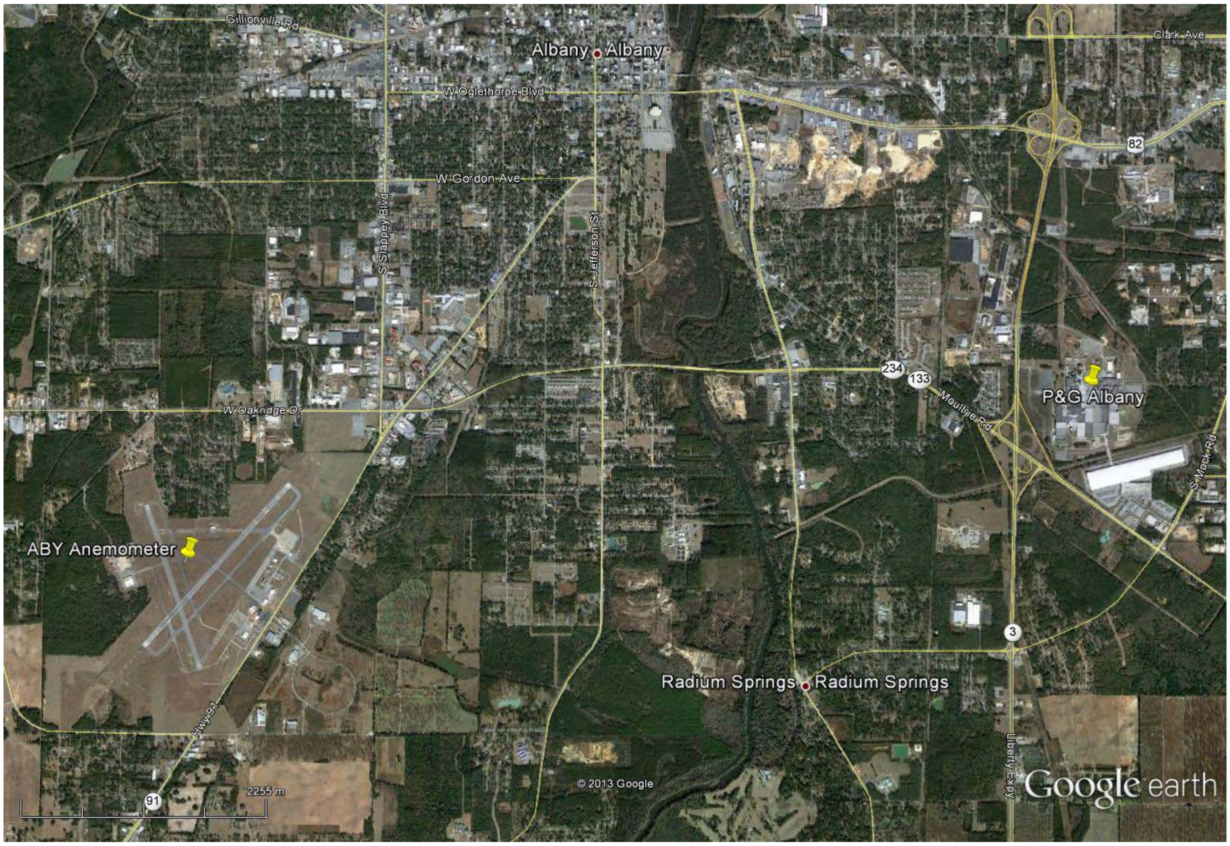
[18] http://www.georgiaair.org/airpermit/html/sspp/modeling/aermetdata.htm.

Figure 3. Proximity of Albany Meteorological Site and P&G Facility



In addition to the short distance, the meteorological and application site are both located just outside the Albany, GA urban area, at the same base elevation, in very similar topographic settings. The 2007-2011 meteorological data years represent a very recent and complete period of record. Given the proximity and topographic similarities, P&G has deemed that the Albany dataset is very representative of the application site.

Building Downwash Analysis

AERMOD incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithms. Direction specific building parameters required by AERMOD are calculated using the BPIP-PRIME preprocessor (version 04274).

Boiler Startup

P&G intends to operate the boiler continuously at maximum capacity following startup. The only planned exceptions would be due to major maintenance events, which are predicted to occur no more than two times per year. Natural gas will be combusted at a heat input rate of approximately 200 MMBtu/hr (approximately 20% of maximum load) during startup until such time that the control devices are fully operational, at which point wood will be introduced into the boiler (approximately 6 hours into the cycle). As a result, emissions will remain well below permitted levels until full boiler heat input is achieved. Since the stack parameters may vary under reduced boiler loads, P&G will conduct modeling analyses for 50%, 75% and 100% load cases to ensure that the full load represents true, worst-case operating conditions.

Representation of Emission Sources

Source Types and Parameters

The AERMOD dispersion model allows for emission units to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases (of which all project point sources will be), it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) in the modeling analyses. In addition to the clearly define stack locations, the modeling will also include storage piles represented as area sources. Per EPD guidance, the release height for the area sources will be set to a height of one-half of the normal pile height.[19] Wind erosion emissions can emanate from anywhere throughout the depth of the pile, as such, an initial vertical dimension (sigma-z) will be set to the average pile height/2.15, per U.S. EPA Guidance for estimating sigma-z for a surface-based source.

GEP Stack Height Analysis

EPA has promulgated stack height regulations that restrict the use of stack heights in excess of "Good Engineering Practice" (GEP) in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations.

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure. The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis are determined using BPIP. In general, the lowest GEP stack height for any source is 65 meters by default.[20] A preliminary evaluation has indicated that none of the proposed emission units at the Albany facility will exceed GEP height and as such, building downwash effects will be considered for all point source emissions.

NO_2 Modeling Approach

EPA's *Guideline on Air Quality Models (Guideline)*, in 40 CFR Part 51, Appendix W, recommends a tiered approach for modeling annual average NO_2 from point sources. The *Guideline* provides that:

a) *A tiered screening approach is recommended to obtain annual average estimates of NO_2 from point sources for New Source Review analysis, including PSD… For Tier 1 … use an appropriate Gaussian model to estimate the maximum annual average concentration and assume a total conversion of NO to NO_2. If the concentration exceeds the NAAQS and/or PSD Increments for NO_2, proceed to the 2^{nd} level screen.*

b) *For Tier 2 (2^{nd} level) screening analysis, multiply the Tier 1 estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default).*

c) *For Tier 3 (3rd level) analyses, a detailed screening method may be selected on a case-by-case basis. For point source modeling, detailed screening techniques such as the Ozone Limiting Method may also be considered.*

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[19] http://www.georgiaair.org/airpermit/downloads/sspp/modeling/quarryguideline_august2012.pdf

[20] 40 CFR §51.100(ii)

d) P&G will begin by utilizing the Ambient Ratio Method (ARM), or Tier 2 approach, which has evolved from previous representations of the oxidation of nitric oxide (NO) by ambient ozone and other photochemical oxidants to form nitrogen dioxide (NO_2 – the regulated ambient pollutant). The ARM is an approach contained in Section 6.2.3 of EPA's the *Guideline*.

EPA issued a memo on March 1, 2011 providing additional clarifications regarding application of Appendix W modeling guidance for the 1-hr NO_2 NAAQS.[21] Per the memo, EPA recommends the use of 0.80 as a default ambient ratio for the 1-hour NO_2 standard under the Tier 2 approach. Based on this updated EPA guidance, P&G will utilize 0.80 as the ambient NO_2:NO_X ratio. Should further refinement be needed, such as the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM), P&G will submit a separate NO_2 modeling protocol to EPD (and EPA) detailing the alternative approach.

Secondary $PM_{2.5}$ Formation

The proposed Albany facility will have emissions of direct $PM_{2.5}$ as well as precursor SO_2 and NO_x in excess of their respective SER. As such, secondary $PM_{2.5}$ formation must be addressed in the modeling analysis. The U.S. EPA's recent draft $PM_{2.5}$ modeling guidance, describes a variety of methods that can be utilized to account for secondary particulate formation.[22] P&G anticipates using the semi-quantitative (hybrid) approach discussed in the guidance. Trinity was made aware, during a recent phone call with EPD personnel, of state-wide, default offset ratios that EPD has been developing through photochemical modeling.[23] The offset ratios would be used to calculate a portion of the SO_2 and NO_x emissions that may be available for secondary $PM_{2.5}$ formation. Those calculated emissions could then be added to the direct $PM_{2.5}$ emission rate in AERMOD to model the "total" $PM_{2.5}$ impact. That approach would be very conservative, both with the offset ratios themselves potentially overestimating conversion potential, and also the addition of those emissions to the source in AERMOD, as that results in impacts being automatically paired in time and space. Temporal and spatial correlation is very unlikely in practice. P&G requests that EPD provide the appropriate offset ratios that may be used at their earliest convenience.

ADDITIONAL IMPACTS MODELING METHODOLOGY

The required additional impacts evaluations include a growth analysis, a soil and vegetation analysis, and a plume visibility analysis. P&G will use the VISCREEN model to determine the impacts on ambient visibility at any airports or state parks within the SIA to meet the requirements of the additional impacts analysis. To assess soil and vegetation impacts, the modeling results from the PSD NAAQS are assessed against the secondary NAAQS standards and EPA's soils/vegetation screening guidelines. If the screening analysis indicates that values will not exceed the SIL, then the results of the screening analysis will be compared to values from the EPA document, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (EPA 450/2-81-078), 1981. For those pollutants triggering NAAQS modeling requirements, the full modeled impact from the facility and inventory will be assessed against those documented values.

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[21] U.S. EPA, Region 4, Memorandum from Mr. Tyler Fox to Regional Air Division Directors. Research Triangle Park, North Carolina. March 1, 2011.

[22] U.S. EPA, *Draft Guidance for $PM_{2.5}$ Permit Modeling*, March 4, 2013

[23] Phone call between Jim Boylan and Yan Huang (EPD) and Jon Hill and Joe Sullivan (Trinity) on April 11, 2013.

TOXIC AIR POLLUTANT MODELING

The evaluation of ambient impacts of toxic pollutant emissions will be submitted in accordance to the Georgia's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (June 21, 1998), which was issued by the EPD Air Protection Branch pursuant to the provisions of GRAQC §391-3--1-.02(2)(a)3(ii).

According to the *Guideline*, dispersion modeling should be completed for potentially toxic pollutants having quantifiable emission increases. The *Guideline* infers that a pollutant is identified as a toxic pollutant if any of the following toxicity-determined values have been established for that pollutant. The *Guideline* specifies that the resources used to develop the long-term and short-term acceptable ambient concentrations (AAC) of toxic air pollutants should be referenced in the priority schedule shown following.

- EPA Integrated Risk Information System (IRIS) reference concentration (RfC) or unit risk;
- Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL);
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV);
- National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL); and
- Lethal Dose – 50% (LD50) Standards.

P&G will detail the methodology for identifying TAP in the analysis included as part of the application submittal. P&G anticipates performing the toxics modeling in AERMOD using the existing setup and methodology discussed previously in this document.

SUMMARY AND APPROVAL OF MODELING PROTOCOL

P&G is supplying this written preliminary protocol so that EPD can formally comment on and approve the methodologies to be used for this analysis. P&G requests a written response to this protocol at your earliest convenience, at least in advance of the scheduled pre-application meeting on May 7, 2013.

If you have any questions about the material presented in this letter, require additional information, or would like to talk about any of the proposed methods, please do not hesitate to call me at 919-462-9693.

Sincerely,

TRINITY CONSULTANTS

Jonathan Hill
Managing Consultant

Attachment

cc: Mr. James Boylan (Georgia EPD)
Ms. Susan Jenkins (Georgia EPD)
Mr. Matt Strain (Procter & Gamble)
Mr. Steve Skarda (Procter & Gamble)
Ms. Tracey Paul (Procter & Gamble)
Mr. Gil Waldman (Sterling Energy Assets)
Mr. Joe Sullivan (Trinity Consultants)
Mr. Justin Fickas (Trinity Consultants)

APPENDIX B – CLASS I AREA NOTIFICATION LETTERS

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trinityconsultants.com

Trinity Consultants

June 11, 2013

Ms. Catherine Collins
Environmental Engineer
United States Fish and Wildlife Service (FWS)
Branch of Air Quality
7333 West Jefferson Avenue, Suite 375
Lakewood, CO 80235
Catherine_Collins@fws.gov

RE: The Procter & Gamble Company – Albany, GA
Notification of PSD Project in Reference to FWS Class I Areas

Dear Ms. Collins:

Trinity Consultants (Trinity) is submitting this letter to your attention on behalf of our client Procter & Gamble Company (P&G) for a proposed major modification to their existing Albany, GA facility. Sterling Energy Assets (Sterling) plans to construct a woody biomass cogeneration facility at P&G's Paper Products Plant located in Albany, Georgia. Once constructed, P&G will assume contractual responsibility for operation of the cogeneration facility. The cogeneration plant will be considered part of the existing P&G site under the Prevention of Significant Deterioration (PSD) and Title V programs by virtue of being on contiguous property, under common control, and assuming the first two digits of the SIC code for P&G's manufacturing operations by virtue of its support to P&G operations.

The P&G Albany facility is an existing PSD Major Source, currently operating under Title V permit number 2676-095-0071-V-02-1. Approximately 50 percent of the steam to be produced by Sterling's 1,037 MMBtu/hr circulating fluid bed (CFB) boiler will be used to generate power for the electrical grid. The remainder of the steam will be supplied to the adjacent P&G operations to replace steam currently produced by an existing permitted 216 MMBtu/hr heat input biomass boiler (ID No. B002), which will be decommissioned following the shakedown period associated with the cogeneration plant. The residual steam to be used for process heating will be used to replace process heat generated from natural gas combustion in existing permitted duct burners as a backup. There will be no physical changes to the production equipment that can increase production capacity or utilization and the use of steam for heating will only maintain existing production capacity. P&G will continue to maintain the capacity to use the natural gas duct burners and backup natural gas boiler for process heating during periods of downtime of the cogeneration boiler.

The proposed project will require a Prevention of Significant Deterioration (PSD) permit. The existing P&G facility is a major stationary source with respect to Title V and emissions increases from the proposed project will exceed the respective PSD significant emission rates thresholds for carbon monoxide (CO), sulfur dioxide (SO_2), oxides of nitrogen (NO_X), particulate matter with an aerodynamic diameter of 10 microns (PM_{10}), PM with an aerodynamic diameter of 2.5 microns ($PM_{2.5}$), and greenhouse gases (CO_2e).[1]

As part of the PSD application process, P&G has qualitatively evaluated the potential for the Albany modification to have impacts on federally-protected Class I areas. The purpose of this letter is to provide the Federal Land Manager (FLM) with preliminary information on the proposed project and to request concurrence from the FLM on the findings presented.

Q/D SCREENING ANALYSIS

A Q/D screening analysis was performed in a manner consistent with the approach discussed in the most recent Federal Land Managers' Air Quality Related Values Work Group (FLAG) guidance document (FLAG 2010), which compares the ratio of visibility affecting pollutant emissions to the distance from the Class I area (i.e., referenced herein as the FLAG 2010 Approach).[2] "Q" is the sum of the annual NO_X, PM_{10}, SO_2, and H_2SO_4 emissions, in tons per year (tpy) and "D" is the distance, in kilometers (km), from the proposed facility to the corresponding Class I area.[3]

A summary of the visibility-affecting pollutant (VAP) emissions resulting from the proposed project are shown in Table 1 using the FLAG 2010 Approach.

[1] CO_2e is carbon dioxide equivalents calculated as the sum of the six well-mixed GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) with applicable global warming potentials per 40 CFR 98 applied.

[2] Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised 2010, *October 7, 2010*.

[3] It is specified within the FLAG 2010 Report that "Q" be calculated as the sum of the worst-case 24-hour emissions converted to an annual basis.

TABLE 1. SUMMARY OF VISIBILITY-AFFECTING POLLUTANT EMISSIONS

Pollutant	Facility-Wide Maximum 24-Hour Emission Increases[2] (lb/hr)	Flag 2010 Approach Annual Emissions[2] (Q - tpy)
NO_x	77.78	340.68
SO_2	20.76	90.93
PM_{10}[1]	26.96	118.08
H_2SO_4	-	-
Total	**125.50**	**549.69**

[1] The PM_{10} rate shown includes all filterable and condensable particulate matter.
[2] Flag2010 approach: $Q = [NO_x+SO_2+PM_{10}+H_2SO_4]*8760/2000$

As shown in Table 2, four (4) Class I areas are located within 300 km of the proposed project in Albany, GA. Three (3) of which are managed by the United States Fish and Wildlife Service (USFWS), specifically St. Marks, Okefenokee, and Wolf Island, located approximately 157 km, 168 km, and 265 km from the Albany facility, respectively.

TABLE 2. SUMMARY OF CLASS I AREAS WITHIN 300 KM OF THE PROPOSED PROJECT

Class I Area	Federal Land Manager	Distance (D in km)	Sum of Annualized Emissions (Q in tpy)	FLAG 2010 Q/D
Bradwell Bay (FL)	USFS	154	550	3.58
St. Marks (FL)	USFWS	157		3.51
Okefenokee (GA)	USFWS	168		3.27
Wolf Island (GA)	USFWS	265		2.07

Table 2 shows the results of the Q/D screening analysis for the FLAG 2010 Approach. All 4 of the Class I areas within 300 km of the project have a Q/D well below ten. This suggests that the proposed project will have no adverse impacts to any Air Quality Related Values (AQRV) at near-by Class I areas; therefore, P&G plans no AQRV analyses for the proposed project. Based on the results shown in Table 2, P&G requests that the USFWS provide written concurrence of this finding of no impact.

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P&G greatly appreciates your feedback on this conclusion regarding no presumptive impacts to AQRVs at Class I areas under management of the USFWS. Please feel free to contact me at 919-462-9693 with any questions or comments you have about the information presented in this letter.

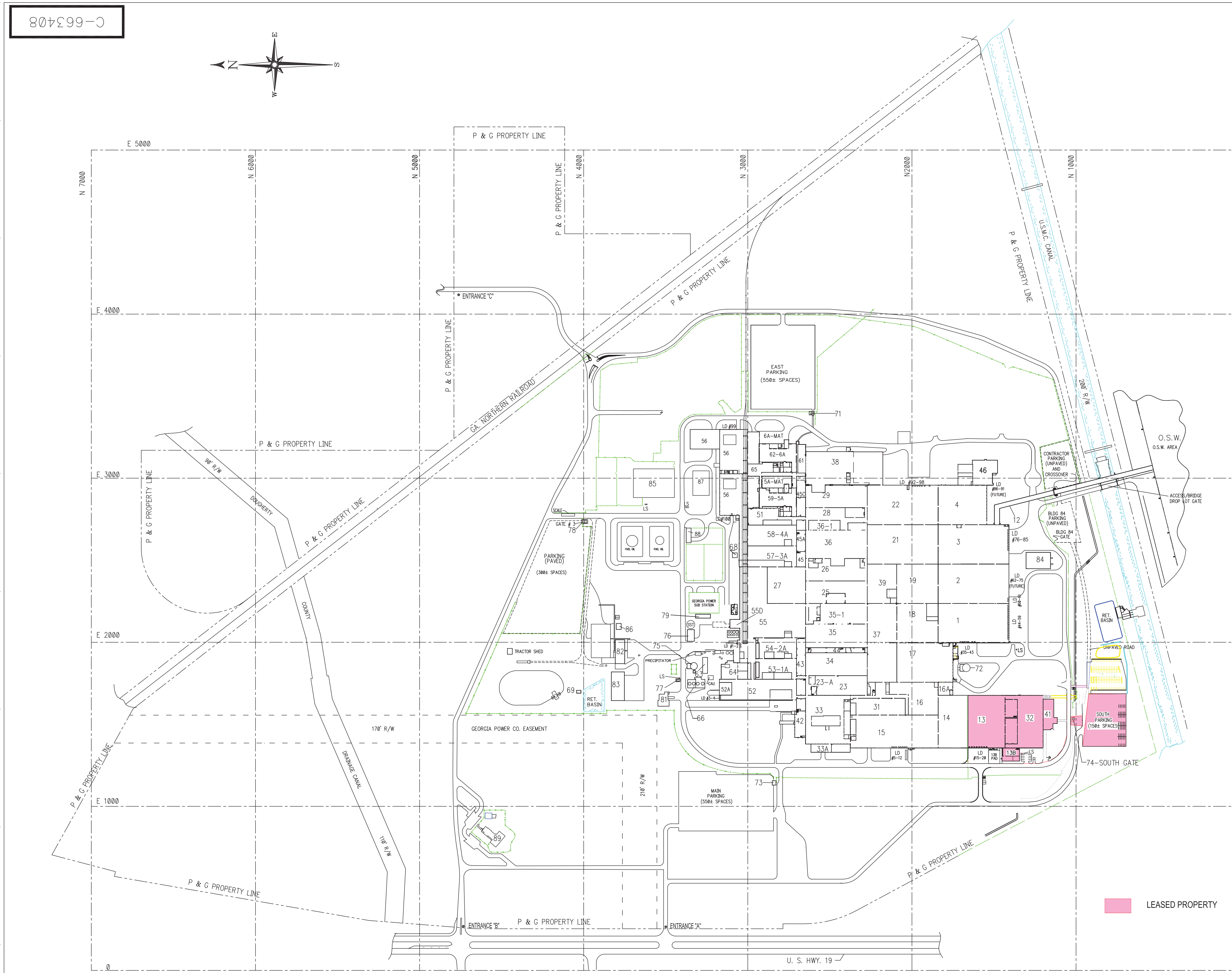
Sincerely,

TRINITY CONSULTANTS

Jonathan Hill
Managing Consultant

cc: Mr. James Boylan (Georgia EPD)
Ms. Susan Jenkins (Georgia EPD)
Mr. Gil Waldman (Sterling)
Mr. Matt Strain (P&G)
Mr. Steven Skarda (P&G)
Ms. Tracey Paul (P&G)

APPENDIX C – P&GPP ALBANY SITE LAYOUT



BLDG. NUMBER	BLDG. NAME
1	FINISHED PROD. WAREHOUSE, PALLETIZERS 4, 5 & 17
2	FINISHED PROD. WAREHOUSE, PALLETIZERS 14, 15 & 16
3	FINISHED PROD. WAREHOUSE, PALLETIZER 21
4	FINISHED PROD. WAREHOUSE
12	FINISHED PROD. TUNNEL TO O.S.W.
13	FINISHED PROD. WAREHOUSE
~~13A~~	~~STORAGE~~ DEMOLISHED
13B	THERMACARE SHOPS & BATTERY CHARGE
14	FINISHED PROD. WAREHOUSE
15	FINISHED PROD. WAREHOUSE
16	FINISHED PROD. WAREHOUSE
17	FINISHED PROD. WAREHOUSE, PALLETIZERS 1, 2, 3 & 19
18	FINISHED PROD. WAREHOUSE, PALLETIZER 22
19	FINISHED PROD. WAREHOUSE, PALLETIZERS 8, 9, 10 & 11
21	FINISHED PROD. WAREHOUSE, PALLETIZERS 6, 7, 12, 13, 18 & 20
22	FINISHED PROD. WAREHOUSE
23	PARENT ROLL STORAGE
23A	OFFICES
25	PARENT ROLL STORAGE
26	PARENT ROLL STORAGE
27	PARENT ROLL STORAGE
28	RAW MATERIAL STORAGE
29	PARENT ROLL STORAGE
31	CONVERTING KRT, AK 9
32	CONVERTING THERMACARE
33	BATTERY CHARGING & SHOPS
33A	OFFICE & CONSTRUCTION SHOP
34	CONVERTING TT WEST, AT 1, 2, 5, 6
35	CONVERTING KRT, AK 1–4
35–1	CONVERTING KRT, LCP
36	CONVERTING TT EAST, AT 7–12
36–1	CONVERTING TT EAST
37	CONVERTING KRT, AK 5, 6, 7, 8
38	CONVERTING TT FAR EAST, AT 13, 14, 15, 16
39	CORE MAKING
41	OFFICES, THERMACARE, PAPER UNIVERSITY
42	OFFICES
43	OFFICES
44	OFFICES
45	OFFICES
46	MAJOR SPARES & STOREROOM
51	SHOPS & STORES, 3A & 4A
52	SHOPS & STORES, 1A & 2A
52A	UTILITIES ANNEX
53	PAPER MAKING, 1A
54	PAPER MAKING, 2A
55	C&FP
55D	FINES DEWATERING
56	C&FP
57	PAPER MAKING, 3A
58	PAPER MAKING, 4A
59	PAPER MAKING, 5A
61	ROLL STORAGE, 5A & 6A
62	PAPER MAKING, 6A
63	WOOD CHIP BOILER
64	BOILER HOUSE
65	SHOPS & STORES, 5A & 6A
66	COOLING TOWER
68	EMERGENCY GENERATOR
69	WOOD YARD
71	GUARD HOUSE (EAST)
72	FIRE PUMP HOUSE (SOUTH)
73	GUARD HOUSE (MAIN GATE)
74	GUARD HOUSE (SOUTH)
75	FIRE PUMP HOUSE (NORTH)
76	WASTE / HAZARDOUS STORAGE
77	MONITORING STATION
78	GUARD HOUSE # 3 (CONTRACTOR)
79	SWITCH GEAR HOUSE
81	VOLATILE OIL STORAGE
82	FACILITIES ENGINEERING
83	MAJOR SPARES & STOREROOM
84	TRAINING
85	STOREROOM & SHOP
86	LAWN EQUIPMENT STORAGE
87	TRAINING & CONSTRUCTION OFFICES
88	MAINTENANCE / WASHDOWN
89	ON–SITE CHILD CARE FACILITY

LETTER DESIGNATION	DESCRIPTION
LD	LOADING DOCK
LS	LIFT STATION
SST	SEWER SURGE TANK (PROCESS SEWER)
CAU	CAUSTIC CONTAINMENT AREA
ACID	ACID CONTAINMENT AREA

LAYER LEGEND

1) PROPERTY MAP
2) EVACUATION ASSEMBLY
3) HAZARDOUS WASTE LOCATIONS
4) LAWN LAYOUT MAP
24 5) SPACE OWNERSHIP CHART
6) DESIGNATED PEDESTRIAN WALKWAYS
7) ENVIRONMENTAL SPILL PROTECTION
8) PLANT FIRE BRIGADE EMERGENCY RESPONSE MAP
9) SITE PROPERTY SQUARE FOOTAGE
24 10) SITE STRUCTURAL ZONES
24 11) NOISE SURVEY LOCATIONS

DRAWN BY–NAME–DATE G.McDANIEL 8–14–97					
CHECKED BY–NAME–DATE B.TAYLOR 8–14–97	LEVEL	TECH.	PROP	ALBANY PLANT AND PROPERTY MAP	DRAWING NUMBER C–663408 -24
	LINE NO.	PRESENTATION			
MATERIAL NONE	EQUIP. NO.	PLANT	ALB		
	DWG. LIST	PROD. AREA		LAYER 1 – PROPERTY MAP	SUPERSEDES:
SCALE 1' = 250'–0"	SUB ASSY. NO.	DESCRIPTOR			
	QUANTITY	BLDG. NO.	YARD	PROCTER & GAMBLE	

APPENDIX D – ELECTRONIC MODELING FILES