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June 20, 2011

Mr. Peter Courtney
Georgia Environmental Protection Division
Air Protection Branch
4244 International Parkway, Suite 120
Atlanta, GA 30354

RE: PyraMax –Proposed Kings Mill Facility
PSD Modeling Protocol

Dear Mr. Courtney:

PyraMax Ceramics, LLC (PyraMax) is proposing to construct and operate a greenfield ceramic pellet manufacturing facility in Jefferson County, Georgia (Kings Mill facility). The facility will include four (4) process lines each consisting of a raw material preparation system, a pelletization system , a kiln feed system, a kiln and cooler, a boiler, and product storage and loading operations.

The proposed project will require a Prevention of Significant Deterioration (PSD) permit. Emission from the proposed facility are anticipated to exceed PSD 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}), particulate matter with an aerodynamic diameter of 2.5 microns ($PM_{2.5}$), and greenhouse gases (CO_2e).[1] PyraMax is planning on submittal of a PSD construction permit application to the Georgia Environmental Protection Division (EPD) in July 2011.

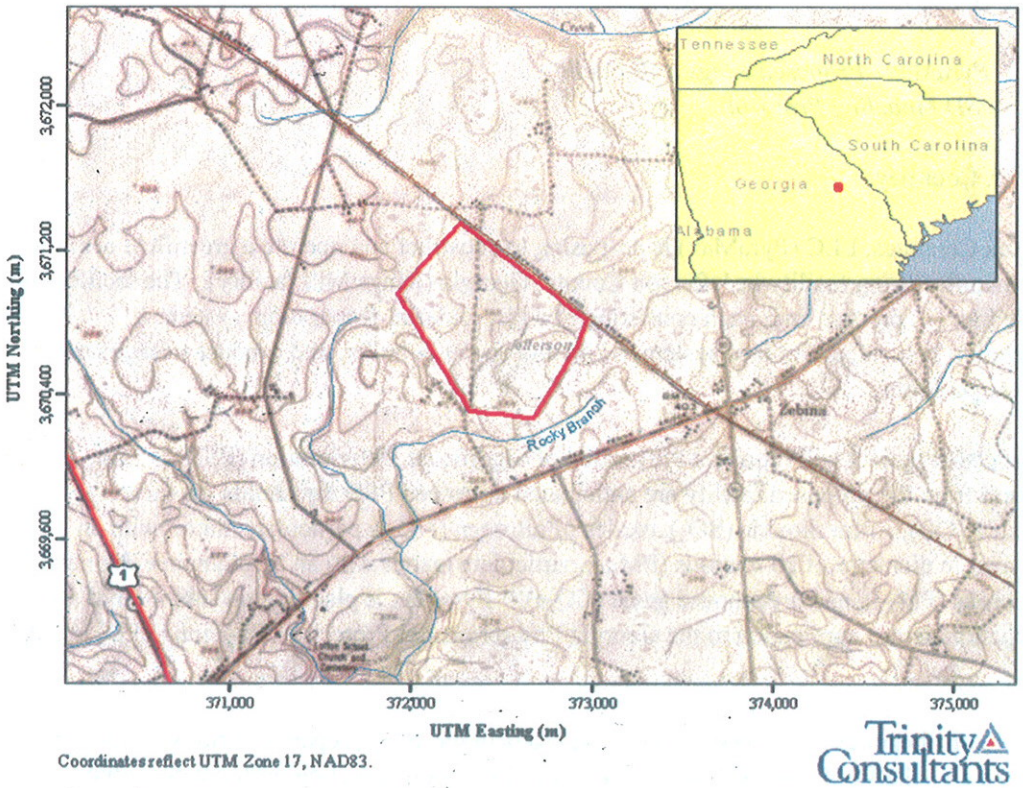
Following EPD policy, a dispersion modeling protocol has been prepared. Trinity Consultants (Trinity), on behalf of PyraMax, has prepared this dispersion modeling protocol describing proposed methodologies and data resources for the project. This protocol includes a brief description of the proposed facility, 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.

[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.

PROJECT DESCRIPTION

Figure 1 provides a map of the area surrounding the Kings Mill property. The approximate central Universal Transverse Mercator (UTM) coordinates of the facility are 372.4 kilometers (km) east and 3,670.8 km north in Zone 17 (NAD 83).

FIGURE 1. FACILITY LOCATION



PyraMax is proposing to construct a greenfield proppant facility for the production of proppant beads for use in the oil and gas industry. Proppants function by holding open fractures in the oil and gas reservoirs, improving the well's flow capacity and increasing recovery rates. The major raw material is kaolin clay. The clay is mixed with chemicals and then fired in a kiln process to produce ceramic beads. The proposed Kings Mill facility operations will include the following:

- Raw material handling;
- Crude preparation;
- Pelletization;
- Green pellet screening;
- Calcinations/sintering; and
- Finishing.

The proposed site will consist of four (4) production lines which will be installed in pairs. Each line will include a raw material preparation system, a pelletization system, a kiln feed system, a kiln and cooler, and product storage and loading operations. Expected emissions from the facility include NO_X, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, VOC, GHG, Hydrogen Chloride (HCl), Hydrogen Fluoride, (HF), methanol and combustion emissions associated with natural gas and propane combustion. A small amount of fugitive particulate emissions will result from ancillary equipment; however, due to the high moisture content of the raw material and building enclosures these emissions will be negligible. As such, PyraMax proposes to exclude these insignificant sources from the modeling analysis.

Per EPA's March 1, 2011 memorandum[2], PyraMax proposes to exclude all true emergency sources (e.g. emergency generators, firewater pumps) which will operate less than 500 hours per year from the modeling analysis. Such sources are only operated outside of emergencies for periodic readiness testing which is conducted in a random, intermittent fashion.

Preliminary emission sources of regulated pollutants at the Kings Mill facility are summarized in Table 1.

TABLE 1. MODELED SOURCE LIST

Source Description	Quantity
Weigh Bin Bin Vent Filters	4
Loading Operations Baghouses	4
Silo Bin Vent Filters	4
Final Product Screening and QC Baghouses	4
Kiln Baghouses	4
Green Pellet Screening Baghouses	4
Kiln Recycle Feed Bin Vent Filters	4
Dry Milling Baghouses	4
Pelletizer Baghouses	4
Feed Bin Vent Filters	4
Baghouse Kiln Dust Recycle to Feed Bins	4
Boilers	4

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[2] From Tyler Fox (EPA), *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, to Regional Air Division Directors*. March 1, 2011.

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. Jefferson County, in which the proposed facility will be located, is currently designated as unclassifiable or in attainment for all criteria pollutants.[3]

PSD requires *major* stationary sources of air pollution to obtain an air pollution permit prior to commencing construction. The threshold defining the status of a facility as a major source under the PSD regulations is 250 tons per year (tpy), unless the source belongs to one of 28 specifically defined industrial source categories, in which case the major source threshold is 100 tpy. Ceramic pellet production is not on the "List of 28" source categories. Thus, the major source threshold under the PSD program for the facility is 250 tpy of a regulated air pollutant.

The potential emissions associated with the facility require permitting as a new major source under the PSD regulations. PyraMax's preliminary emission calculations have shown that the facility may qualify as a PSD major source due to potential emissions of CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ in excess of 250 tpy and would, therefore, trigger PSD review for these pollutants.

EPA'S GHG TAILORING RULE

On May 13, 2010, the EPA finalized the Tailoring Rule (published at 75 FR 31514 on June 3, 2010) which establishes an approach to addressing greenhouse gases (GHGs) from stationary sources under the Clean Air Act (CAA) permitting programs (PSD and Title V). GHGs become subject to regulation under the CAA on January 2, 2011 when EPA's Light Duty Vehicle Rule takes effect. Recognizing that the existing major source thresholds established under the CAA (100 and 250 tpy) and in the federal PSD program under 40 CFR 52.21, while appropriate for criteria pollutants, are not feasible for GHGs which are emitted in much higher amounts, the EPA is phasing in the CAA permitting of GHG sources via this rule. The rule establishes a schedule for the phase in of CAA permitting requirements for GHGs via two initial steps: Step 1 for the time period from January 2, 2011 through June 30, 2011, and Step 2 for the time period from July 1, 2011 through June 30, 2013.

The Tailoring Rule addresses PSD permitting with respect to GHGs. During the Step 1 time period, projects subject to PSD permitting anyway for non-GHG pollutants must review GHG emissions increases, and if over 75,000 tons per year of CO_2e, GHG BACT must also be addressed in their PSD permit applications. In Step 2, starting July 1, 2011, projects with a potential to emit greater than or equal to 100,000 tons per year CO_2e will be considered a major source under PSD. It is anticipated that the proposed Kings Mill facility will be considered a major source with respect to the PSD program since potential CO_2e emissions are expected to exceed 100,000 tpy. No PSD SIL, NAAQS, or PSD Increments exist for CO_2e.

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[3] 40 CFR §81.314

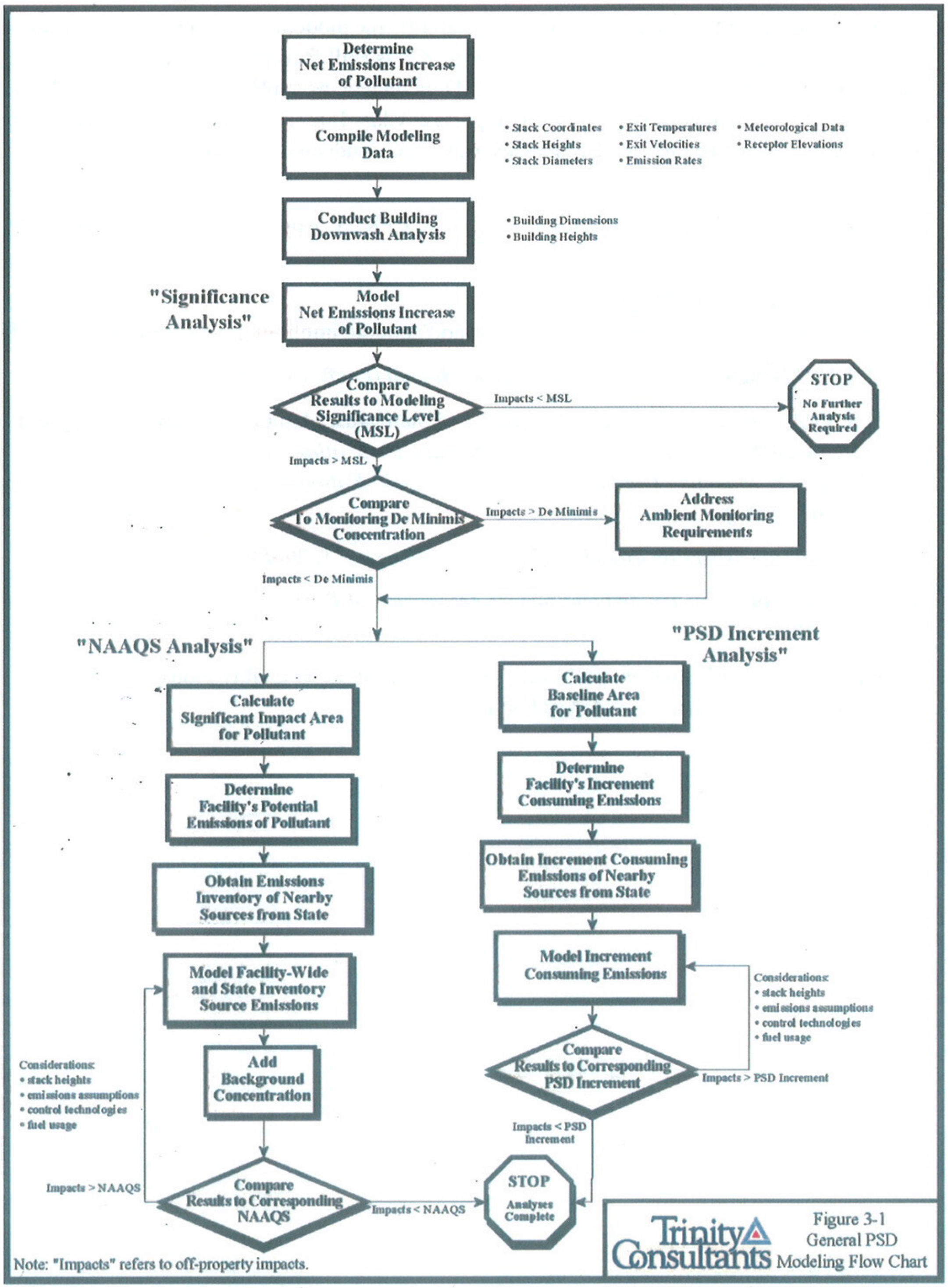
PSD MODELING ANALYSES

Trinity has prepared this modeling protocol to describe the modeling methodologies and data resources that will be used to demonstrate that the Kings Mill 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 Kings Mill 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)
- 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* (December 1, 2006)
- Georgia's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (June 21, 1998)

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.

FIGURE 2. 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.

SIGNIFICANCE ANALYSIS

The Significance Analysis is conducted to determine whether the emissions associated with the proposed new construction project could cause a significant impact upon the area surrounding the facility. "Significant" impacts are defined by ambient concentration thresholds commonly referred to as the Significant Impact Levels (SIL). Table 2 lists the SIL, NAAQS, and PSD Increments for all relevant NSR regulated pollutants for this project.

TABLE 2. 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_X	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	35	9[9]	4
	Annual	0.3	15	8[9]	--

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 99[th] 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 98[th] 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 become effective on December 20, 2010 (i.e., 60 days after the rule was published in the Federal Register) and the PSD Increments become effective on October 20, 2011 (i.e., one year after the date of promulgation).

As shown in Figure 2, if the highest modeled ambient concentrations for a pollutant for 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 2. 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, PyraMax proposes to use existing ambient monitor data in lieu of pre-construction monitoring requirements.

BACKGROUND CONCENTRATIONS

If the maximum modeled impacts for a PSD triggering pollutant are greater than the SIL in the Significance Analysis, a NAAQS analysis is required for that pollutant. In the NAAQS analysis, modeled impacts from the facility will be combined with background concentrations, which represent the air quality concentrations due to sources that are not explicitly modeled (e.g., mobile sources, small but local stationary sources, non-regulated fugitive sources, and large but distant sources). Selection of the existing monitoring station data that is "representative" of the ambient air quality in the area surrounding the proposed facility is determined based on the following three criteria: 1) monitor location, 2) data quality, and 3) data currentness. Key considerations based on the monitor location criteria include proximity to the significant impact area of the proposed facility, similarity of emission sources impacting the monitor to the emission sources impacting the airshed surrounding the proposed facility, and the similarity of the land use and land cover (LULC) surrounding the monitor and proposed facility. The data quality criteria refers to the monitor being an approved SLAM or similar monitor type subject to the quality assurance requirements in 40 CFR Part 58 Appendix A. Data currentness refers to the fact that the most recent three complete years of quality assured data are generally preferred. PyraMax will work with EPD to determine the appropriate monitoring site and value to incorporate in the analysis.

SIGNIFICANT IMPACT AREA AND NAAQS/PSD INCREMENT INVENTORIES

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 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.

The NAAQS regional source inventory will be comprised of all sources (major and minor) within the SIA that are not excluded based on the "20D" procedure.[4] Using this procedure, sources outside the area of significant impact are excluded from the inventory if the entire facility's emissions (tpy) are less than 20 times the distance (km) from the facility to the nearest edge of the SIA (long-term averaging period), and are excluded if the entire facility's emissions (tpy) are less than 20 times the distance (km) from the facility to the Kings Mill site (short term averaging period). To be conservative, emissions from sources within close proximity to each other (2 km) will be combined prior to applying the "20D" procedure.

Sources in the inventories provided by EPD will be evaluated for inclusion in the NAAQS and PSD Increment analyses. If PyraMax discovers that refinements to these inventories are necessary after conducting a detailed review of the modeled source parameters provided and evaluating impacts from the inventory sources in preliminary NAAQS and PSD Increment modeling scenarios, PyraMax will work with EPD to obtain refined inventories. The complete list of modeled inventory sources and the associated model input parameters will be provided in the final modeling report submitted with the PSD permit application for the facility.

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

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[4] *Federal Register* 8079, March 6, 1992.

[5] 40 CFR §50.2(b).

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_X standards,
- Modeled annual arithmetic mean impact averaged over the full five years to demonstrate compliance with the annual $PM_{2.5}$ standard,
- 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 run and to simplify the year-by-year EVENT analysis required in the case of any modeled NAAQS violations.[6]
- The 24-hr $PM_{2.5}$ standard is the 98th percentile (approximated by the high-eighth-high, H8H modeled concentration) of 24-hr concentrations in a given year averaged over three years. However, U.S. EPA OAQPS has issued specific guidance in a series of two (2) recent policy memos that recommends the use of the average of the highest first-high (H1H) modeled 24-hr impacts over 5 years as the modeled contribution to the cumulative NAAQS compliance analysis.[7, 8] Should modeled impacts exceed the NAAQS using that conservative assumption, PyraMax may propose alternative metrics to demonstrate compliance with the NAAQS as written.
- Maximum five-year average of the 98th percentile (H8H) modeled 1-hr concentration, on a receptor-by-receptor basis, to demonstrate compliance with the 1-hr NO_2 standard.

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[6] EVENT analysis refers to the control block keyword EVENTFIL in the AERMOD input file.

[7] U.S. EPA Office of Air Quality Planning and Standards Memorandum from Tyler Fox, Leader of the Air Quality Modeling Group to Erik Snyder and Jeff Robinson, U.S. EPA Region 6 entitled "Model Clearinghouse Review of Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS", February 26, 2010.

[8] U.S. EPA Office of Air Quality Planning and Standards Memorandum from Stephen D. Page, Director to EPA Regional Modeling Contacts entitled "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS", March 23, 2010.

- Maximum five-year average of the 99th percentile (H4H) modeled 1-hr concentration, on a receptor-by-receptor basis, to demonstrate compliance with the 1-hr SO_2 standard.

When a violation of the NAAQS is predicted at receptor(s) in the significant impact area, a source is not considered to have caused or contributed to the violation if its own impact is not significant (i.e., the source's contribution to the modeled violations is less than the SIL) at the violating receptor at the time of the predicted violation.[9] If a culpability analysis is required for modeled violations, PyraMax will first identify all violations using the plot file output feature in AERMOD which will identify the receptor locations and events (i.e., month, day, year, and end hour) for the violations. Based on this information, PyraMax will evaluate the facility's contribution to the violation using either the EVENT processing utility or the MAXDCONT/MAXDAILY output options inherent to AERMOD. As an example, the EVENT run may be set up to predict the individual source contribution for any impacts exceeding the NAAQS by using the MAXIFILE output option with the threshold set to the relevant NAAQS minus the background concentration.[10] Analyzing the EVENT file output during the violations will allow PyraMax to demonstrate the facility impacts are below the relevant SIL at the time and location of any modeled exceedance. In cases where violations due to inventory sources are identified, PyraMax must determine (for inclusion in the modeling report and project summary issued in conjunction with the draft permit) the maximum NAAQS impact during which the contribution from facility's emissions sources causes a significant impact. To determine the maximum NAAQS impact for the PyraMax project if violations due to inventory sources are identified, PyraMax will first setup an EVENT analysis with the threshold set to the project only NAAQS impacts and then will iteratively evaluate the highest cumulative impacts between the identified NAAQS violations and project only impacts until an event is identified during which the facility's impacts are significant.

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 $PM_{2.5}$.[11] 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 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,

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[9] U.S. EPA New Source Review Workshop Manual Chapter D Section IV.E and 40 CFR Part 51 Appendix W Section 10.2.3.2 and 10.2.3.3.

[10] MAXIFILE refers to the output block keyword in the AERMOD input file.

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

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 and the major source baseline date for NO_X is February 8, 1988. 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. PyraMax requests that EPD confirm the MSBD for Jefferson County.

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. The previous discussion regarding potential NAAQS violations and the approach for assessing culpability applies to the PSD Increment Analysis as well.

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, PyraMax proposes that no modeling be required for ozone for several reasons.[12] First, modeling of ozone using reactive plume models is rarely conducted on a source-by-source basis

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[12] 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.

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, and this project will be required to offset any increases in NO_X with actual emissions decreases due to GRAQC §391-3-1-.03(8)(c)(15). 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, PyraMax will complete a qualitative assessment of the impact of the proposed Kings Mill facility on ambient ozone concentrations and the attainment status of the surrounding area.

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. There are no Class I areas within 200 km of the Kings Mill facility. 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 Kings Mill facility. Table 4 details the Class I areas located at a distance of less than 300 km from the Kings Mill facility.

TABLE 3. PRELIMINARY SUMMARY OF VISIBILITY-AFFECTING POLLUTANT EMISSIONS

Pollutant	Facility-Wide Maximum 24-Hr Emissions[2] (lb/hr)	FLAG 2010 Approach Annual Emissions[2] (tpy)
NO_X	160	700
Direct Particulate[1]	75	327
SO_2	47	205
Sum of Emissions (tpy)	281	1,232

1. Direct particulate includes all filterable and condensible PM_{10}, such as EC, PMC, PMF, H2SO4, SOA, NO3, etc.
2. FLAG2010 Approach: Q = [SO2 + NO2 + SO4 + EC + PMC + PMF + SOA + NO3 (maximum 24-hr basis)] * 8,760 / 2000

TABLE 4. SUMMARY OF CLASS I AREAS WITHIN 300 KM OF THE KINGS MILL FACILITY

Class I Area	Responsible FLM	Minimum Distance from Site (km)	Sum of Annualized VAP Emissions - Q (tpy)	FLAG 2010 Approach Q/D
Wolf Island Fish & Wildlife	FWS	223	1,232	5.52
Okefenokee Fish & Wildlife	FWS	234		5.27
Shining Rock Wilderness	FS	244		5.06
Cape Romain Fish & Wildlife	FWS	255		4.82
Great Smoky Mountains National Park	NPS	271		4.55
Cohutta Wilderness	FS	276		4.46
Joyce Kilmer - Slick Rock Wilderness	FS	282		4.38
Linville Gorge Wilderness	FS	296		4.16

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 6; 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.[13] PyraMax 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 Kings Mill facility.

In addition to the AQRV analysis, PyraMax is also required to assess, Class I PSD Increment consumption, at the affected Class I areas. PyraMax 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.

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*.

[13] 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.

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, PyraMax will use the AERMOD modeling system to 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 (11103) 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.[14] 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.[15] 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.[16]

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.

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[14] 40 CFR Part 51, Appendix W–*Guideline on Air Quality Models*, Appendix A.1– AMS/EPA Regulatory Model (AERMOD).

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

[16] 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.

PyraMax 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 11103) 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 PyraMax will be performed using all regulatory default options.

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 Air Dispersion Modeling Guidance.[17] 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. For pollutants exceeding the SIL, the grid will be sufficiently large to ensure that the full SIA is captured. Subsequent NAAQS and PSD increment analyses will be performed for only those receptors within the SIA for which the Kings Mill facility is significant.[18]

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 Kings Mill facility will be located at approximately 372.4 km east and 3,670.8 km north in Zone 17 (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

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[17] http://www.georgiaair.org/airpermit/downloads/sspp/modeling/AirDispModelingGuid_v2.pdf.

[18] 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.