CONSTRUCTION AND OPERATING PERMIT APPLICATION
VOLUME II - MODELING

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1. EXECUTIVE SUMMARY

PyraMax Ceramics, LLC (PyraMax) is proposing to construct and operate a greenfield ceramic proppant manufacturing facility in Jefferson County, Georgia (Kings Mill facility). The proppant facility will produce proppant beads for use in the oil and natural gas drilling industry. The facility will include two (2) 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. Emissions 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]

TABLE 1-1. PROPOSED PROJECT POTENTIAL EMISSIONS

Pollutant	Project Emissions (tpy)
CO	608
NO_X	351
PM	157
PM_{10}	157
$PM_{2.5}$	107
SO_2	103
VOC	130
Fluorides	0.19
CO_2e	167,569

Volume I of the construction permit application contains the project description, emission calculation methodologies, regulatory applicability analysis, Best Available Control Technology (BACT) review, and permit application forms and was submitted on July 27, 2011. This report (Volume II) provides details of the air quality dispersion modeling conducted in support of the application.

The following sections detail the methods and models used to demonstrate that the proposed facility will not cause or contribute to a violation of either the National Ambient Air Quality Standards (NAAQS) or PSD Class I and Class II Increment. The modeling methods used are consistent with the U.S. EPA's *Guideline on Air Quality Models*, 40 CFR Part 51, Appendix W (Revised,

[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.

November 9, 2005), and the U.S. EPA's *AERMOD Implementation Guide*.[2] Additionally, the ambient impact assessment of toxic air pollutant (TAP) emissions is conducted in accordance to the Georgia's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (June 21, 1998).

The results of the air quality dispersion modeling analyses presented in this report are summarized below.

1. The proposed project does not cause any ambient impacts of CO or SO_2 above the respective Class II Significant Impact Levels (SILs) for all applicable averaging periods.
2. The proposed project does not cause any ambient impacts of SO_2, PM_{10} or NO_2 above their respective Class I SILs for all applicable averaging periods.
3. Maximum ambient impacts of NO_2 above the proposed 1-hr Class II SIL are predicted at a distance of 8.7 kilometers (km) from the proposed facility. Maximum ambient impacts of NO_2 above the annual Class II SIL are predicted at a distance less than 1 km from the proposed facility.
4. Maximum ambient impacts of PM_{10} above the 24-hr Class II SIL are predicted at a distance of 1.2 km from the proposed facility.
5. Maximum ambient impacts of $PM_{2.5}$ above the 24-hr and annual Class II SILs are predicted at a distance of 2.2 km and 1.1 km, respectively, from the proposed facility.
6. The facility does not cause or contribute to any exceedance of the NAAQS for NO_2, PM_{10}, or $PM_{2.5}$.
7. This facility does not cause or contribute to any exceedance of the annual Class II PSD Increment for PM_{10} or NO_2.
8. The ambient impacts of TAP emissions are less than the acceptable ambient concentrations (AACs) as defined by Georgia EPD based on AERMOD modeling of the facility.

The PSD air quality analyses described in this report demonstrate that the proposed project will neither cause nor contribute to a violation of any NAAQS, PSD Increment, or any Georgia EPD toxic air pollutant standards.

The remainder of this modeling report is organized as follows.

- Section 2 – description of the proposed project;
- Section 3 – required dispersion modeling analyses;
- Section 4 – technical approach employed in the modeling analyses;
- Section 5 – results of the PSD dispersion analyses;

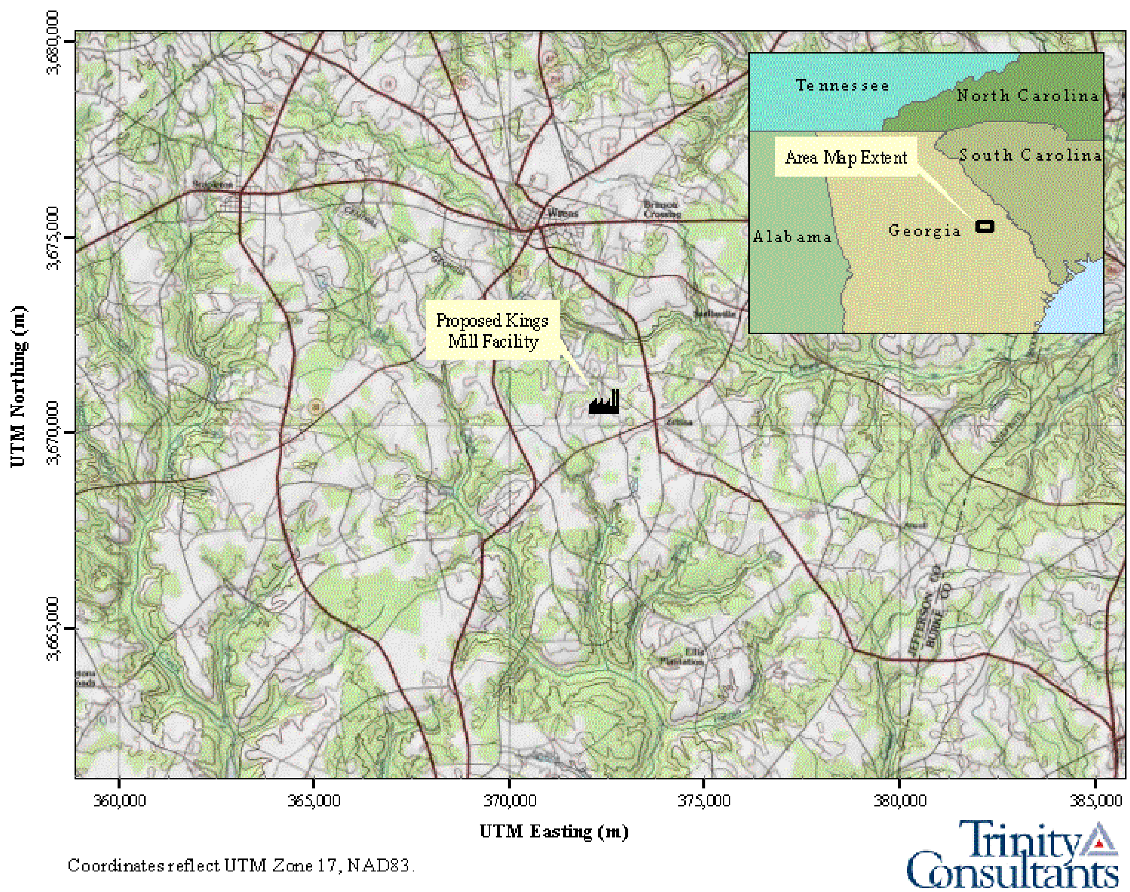
[2] http://www.epa.gov/scram001/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf

- Section 6 – ambient impact assessment of TAP emissions;

- Appendix A – area map, site layout map, and other supporting figures;
- Appendix B – flowchart of PSD modeling requirements;
- Appendix C – land use representativeness analysis;
- Appendix D – documentation of the regional source inventory;
- Appendix E – electronic modeling files;
- Appendix F – documentation of the Georgia EPD TAP analysis;
- Appendix G – dispersion modeling protocol; and
- Appendix H – Class I notification letters.

PyraMax is proposing to construct a greenfield proppant manufacturing facility in Wrens, Jefferson County, Georgia for the production of proppant beads for use in the oil and gas industry. Figure 2-1 provides a map of the area surrounding the Kings Mill property. The approximate central Universal Transverse Mercator (UTM) coordinates of the proposed facility are 372.4 kilometers (km) east and 3,670.8 km north in Zone 17 (NAD 83).

FIGURE 2-1. FACILITY LOCATION



Proppants improve the well's flow capacity and increase recovery rates. The major raw material is clay. The clay is mixed with chemicals and then fired in a kiln process to produce ceramic beads. The proposed 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 two (2) production lines. Each line will include a raw material preparation system, a pelletization system, a kiln feed system, a boiler, 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, methyl acetate, ammonia, 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, these insignificant sources were excluded from the modeling analysis.

A detailed discussion of emission estimates, including control technology limitations, was presented in Volume I of this application. Figures A-3 and A-4 in Volume II present the layout of buildings and modeled emission sources on the property. The emissions rates included in this modeling analysis are presented in Section 4, “Modeling Methodologies.”

Per EPA’s March 1, 2011 memorandum[3], PyraMax excluded 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. The emergency engines will be purchased prior to operation of the site. However, at this time PyraMax anticipates purchasing new equipment. Therefore, the manufacture date will be 2011 or later, and the engines will be subject to NSPS IIII.

The engines will fire diesel fuel that meets the ultra-low sulfur specifications for NSPS Subpart IIII. Maximum potential emissions (both lb/hr and lb/year) for the emergency generators are included in Appendix C of Volume I of the application. The engines will operate during periods of interrupted power supply due to conditions beyond the control of PyraMax (storms, loss of electric grid, etc.) to ensure that critical plant functions do not lose power. Once power is safely restored to the facility, the engines will cease operation. As these events are unplanned and beyond the control of the facility, PyraMax is unable to define the duration of each instance.

The manufacturer recommends testing on a weekly basis to ensure the proper functioning of the unit. The testing will not be under load and will typically be 30 minutes or less in duration per engine. The manufacturer also recommends annual testing at full load. PyraMax will minimize the full load test duration, provided the test meets the manufacturer’s recommendations. Operation for testing and maintenance is limited to 100 hours per year, per NSPS Subpart IIII. As the testing/maintenance will be performed weekly, PyraMax is unable to determine the exact time and duration of each test.

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[3] 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.

Therefore, PyraMax must be flexible in the testing/maintenance schedule to accommodate production requirements.

No alternative operating scenarios have been provided in this assessment. Alternative operating scenarios are not anticipated as the plant equipment are not operating control technologies that will require an emissions bypass during startup operations of the equipment. When starting up equipment there will only be brief startup periods of a short duration, at which time all pollution control equipment will be functioning. Startups will occur on an infrequent basis.

PyraMax has included a site plan in Appendix A of Volume I. The site plan provided represents the layout with the longest route of vehicle traffic (i.e. the longest route that would be traveled from the public road to the raw material unloading site). Other road layouts under consideration would result in shorter distances for on-site vehicle traffic. All plant roads will be paved (either concrete or asphalt).

The vehicle roads will be maintained as required to minimize fugitive emissions. These measures will include periodic sweeping of the on-site roads (including water sprays should conditions require them). PyraMax will also ensure that trucks traveling on-site follow proper procedures to minimize fugitive emissions (e.g. speed, safe operation). Additionally, paving the on-site roads will minimize emissions from vehicle traffic. The trucks will be dump trucks carrying approximately 20 tons of raw material per load. Vehicle traffic will occur from approximately 8AM to 5PM daily.

There are raw material handling operations (unloading, material transfer points) prior to introduction to the process. The raw material contains approximately 20 percent by weight moisture, which greatly reduces the potential for particulate matter emission generation. Therefore, assessment of modeled emissions from such sources was considered unnecessary. Emissions from raw material handling, as well as road traffic, would be estimated to be less than 0.5 ton/yr $PM_{10}/PM_{2.5}$ each.

3. PSD MODELING REQUIREMENTS

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.[4]

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.

As discussed in Volume I, the project triggers PSD requirements for CO, SO_2, NO_X, PM_{10}, and $PM_{2.5}$ due to the emissions of the proposed project as shown in Table 1-1.

Section 3 of this report addresses requirements for evaluating NAAQS, PSD Increment, and additional impacts. These PSD air dispersion modeling analyses were 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 Appendix B to this report.

[4] 40 CFR §81.314

3.1 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. The proposed facility will be considered a major source with respect to the PSD program since potential CO_2e emissions exceed 100,000 tpy. No PSD SIL, NAAQS, or PSD Increments exist for CO_2e.

3.2 SIGNIFICANCE ANALYSIS (CLASS II)

The Class II Significance Analysis is conducted to determine whether the emissions increases associated with the project would cause a significant impact upon the area surrounding the facility. The Significance Analysis is limited to CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$, as these are the only pollutants for which PSD modeling requirements are triggered (see discussions in Section 3.3 regarding ozone). "Significant" impacts are defined by ambient concentration thresholds commonly referred to as the Significance Impact Levels (SILs), shown in Table 3-1.

TABLE 3-1. SIGNIFICANT IMPACT LEVELS, NAAQS, PSD CLASS II INCREMENTS, AND MONITORING DE MINIMIS LEVELS FOR CRITERIA AIR 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
	Annual	1	N/A	17	--
$PM_{2.5}$	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 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). However, these standards are still current in effect.

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 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).

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.

3.3 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.

For the pollutants that exceed the monitoring *de Minimis* levels, PyraMax requests that Georgia EPD waive the pre-construction monitoring requirements of 40 CFR §52.21(m) for this project since background concentration data developed from a statewide study are already available from Georgia EPD and provide suitable estimates of background concentrations. Table 3-2 shows the background concentrations provided by GA EPD for use in this modeling analysis.[5]

TABLE 3-2. BACKGROUND MONITOR VALUES

Pollutant	Averaging Period	Monitor Location	Background Value ($\mu g/m^3$)	Monitoring Period
CO	1-hour 8-hour	Paulding County	943 802	2010
NO_2	1-hour Annual	Paulding County	35.8 5.2	2008-2010
SO_2	1-hour 3-hour 24-hour Annual	Macon SE	67 51.5 16.8 3.89	2008-2010
PM_{10}	24-hour Annual	Bungalow Road, Augusta	38 20	2008-2010
$PM_{2.5}$	24-hour Annual	Bungalow Road, Augusta	25 12.7	2008-2010

1. Background monitor data provided to Jon Hill (Trinity) by Peter Courtney (EPD) via email on July 7, 2011.

[5] Background monitor data provided to Jon Hill (Trinity) by Peter Courtney (EPD) via email on July 7, 2011.

Georgia EPD provided PyraMax with quality-assured 2008-2010 $PM_{2.5}$ background data from the Bungalow Road monitor location in Augusta.[6] This monitor is located approximately 44 km from the proposed facility and is in a suburban area of Augusta.

The form of the $PM_{2.5}$ NAAQS standard allows for the 98th percentile of the 24-hour concentrations (averaged over 3 years) to be used for background. The annual background value is based on the 3-year average of the arithmetic mean.

For $PM_{2.5}$, which is the only pollutant to exceed the monitoring *de Minimis* concentrations, the ambient background concentrations provided by EPD are 12.7 $\mu g/m^3$ and 25.0 $\mu g/m^3$ for annual and 24-hour average concentrations, respectively. These values are added to $PM_{2.5}$ impacts predicted in the modeling analysis conducted to demonstrate compliance with the NAAQS. CO, NO_2, and PM_{10} are below the monitoring *de Minimis* concentrations, and thus no pre-construction monitoring is required.

While the Significance Analysis modeling does not predict NO_2 concentrations greater than the monitoring *de Minimis* levels, the NO_X and VOC project emission increases are greater than 100 tpy, which is the SIL trigger for ozone. As NO_X and VOC are precursors to ozone formation, the project's potential impact on ozone formation is considered. A minimal impact on ozone formation due to NO_X is typically demonstrated through compliance with the NO_2 standard due to the infeasibility of completing a photochemical modeling analysis for a single stationary source. The southeastern U.S. is considered a NO_X-limited atmosphere with respect to ozone formation, and while it is possible that increasing NO_X emissions in a NO_X-limited atmosphere could cause an increase in ozone production, this effect is miniscule on an individual source-level and for practical purposes cannot be quantified, but rather is qualitatively addressed as insignificant for all but the very largest sources.[7] Furthermore, ozone monitor data are readily available from the state-run ozone monitors in Augusta, Georgia, located approximately 44 km from the proposed facility.[8] PyraMax asserts that ozone monitoring is not necessary in light of the magnitude of the NO_X and VOC emissions increases as well as the presence of the existing monitors that are nearby.

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[6] Email from Janet Aldredge (Georgia EPD) to Jon Hill (Trinity) on May 17, 2010.

[7] To appreciate the essentially immeasurable impact on area ozone due to a source such as proposed, consider EPA's detailed findings in the final CAIR rulemaking (generally 70 FR 25162, May 12, 2005). Table VI-12 (p. 25254) shows a base case impact for Atlanta a 1.4 ppb decrease via 2010 CAIR controls. Those 2010 CAIR controls are based on a reduction of 1.2 million tpy of NO_X in the states. Focusing on Georgia reductions alone, which have the largest impact on ozone, a state reduction of 76,819 tpy (combined with reductions in surrounding states) was necessary to impact ozone by 1.4 ppb. Using the relationship of Georgia reductions in NO_X to ozone level reductions, a 400 tpy emissions rate could be expected to impact ozone by 0.007 ppb, which is 0.01% of the 75 ppb NAAQS. Contrast 0.01% with the relative ratios of SIL versus NAAQS. The next lowest ratio for a short-term standard is SO_2 24-hr with a factor of 1.36%, or nearly two orders of magnitude different.

[8] The Bungalow Road monitor in Augusta is located at approximately 238.93 km East and 3635.64 km North, Zone 17, NAD; it is located in a residential suburban area.

3.4 REGIONAL SOURCE INVENTORIES

For off-site pollutant impacts calculated in the Significance Analysis that exceeded the applicable Class II SIL, a Significant Impact Area (SIA) was determined for each pollutant for which an exceedance is predicted. The SIA encompasses a circle centered on the Kings Mill facility with a radius extending out to the (1) furthest location where emissions increases cause a significant ambient impact, or (2) a distance of 50 km, whichever is less. Per USEPA guidance, the results from the 1-hour NO_2 Significance Analysis were averaged by receptor over the five modeled years in order to determine the SIA of 8.7 km for the 1-hour averaging period.[9] The annual results were analyzed for each of the five modeled years in order to determine the SIA of 0.63 km for the annual averaging period. All NO_2 significance analyses included the ARM, using a conservative ratio of 0.8.
The results from the PM_{10} Significance Analysis for each of the five modeled years were analyzed in order to determine the SIA of 1.2 km for the 24-hour averaging period. $PM_{2.5}$ Significance Analysis impacts for the 24-hour and annual averaging periods also exceeded the SIL but due to technical difficulties with the modeling of $PM_{2.5}$, the inventory was developed based on the assumption that PM_{10} is equivalent to $PM_{2.5.}$ The $PM_{2.5}$ SIA for the 24-hour and annual averaging periods are 2.2 km and 1.1 km, respectively. For conservatism, the larger SIA determined for $PM_{2.5}$ was also used for PM_{10}. CO and SO_2 were shown to have impacts below their respective SILs.

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 were 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 was compiled using the procedures provided by Georgia EPD.[10] The first step was to develop an initial list of facilities within 50 km of the SIA, a distance of approximately 53 km (also known as the Significant Impact Distance [SID]).[11] PyraMax used a Geographic Information System (GIS) program to select all counties that fall within 53 km of the proposed facility. PyraMax then identified all sources in these counties using a list of Title V sources provided by Georgia EPD[12], and the Georgia EPD online database of issued air permits.[13] PyraMax reviewed the list of sources and calculated the distance from each facility in the inventory to the proposed facility. Any sources beyond 50 km of the SIA were excluded. The annual NO_2 inventory was also developed in a similar manner. The inventory for annual NO_2 was developed on the conservative use of the SIA of 8.7 km from the 1-hr averaging period SIA determination.

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[9] U.S. EPA, Office of Air Quality Planning and Standards, *Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program,* (Research Triangle Park, NC: U.S. EPA, June 29, 2010).

[10] Recommended Minor and Major Source Criteria Pollutant Inventory Techniques for PSD Modeling Projects Memorandum, as provided by Georgia EPD

[11] PyraMax conservatively utilized an SIA of 3 km for both PM_{10} and $PM_{2.5}$.

[12] Title V Source list provided by Mr. Peter Courtney (Georgia EPD) in an email to Ms. Lori Price (Trinity) on April 27, 2010.

[13] http://www.georgiaair.org

For sources within 50 km of the SIA, PyraMax reviewed the Georgia EPD online Title V database, facility permits available online, and Georgia EPD paper files to determine the potential PM_{10} and NO_2 emissions for each facility. Emissions of $PM_{2.5}$ for identified inventory sources were assumed to be the same as PM_{10}, unless site specific information regarding $PM_{2.5}$ emissions from the sources of interest were available. For these facilities within 50 km of the SIA, the "20D" screening process was applied to exclude insignificant sources.[14] 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) were evaluated cumulatively in the 20D analysis to determine whether the combined "source" was still appropriate to exclude. The 20D procedure was based on an evaluation of NOx emissions from the facility of interest. However, if a source was included and modeled in the emissions inventory the Ambient Ratio Method (ARM) value of 0.8 was applied to the NO_x emissions to estimate emissions of NO_2. The tables in Appendix D list the sources considered in the 20D screening evaluation.

Development of the inventory for the 1-hr NO_2 modeling was based on recent documentation received from Georgia EPD.[15] First, the SIA was determined using a somewhat coarser (spacing greater than 100 m at large distances from the facility) receptor grid to allow larger areal coverage without an overwhelming number of receptors. The grid was made sufficiently large to ensure that the full SIA (plus a buffer) would be captured. Second, the outer distance to which sources were considered for inclusion in the inventory was limited to that supported by the maximum hourly wind speed of 11.28 m/s in the 2006-2010 Augusta/Daniel Field meteorological data. That wind speed yields a maximum transport distance of 40.6 km which was rounded to 41 km in the inventory analysis.

A separate emissions inventory for evaluation of PSD increment was not developed for the project. It was determined that a "worst-case" scenario for evaluation of NO_2 annual increment would involve use of the developed annual NO_2 NAAQS inventory, and compare results to the increment standards. Also, development of a PM_{10} increment inventory is not necessary as the minor source baseline date for Jefferson County has not yet been triggered. This project has not evaluated $PM_{2.5}$ increment as EPD guidance indicated that an evaluation of $PM_{2.5}$ increment consumption for the project is unnecessary provided that the application is deemed complete as of the effective date of the rule, October 20, 2011.[16]

Modeled emission rates and stack parameters for the NAAQS emission inventory sources are shown in tables provided in Appendix D.

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

[15] E-mail from Pete Courtney to Jon Hill, dated July 7, 2011 – Model Receptor Development, Draft EPD Guidance, 6/30/11

[16] Protocol Review comments emailed by Peter Courtney (EPD) to Jon Hill (Trinity) on July 7, 2011.

3.5 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 which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health."[17] Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The objective of the NAAQS analysis is to demonstrate through air quality modeling that emissions from a proposed project do not contribute to or cause an exceedance of the NAAQS at any ambient location. Table 3-1 lists the NAAQS for the criteria pollutants modeled for this project. For NO_2, PM_{10}, and $PM_{2.5}$, a NAAQS analysis is required since the Significance Analysis impacts were above the SILs.

3.5.1 NO_2 NAAQS

The NAAQS analysis included the potential emissions from all proposed emission units at the facility. Impacts attributable to facility-wide emissions were then combined with the impacts attributable to the regional source inventory. The resulting impacts, added to appropriate background concentrations, were assessed against the applicable NAAQS to demonstrate compliance.[18]

The maximum of the annual average concentrations predicted over each of the five years was compared to the NAAQS annual standard for NO_2. For 1-hr NO_2, the form is the 98th percentile of the daily 1-hr maximum averaged across the years of meteorological data. This form is most accurately represented as the average of each of the five years 8th-highest daily maximum 1-hr concentration.[19]

3.5.2 PM_{10} NAAQS

The NAAQS analysis included the potential emissions from all proposed emission units at the facility. Impacts attributable to facility-wide emissions were then combined with the impacts attributable to the regional source inventory. The resulting impacts, added to appropriate background concentrations, were assessed against the applicable NAAQS to demonstrate compliance.[20]

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

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[17] 40 CFR 50.2(b)

[18] 1-hour background concentration of 35.8 $\mu g/m^3$ (from the Paulding County monitor) was provided by Georgia EPD in the protocol response dated July 7, 2011.

[19] Per June 29, 2010, EPA SCRAM Memo, *Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program.*

[20] 24-hour background concentration of 38 $\mu g/m^3$ was provided by Georgia EPD provided by Georgia EPD in the protocol response dated July 7, 2011.

the long model run times associated with running all five meteorological years within one model run.

3.5.3 $PM_{2.5}$ NAAQS

The NAAQS analysis included the potential emissions from all proposed emission units at the facility. Impacts attributable to facility-wide emissions were then combined with the impacts attributable to the regional source inventory. The modeled impacts were added to appropriate background concentrations, and then assessed against the applicable NAAQS to demonstrate compliance.[21]

The maximum of the annual average concentrations predicted over each of the five years was compared to the NAAQS annual standard for $PM_{2.5}$. 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.[22, 23] As such, PyraMax utilized the average of the H1H modeled 24-hour impacts to determine compliance with the NAAQS.

3.6 CLASS II 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 $PM_{2.5}$.[24] The PSD Increments are divided into Class I, II, and III Increments. 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 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 and PM_{10}, from among the five meteorological years were compared against the short-term increments. The highest annual average SO_2, PM_{10}, and NO_x impacts were compared against the annual increments.

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[21] 24-hour background concentration of 25.0 μg/m^3 and annual background concentration of 12.7 μg/m^3 (from the Bungalow Road monitor in Augusta) was provided by Georgia EPD in the protocol response dated July 7, 2011.

[22] 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.

[23] 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.

[24] The $PM_{2.5}$ PSD Increments become effective on October 20, 2011 (i.e., one year after the date of promulgation). As it is presumed that the application for the facility will be deemed complete by October 20, 2011 no $PM_{2.5}$ increment evaluation was necessary.

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 chance 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. The minor source baseline date for Jefferson County was established as January 10, 2002 for annual NO_2.

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 were modeled and assessed cumulatively against the PSD Increments for annual NO_2. PyraMax conservatively utilized the NAAQS inventory for annual NO_2 for the PSD Increment Analysis and did not consider increment expansion from shutdown emission sources. Inventory sources were not accounted for in the PM_{10} increment evaluation as submittal of this application will trigger the minor source baseline date for Jefferson County.

3.7 CLASS I REQUIREMENTS

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. Two principal air quality impacts are considered for Class I areas: PSD Increments for NO_2, SO_2, PM_{10}, $PM_{2.5}$ and air quality related values (AQRV).

In general, all PSD permit applications are required to demonstrate through air quality modeling that the emissions increases from the proposed project will not cause or contribute to any violations of allowable increments within potentially affected Class I areas, which are protected to a greater degree (i.e., the allowable increments are lower) than Class II areas. A significant contribution to Class I Increment consumption is defined as a modeled concentration in excess of the SILs summarized in Table 3-3. These SILs, which were originally developed as part of the 1996 New Source Review (NSR) reform rulemaking, have been accepted by states and Federal Land Managers (FLM) as an indication of whether a project is likely to cause or contribute to a Class I increment violation. As it is presumed that the application for the facility will be deemed complete by October 20, 2011 no $PM_{2.5}$ increment evaluation was necessary.

TABLE 3-3. CLASS I PSD MODELING SIGNIFICANCE LEVELS

Pollutant	Averaging Period	Class I PSD SIL ($\mu g/m^3$)
SO_2	3-Hr	1.00
	24-Hr	0.20
	Annual	0.08
PM_{10}	24-Hr	0.32
	Annual	0.20
NO_2	Annual	0.1

In addition to the Class I Increment, the proposed project may be evaluated for its potential impact on AQRV at potentially-affected Class I areas. The FLM for Class I areas have the responsibility to protect AQRV and to consider, in consultation with the permitting authority, whether a proposed major emitting facility will have an adverse impact on such values. AQRV typically considered include visibility and deposition of sulfur and nitrogen.

PyraMax has qualitatively evaluated its impacts on federally-protected Class I areas by performing a Q/D screening analysis consistent with the FLM's AQRV Work Group (FLAG) 2010 guidance, which compares the ratio of visibility affecting pollutant emissions to the distance from the Class I area.[25] The analysis suggests that the proposed project will have no presumptive adverse impacts to any AQRVs at near-by Class I areas; therefore, PyraMax plans no AQRV analyses for the proposed project.

PyraMax has submitted a request for concurrence to the appropriate FLMs on the findings for the nearby Class I areas.[26,27,28] Copies of the letters to the FLMs presenting the Q/D screening analysis are included in Appendix H.

In order to assure that the proposed project does not contribute to exceedances of the Class I Increment standards at any of the above Class I areas, PyraMax performed a screening analysis for Class I Increment. Following the procedure outlined by Georgia EPD, PyraMax modeled 360 receptors located 50 km from the facility (the maximum recommended range of AERMOD)

[25] 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.

[26] Letter from Mr. Justin Fickas (Trinity) to Mr. Bill Jackson (USDA Forest Service), dated July 26, 2011.

[27] Letter from Mr. Justin Fickas (Trinity) to Ms. Catherine Collins (US Fish and Wildlife Service), dated July 26, 2011.

[28] Letter from Mr. Justin Fickas (Trinity) to Mr. John Notar (US National Park Service), dated July 26, 2011.

surrounding the facility. This receptor grid is shown in Figure A-8 in Appendix A. The results from these receptors are compared against the proposed Class I SILs in Table 3-3 to demonstrate whether the project emissions would contribute to an exceedance of the Class I Increment. Results are summarized in below.

TABLE 3-4. RESULTS OF CLASS I SCREENING ANALYSIS

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceeds SIL? (Yes/No)
SO_2	3-Hr	0.308	1.00	No
	24-Hr	0.104	0.20	No
	Annual	0.006	0.08	No
PM_{10}	24-Hr	0.180	0.32	No
	Annual	0.013	0.20	No
NO_2	Annual	0.018	0.1	No

3.8 ADDITIONAL IMPACTS ANALYSIS

PSD regulations require that three additional impacts be considered as part of a PSD permit action. These are a growth analysis, a soil and vegetation analysis, and a visibility analysis. The effect of the proposed project's PM_{10}, $PM_{2.5}$, NO_2, and CO emissions on local soils and vegetation is addressed through comparison of modeled impacts to secondary NAAQS and other relevant screening criteria that have been developed by EPA to provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings.[29] PSD regulations require that three additional impacts be considered as part of a PSD permit action. These are a growth analysis, a soil and vegetation analysis, and a visibility analysis.

The effect of the proposed project's PM_{10}, $PM_{2.5}$, NO_2, and CO emissions on local soils and vegetation is addressed through comparison of modeled impacts to secondary NAAQS and other relevant screening criteria that have been developed by EPA to provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings.[30]

A growth analysis is intended to quantify the amount of new growth that is likely to occur in support of the facility and to estimate emissions resulting from associated growth. Associated growth includes residential and commercial/industrial growth resulting from the new facility. Residential

[29] EPA, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals* (EPA 450/2-81-078). 1980.

[30] Ibid.

growth depends on the number of new employees and the availability of housing in the area, while associated commercial and industrial growth consists of new sources providing services to the new employees and the facility. The facility will have approximately 66 employees. These employees will be drawn from the local employment pool as the area selected for the site has high unemployment. Therefore, additional growth will be minimal, if at all, as the existing infrastructure is already in place. The clay raw material will be sourced from an existing mine. There will be increased truck traffic between the mine site and the proposed facility location; however, the increase expected from this project (compared to intrinsic growth without the facility) will be minimal as the industry has grown at a consistent pace. The closest mine location supplying materials to the site for potential use would be expected to be outside the SIA for all pollutant averaging periods.

Visibility analyses for Class II areas are not necessary for this project, as no airstrips, state parks, or State Historic Sites are located within the project's Significant Impact Area (SIA) for non 1-hr NAAQS related pollutants. Recent guidance issued by the Georgia EPD has indicated that, in terms of a Class II visibility analysis, receptors of interest (i.e. State Parks, Historic Sites, airports) that fall within the largest SIA of pollutants considered by the VISCREEN model need to be considered [31].

[31] E-mail from Pete Courtney to Jon Hill, dated July 7, 2011 – Additional Impact Air Quality Analysis, Draft EPD Guidance, 6/14/11.

4. MODEL SELECTION AND METHODOLOGY

This section includes a summary of the modeling methodology originally presented in dispersion modeling protocol previously submitted,[32] and approved by Georgia EPD.[33] Copies of the protocol letter and EPD comment letter (with responses to comments) are included in Appendix G.

4.1 MODELED EMISSION SOURCES

As discussed in Section 3 of this report, the Significance and NAAQS modeling analyses have different objectives and therefore, include distinct sets of emission sources and/or emission rates in the analyses. In short, the Significance Analysis evaluates the emission increases associated with the project while the NAAQS Analysis evaluates all emission sources currently in operation. This section discusses the emission sources and rates included in each of these analyses.

4.1.1 FACILITY MODELED SOURCES

Table 4-1 presents a summary of the facility modeled sources and emission rates included in the Significance Analysis and NAAQS and Increment Analysis. These modeled rates are consistent with the emission rates for the sources of interest as provided in the calculations in Appendix C of Volume I of the application, and are representative of the proposed BACT emission limits for the sources of interest. Note that the NO_2 emission rates have the ARM applied, using the 0.8 ratio proposed in recent USEPA guidance.

[32] Letter from Mr. Jonathan Hill (Trinity) to Mr. Peter Courtney (Georgia EPD), dated June 20, 2011.

[33] Written approval provided in correspondence from Mr. Peter Courtney (Georgia EPD) to Mr. Jonathan Hill (Trinity) dated July 7, 2011.

Table 4-1. Modeled Facility Sources List

Modeled Stack ID	Source Description	Modeled Emission Rates (lb/hr)					
		PM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO
Line 1							
16121573	Weigh Bin Bin Vent Filter	0.002	0.002	0.001	-	-	-
16121580	Loading Operations Baghouse	0.690	0.690	0.363	-	-	-
16121521	Silo #1 Bin Vent Filter	0.010	0.010	0.005	-	-	-
16121531	Silo #2 Bin Vent Filter	0.010	0.010	0.005	-	-	-
16121541	Silo #3 Bin Vent Filter	0.010	0.010	0.005	-	-	-
16121551	Silo #4 Bin Vent Filter	0.010	0.010	0.005	-	-	-
16121561	Silo #5 Bin Vent Filter	0.010	0.010	0.005	-	-	-
15121488	Final Product Screening and QC Baghouse	0.371	0.371	0.195	-	-	-
14121412	Kiln Baghouse	8.531	8.531	6.982	11.6	29.0	55.5
13121215	Green Pellet Screening Baghouse	0.321	0.321	0.169	-	-	-
14121486	Kiln Recycle Feed Bin Vent Filter	0.010	0.010	0.005	-	-	-
13121224	Dry Milling Baghouse	0.001	0.001	0.000	-	-	-
12121141	Pelletizer Baghouse	7.699	7.699	4.257	0.045	1.80	13.7
12121163	Feed Bin Vent Filter	0.002	0.002	0.001	-	-	-
12121170	Baghouse Kiln Dust Recycle to Feed Bin	0.032	0.032	0.017	-	-	-
B1	Boiler 1	0.075	0.075	0.075	0.006	1.11	0.107
S1a	Sodium Bicarbonate Silo Bin Vent Filter	0.021	0.021	0.011	-	-	-
S1b	Fly Ash Silo Bin Vent Filter	0.086	0.086	0.045	-	-	-
PVA1	Additive Silo Bin Vent Lines 1 and 2	0.021	0.021	0.011	-	-	-
Line 2							
26121573	Weigh Bin Bin Vent Filter	0.002	0.002	0.001	-	-	-
26121580	Loading Operations Baghouse	0.690	0.690	0.363	-	-	-
26121521	Silo #1 Bin Vent Filter	0.010	0.010	0.005	-	-	-
26121531	Silo #2 Bin Vent Filter	0.010	0.010	0.005	-	-	-
26121541	Silo #3 Bin Vent Filter	0.010	0.010	0.005	-	-	-
26121551	Silo #4 Bin Vent Filter	0.010	0.010	0.005	-	-	-
26121561	Silo #5 Bin Vent Filter	0.010	0.010	0.005	-	-	-
25121488	Final Product Screening and QC Baghouse	0.371	0.371	0.195	-	-	-
24121412	Kiln Baghouse	8.531	8.531	6.982	11.6	29.0	55.5
23121215	Green Pellet Screening Baghouse	0.321	0.321	0.169	-	-	-
24121486	Kiln Recycle Feed Bin Vent Filter	0.010	0.010	0.005	-	-	-
23121224	Dry Milling Baghouse	0.001	0.001	0.000	-	-	-
22121141	Pelletizer Baghouse	7.699	7.699	4.257	0.045	1.80	13.7
22121163	Feed Bin Vent Filter	0.002	0.002	0.001	-	-	-
22121170	Baghouse Kiln Dust Recycle to Feed Bin	0.032	0.032	0.017	-	-	-
B2	Boiler 2	0.075	0.075	0.075	0.006	1.11	0.107
S2a	Sodium Bicarbonate Silo Bin Vent Filter	0.021	0.021	0.011	-	-	-
S2b	Fly Ash Silo Bin Vent Filter	0.086	0.086	0.045	-	-	-

4.2 Selection of Model

The latest version (11103) of the AERMOD modeling system was used to estimate maximum ground-level concentrations in all air pollutant 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 for this type of air quality analysis.[34] 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

[34] 40 CFR Part 51, Appendix W–*Guideline on Air Quality Models*, Appendix A.1– AMS/EPA Regulatory Model (AERMOD).

determined by the Building Profile Input Program, PRIME (BPIP PRIME), version 04274.[35] 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.[36]

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 Database (NED) data available from the USGS are utilized to interpolate surveyed elevations onto user-specified receptor grids and buildings and sources in the absence of more accurate site-specific 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 particular facility and/or meteorological site. By feeding raw surface and upper air station NWS observation data to AERMET, a complete set of model-ready meteorological data specific to this project was created. The details of the AERMET processing are provided in Section 4.3 below.

The *BREEZE*®-AERMOD Pro software, developed by Trinity Consultants, was used to assist in developing the model input files for AERMOD. These software programs incorporate and utilize the most recent EPA versions of AERMOD (dated 11103) and AERMAP (dated 11103) to estimate ambient impacts from the modeled sources. Following procedures outlined in the *Guideline*, the AERMOD modeling was performed using all regulatory default options.

4.3 METEOROLOGICAL DATA AND LAND USE REPRESENTATIVENESS

The U.S. EPA's federal *Guideline on Air Quality Models*, codified at 40 CFR Part 51, Appendix W, states in Section 9.3.1.2, "Meteorological Input Data – Recommendations" that:

> *… five years of representative meteorological data should be used when estimating concentrations with an air quality model. Consecutive years from the most recent, readily available 5-year period are preferred. The meteorological data may be collected either onsite or at the nearest National Weather Service (NWS) station.*

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

[36] 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.

The meteorological data that are "representative" for a particular facility are typically determined subjectively, and the *Guideline* offers the following guidance in Section 9.3(a).

> *The meteorological data … should be selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the individual parameters selected to characterize the transport and dispersion conditions in the area of concern. The representativeness of the data is dependent on: (1) the proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected. The spatial representativeness of the data can be adversely affected by large distances between the source and receptors of interest and the complex topographic characteristics of the area.*

Georgia EPD provided PyraMax with AERMOD meteorological data files for the Daniel Field NWS station in Augusta, Georgia.[37] These files, including the 1-minute ASOS wind observations, had already been processed using the latest version of AERMET (11103). As such, no AERMET processing was required to be performed by PyraMax. Instead, PyraMax conducted a land use representativeness analysis to demonstrate that the meteorological data is appropriate for use with the proposed Kings Mill facility. Based on the analysis included in Appendix C, the Daniel Field (DNL) NWS station is representative of the conditions at the Kings Mill facility and provides a suitable match. Thus, meteorological data based surface observations from Daniel Field (station 13837) and upper air measurements from Peachtree City (station 53819) for the 2006-2010 time period were used for all AERMOD modeling analyses. The height of the meteorological profile base (met station elevation above sea-level, used in computation of the potential temperature) is listed on the National Climatic Data Center (NCDC) website as 423 ft (129 meters).

4.4 RECEPTOR GRID COORDINATE SYSTEM

For this air dispersion modeling analysis, ground level concentrations were calculated at receptors placed along the fence line and on a Cartesian receptor grid. Appendix A contains plots of each of the receptor grids described below. Fence line receptors were spaced 100 meters apart, as specified in the guidance document provided by Georgia EPD.[38] Beyond the fence line, receptors are spaced 100 meters apart in a Cartesian grid extending out 5 km for SO_2, PM_{10}, $PM_{2.5}$, and CO for the significance analysis. For NO_2, a variable density Cartesian grid was utilized with 100 m spacing extending to 2 km, 250 m spacing extending from 2 km to 5 km, and 500 m spacing extending to 5 to 10 km.

For the full NAAQS analyses, modeling need only be conducted for receptors where the project could potentially show a significant impact (modeled concentration in excess of the SIL); however, the full

[37] AERMET files provided via email to Mr. Jonathan Hill (Trinity) by Mr. Peter Courtney (Georgia EPD) on June 30, 2011.

[38] Guidance on model receptor development provided via email to Mr. Jonathan Hill (Trinity) by Mr. Peter Courtney (Georgia EPD) on June 30, 2011.

significance grid was conservatively included in all analyses with the exception of the 1-hour NO2 NAAQS demonstration.

The 1-hour NO_2 NAAQS analysis included three different sets of modeled receptors. The significance grid consisted of the variable density Cartesian grid described above. From that grid, only those receptors with modeled concentrations in excess of the SIL plus a buffer (all concentrations in excess of 7 $\mu g/m^3$) were included. Since the 1-hour NO_2 NAAQS analysis showed potential modeled violations in areas where the receptor spacing was coarser than 100 m resolution, a third receptor set was generated to ensure that the proposed facility was insignificant at each violating receptor. This receptor set was created by fitting a polygon around the areas of concern and generating 100 m spaced receptors within that polygon.

As previously described the evaluation of Class I Increment (via a significance analysis) was completed by using a polar ring of receptors (with radial distance of 1 degree to maintain resolution below 1 km) located at a distance of 50 km from the project site.

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.[39] NED data are freely available from the USGS via its National Map Viewer.[40] The map allows a user to interactively view and download geographic data from the USGS and other government agencies. AERMAP uses elevation data files to determine the terrain profiles around the receptors (where impacts are calculated). The NED data (at 1 arc-second resolution) was selected based on approximate geographic coordinates of the facility and extended more than 50 km out from the proposed site. Copies of the NED files are included on the CD in Appendix E. Plots of the receptor location and elevations are included in Appendix A.

In all modeling analysis data files, the locations of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. The proposed facility will be located at approximately 372.4 kilometers east and 3,670.8 kilometers north in Zone 17 (North American Datum 1983, NAD 83).

4.5 BUILDING DOWNWASH

The emission units at the proposed facility were evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures leading to downwash of the plumes. Wind blowing around a building creates zones of turbulence that are greater than if the building were absent. The current version of the AERMOD dispersion model treats building wake effects following the algorithms

[39] NED obtained from USGS: http://nmviewogc.cr.usgs.gov/viewer.htm

[40] http://nmviewogc.cr.usgs.gov/viewer.htm

developed by Schulman and Scire.[41] This approach requires the modeler to input wind direction-specific building dimensions for structures located within 5*L* of a stack, where *L* is the lesser of the height or projected width of a nearby structure. Stacks taller than the structure height plus 1.5*L* are not subject to the effects of downwash in the AERMOD model.

For these modeling analyses, the direction-specific building dimensions used as input to the AERMOD model were calculated using the U.S. EPA sanctioned Building Profile Input Program, PRIME version (BPIP PRIME), version 04274, as incorporated in the *BREEZE®AERMOD Pro* software, developed by Trinity. 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.[42]

Output from the BPIP PRIME downwash analysis is provided in the electronic files included with this report in Appendix E. The output contains a summary of the dominant structure for each emissions unit and the actual building height and projected widths for all wind directions. Building downwash was not considered for any regional sources for the NAAQS analyses.

4.6 REPRESENTATION OF EMISSION SOURCES

4.6.1 COORDINATE SYSTEM

In all modeling analysis input and output files, the location of emission sources, structures, and receptors will be represented in the UTM coordinate system. The proposed facility will be located at approximately 372.4 km east and 3,670.8 km north in Zone 17 (NAD 83).

4.6.2 SOURCE TYPES

The AERMOD dispersion model allows for emissions units to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases, it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) in the modeling analyses. All of the facility sources were modeled as point sources using actual stack parameters. Table 4-2 details the source parameters for all sources.

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

[42] 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.

TABLE 4-2. FACILITY SOURCES MODELED PARAMETERS

Modeled Stack ID	Source Description	Pollutant	Stack Height (m)	Exhaust Temp. (K)	Exhaust Velocity (m/s)	Stack Diameter (m)
Line 1						
16121573	Weigh Bin Bin Vent Filter	$PM_{10}/PM_{2.5}$	16.76	293	2.27	0.10
16121580	Loading Operations Baghouse	$PM_{10}/PM_{2.5}$	30.48	293	15.14	0.76
16121521	Silo #1 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
16121531	Silo #2 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
16121541	Silo #3 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
16121551	Silo #4 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
16121561	Silo #5 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
15121488	Final Product Screening and QC Baghouse	$PM_{10}/PM_{2.5}$	44.20	293	15.14	0.56
14121412	Kiln Baghouse	ALL	91.44	399	9.32	1.88
13121215	Green Pellet Screening Baghouse	$PM_{10}/PM_{2.5}$	48.77	293	15.85	0.51
14121486	Kiln Recycle Feed Bin Vent Filter	$PM_{10}/PM_{2.5}$	45.72	293	12.81	0.10
13121224	Dry Milling Baghouse	$PM_{10}/PM_{2.5}$	45.72	293	0.93	0.51
12121141	Pelletizer Baghouse	ALL	76.20	366	18.62	1.83
12121163	Feed Bin Vent Filter	$PM_{10}/PM_{2.5}$	45.72	293	7.28	0.10
12121170	Baghouse Kiln Dust Recycle to Feed Bin	$PM_{10}/PM_{2.5}$	45.72	293	10.51	0.20
B1	Boiler 1	ALL	18.29	466	13.70	0.69
S1a	Sodium Bicarbonate Silo Bin Vent Filter	$PM_{10}/PM_{2.5}$	16.76	293	1.20	0.50
S1b	Fly Ash Silo Bin Vent Filter	$PM_{10}/PM_{2.5}$	16.76	293	4.81	0.50
PVA1	Additive Silo Bin Vent Lines 1 and 2	$PM_{10}/PM_{2.5}$	16.76	293	1.20	0.50
Line 2						
26121573	Weigh Bin Bin Vent Filter	$PM_{10}/PM_{2.5}$	16.76	293	2.27	0.10
26121580	Loading Operations Baghouse	$PM_{10}/PM_{2.5}$	30.48	293	15.14	0.76
26121521	Silo #1 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
26121531	Silo #2 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
26121541	Silo #3 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
26121551	Silo #4 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
26121561	Silo #5 Bin Vent Filter	$PM_{10}/PM_{2.5}$	30.48	293	12.81	0.10
25121488	Final Product Screening and QC Baghouse	$PM_{10}/PM_{2.5}$	44.20	293	15.14	0.56
24121412	Kiln Baghouse	ALL	91.44	399	9.32	1.88
23121215	Green Pellet Screening Baghouse	$PM_{10}/PM_{2.5}$	48.77	293	15.85	0.51
24121486	Kiln Recycle Feed Bin Vent Filter	$PM_{10}/PM_{2.5}$	45.72	293	12.81	0.10
23121224	Dry Milling Baghouse	$PM_{10}/PM_{2.5}$	45.72	293	0.93	0.51
22121141	Pelletizer Baghouse	ALL	76.20	366	18.62	1.83
22121163	Feed Bin Vent Filter	$PM_{10}/PM_{2.5}$	45.72	293	7.28	0.10
22121170	Baghouse Kiln Dust Recycle to Feed Bin	$PM_{10}/PM_{2.5}$	45.72	293	10.51	0.20
B2	Boiler 2	$PM_{10}/PM_{2.5}$	18.29	466	13.70	0.69
S2a	Sodium Bicarbonate Silo Bin Vent Filter	$PM_{10}/PM_{2.5}$	16.76	293	1.20	0.50
S2b	Fly Ash Silo Bin Vent Filter	$PM_{10}/PM_{2.5}$	16.76	293	4.81	0.50

4.6.3 GEP STACK HEIGHT ANALYSIS

The U.S. 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. The GEP height of a stack is the greater of (1) 65 meters (measured from the base elevation of the stack) and (2) the value returned from the following equation: [43]

$H_{GEP} = H + 1.5L$, where:

H_{GEP} = minimum GEP stack height,
H = structure height, and
L = lesser dimension of the structure (height or projected width).

Under the regulations, that portion of a stack that is in excess of the GEP stack height is generally not creditable when modeling to determine source impacts, preventing the use of excessively tall stacks to reduce ground-level pollutant concentrations. Stacks that have a release height lower than their GEP value were modeled at their actual release height.

A GEP analysis was conducted for each facility stack included in these modeling analyses using BPIP. All point source stacks were below 65 meters in height with the exception of the kiln and pelletizer baghouses. The BPIP output file demonstrates that the stack heights for these sources are less than their GEP values. Therefore, all stacks were modeled at the actual release heights.

4.7 CLASS I AREAS MODELING METHODOLOGY

Per Georgia EPD guidance, PyraMax assessed the Class I area significance by creating a receptor grid with composed of 360 located approximately 50 km from the project site in all directions. Figure A-8 illustrates the locations of the receptors.

[43] 40 CFR 51.100(ii).

This section summarizes the results of the Class II dispersion modeling analyses and demonstrates that the proposed facility does not cause or contribute to an exceedance of the NAAQS or Class II Increment. Electronic copies of modeling files are included on a CD-ROM in Appendix E.

5.1 SIGNIFICANCE ANALYSIS

5.1.1 CLASS II SIGNIFICANCE ANALYSIS

As discussed in Section 3, a Significance Analysis was conducted to determine the need for further pollutant modeling. The results of the Significance Analysis for each pollutant are provided in Table 5-1 through Table 5-5. A comparison of the significance modeling results and the monitoring *de Minimis* levels is shown in Table 5-6.

TABLE 5-1. CO SIGNIFICANCE RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Max Conc. (μg/m^3)	SIL (μg/m^3)	Exceeds SIL?	SIA (km)
1-Hour	2006	372.29	3,671.98	47.6	2,000	No	N/A
	2007	372.89	3,671.28	43.7	2,000	No	
	2008	372.99	3,671.28	45.6	2,000	No	
	2009	371.79	3,669.68	50.3	2,000	No	
	2010	373.29	3,671.78	54.2	2,000	No	
	MAX	373.29	3,671.78	54.2	2,000	No	
8-Hour	2006	372.89	3,671.28	26.1	500	No	N/A
	2007	372.79	3,671.58	23.0	500	No	
	2008	371.69	3,670.48	28.3	500	No	
	2009	372.09	3,670.08	27.6	500	No	
	2010	372.69	3,671.48	22.5	500	No	
	MAX	371.69	3,670.48	28.3	500	No	

TABLE 5-2. NO2 CLASS II SIGNIFICANCE RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Max Conc. (μg/m^3)	SIL (μg/m^3)	Exceeds SIL?	SIA (km)
1-Hour[1]	2006-2010	372.08	3,670.71	43.40	7.5	Yes	8.70
Annual	2006	372.80	3,671.10	1.02	1	Yes	0.63
	2007	372.00	3,671.10	1.02	1	Yes	
	2008	372.76	3,670.98	0.95	1	No	
	2009	372.60	3,671.10	0.94	1	No	
	2010	372.60	3,671.10	1.19	1	Yes	
	MAX	372.60	3,671.10	1.19	1	Yes	

1. 5-year average H1H.

TABLE 5-3. SO2 CLASS II SIGNIFICANCE RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Max Conc. (μg/m^3)	SIL (μg/m^3)	Exceeds SIL?	SIA (km)
1-Hour[1]	2006-2010	372.69	3,671.78	7.13	7.8	No	N/A
3-Hour	2006	372.89	3,671.58	6.02	25	No	N/A
	2007	372.69	3,671.58	6.12	25	No	
	2008	372.49	3,671.58	6.43	25	No	
	2009	372.69	3,671.58	5.91	25	No	
	2010	372.79	3,671.88	5.26	25	No	
	MAX	372.49	3,671.58	6.43	25	No	
24-Hour	2006	372.99	3,671.28	1.81	5	No	N/A
	2007	371.69	3,670.48	1.88	5	No	
	2008	371.69	3,670.48	2.57	5	No	
	2009	371.79	3,670.28	2.13	5	No	
	2010	372.69	3,671.28	1.74	5	No	
	MAX	371.69	3,670.48	2.57	5	No	
Annual	2006	372.89	3,671.18	0.25	1	No	N/A
	2007	372.89	3,671.18	0.23	1	No	
	2008	372.89	3,671.18	0.22	1	No	
	2009	372.89	3,671.28	0.19	1	No	
	2010	372.92	3,670.69	0.26	1	No	
	MAX	372.92	3,670.69	0.26	1	No	

1. 5-year average H1H.

TABLE 5-4. PM10 CLASS II SIGNIFICANCE RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Max Conc. (μg/m^3)	SIL (μg/m^3)	Exceeds SIL?	SIA (km)
24-Hour	2006	372.69	3,671.38	6.81	5	Yes	1.18
	2007	372.69	3,671.38	9.39	5	Yes	
	2008	372.69	3,671.28	8.74	5	Yes	
	2009	372.19	3,670.54	7.60	5	Yes	
	2010	372.59	3,671.18	8.20	5	Yes	
	MAX	372.69	3,671.38	9.39	5	Yes	

TABLE 5-5. PM2.5 CLASS II SIGNIFICANCE RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Max Conc. ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceeds SIL?	SIA (km)
24-Hour	AVG	372.69	3,671.38	4.64	1.2	Yes	2.24
Annual	2006	372.68	3,671.04	0.64	0.3	Yes	1.14
	2007	372.68	3,671.04	0.61	0.3	Yes	
	2008	372.68	3,671.04	0.59	0.3	Yes	
	2009	372.08	3,671.14	0.59	0.3	Yes	
	2010	372.76	3,670.98	0.72	0.3	Yes	
	MAX	372.76	3,670.98	0.72	0.3	Yes	

As shown in the tables above, only NO_2, PM_{10}, and $PM_{2.5}$ exceed the Class II SILs, requiring further analysis to demonstrate compliance with NAAQS and Class II Increment (where established). CO and SO_2 are below the SILs, and no further modeling is required to demonstrate compliance with the air quality standards.

TABLE 5-6. COMPARISON AGAINST MONITORING DE MINIMIS LEVELS

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Max. Conc. ($\mu g/m^3$)	Monitoring *De Minimis* ($\mu g/m^3$)	Exceeds *De Minimis*?
CO	8-hour	2010	371.69	3,670.48	28.3	575	No
SO_2	24-hour	2006-2010	327.69	3,674.78	7.13	13	No
NO_2	Annual	2008	371.69	3,670.48	2.57	14	No
PM_{10}	24-hour	2007	372.69	3,671.38	9.38	10	No
$PM_{2.5}$	24-hour	2010	372.69	3,671.38	5.34	4	Yes

The modeled impacts of $PM_{2.5}$ exceed the monitoring *de Minimis* levels. As discussed in Section 3.3, PyraMax requests that Georgia EPD waive the pre-construction monitoring requirements of 40 CFR §52.21(m) for this project since ambient monitoring data are already available from suitable monitoring stations.

5.2 NAAQS ANALYSIS

The NAAQS Analysis for NO_2, PM_{10}, and $PM_{2.5}$ was conducted using the approach described in Section 3 with the emissions and stack parameter data shown in Table 4-1 and Table 4-2 for the facility proposed emissions sources and Appendix D for regional sources.

5.2.1 NO_2 NAAQS

In order to receive a PSD permit, a proposed PSD project must be determined to not "cause or contribute" to a PSD Increment or NAAQS violation. According to U.S. EPA's *Draft New Source Review Workshop Manual*, the impacts from the project's "net emissions increase" are not considered to be causing or contributing to an exceedance when emissions levels are insignificant.[44] Table 5- illustrates the results from the NO_2 NAAQS analyses, indicating that potential exceedances of the 1-hour NAAQS may occur.

TABLE 5-7. NO2 NAAQS RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Modeled Conc. ($\mu g/m^3$)	Bkg. Conc. ($\mu g/m^3$)	Total Ambient Conc.[2] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Exceeds NAAQS?
1-Hour	2006-2010	376.65	3,675.30	152.04[a]	36	187.8	188	No
Annual	2006	372.80	3,671.10	2.32	5.20	7.52	100	No
	2007	372.00	3,671.10	2.18	5.20	7.38	100	No
	2008	372.80	3,671.00	2.09	5.20	7.29	100	No
	2009	372.01	3,671.07	2.89	5.20	8.09	100	No
	2010	372.60	3,671.10	3.35	5.20	8.55	100	No
	MAX	372.60	3,671.10	3.35	5.20	8.55	100	No

[a] 1-hour impact shown is the highest compliance concentration at a significant receptor location.

As previously described, there were modeled violations of the 1-hour NO_2 NAAQS. In order to minimize the number of violations required to be analyzed, the modeled receptor set was limited to only those locations where the PyraMax facility was shown to have a potentially significant impact (concentrations in excess of 7 $\mu g/m^3$). To assess whether the proposed project caused or contributed to any modeled 1-hour NAAQS exceedances, PyraMax first used the MAXIFILE and EVENTFILE options inherent to AERMOD to identify those receptors and hours (i.e., receptor-events) during which the modeled impacts were in excess for the NAAQS (less background, 152.2 $\mu g/m^3$ in this case). This option generates a new AERMOD input file that contains only those receptor-events in excess of the NAAQS. The impacts from those receptor-events were then reviewed to determine whether the Kings Mill facility was significant at any of those receptor-events (i.e., the Kings Mill facility impacts were greater than the SIL). Based on the evaluations, conducted on a year-by-year basis (i.e., not considering the reduction in predicted impact caused by computing the five-year average), PyraMax determined that the proposed Kings Mill facility was not significant at any of those receptor-events and therefore, by definition, cannot cause or contribute to a NAAQS violation at those receptor-events, even when considering the impacts on a year-by-year (versus averaged over five years) basis.

[44] U.S. EPA, Office of Air Quality Planning and Standards, *Draft New Source Review Workshop Manual*, (Research Triangle Park, NC: U.S. EPA, October 1990).

Spreadsheets containing all of the receptor-events potentially exceeding the NAAQS are included on the CD-ROM in Appendix E.

5.2.2 PM_{10} NAAQS

To demonstrate compliance with the NAAQS, the combined modeled impacts of the facility and regional inventory sources were added to appropriate background concentrations and compared against the applicable NAAQS. Table 5- illustrates the results from the PM_{10} NAAQS analyses, indicating that potential exceedances of the 24-hour NAAQS do not occur.

TABLE 5-8. PM10 NAAQS RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Modeled Conc. (µg/m³)	Bkg. Conc. (µg/m³)	Total Ambient Conc. (µg/m³)	NAAQS (µg/m³)	Exceeds NAAQS?
24-Hour H2H	2006	371.59	3,670.58	6.76	38.0	44.8	150	No
	2007	372.69	3,671.28	7.44	38.0	45.4	150	No
	2008	371.69	3,670.58	7.78	38.0	45.8	150	No
	2009	371.99	3,670.68	6.91	38.0	44.9	150	No
	2010	372.69	3,671.28	7.78	38.0	45.8	150	No
	MAX	371.69	3,670.58	7.78	38.0	45.8	150	No

5.2.3 $PM_{2.5}$ NAAQS

To demonstrate compliance with the NAAQS, the combined modeled impacts of facility and regional inventory sources were added to appropriate background concentrations and compared against the applicable NAAQS. Table 5- illustrates the results from the $PM_{2.5}$ NAAQS analyses, indicating that potential exceedances of the 24-hour and annual NAAQS do not occur.

TABLE 5-9. PM2.5 NAAQS RESULTS

Averaging Period	Year	UTM East (km)	UTM North (km)	Modeled Conc. (μg/m^3)	Bkg. Conc. (μg/m^3)	Total Ambient Conc. (μg/m^3)	NAAQS (μg/m^3)	Exceeds NAAQS?
24-Hour[1]	AVG	371.79	3,670.58	5.41	25.3	30.7	35	No
Annual	2006	372.68	3,671.04	0.85	12.7	13.5		
	2007	372.68	3,671.04	0.80	12.7	13.5		
	2008	372.68	3,671.04	0.79	12.7	13.5		
	2009	372.08	3,671.14	0.86	12.7	13.6		
	2010	372.76	3,670.98	0.92	12.7	13.6		
	MAX	372.76	3,670.98	0.92	12.7	13.6	15	No

1. Highest first-high (H1H) modeled impact.

5.3 PSD INCREMENT ANALYSIS

The PSD Increment Analysis for NO_X and PM_{10} was conducted using the approach described in Section 3 with the emissions and stack parameter data shown in Table 4-1 and Table 4-2 for the facility emissions sources and Appendix D for regional sources. The modeling results presented in Table 5-10demonstrate that the proposed facility will not cause or contribute to an exceedance of the PSD Increment for any NO_X or PM_{10}.

TABLE 5-10. INCREMENT ANALYSIS RESULTS

Pollutant	Averaging Period	UTM East (km)	UTM North (km)	Modeled Year	Modeled Concentration (μg/m^3)	Increment (μg/m^3)	Exceeds Increment? (Yes/No)
NO_2	Annual	372.6	3,671.1	2010	3.35	25	No
PM_{10}	24-Hour	371.7	3,670.6	2008	7.78	30	No
	Annual	372.8	3,671.0	2010	1.39	17	No

5.4 ADDITIONAL IMPACTS

To address potential soil and vegetation impacts, two comparisons were used. First, the NAAQS results (or significance results if SILs were not reached) were assessed against the secondary NAAQS standards, which provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. The NAAQS analysis includes emissions from all facility sources and regional inventory sources.

Additionally, NAAQS impacts (or Significance Analysis impacts for pollutants not requiring full NAAQS analyses be completed) and/or air toxics impacts were also compared against conservative screening levels provided by EPA specifically to address potential soil and vegetation impacts.[45]

Table 5-7 shows that no impacts exceed the secondary NAAQS or the EPA screening levels. Thus, there are no adverse impacts expected on soils or vegetation.

[45] EPA, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (EPA 450/2-81-078), 1981.

TABLE 5-7. SOIL AND VEGETATION IMPACTS

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)	Threshold Exceeded?
SO_2	1-hour	7.13	917	-	-	N/A	917	No
	3-hour	6.43	786	2,096	13,100	1,300	786	No
	Annual	0.26	-	18	-	N/A	18	No
NO_2[3]	4-Hour	187.8	3,760	6,400	16,920	N/A	3,760	No
	8-Hour	187.8	3,760	7,520	15,040	N/A	3,760	No
	1-Month	187.8	-	564	-	N/A	564	No
	Annual	8.55	-	94	-		94	No
CO[4]	1-wk	54.2	1,800,000	-	18,000,000	N/A	1,800,000	No
PM_{10}[5]	24-hour	45.8	-	-	-	150	150	No
	Annual	21.4	-	-	-	50	50	No
$PM_{2.5}$	24-hour	30.7	-	-	-	35	35	No
	Annual	13.6	-	-	-	15	15	No
H_2S[6]	4-hour	-	28,000	-	560,000	N/A	28,000	No
Ethylene[6]	3-hour	-	-	47	-	N/A	47	No
	24-hour	-	-	1.2	-	N/A	1.2	No
Fluorine[6]	10-Days	-	-	0.5	-	N/A	0.5	No
Beryllium[7]	1-Month	-	-	0.01	-	N/A	0.01	No
Lead[7]	3-Months	-	-	1.5	-	0.15	0.15	No

1. Results from the Significance Analysis or NAAQS Analysis where modeled impacts exceeded the SIL.
2. Screening concentrations based on Table 3.1 in *A Screening Procedure for Impact of Air Pollution Sources on Plants, Soil and Animals* , EPA, December 12, 1980. Minimum values noted if range listed.
3. Results from 1-hour averaging period (NAAQS) are conservatively used for the 4-hour, 8-hour, and monthly impacts. Value includes background.
4. Maximum impact is for the 24-hour averaging period since AERMOD does not calculate a weekly averaging period. Based on Significance Analysis since NAAQS analysis was not required to performed.
5. Annual results from PSD Increment Analysis plus a background concentration of µg/m³.
6. No H2S, Ethylene, Fluorine emissions are anticipated, hence no modeling was completed for these pollutants.
7. Hexane is the maximum individual HAP associated with natural gas combustion and was evaluated in the TAP analysis as a surrogate for all other pollutants associated with natural gas combustion. Lead and beryllium emissions from the project will be negligible.

6. TOXIC AIR POLLUTANTS IMPACT ASSESSMENT

This section details the assumptions used for completing the toxic air pollutant (TAP) modeling analysis (i.e., model setup) and the results of modeling analysis.

Georgia EPD regulates the emissions of toxic air pollutant (TAP) emissions through a program approved under the provisions of *Georgia Rules for Air Quality Control*, 391-3-1-.02(2)(a)3(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of toxic air pollutant emissions as part of air permit reviews are contained in the agency's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Guideline)*.[46]

6.1 DERIVATION OF ACCEPTABLE AMBIENT CONCENTRATION

According to the *Guideline*, dispersion modeling should be completed for each potentially toxic pollutant 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:

- ▲ 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.

The *Guideline* specifies that the resources should be referenced in the priority schedule listed above to determine long-term and short-term acceptable ambient concentrations (AACs) based on the exposure limits that are provided.

The AAC for each toxic pollutant is calculated from the toxicity data presented in the resources listed above. For any pollutant, both a long-term and short-term AAC might be calculated. If a pollutant has an RfC and/or unit risk, an annual average (long-term) AAC can be calculated as follows. The RfC is an estimate of daily inhalation exposure that is likely to be without an appreciable risk of deleterious effects during a lifetime. The unit risk is a quantitative assessment of cancer-causing potential per concentration of air inhaled. An annual average AAC is obtained by dividing the unit risk by a cancer risk factor based on the weight-of-evidence classification, i.e., 1:1,000,000 for known carcinogens (class A), 1:100,000 for probable carcinogens (class B), and 1:10,000 for suspected carcinogens (class C). The resultant is an annual average AAC in units of micrograms per cubic

[46] *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*. Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch, Revised, June 21, 1998.

meter ($\mu g/m^3$). RfC values are given in units of milligrams per cubic meter (mg/m^3) and require no conversion.

If RfC and unit risk data are not available in the IRIS database, then an annual standard cannot be calculated and a 24-hour AAC must be derived. The bases for the 24-hour standards are the OSHA PEL given at 29 CFR Part 1910 Subpart Z, followed in priority by the ACGIH TLV, NIOSH REL, and LD50 databases. These resources provide exposure limits as time-weighted averages (TWA) in terms of occupational exposure duration (i.e., typically an 8-hour average). If a TWA value is provided for a given pollutant, the 24-hour average AAC is derived as follows. First, an adjustment factor (i.e., 40 divided by the total weekly emitting hours) is applied to the TWA to account for exposure in excess of occupational duration. This adjustment factor is assumed to be 168 hours per week for continuous operation. Second, the adjusted TWA is divided by a safety factor to account for human carcinogenicity: 100 for pollutants that are not known human carcinogens, 300 for pollutants that are known human carcinogens. The resultant value is adopted as a 24-hour AAC. Per the *Guideline*, if a toxic air pollutant has an annual AAC, then the derivation of and comparison to a 24-hour standard is not required.

An additional standard must be met if a given pollutant has listed a Short Term Exposure Limit (STEL) or Ceiling (C) in any one of the above-named resources. A STEL is a 15-minute weighted average concentration that should not be exceeded at any time during the workday. A C value is a concentration that should not be exceeded at any time during occupational exposure. These values have been established for pollutants that are acute sensory irritants and apply as a 15-minute standard, also adjusted by a safety factor of 10 as recommended by the *Guideline*. No other adjustment factor is applied to STEL or C values. A 15-minute average standard, if applicable, must be met in addition to an annual average and/or 24-hour average standard. The *Guideline* clearly states that each of annual, 24-hour, and 15-minute AAC should be derived if the appropriate toxicity information is provided in any of the listed resources.

Details on the development of the emissions for the proposed project are presented in Volume I of this Application. PyraMax has evaluated the available reference material to determine the applicable AAC standards for TAP identified as being emitted at the facility.

Table F-1 summarizes the annual, 24-hour and 15-minute AACs for the pollutants potentially emitted by the proposed facility.

6.2 DETERMINATION OF TOXIC AIR POLLUTION IMPACT

PyraMax completed refined modeling for hydrogen chloride (HCL), hydrogen fluoride (HF), ammonia (NH_3), methyl acetate, methanol, and hexane using the AERMOD dispersion model (dated 11103).[47] The receptor grid developed for the PSD Significance Analysis (Cartesian grid extending 5 m with 100 m spacing) was utilized for the TAP modeling. Stack parameters and meteorological

[47] Hexane is the worst-case TAP associated with natural gas combustion and is utilized as a surrogate for all other HAP emitted as a result of natural gas combustion.

dataset are consistent with the PSD Significance and NAAQS modeling analyses. Table 6-1 presents the modeled emission rates.

TABLE 6-1. MODELED TAP EMISSION RATES

Modeled Stack ID	Source Description	Modeled Emission Rates (lb/hr) Methanol	HCL	HF	NH_3	Hexane	Methyl Acetate (Short Term)[1]	Methyl Acetate (Long Term)[2]
Line 1								
14121412	Kiln Baghouse	-	0.67	1.03	0.02	0.09	-	-
12121141	Pelletizer Baghouse	5.48	-	-	122.71	0.14	5.48	5.48
B1	Boiler 1	-	-	-	-	0.02	-	-
PVA1	PVA Silo Bin Vent Lines 1 and 2	30.15	-	-	-	-	45.06	1.88
Line 2								
24121412	Kiln Baghouse	-	0.67	1.03	0.02	0.09	-	-
22121141	Pelletizer Baghouse	5.48	-	-	122.71	0.14	5.48	5.48
B2	Boiler 2	-	-	-	-	0.02	-	-

1. Short term emission rate utilized for demonstrating compliance with 15 minute AAC.
2. Long term emission rate utilized for demonstrating compliance with 24-hour and annual AACs.
Emission rate is scaled due to silo loading occuring at most once per day.

6.2.1 AERMOD MODELING RESULTS

Table 6-2 presents the results for each pollutant and averaging period. Note that the maximum 15-minute impact is based on the maximum 1-hour predicted impact multiplied by 1.32.

TABLE 6-2. SUMMARY OF AERMOD ANALYSIS

Pollutant	CAS	Maximum 1-Hour Impact[1] (μg/m^3)	Maximum 15-Min Impact[2] (μg/m^3)	15-min AAC (μg/m3)	Maximum 24-hr Impact[1] (μg/m3)	24-hr AAC (μg/m3)	Maximum Annual Impact[1] (μg/m3)	Annual AAC (μg/m3)	Exceed Standard?
Methanol	67-56-1	2,480	3,273	32,750	181	619	None		No
Ammonia	7664-41-7	97.0	128	2,450	Not Required		3.48	100	No
Chlorides	7647-01-0	0.53	0.70	700	Not Required		0.01	20.0	No
Fluorides	7664-39-3	0.82	1.08	164	0.23	5.86	None		No
Methyl Acetate	79-20-9	3,707	4,893	75,750	11.30	476	None		No
Hexane	110-54-3	1.19	None		Not Required		0.02	700	No

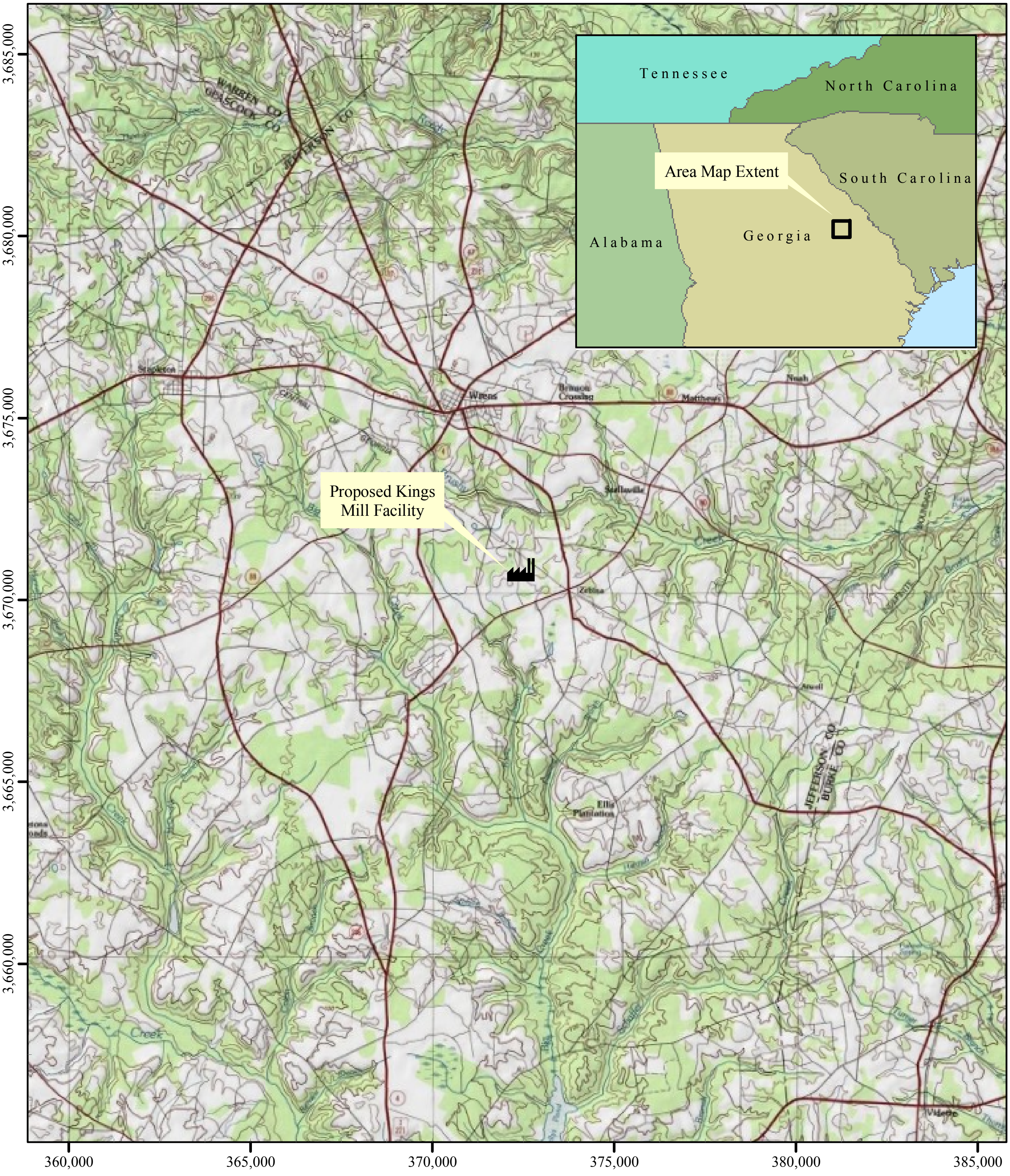
1. First-high modeled impact.
2. Modeled 1-hour concentration multiplied by 1.32 to convert to 15-minute impact per GA Air Toxics Guidance (June 21, 1998).

As shown in Table 6-2, impacts of all TAP from the proposed facility are below the respective AACs.

APPENDIX A

SUPPORTING FIGURES

Figure A-1. Area Map
PyraMax Ceramics, LLC
Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

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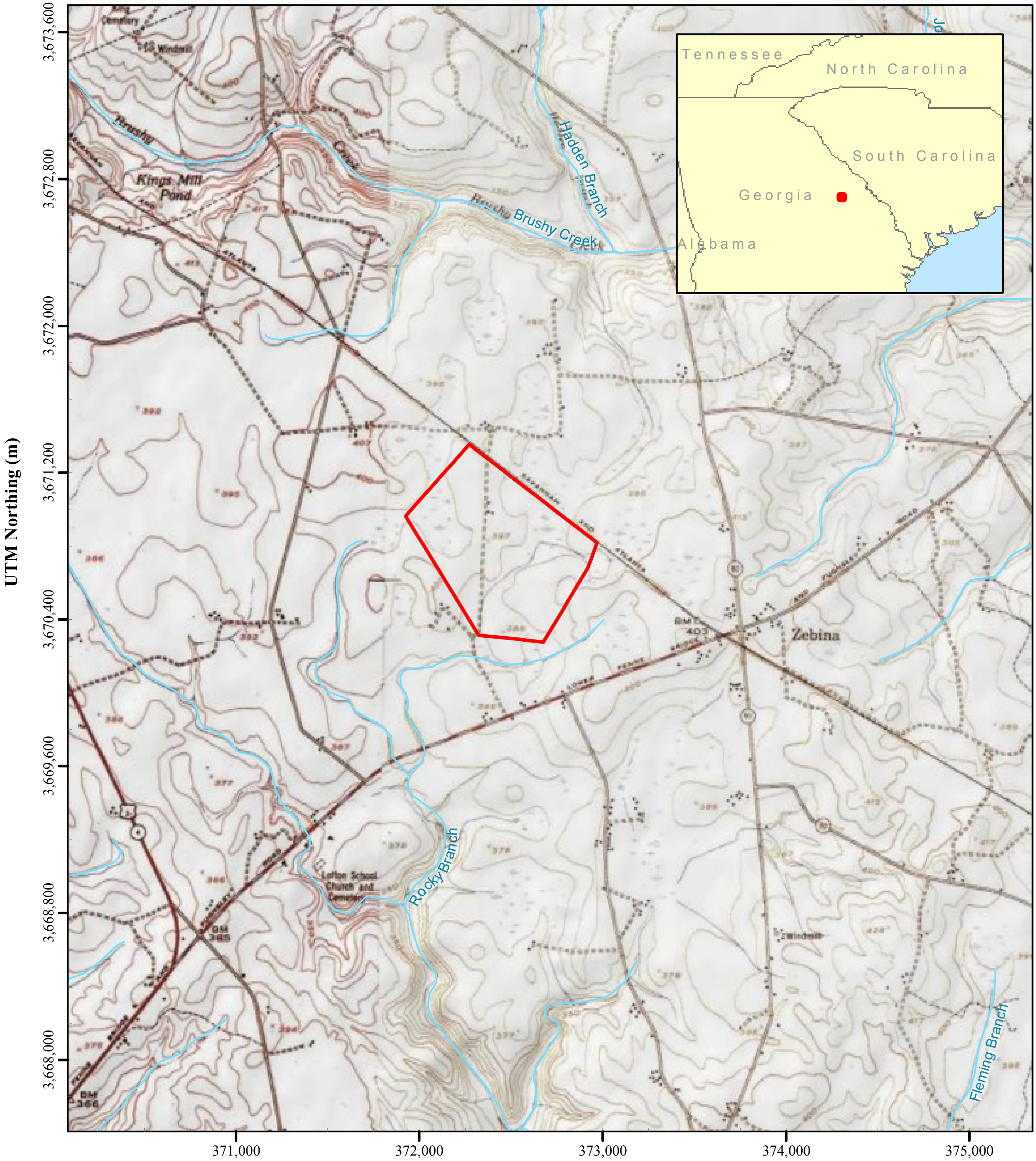
Figure A-2. Boundary Overview
PyraMax Ceramics, LLC
Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

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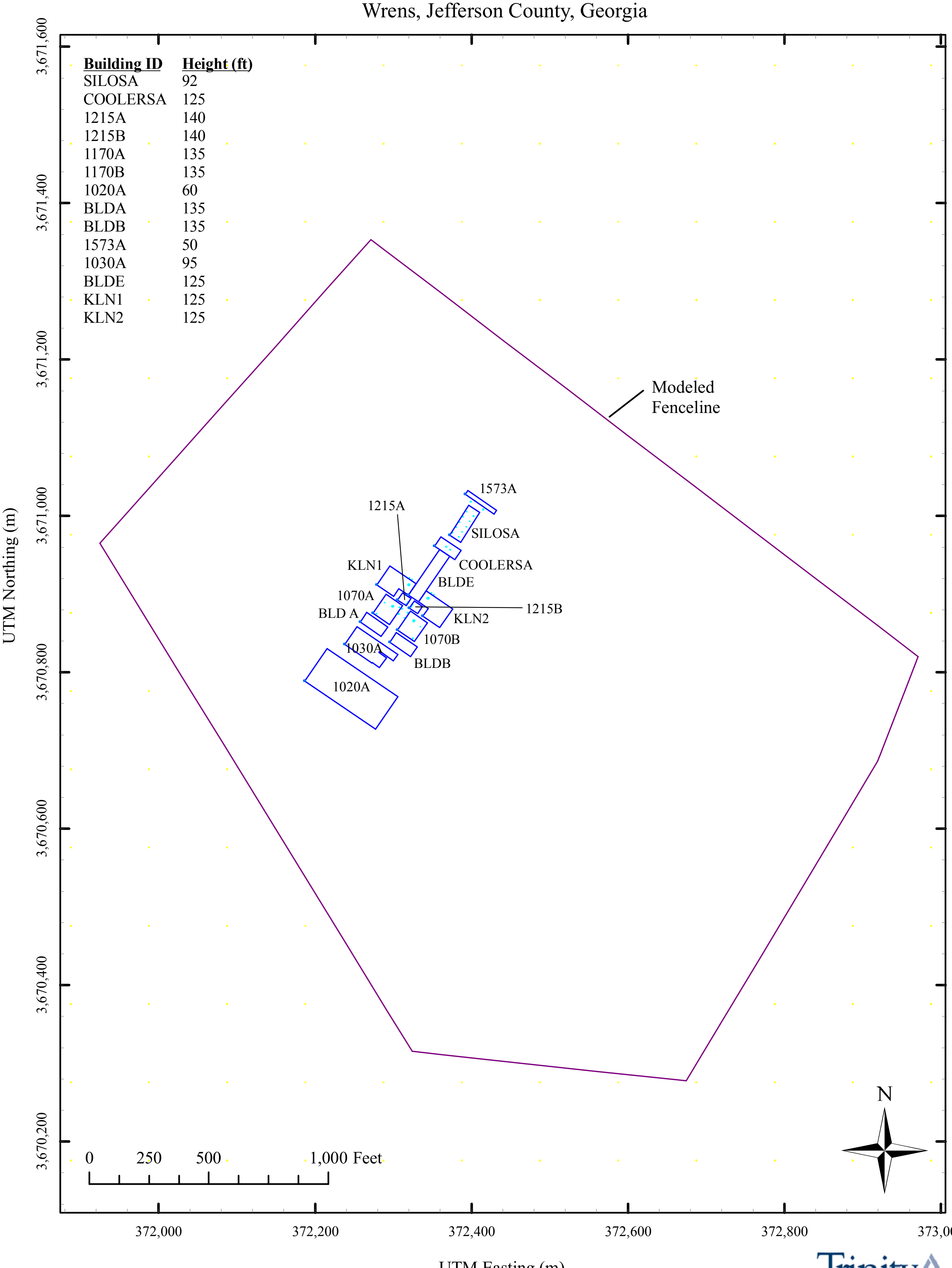
Figure A-3. Modeled Building Layout
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

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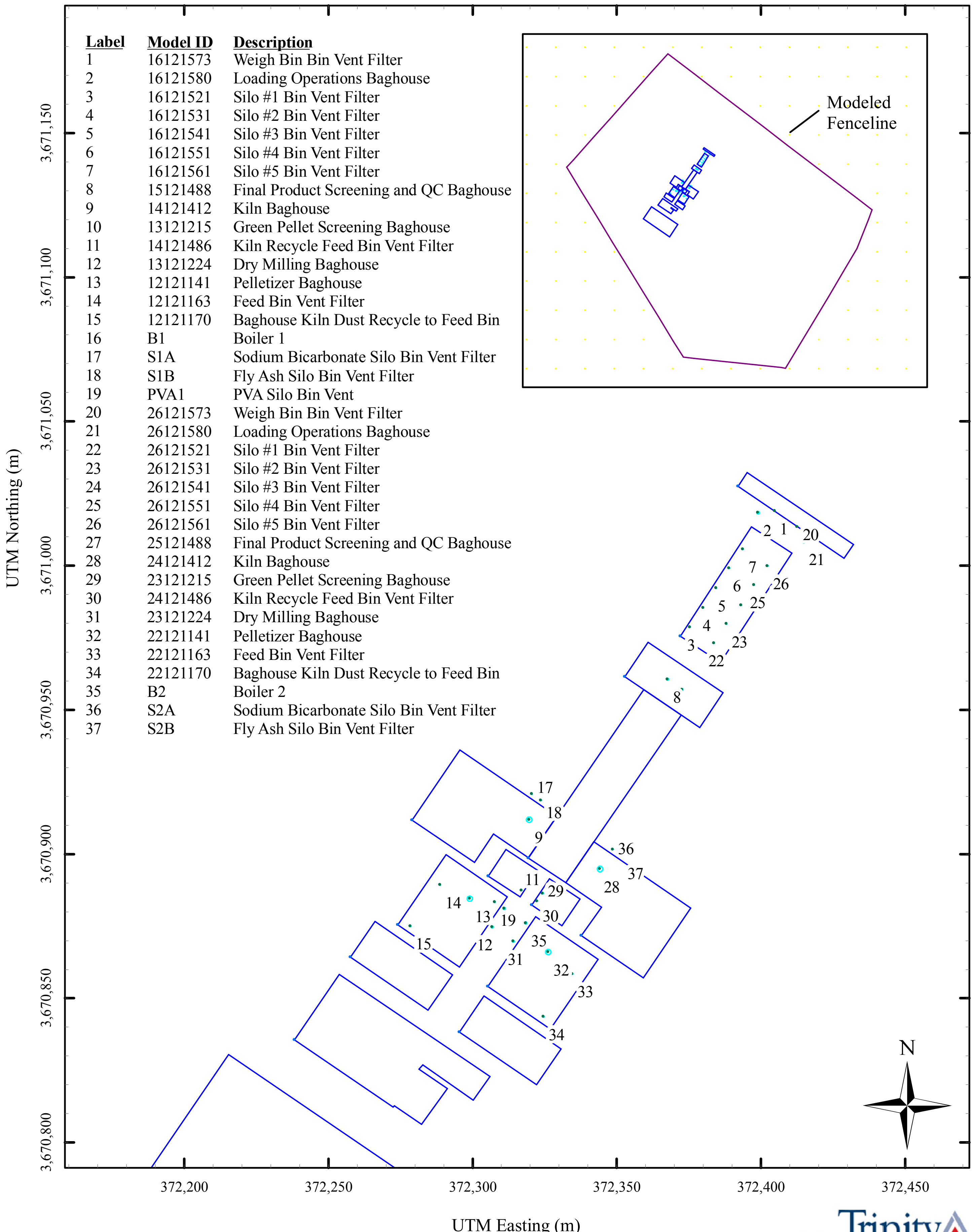
Figure A.4 - Modeled Source Layout
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Label	Model ID	Description
1	16121573	Weigh Bin Bin Vent Filter
2	16121580	Loading Operations Baghouse
3	16121521	Silo #1 Bin Vent Filter
4	16121531	Silo #2 Bin Vent Filter
5	16121541	Silo #3 Bin Vent Filter
6	16121551	Silo #4 Bin Vent Filter
7	16121561	Silo #5 Bin Vent Filter
8	15121488	Final Product Screening and QC Baghouse
9	14121412	Kiln Baghouse
10	13121215	Green Pellet Screening Baghouse
11	14121486	Kiln Recycle Feed Bin Vent Filter
12	13121224	Dry Milling Baghouse
13	12121141	Pelletizer Baghouse
14	12121163	Feed Bin Vent Filter
15	12121170	Baghouse Kiln Dust Recycle to Feed Bin
16	B1	Boiler 1
17	S1A	Sodium Bicarbonate Silo Bin Vent Filter
18	S1B	Fly Ash Silo Bin Vent Filter
19	PVA1	PVA Silo Bin Vent
20	26121573	Weigh Bin Bin Vent Filter
21	26121580	Loading Operations Baghouse
22	26121521	Silo #1 Bin Vent Filter
23	26121531	Silo #2 Bin Vent Filter
24	26121541	Silo #3 Bin Vent Filter
25	26121551	Silo #4 Bin Vent Filter
26	26121561	Silo #5 Bin Vent Filter
27	25121488	Final Product Screening and QC Baghouse
28	24121412	Kiln Baghouse
29	23121215	Green Pellet Screening Baghouse
30	24121486	Kiln Recycle Feed Bin Vent Filter
31	23121224	Dry Milling Baghouse
32	22121141	Pelletizer Baghouse
33	22121163	Feed Bin Vent Filter
34	22121170	Baghouse Kiln Dust Recycle to Feed Bin
35	B2	Boiler 2
36	S2A	Sodium Bicarbonate Silo Bin Vent Filter
37	S2B	Fly Ash Silo Bin Vent Filter

Coordinates reflect UTM Zone 17, NAD83.

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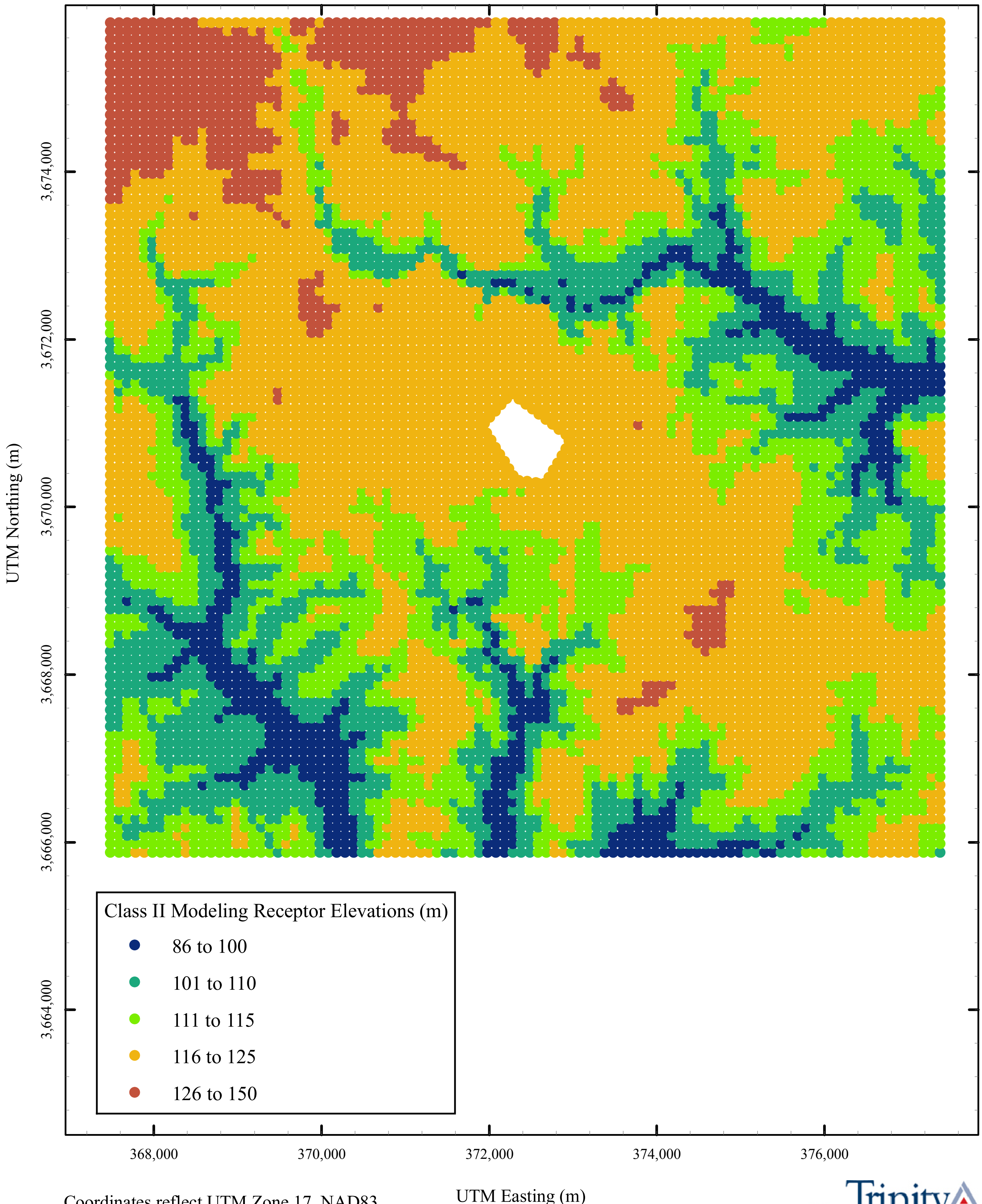
Figure A.5 - Class II Significance Modeling Grid Elevations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

* Class II significance modeling grid utilized for CO, SO_2, PM_{10}, and $PM_{2.5}$.

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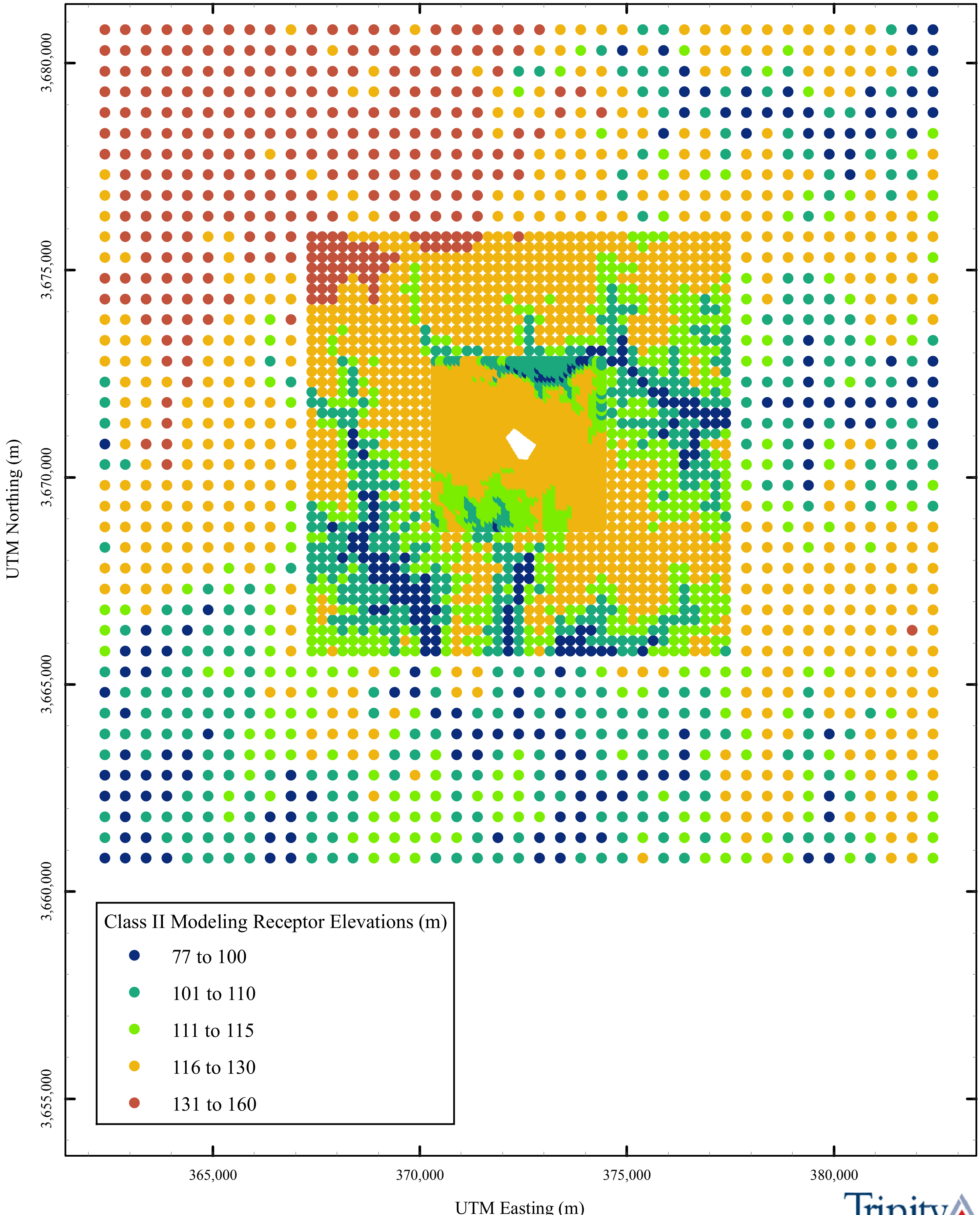
Figure A.6 - Class II NO_X Significance Modeling Grid Elevations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

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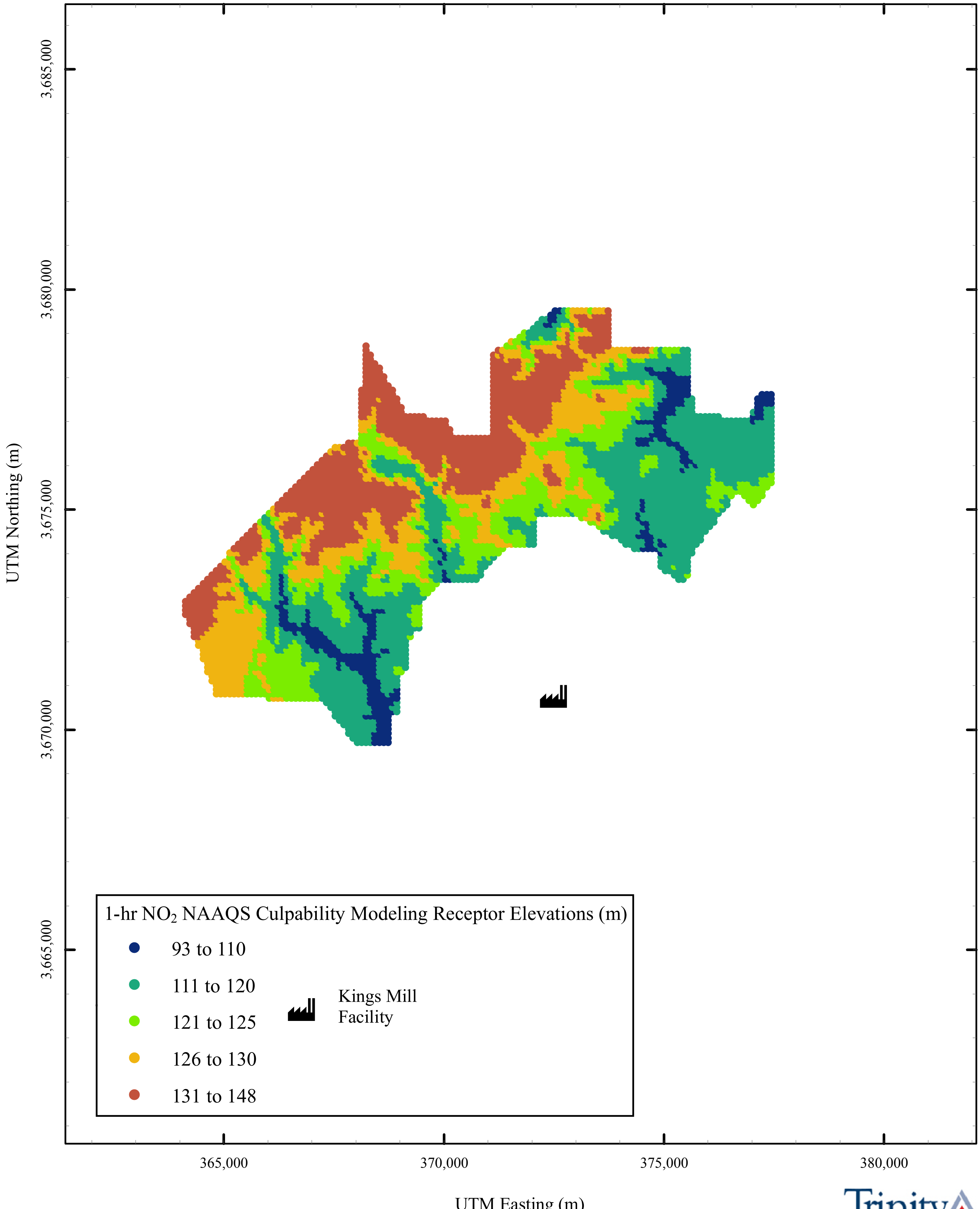
Figure A.7 - Class II 1-Hr NO_2 NAAQS Culpability Modeling Grid Elevations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

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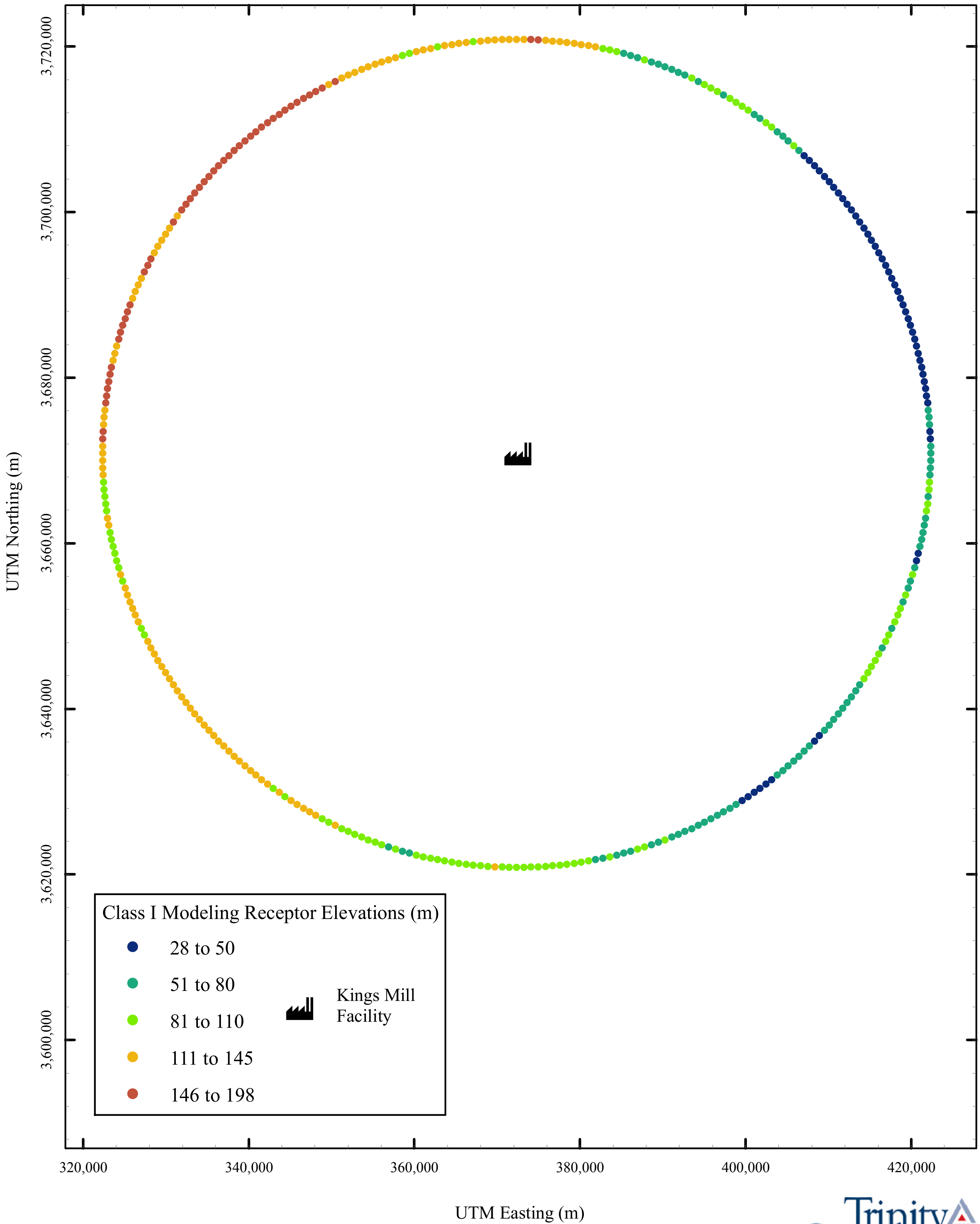
Figure A.8 - Class I Significance Modeling Grid Elevations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

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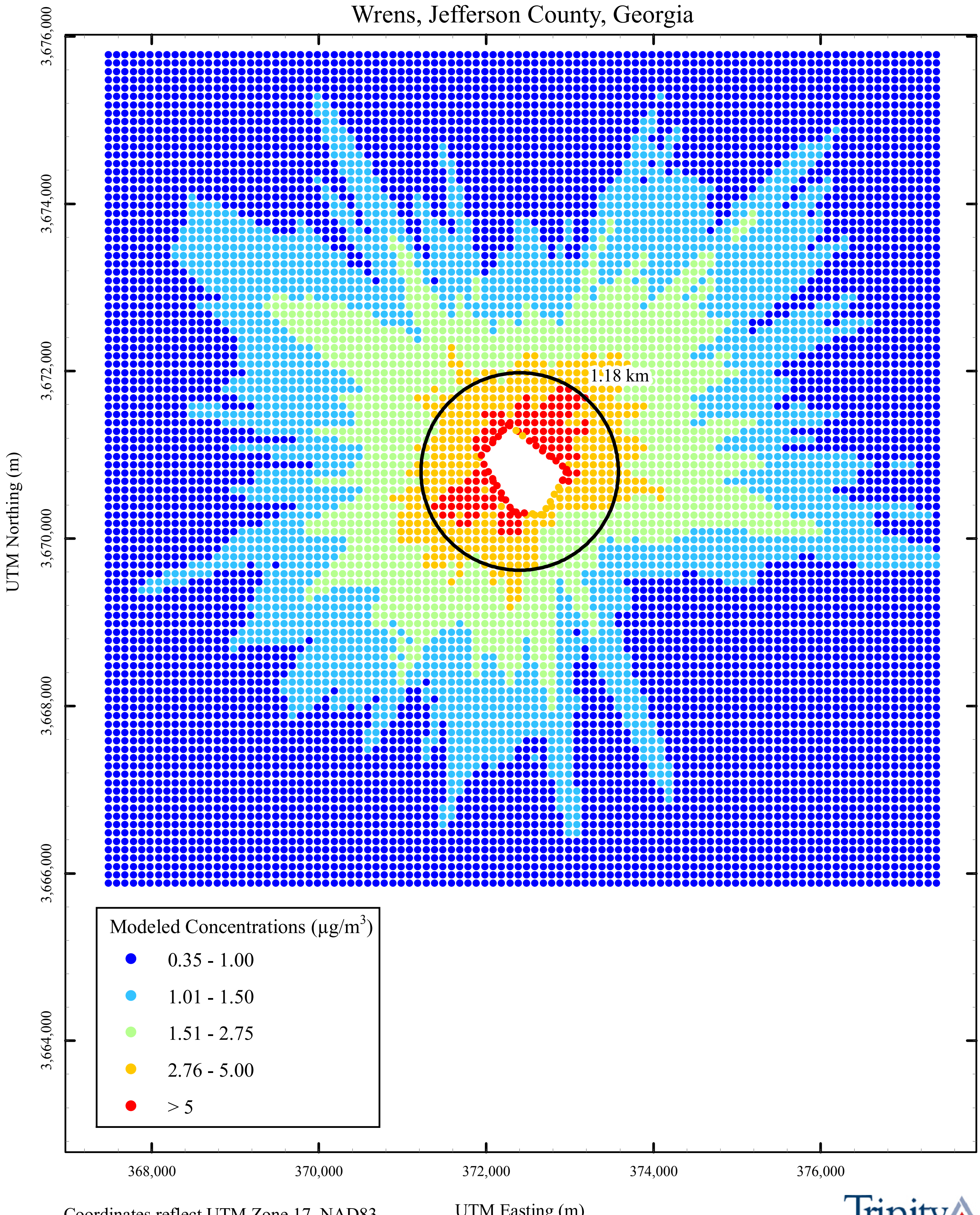
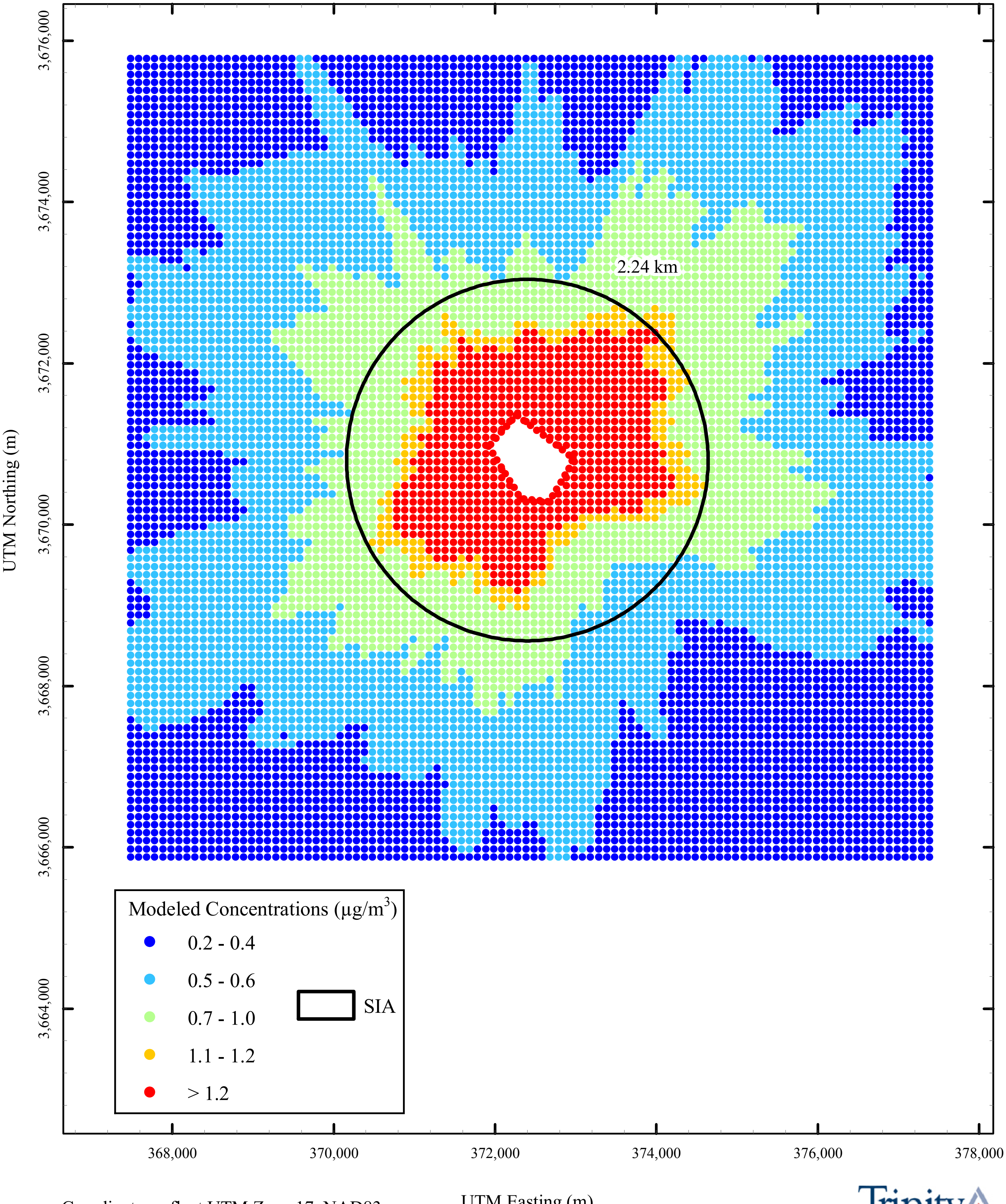
Figure A.9 - Class II Significance Modeling
24-Hour PM_{10} Maximum 1st High Concentrations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

24-Hour PM_{10} SIL: 5 $\mu g/m^3$

Figure A.10 - Class II Significance Modeling
24-Hr $PM_{2.5}$ Average 1st High Concentrations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

24-Hour $PM_{2.5}$ SIL: 1.2 $\mu g/m^3$

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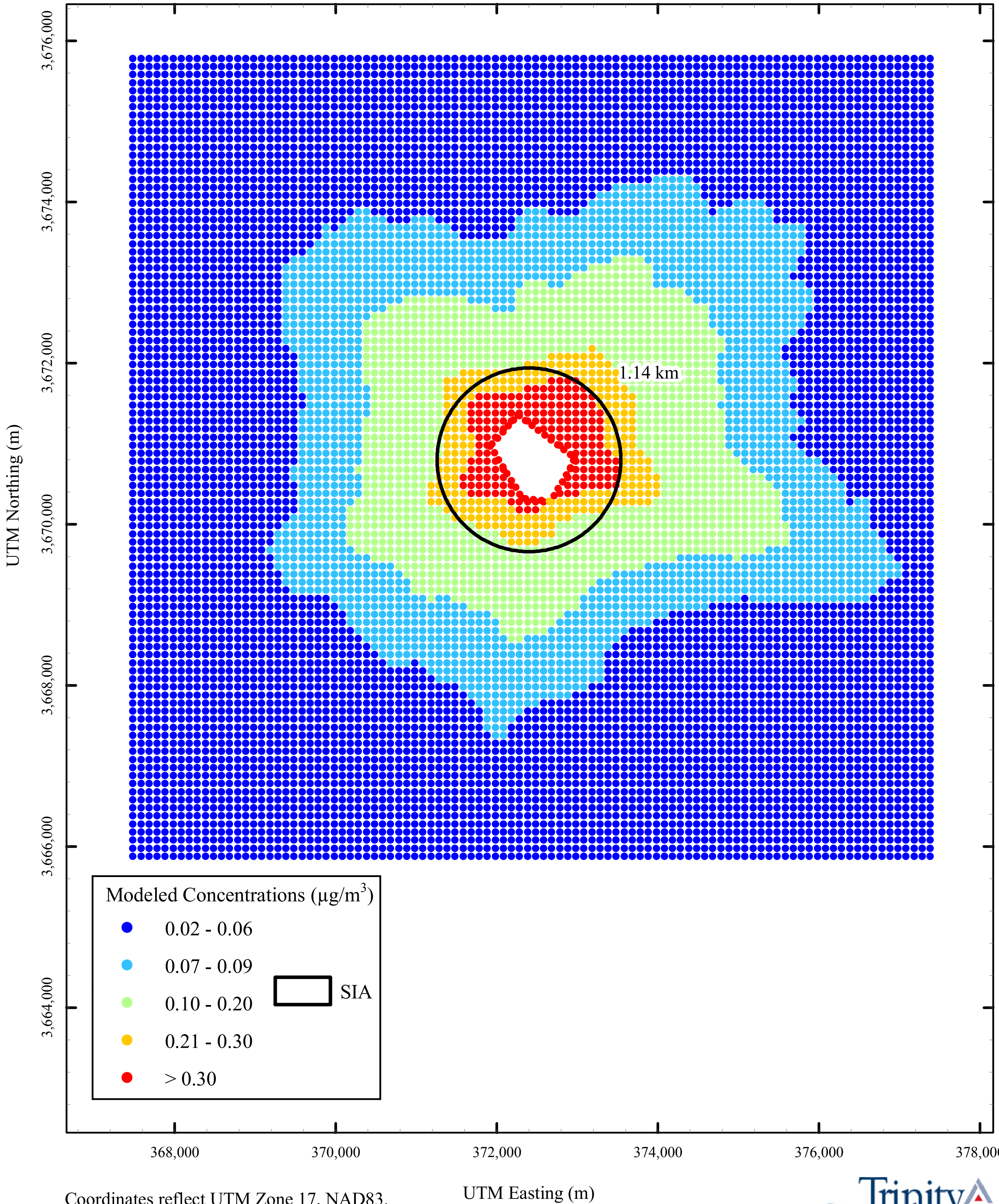
Figure A.11 - Class II Significance Modeling
Annual $PM_{2.5}$ Average 1st High Concentrations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

Annual $PM_{2.5}$ SIL: 0.3 µg/m³

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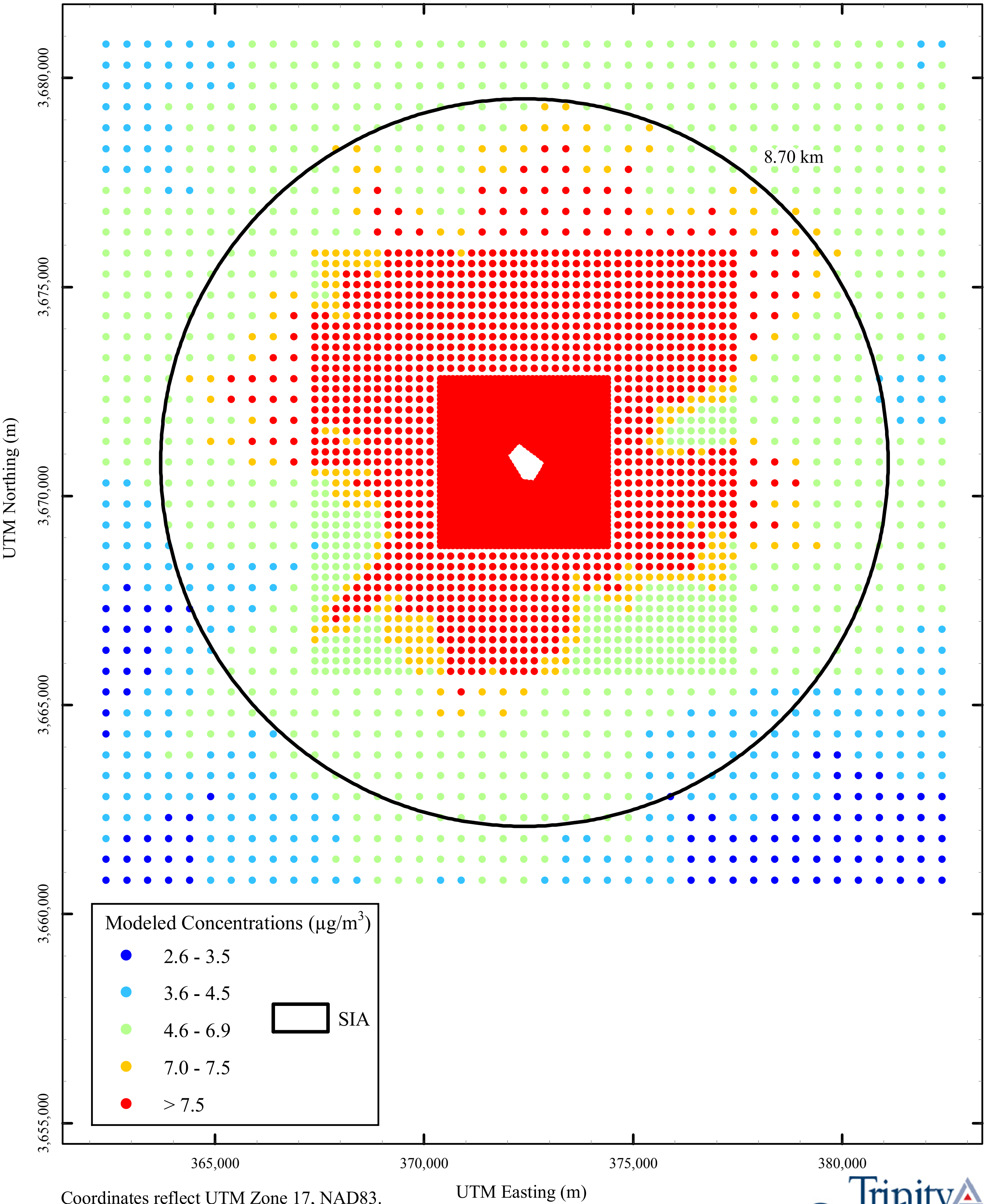
Figure A.12 - Class II Significance Modeling
1-Hour NO_2 Average 1st High Concentrations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia



Coordinates reflect UTM Zone 17, NAD83.

1-Hour NO_2 SIL: 7.5 µg/m^3

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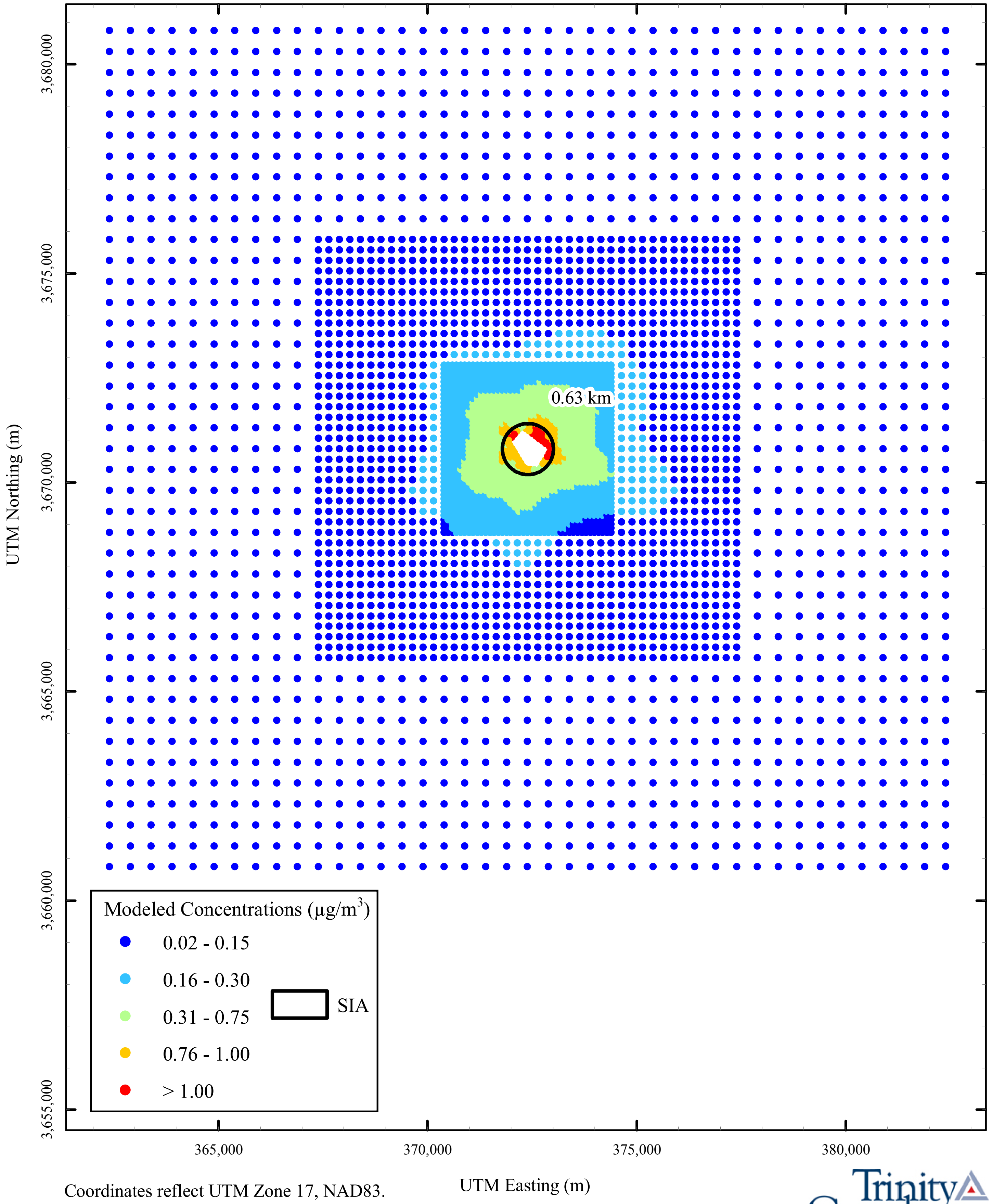
Figure A.13 - Class II Significance Modeling
Annual NO_2 Maximum 1st High Concentrations
PyraMax Ceramics, LLC - Kings Mill Facility
Wrens, Jefferson County, Georgia

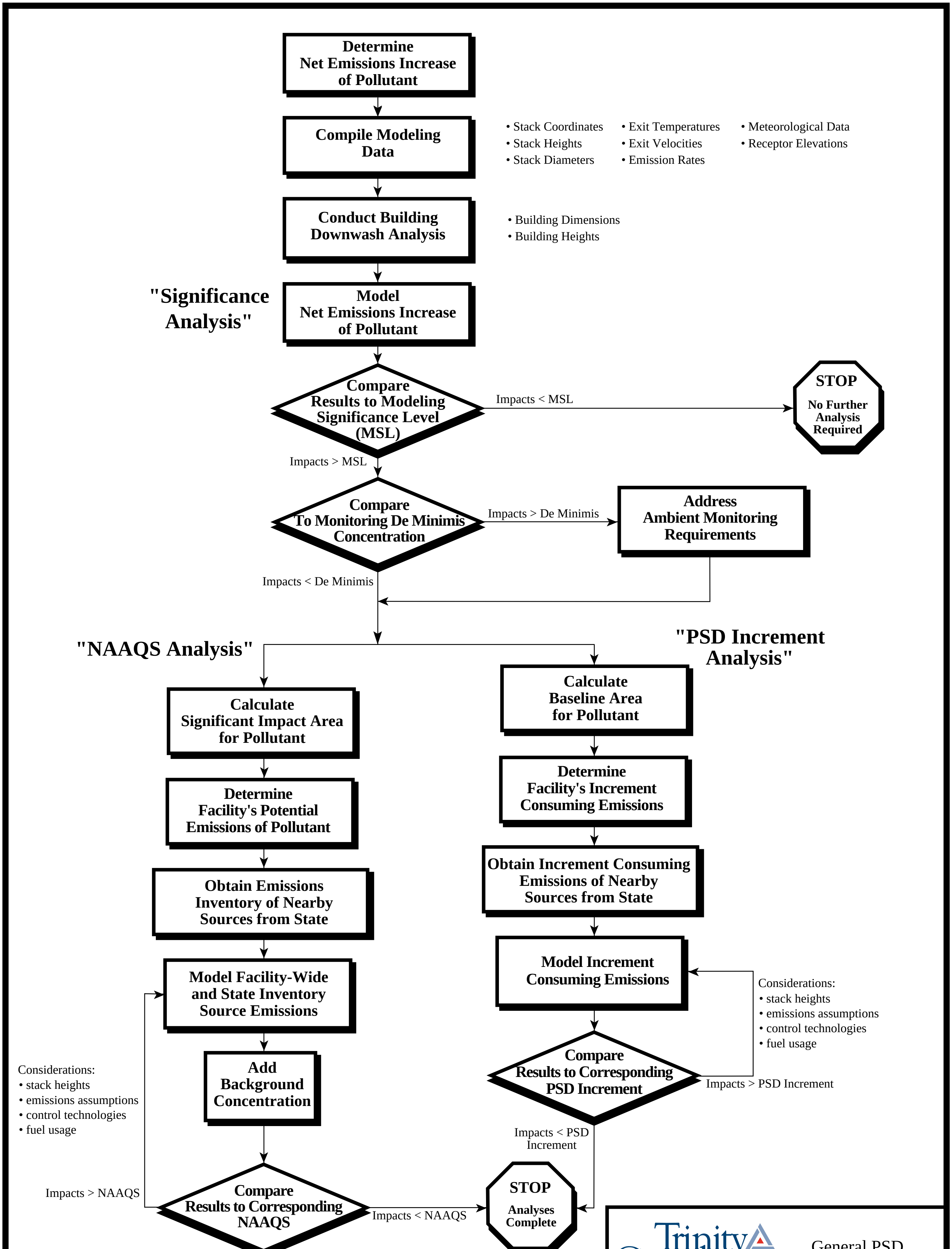


Coordinates reflect UTM Zone 17, NAD83.

Annual NO_2 SIL: 1 µg/m^3

APPENDIX B

PSD FLOW CHART



Note: "Impacts" refers to off-property impacts.

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General PSD
Modeling Flow Chart

APPENDIX C

LAND USE REPRESENTATIVENESS ANALYSIS

To define the land use characteristics and micrometeorological parameters in the areas of interest, Trinity Consultants (Trinity) utilized the EPA program AERSURFACE (version 08009) to analyze a digital mapping of land use and cover; specifically the 30-meter resolution USGS digital National Land Cover Data (NLCD) from 1992, as is recommended for usage with AERSURFACE.[1]

AERSURFACE resolves predominant land cover types into a grid comprising 30 meter-by-30 meter cells extending out to a specified distance from the center of the Kings Mill or NWS site; the recommended distance is 1 km for surface roughness and 10 km for albedo and Bowen ratio. The data, which contain the land use category code and coordinates for each cell, are used by AERSURFACE to calculate the wind sectors and determine the weighted percentage of each land use type contained within each of the twelve 30-degree sectors; note that albedo and Bowen ratio are constant for each of the sectors, varying only seasonally. The weighted percentages of each land use type are then utilized to calculate the weighted average surface parameters (Bowen ratio, albedo, and surface roughness) for each of the sectors.

Figures C-1a and C-1b illustrate the land use and cover for the Kings Mill site based on the grid cell assignments contained in the AERSURFACE roughness domain output file. Figure C-1a shows pre-construction land use and Figure C-1b depicts post-construction landuse. In order to represent post-construction conditions, a circular area covering 75 acres centered on the process lines was modified. The circle in the figures denotes a 1 km radius around the center of the Kings Mill site; individual sectors are also shown in black. A similar figure for the Daniel Field NWS station was created by Trinity using the AERSURFACE grid cell assignments (from AERSURFACE runs prepared using the NWS coordinates provided by EPD) and is included as Figure C-2.[2]

[1] http://seamless.usgs.gov/website/seamless/viewer.htm

[2] http://mi3.ncdc.noaa.gov/mi3qry/login.cfm

FIGURE C-1A. LAND USE CATEGORIES FOR THE 1-KM AREA SURROUNDING THE KINGS MILL FACILITY (PRE-CONSTRUCTION)

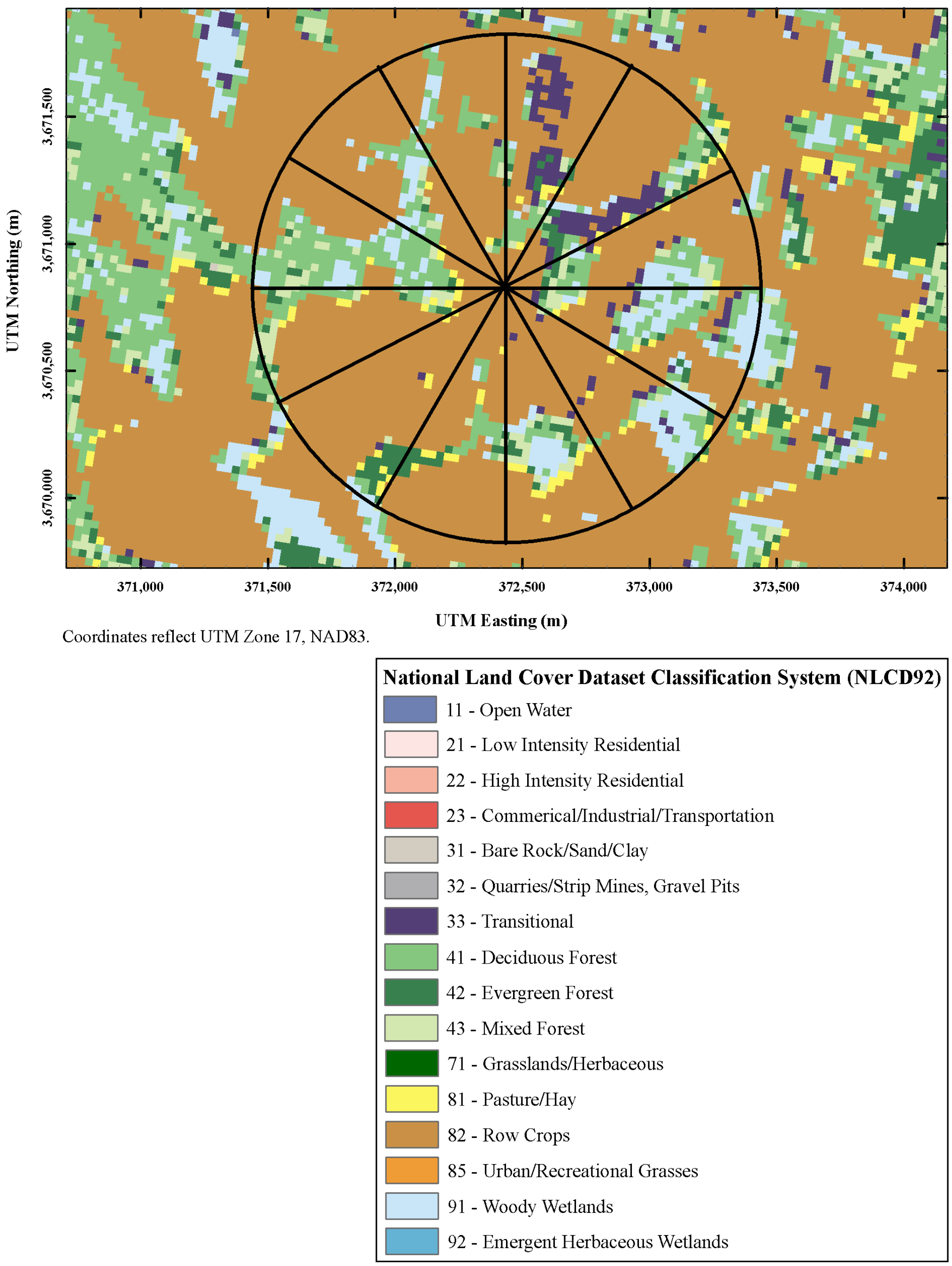
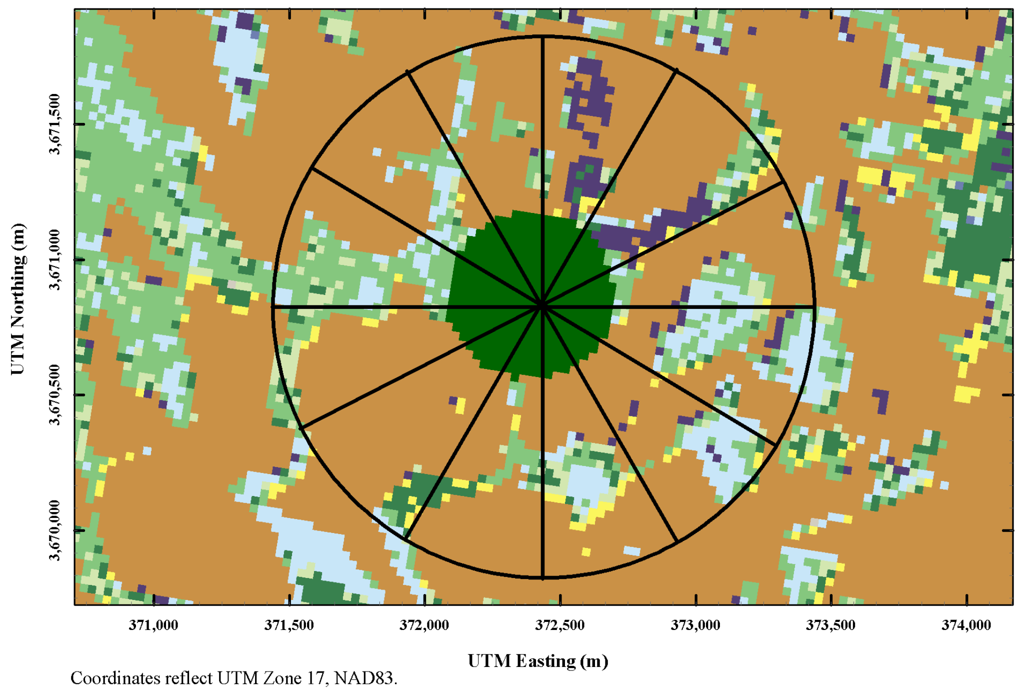


FIGURE C-1B. LAND USE CATEGORIES FOR THE 1-KM AREA SURROUNDING THE KINGS MILL FACILITY (POST-CONSTRUCTION)

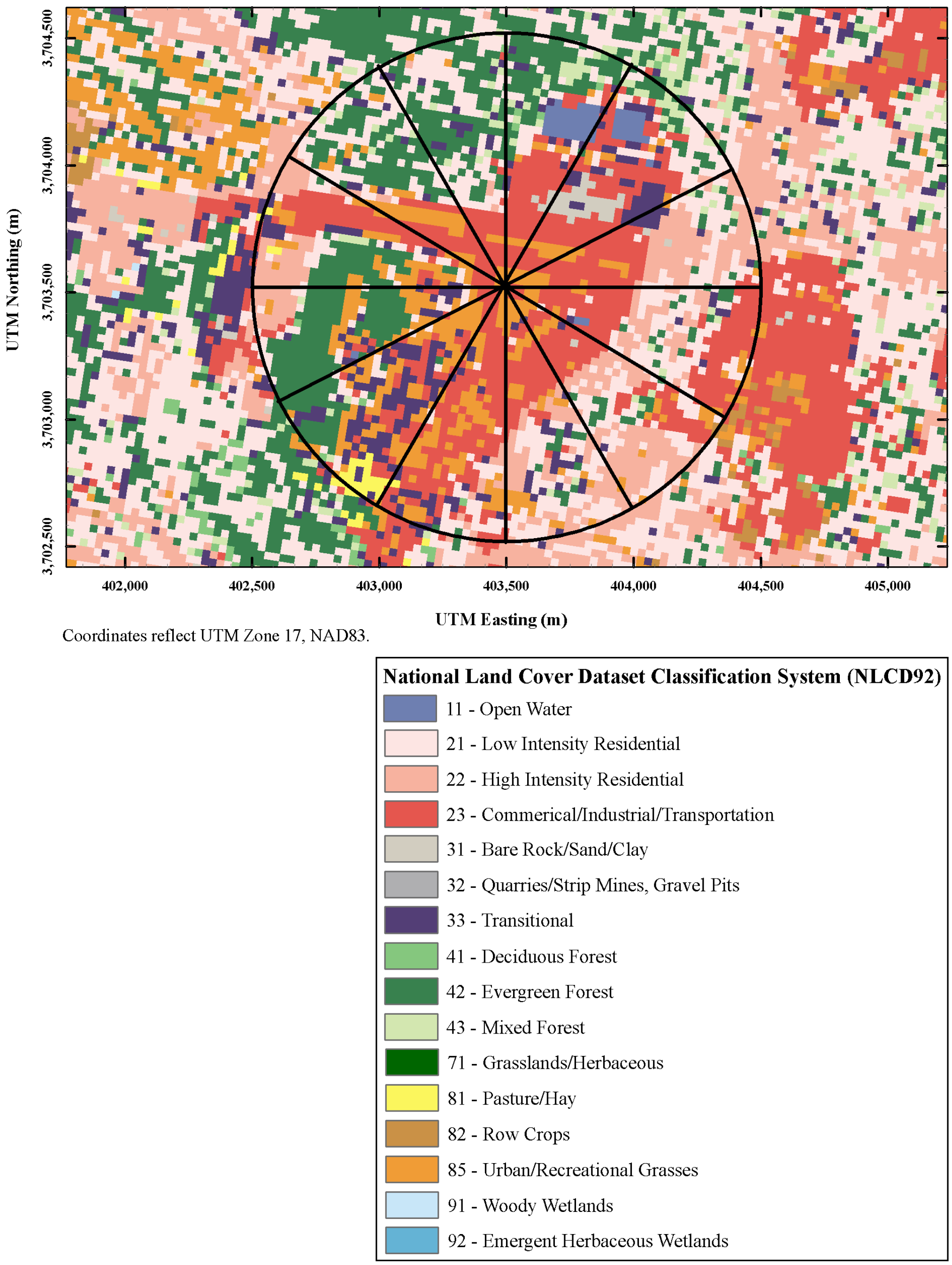


Coordinates reflect UTM Zone 17, NAD83.

National Land Cover Dataset Classification System (NLCD92)

- 11 - Open Water
- 21 - Low Intensity Residential
- 22 - High Intensity Residential
- 23 - Commerical/Industrial/Transportation
- 31 - Bare Rock/Sand/Clay
- 32 - Quarries/Strip Mines, Gravel Pits
- 33 - Transitional
- 41 - Deciduous Forest
- 42 - Evergreen Forest
- 43 - Mixed Forest
- 71 - Grasslands/Herbaceous
- 81 - Pasture/Hay
- 82 - Row Crops
- 85 - Urban/Recreational Grasses
- 91 - Woody Wetlands
- 92 - Emergent Herbaceous Wetlands

FIGURE C-2. LAND USE CATEGORIES FOR THE 1-KM AREA SURROUNDING THE DANIEL FIELD NWS



Inspection of the land use figures shows that the land use surrounding the Kings Mill site appears to be predominantly row crops and deciduous forest. Post-construction land use will also include areas of grassland. The Daniel Field NWS station has large areas of urban and recreation grasses as well as low and high intensity residential, and commercial/industrial/transportation and some forested areas and agricultural characteristics.

To facilitate a quantitative comparison of surface characteristics, Trinity utilized AERSURFACE to determine the weighted average parameters for the Kings Mill site and the Daniel Field NWS site based on the 1992 NLCD data, as well as modified NCLD data to reflect post-construction land use for the Kings Mill site.[3] Geographic coordinates for the NWS site obtained from Google Earth were used for the center of the study area while an approximate central location was used as the center of the Kings Mill study area. Because the Kings Mill and NWS site are located in a temperate region that experiences weather conditions typical of varying seasons, seasonal average parameters were computed for each season; the seasonal assignment "winter" values were assigned by AERSURFACE based on no "continuous snow cover for most of winter". The analysis was completed for dry, wet, and average moisture conditions (moisture conditions impact the Bowen ratio parameters assigned).

Table C-1 presents a summary of the parameter values utilized to compute the weighted average parameters, while Tables C-2a and C-2b present the surface characteristics determined by AERSURFACE for the Kings Mill site, both pre- and post-construction. All parameter values are based on the values recommended in EPA's *AERMET User's Guide*.[4]

Tables C-1 through C-6 present various comparisons of the parameter assignments, considering annual averages, seasonal averages, and overall differences.[5] Tables C-6a and C-6b include a quantitative review of the land use assignments for pre-and post-construction scenarios. These comparisons illustrate that the Daniel Field NWS station is similar to the Kings Site under post-construction conditions for albedo and Bowen ratio (when considering all moisture conditions). The Kings Mill's post-construction surface roughness parameter assignments are similar to the Daniel Field NWS station when considered on a sector-by-sector basis.

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[3] Approximately 75 acres of land will be cleared surrounding the process lines.

[4] EPA, *User's Guide for the AERMOD Meteorological Preprocessor (AERME*T), EPA-454/B-03-002, November 2004.

[5] Analyses presented based on methodology recommended by the Alabama Department of Environmental Management (ADEM).

TABLE C-1. AERMET PARAMETER VALUES

Landuse	Albedo				Surface Roughness				Bowen Ratio (Average Moisture)				Bowen Ratio (Dry Conditions)				Bowen Ratio (Wet Conditions)			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Water	0.12	0.10	0.14	0.20	0.0001	0.0001	0.0001	0.0001	0.1	0.1	0.1	1.5	0.1	0.1	0.1	2.0	0.1	0.1	0.1	0.3
Deciduous Forest	0.12	0.12	0.12	0.50	1.00	1.30	0.80	0.50	0.7	0.3	1.0	1.5	1.5	0.6	2.0	2.0	0.3	0.2	0.4	0.5
Coniferous Forest	0.12	0.12	0.12	0.35	1.30	1.30	1.30	1.30	0.7	0.3	0.8	1.5	1.5	0.6	1.5	2.0	0.3	0.2	0.3	0.3
Swamp/Wetlands	0.12	0.14	0.16	0.30	0.20	0.20	0.20	0.05	0.1	0.1	0.1	1.5	0.2	0.2	0.2	2.0	0.1	0.1	0.1	0.5
Cultivated Land	0.14	0.20	0.18	0.60	0.03	0.20	0.05	0.01	0.3	0.5	0.7	1.5	1.0	1.5	2.0	2.0	0.2	0.3	0.4	0.5
Grassland	0.18	0.18	0.20	0.60	0.50	0.10	0.01	0.001	0.4	0.8	1.0	1.5	1.0	2.0	2.0	2.0	0.3	0.4	0.5	0.5
Urban	0.14	0.16	0.18	0.35	1.00	1.00	1.00	1.00	1.0	2.0	2.0	1.5	2.0	4.0	4.0	2.0	0.5	1.0	1.0	0.5
Desert Shrubland	0.30	0.28	0.28	0.45	0.30	0.30	0.30	0.15	3.0	4.0	6.0	6.0	5.0	6.0	10.0	10.0	1.0	1.5	2.0	2.0

TABLE C-2A. AERSURFACE ASSIGNMENTS FOR THE PROPOSED KINGS MILL FACILITY (PRE-CONSTRUCTION)

Sector	Albedo				Surface Roughness				Bowen Ratio (Average Moisture)				Bowen Ratio (Dry Conditions)				Bowen Ratio (Wet Conditions)			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1 (0-30 deg)	0.14	0.17	0.17	0.16	0.077	0.278	0.278	0.055	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
2 (30-60 deg)	0.14	0.17	0.17	0.16	0.083	0.282	0.282	0.062	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
3 (60-90 deg)	0.14	0.17	0.17	0.16	0.112	0.370	0.370	0.079	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
4 (90-120 deg)	0.14	0.17	0.17	0.16	0.149	0.401	0.401	0.107	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
5 (120-150 deg)	0.14	0.17	0.17	0.16	0.057	0.259	0.259	0.039	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
6 (150-180 deg)	0.14	0.17	0.17	0.16	0.062	0.275	0.275	0.043	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
7 (180-210 deg)	0.14	0.17	0.17	0.16	0.048	0.252	0.252	0.032	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
8 (210-240 deg)	0.14	0.17	0.17	0.16	0.036	0.216	0.216	0.024	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
9 (240-270 deg)	0.14	0.17	0.17	0.16	0.063	0.288	0.288	0.043	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
10 (270-300 deg)	0.14	0.17	0.17	0.16	0.180	0.491	0.491	0.120	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
11 (300-330 deg)	0.14	0.17	0.17	0.16	0.062	0.283	0.283	0.042	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
12 (330-360 deg)	0.14	0.17	0.17	0.16	0.055	0.272	0.272	0.037	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35

TABLE C-2B. AERSURFACE ASSIGNMENTS FOR THE PROPOSED KINGS MILL FACILITY (POST-CONSTRUCTION)

	Albedo				**Surface Roughness**				**Bowen Ratio (Average Moisture)**				**Bowen Ratio (Dry Conditions)**				**Bowen Ratio (Wet Conditions)**			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1 (0-30 deg)	0.14	0.17	0.17	0.16	0.063	0.179	0.179	0.029	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
2 (30-60 deg)	0.14	0.17	0.17	0.16	0.073	0.202	0.202	0.036	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
3 (60-90 deg)	0.14	0.17	0.17	0.16	0.082	0.254	0.254	0.042	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
4 (90-120 deg)	0.14	0.17	0.17	0.16	0.113	0.280	0.280	0.058	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
5 (120-150 deg)	0.14	0.17	0.17	0.16	0.060	0.219	0.219	0.032	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
6 (150-180 deg)	0.14	0.17	0.17	0.16	0.069	0.233	0.233	0.036	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
7 (180-210 deg)	0.14	0.17	0.17	0.16	0.055	0.210	0.210	0.027	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
8 (210-240 deg)	0.14	0.17	0.17	0.16	0.044	0.162	0.162	0.018	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
9 (240-270 deg)	0.14	0.17	0.17	0.16	0.056	0.200	0.200	0.025	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
10 (270-300 deg)	0.14	0.17	0.17	0.16	0.144	0.320	0.320	0.064	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
11 (300-330 deg)	0.14	0.17	0.17	0.16	0.069	0.214	0.214	0.031	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
12 (330-360 deg)	0.14	0.17	0.17	0.16	0.054	0.197	0.197	0.025	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35

TABLE C-3A. COMPARISON OF AERSURFACE ASSIGNMENTS, ANNUAL AVERAGES (PRE-CONSTRUCTION)

Albedo Assignments

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	0.163	0.160	1.5%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	0.94	0.56	41%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	1.99	1.24	37.6%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	0.56	0.30	47.1%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

Wind Direction	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
30	0.108	0.172	59%
60	0.084	0.177	112%
90	0.176	0.233	32%
120	0.165	0.265	61%
150	0.195	0.154	21%
180	0.158	0.164	4%
210	0.065	0.146	124%
240	0.083	0.123	49%
270	0.238	0.171	28%
300	0.164	0.321	96%
330	0.088	0.168	91%
360	0.376	0.159	58%
All	0.158	0.188	18%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE C-3B. COMPARISON OF AERSURFACE ASSIGNMENTS, ANNUAL AVERAGES (POST-CONSTRUCTION)

Albedo Assignments

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	0.163	0.160	1.5%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	0.94	0.56	41%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	1.99	1.24	37.6%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

Sector	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
All	0.56	0.30	47.1%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

Wind Direction	**Daniel Field NWS (DNL)** Average	**Facility** Average	**Facility** % Difference from DNL[1]
30	0.108	0.113	4%
60	0.084	0.128	53%
90	0.176	0.158	10%
120	0.165	0.183	11%
150	0.195	0.133	32%
180	0.158	0.143	10%
210	0.065	0.126	92%
240	0.083	0.097	17%
270	0.238	0.120	49%
300	0.164	0.212	29%
330	0.088	0.132	50%
360	0.376	0.118	69%
All	0.158	0.138	13%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE C-4A. COMPARISON OF AERSURFACE ASSIGNMENTS, SEASONAL AVERAGES (PRE-CONSTRUCTION)

Albedo Assignments

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.16	0.16	0.16	0.17	0.14	0.17	0.17	0.16
% of NWS[1]	n/a	n/a	n/a	n/a	13%	6%	6%	6%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.91	0.74	1.05	1.05	0.41	0.41	0.69	0.71
% of NWS[1]	n/a	n/a	n/a	n/a	55%	45%	34%	32%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	1.98	1.57	2.20	2.20	1.02	0.92	1.51	1.51
% of NWS[1]	n/a	n/a	n/a	n/a	48%	41%	31%	31%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.56	0.51	0.58	0.58	0.23	0.25	0.35	0.35
% of NWS[1]	n/a	n/a	n/a	n/a	59%	51%	40%	40%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.158	0.169	0.160	0.146	0.082	0.306	0.306	0.057
% of NWS[1]	n/a	n/a	n/a	n/a	48%	81%	91%	61%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE C-4B. COMPARISON OF AERSURFACE ASSIGNMENTS, SEASONAL AVERAGES (POST-CONSTRUCTION)

Albedo Assignments

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.16	0.16	0.16	0.17	0.14	0.17	0.17	0.16
% of NWS[1]	n/a	n/a	n/a	n/a	13%	6%	6%	6%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.91	0.74	1.05	1.05	0.41	0.41	0.69	0.71
% of NWS[1]	n/a	n/a	n/a	n/a	55%	45%	34%	32%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	1.98	1.57	2.20	2.20	1.02	0.92	1.51	1.51
% of NWS[1]	n/a	n/a	n/a	n/a	48%	41%	31%	31%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.56	0.51	0.58	0.58	0.23	0.25	0.35	0.35
% of NWS[1]	n/a	n/a	n/a	n/a	59%	51%	40%	40%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Daniel Field NWS (DNL)				Facility (% Difference from DNL)[1]			
	Spring	Summer	Fall	Winter	Spring	**Summer**	**Fall**	Winter
Seasonal Average	0.158	0.169	0.160	0.146	0.074	0.223	0.223	0.035
% of NWS[1]	n/a	n/a	n/a	n/a	54%	32%	39%	76%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE C-5A. COMPARISON OF AERSURFACE ASSIGNMENTS, DIFFERENCES (PRE-CONSTRUCTION)

Albedo Assignments

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.16	0.16	0.16	0.17	0.14	0.17	0.17	0.16	0.02	(0.01)	(0.01)	0.01	13%	6%	6%	6%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.91	0.74	1.05	1.05	0.41	0.41	0.69	0.71	0.50	0.33	0.36	0.34	55%	45%	34%	32%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	1.98	1.57	2.20	2.20	1.02	0.92	1.51	1.51	0.96	0.65	0.69	0.69	48%	41%	31%	31%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.56	0.51	0.58	0.58	0.23	0.25	0.35	0.35	0.33	0.26	0.23	0.23	59%	51%	40%	40%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
30	0.108	0.114	0.110	0.101	0.077	0.278	0.278	0.055	0.031	-0.164	-0.168	0.046	29%	144%	153%	46%
60	0.084	0.089	0.084	0.078	0.083	0.282	0.282	0.062	0.001	-0.193	-0.198	0.016	1.2%	217%	236%	21%
90	0.176	0.187	0.178	0.163	0.112	0.370	0.370	0.079	0.064	-0.183	-0.192	0.084	36%	98%	108%	52%
120	0.165	0.171	0.166	0.157	0.149	0.401	0.401	0.107	0.016	-0.230	-0.235	0.050	10%	135%	142%	32%
150	0.195	0.206	0.197	0.183	0.057	0.259	0.259	0.039	0.138	-0.053	-0.062	0.144	71%	26%	31%	79%
180	0.158	0.170	0.160	0.143	0.062	0.275	0.275	0.043	0.096	-0.105	-0.115	0.100	61%	62%	72%	70%
210	0.065	0.073	0.066	0.057	0.048	0.252	0.252	0.032	0.017	-0.179	-0.186	0.025	26%	245%	282%	44%
240	0.081	0.094	0.086	0.070	0.036	0.216	0.216	0.024	0.045	-0.122	-0.130	0.046	56%	130%	151%	66%
270	0.239	0.258	0.240	0.215	0.063	0.288	0.288	0.043	0.176	-0.030	-0.048	0.172	74%	12%	20%	80%
300	0.164	0.177	0.166	0.148	0.180	0.491	0.491	0.120	-0.016	-0.314	-0.325	0.028	10%	177%	196%	19%
330	0.088	0.101	0.089	0.073	0.062	0.283	0.283	0.042	0.026	-0.182	-0.194	0.031	30%	180%	218%	42%
360	0.375	0.387	0.381	0.360	0.055	0.272	0.272	0.037	0.320	0.115	0.109	0.323	85%	30%	29%	90%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE C-5B. COMPARISON OF AERSURFACE ASSIGNMENTS, DIFFERENCES (POST-CONSTRUCTION)

Albedo Assignments

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.16	0.16	0.16	0.17	0.14	0.17	0.17	0.16	0.02	(0.01)	(0.01)	0.01	13%	6%	6%	6%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.91	0.74	1.05	1.05	0.41	0.41	0.69	0.71	0.50	0.33	0.36	0.34	55%	45%	34%	32%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	1.98	1.57	2.20	2.20	1.02	0.92	1.51	1.51	0.96	0.65	0.69	0.69	48%	41%	31%	31%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.56	0.51	0.58	0.58	0.23	0.25	0.35	0.35	0.33	0.26	0.23	0.23	59%	51%	40%	40%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Daniel Field NWS (DNL)				Facility				Difference Between DNL & Facility				Facility (% Difference from DNL)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
30	0.108	0.114	0.110	0.101	0.063	0.179	0.179	0.029	0.045	-0.065	-0.069	0.072	42%	57%	63%	71%
60	0.084	0.089	0.084	0.078	0.073	0.202	0.202	0.036	0.011	-0.113	-0.118	0.042	13.1%	127%	140%	54%
90	0.176	0.187	0.178	0.163	0.082	0.254	0.254	0.042	0.094	-0.067	-0.076	0.121	53%	36%	43%	74%
120	0.165	0.171	0.166	0.157	0.113	0.280	0.280	0.058	0.052	-0.109	-0.114	0.099	32%	64%	69%	63%
150	0.195	0.206	0.197	0.183	0.060	0.219	0.219	0.032	0.135	-0.013	-0.022	0.151	69%	6%	11%	83%
180	0.158	0.170	0.160	0.143	0.069	0.233	0.233	0.036	0.089	-0.063	-0.073	0.107	56%	37%	46%	75%
210	0.065	0.073	0.066	0.057	0.055	0.210	0.210	0.027	0.010	-0.137	-0.144	0.030	15%	188%	218%	53%
240	0.081	0.094	0.086	0.070	0.044	0.162	0.162	0.018	0.037	-0.068	-0.076	0.052	46%	72%	88%	74%
270	0.239	0.258	0.240	0.215	0.056	0.200	0.200	0.025	0.183	0.058	0.040	0.190	77%	22%	17%	88%
300	0.164	0.177	0.166	0.148	0.144	0.320	0.320	0.064	0.020	-0.143	-0.154	0.084	12%	81%	93%	57%
330	0.088	0.101	0.089	0.073	0.069	0.214	0.214	0.031	0.019	-0.113	-0.125	0.042	22%	112%	140%	58%
360	0.375	0.387	0.381	0.360	0.054	0.197	0.197	0.025	0.321	0.190	0.184	0.335	86%	49%	48%	93%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

FIGURE C-6A. COMPARISON OF LAND USE CATEGORIES (PRE-CONSTRUCTION)

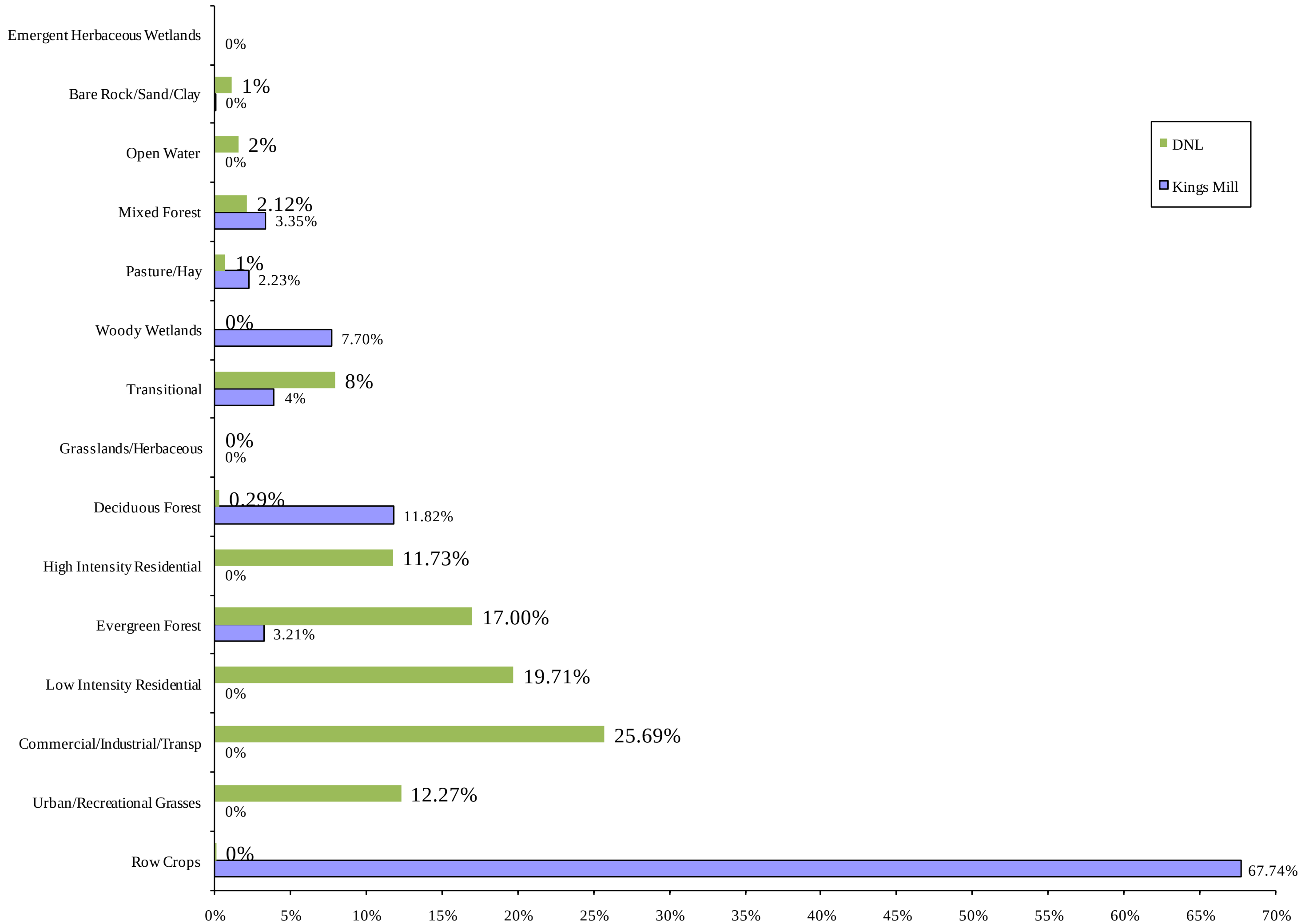
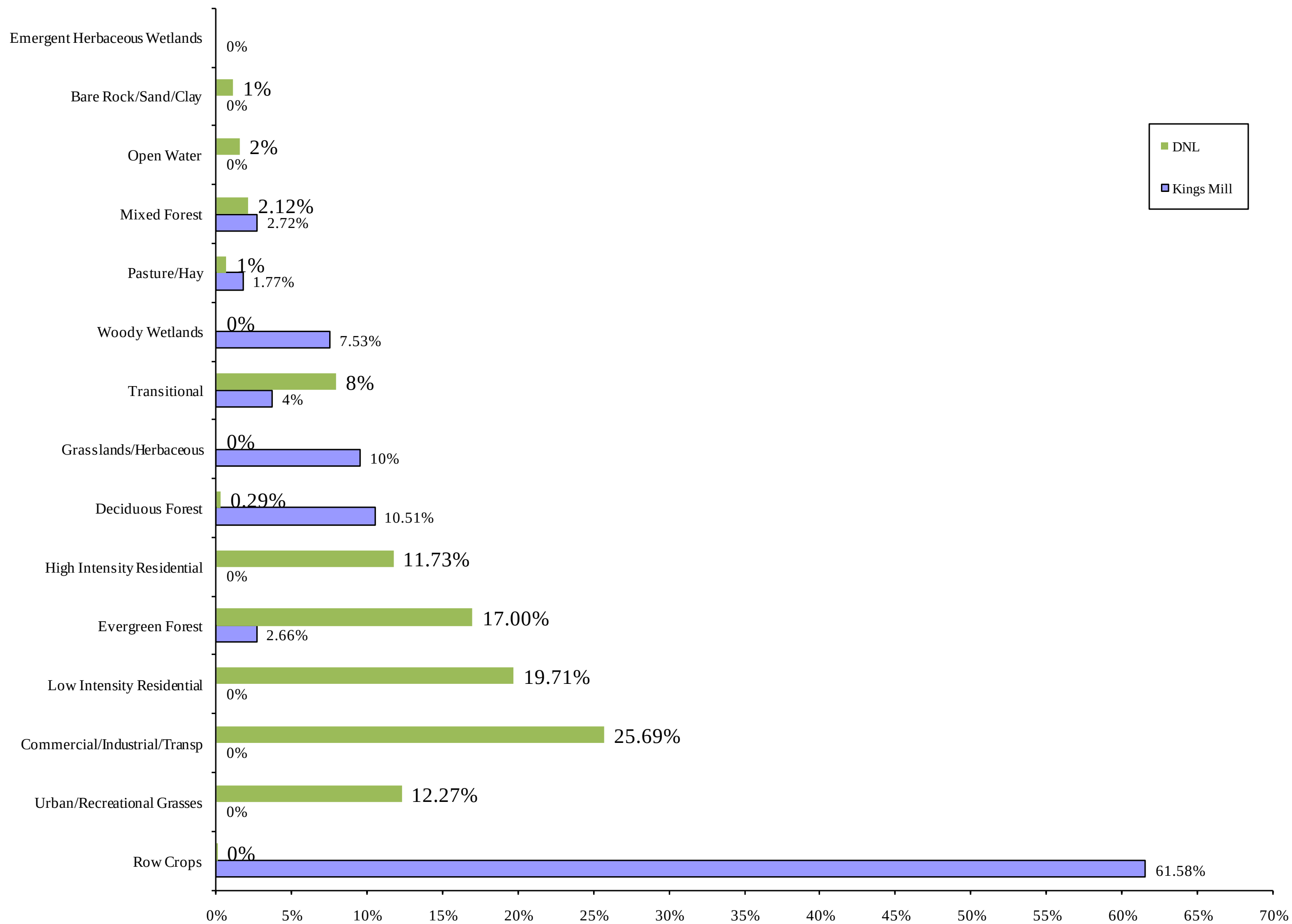


FIGURE C-6B. COMPARISON OF LAND USE CATEGORIES (POST-CONSTRUCTION)



APPENDIX D

REGIONAL INVENTORY SOURCES

Table D-1. Annual NO_X Regional Source Inventory - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility NO_X Emissions[1] (tpy)	Distance from Facility (km)	Within 2 km of another facility?	NO_X 20D	NO_X Exclude Per 20D Rule?[2]
Georgia Sources								
Continental Commercial Products Llc-Glit Div	Jefferson	371,893	3,675,464	28.44	4.75	No	81.52	Yes
Mestek, Inc. (dba Air Balance, Inc.)	Jefferson	369,624	3,673,972	3.30	4.30	No	72.68	Yes
Thiele Kaolin Co Reedy Creek Div	Glascock	366,517	3,682,647	61.07	13.30	No	252.70	Yes
Southern Natural Gas	Jefferson	368,097	3,679,656	469.90	9.92	No	185.06	No
KaMin - Wrens Calcine Plant	Jefferson	366,224	3,680,413	92.88	11.51		216.78	Yes
KaMin - Wrens Main	Jefferson	369,361	3,682,652	250.00	12.30	No	232.59	No
Thermo King Corporation	Jefferson	367,098	3,651,540	16.56	19.95	No	385.69	Yes
US Army Signal Ctr. & Ft. Gordon	Richmond	391,250	3,697,629	318.58	32.78	No	642.16	Yes
Erdene Materials Corporation - Dearing Plant	McDuffie	371,879	3,698,091	6.44	27.34	No	533.46	Yes
Georgia Vitrified Brick & Clay Ltd	Columbia	379,728	3,697,659	1.23	27.86	No	543.86	Yes
Unimin Corporation - Hephzibah	Richmond	395,896	3,686,999	49.50	28.50	No	556.53	Yes
Augusta-Richmond County Deans Bridge Road Landfill	Richmond	394,215	3,690,716	40.33	29.51	No	576.77	Yes
Georgia DOT - Davisboro Asphalt Plant	Washington	350,960	3,651,100	8.51	29.15	No	569.54	Yes
ASTA, Inc.	Burke	404,618	3,663,313	-	32.99	No	646.31	Yes
Farmers Gin & Storage	Jefferson	369,313	3,636,718	2.50	34.18	Yes	670.29	Yes
Fulghum Industries, Inc.	Jefferson	368,699	3,635,941	-	35.02		686.97	Yes
Battle Lumber Company Inc.	Jefferson	369,319	3,636,323	59.07	34.58		678.13	Yes
National Security Agency	Richmond	408,130	3,704,261	49.50	48.92	No	965.04	Yes
Tin Inc. dba Temple-Inland	Mcduffie	362,547	3,703,842	453.99	34.55	No	677.54	Yes
TRW Warrenton Foundry	Warren	346,921	3,697,931	25.00	37.31	No	732.79	Yes
Martin Marietta Aggregates - Warrenton Rock Quarry	Warren	347,946	3,695,382	-	34.76	No	681.89	Yes
HP Pelzer - Thomson	Mcduffie	357,093	3,702,062	3.26	34.89	Yes	684.31	Yes
Shaw Industries Group, Inc. - Plant 22/89	McDuffie	356,807	3,701,993	42.90	34.95		685.63	Yes
Mundy, Inc.	Burke	405,858	3,661,689	100.00	34.58	Yes	678.29	Yes
FIAMM Technologies Inc.	Burke	405,633	3,663,396	-	33.96		665.73	Yes
Georgia Iron Works Co	Columbia	389,655	3,702,550	0.15	36.14	No	709.31	Yes
Plant Washington	Washington	337,088	3,659,816	1,345.00	37.05	No	727.54	No
Georgia-Pacific Corp Chip-n-Saw Div. Warrenton	Warren	346,957	3,697,767	100.00	37.16	No	729.90	Yes
Dogwood Quarry	Columbia	383,226	3,709,658	100.00	40.36	No	793.79	Yes
Hanson Aggregates Southeast LLC - Sparta Quarry	Hancock	322,678	3,681,213	100.00	50.89	No	1,004.43	Yes
American Concrete - Gracewood	Richmond	402,911	3,693,445	100.00	37.96	No	745.73	Yes
Jebco, Inc.	Warren	343,844	3,697,225	100.00	39.00	No	766.56	Yes
Solvay Advanced Polymers - Augusta	Richmond	405,656	3,692,766	250.00	39.81			
Omni Oxide Corporation	Richmond	405,926	3,692,761	100.00	40.03			
US Battery Mfg. Co of Augusta	Richmond	405,926	3,692,761	100.00	40.03	No	787.27	Yes
Martin Marietta Aggregates	Columbia	385,159	3,709,414	100.00	40.68	No	800.28	Yes
Augusta Ready Mix, Inc.	Columbia	387,150	3,706,000	100.00	38.17			
Reeves Construction Co.	Columbia	384,120	3,709,694	100.00	40.64			
EKA Chemicals - Augusta GP Plant	Richmond	407,594	3,695,445	100.00	42.92			
Sample & Son Const and Demolition LF	Columbia	382,931	3,710,318	100.00	40.92			
The Procter & Gamble Manufacturing Company	Richmond	406,562	3,694,781	100.00	41.70			
Leco Corporation	Columbia	394,372	3,705,331	100.00	40.92	No	805.04	Yes
Milliken & Company Kingsley Plant	McDuffie	360,222	3,710,799	100.00	41.88	No	824.18	Yes
Pryoflex Augusta LLC	Richmond	411,350	3,689,329	100.00	43.08	Yes	848.13	No
West Fraser - Augusta Lumber Mill	Richmond	410,417	3,688,499	22.79	41.88			
Deerfield Tissue, LLC	Richmond	411,063	3,687,063	9.64	41.89			
Farmers & Truckers Biodiesel LLC	Richmond	410,501	3,688,406	-	41.92			
International Paper - Augusta Mill	Richmond	411,198	3,688,017	4,761.60	42.39			
International Flavors and Fragrances	Richmond	410,509	3,688,702	34.78	42.05			
PVS Technologies, Inc.	Richmond	411,101	3,689,082	-	42.75			
Augusta Newsprint Co	Richmond	411,043	3,688,936	499.63	42.63			
Olin Corporation Augusta Plant	Richmond	411,642	3,689,877	18.31	43.58			
Lafarge Building Materials, Inc. - Martinez Concrete Plant	Columbia	395,868	3,705,928	100.00	42.24	No	831.35	Yes
Finnchem USA, Inc	Richmond	410,028	3,691,245	100.00	42.77	Yes	842.04	Yes
Garrett Aviation Services	Richmond	409,383	3,692,743	100.00	42.95			
Occidental Chemical Corp	Richmond	408,146	3,695,572	250.00	43.45	Yes	855.56	Yes
Prayon Inc	Richmond	407,850	3,695,193	100.00	42.99			
Keebler Foods Company	Richmond	408,029	3,695,528	100.00	43.33			
Augusta Select Tissue, LLC	Richmond	408,349	3,695,293	100.00	43.46			
Kendall Co Augusta Plant	Richmond	408,434	3,695,438	100.00	43.61			
Georgia-Pacific Corporation 1 LLC	Richmond	407,912	3,697,238	100.00	44.23			
American Concrete - Martinez	Richmond	398,414	3,706,473	100.00	44.14	No	869.37	Yes
Cobb EMC - Sandersville	Washington	331,802	3,652,098	76.60	44.76	No	881.70	Yes
Burgess Pigment Company, Sandersville Plant	Washington	329,707	3,649,412	79.58	47.80			
Thiele Kaolin Co . - Sandersville Plant	Washington	330,686	3,649,165	211.71	47.04			
Bulk Chemical Services, LLC	Washington	332,077	3,649,008	-	45.89			
KaMin - Sandersville	Washington	329,681	3,649,059	250.00	47.99			

Table D-1. Annual NO_X Regional Source Inventory - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility NO_X Emissions[1] (tpy)	Distance from Facility (km)	Within 2 km of another facility?	NO_X 20D	NO_X Exclude Per 20D Rule?[2]
Thermal Ceramics	Richmond	407,079	3,700,074	10.38	45.35	Yes	893.57	Yes
Boral Bricks #6 Augusta Plt	Richmond	408,218	3,699,805	30.66	46.05			
USVA Veterans Admin H	Richmond	404,725	3,703,684	63.97	46.09			
Augusta Hospital, LLC	Richmond	405,418	3,703,585	100.00	46.50			
University Hospital	Richmond	405,696	3,703,934	98.07	46.95			
Transflo Terminal Servies, Inc.	Richmond	406,412	3,702,582	-	46.52			
Southern Crushers, Inc.	Richmond	408,492	3,701,078	86.63	47.08			
Mabus Brothers Construction Company	Richmond	408,492	3,701,078	48.20	47.08			
FPL Food, LLC	Richmond	409,291	3,701,655	68.14	48.06			
crawford kitchens, inc	Columbia	398,903	3,708,252	25.00	45.87	Yes	903.99	Yes
Martin Marietta Aggregates - Richmond County	Richmond	398,434	3,709,133	100.00	46.33			
KGEN Sandersville LLC	Washington	326,300	3,665,800	724.00	46.45	Yes	903.99	Yes
Paul Creek Energy Center	Washington	325,635	3,664,932	100.00	47.21			
Imerys Clays, Inc. Sandersville Calcine Plant	Washington	330,657	3,649,161	154.96	47.07	Yes	903.99	Yes
Kentucky-Tennessee Clay Company (Plts 51 & 52)	Washington	329,474	3,648,637	100.00	48.36			
World Color Printing (USA) II Corp.	Columbia	396,085	3,711,586	100.00	47.16	Yes	929.84	Yes
US Battery Manufacturing Company	Columbia	395,518	3,712,345	100.00	47.54			
Greenfield Industries, Inc.	Columbia	396,501	3,710,870	100.00	46.76			
Sandersville Ethanol, LLC	Washington	328,546	3,651,211	100.00	48.09	No	948.35	Yes
Elanco Augusta Technology Center	Richmond	412,216	3,698,452	100.00	48.43	Yes	955.29	Yes
The Nutrasweet Kelco Co	Richmond	412,217	3,698,455	250.00	48.44			
American Concrete - Downtown	Richmond	409,105	3,704,324	100.00	49.68	Yes	980.18	Yes
Boral Bricks, Inc. - Plants 3 & 5	Richmond	409,495	3,703,909	100.00	49.69			
Medical College of Georgia	Richmond	408,094	3,703,760	100.00	48.55			
Modern Welding Company of Georgia	Richmond	409,380	3,704,826	100.00	50.22			
Potters Industries, Inc. - Q-Cel Facility	Richmond	409,380	3,704,826	100.00	50.22			
Standard Textile Augusta, Inc.	Richmond	407,982	3,705,392	100.00	49.60			
Industrial Metal Finishing, Inc.	Richmond	409,399	3,704,113	100.00	49.76			
Top Bead Welding Services, Inc.	Richmond	409,806	3,702,494	100.00	48.99			
Reeves CC Inc. - Riverwatch HMAF	Richmond	403,644	3,709,732	100.00	49.90	Yes	984.64	Yes
Martin Marietta Materials, Inc. - Augusta Quarry	Richmond	404,023	3,711,378	100.00	51.43			
Kentucky-Tennessee Clay Company (Plt 53)	Washington	325,130	3,654,389	100.00	50.10	Yes	988.63	Yes
Cobb EMC - Robin Springs	Washington	324,916	3,654,516	100.00	50.26			
Imerys Clays Inc, Deepstep Road Plant Sandersville GA	Washington	324,393	3,655,700	142.87	50.39			
General Chemical Corp., Augusta Plant	Richmond	413,066	3,700,330	-	50.22	Yes	990.93	No
PCS Nitrogen Fertilizer Inc	Richmond	413,506	3,700,701	4,096.56	50.79			
DSM Resins U.S. Inc	Richmond	413,697	3,701,994	10.42	51.72			
DSM Chemicals North America, Inc.	Richmond	413,727	3,702,063	700.00	51.78			

1. For conservatism, facility emissions were set to the PTE maximum thresholds in Section B1 (i.e., 50, 100, 250 tpy) unless further analysis was needed to evalate 20D applicability.

2. Emissions from facilities within 2 km of another site, as determined by a review of the coordinates when sorted by distance from the King site, were grouped together when completing the 20D screening.

Table D-2. Modeling Data for Southern Natural Gas - Wrens

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
C01S	SNGW01	368.33	3,679.75	144.80	2.47E+00	5.18	0.25	36.60	799.80
C02S	SNGW02	368.34	3,679.75	144.80	2.47E+00	5.18	0.25	36.60	799.80
C03S	SNGW03	368.35	3,679.76	144.80	5.00E+00	4.88	0.29	52.70	866.50
C05S	SNGW05	368.46	3,679.75	144.80	8.84E-01	11.28	1.07	12.80	732.00

Table D-3. Modeling Data for KaMin Wrens - Main

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
202S	KMWM202S	369.06	3,682.52	137.46	1.43E+00	4.88	0.26	4.57	327.59
378S	KMWM378S	369.06	3,682.52	137.46	3.57E+01	29.57	1.83	10.06	386.48
431S	KMWM431S	369.06	3,682.52	137.46	1.64E+01	15.85	1.07	3.66	327.59
501S	KMWM501S	369.06	3,682.52	137.46	2.74E+00	11.58	0.61	0.91	327.59
52S	KMWM52S	369.06	3,682.52	137.46	1.83E+01	22.86	1.34	60.96	372.04
62S	KMWM62S	369.06	3,682.52	137.46	2.56E+01	22.86	1.43	63.09	372.04
GG1S	KMWMGG1S	369.06	3,682.52	137.46	2.31E+02	3.35	0.26	4.57	327.59

Table D-4. Modeling Data for Plant Washington

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
S1	PWS1	337.09	3,659.82	94.00	4.18E+01	137.16	9.14	18.55	333.00
S45	PWS45	337.41	3,659.77	94.00	2.42E+00	32.43	1.52	19.81	408.00

Table D-5. Modeling Data for International Flavors and Fragrances

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
B01	IFFB01	410.51	3,688.70	55	2.52E-01	9.14	0.66	0.58	449.82
B02	IFFB02	410.51	3,688.70	55	5.11E-01	9.14	0.66	0.58	449.82
B03	IFFB03	410.51	3,688.70	55	5.11E-01	9.14	0.66	0.58	449.82

Table D-6. Modeling Data for Augusta Newsprint Co.

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
S009	ANCS009	411.04	3,688.94	55.00	1.11E+01	42.67	2.90	11.83	338.71
S001	ANCS001	411.04	3,688.94	55.00	4.30E-01	36.88	2.13	14.19	588.15

Table D-7. Modeling Data for Olin Corporation Augusta Plant

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
E05A	OCOE05A	411.64	3,689.88	52.00	2.11E-01	11.28	0.61	10.06	422.04
E06A	OCOE06A	411.64	3,689.88	52.00	2.11E-01	11.28	0.61	10.06	422.04

Table D-8. Modeling Data for West Fraser Augusta Mill

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
KD01	WFLKD01	410.42	3,688.50	48.77	1.15E-01	8.99	0.53	5.18	394.26
KD02	WFLKD02	410.42	3,688.50	48.77	2.29E-01	9.14	0.53	5.18	394.26
KD03	WFLKD03	410.42	3,688.50	48.77	3.78E-01	9.14	0.53	5.18	394.26

Table D-9. Modeling Data for Deerfield Tissues, LLC

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
B02	DEERB02	411.06	3,687.06	44.20	2.22E-01	4.88	1.14	15.18	463.71

Table D-10. Modeling Data for International Paper - Augusta Mill

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
LK1	IPALK1	410.98	3,687.39	48.16	2.71E+00	61.57	1.73	4.88	349.26
LK2	IPALK2	410.98	3,687.39	48.16	4.88E+00	64.62	1.56	14.94	340.93
PB1	IPAPB1	410.98	3,687.39	48.16	2.65E+01	60.90	2.23	18.50	331.48
PB2	IPAPB2	410.98	3,687.39	48.16	2.90E+01	60.90	2.44	25.15	506.48
PB3	IPAPB3	410.98	3,687.39	48.16	1.69E+01	60.96	3.05	17.07	444.26
RB2	IPARB2	410.98	3,687.39	48.16	4.01E+00	60.96	2.44	24.38	428.71
RB3	IPARB3	410.98	3,687.39	48.16	1.89E+01	64.01	3.00	36.58	473.15
RLB	IPARLB	410.98	3,687.39	48.16	5.75E+00	36.58	1.52	12.92	477.59
ST2	IPAST2	410.98	3,687.39	48.16	7.36E-02	59.44	1.05	16.92	338.71
ST3	IPAST3	410.98	3,687.39	48.16	3.10E-01	64.01	1.83	6.10	347.04
PAPR	IPAPAPR	410.98	3,687.39	48.16	4.93E-01	17.74	1.04	8.42	497.59

Table D-11. Modeling Data for PCS Nitrogen Fertilizer

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
ST11	PCSST11	413.51	3,700.70	37.80	1.62E+01	32.92	4.24	12.80	455.37
ST18	PCSST18	413.51	3,700.70	37.80	5.73E+01	41.91	0.98	31.70	309.26
ST19	PCSST19	413.51	3,700.70	37.80	1.64E+01	21.03	1.52	31.70	446.48
ST20	PCSST20	413.51	3,700.70	37.80	1.38E-02	3.66	0.30	0.61	294.26
ST21	PCSST21	413.51	3,700.70	37.80	9.16E-01	38.10	1.52	3.17	422.04
ST24	PCSST24	413.51	3,700.70	37.80	3.48E+00	31.70	1.52	1.58	438.71
ST36	PCSST36	413.51	3,700.70	37.80	3.22E-03	30.48	0.08	5.64	422.04

Table D-12. Modeling Data for DSM Resins U.S. Inc. and DSM Chemicals North America, Inc.

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
F001	DSMRF001	413.70	3,701.99	39.62	9.98E-02	10.06	0.51	5.79	752.59
F002	DSMRF002	413.70	3,701.99	39.62	1.40E-01	10.06	0.76	5.79	752.59
S014	DSMCS014	413.73	3,702.06	39.62	2.13E+01	67.06	3.58	15.15	422.04
S029	DSMCS029	413.73	3,702.06	39.62	1.24E-01	10.97	0.46	8.84	588.71
S031	DSMCS031	413.73	3,702.06	39.62	3.34E-01	45.72	0.61	4.27	672.04
S002	DSMCS002	413.73	3,702.06	39.62	8.24E-01	24.38	1.07	7.32	449.82
S012	DSMCS012	413.73	3,702.06	39.62	3.34E-02	19.81	0.61	4.27	672.04
S017	DSMCS017	413.73	3,702.06	39.62	4.99E-02	23.01	0.66	4.88	672.04
S020	DSMCS020	413.73	3,702.06	39.62	5.61E+00	24.38	1.37	15.09	449.82
S07A	DSMCS07A	413.73	3,702.06	39.62	1.61E+00	49.38	0.82	15.85	656.48
S18A	DSMCS18A	413.73	3,702.06	39.62	2.30E+00	38.10	0.91	19.75	449.82

Table D-13. Hourly NO_2 Regional Source Inventory - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility NO_X Emissions[1] (tpy)	Distance from Facility (km)	W/in 2 km of another facility?	NO_X 20D	NO_X Exclude Per 20D Rule?[2]
Georgia Sources								
Continental Commercial Products Llc-Glit Div	Jefferson	371,893	3,675,464	28.44	4.75	No	N/A	No
Mestek, Inc. (dba Air Balance, Inc.)	Jefferson	369,624	3,673,972	3.30	4.30	No	N/A	No
Thiele Kaolin Co Reedy Creek Div	Glascock	366,517	3,682,647	61.07	13.30	No	266.10	Yes
Southern Natural Gas	Jefferson	368,097	3,679,656	469.90	9.92	No	198.46	No
KaMin - Wrens Calcine Plant	Jefferson	366,224	3,680,413	92.88	11.51		230.18	Yes
KaMin - Wrens Main	Jefferson	369,361	3,682,652	250.00	12.30	No	245.99	No
Thermo King Corporation	Jefferson	367,098	3,651,540	16.56	19.95	No	399.09	Yes
US Army Signal Ctr. & Ft. Gordon	Richmond	391,250	3,697,629	318.58	32.78	No	655.56	Yes
Erdene Materials Corporation - Dearing Plant	McDuffie	371,879	3,698,091	6.44	27.34	No	546.86	Yes
Georgia Vitrified Brick & Clay Ltd	Columbia	379,728	3,697,659	1.23	27.86	No	557.26	Yes
Unimin Corporation - Hephzibah	Richmond	395,896	3,686,999	49.50	28.50	No	569.93	Yes
Augusta-Richmond County Deans Bridge Road Landfill	Richmond	394,215	3,690,716	40.33	29.51	No	590.17	Yes
Georgia DOT - Davisboro Asphalt Plant	Washington	350,960	3,651,100	8.51	29.15	No	582.94	Yes
ASTA, Inc.	Burke	404,618	3,663,313	-	32.99	No	659.71	Yes
Farmers Gin & Storage	Jefferson	369,313	3,636,718	2.50	34.18	Yes	683.69	Yes
Fulghum Industries, Inc.	Jefferson	368,699	3,635,941	-	35.02		700.37	Yes
Battle Lumber Company Inc.	Jefferson	369,319	3,636,323	59.07	34.58		691.53	Yes
National Security Agency	Richmond	408,130	3,704,261	49.50	48.92	No	978.44	Yes
Tin Inc. dba Temple-Inland	McDuffie	362,547	3,703,842	453.99	34.55	No	690.94	Yes
TRW Warrenton Foundry	Warren	346,921	3,697,931	25.00	37.31	No	746.19	Yes
Martin Marietta Aggregates - Warrenton Rock Quarry	Warren	347,946	3,695,382	-	34.76	No	695.29	Yes
HP Pelzer - Thomson	McDuffie	357,093	3,702,062	3.26	34.89	Yes	697.71	Yes
Shaw Industries Group, Inc. - Plant 22/89	McDuffie	356,807	3,701,993	42.90	34.95		699.03	Yes
Mundy, Inc.	Burke	405,858	3,661,689	100.00	34.58	Yes	691.69	Yes
FIAMM Technologies Inc.	Burke	405,633	3,663,396	-	33.96		679.13	Yes
Georgia Iron Works Co	Columbia	389,655	3,702,550	0.15	36.14	No	722.71	Yes
Plant Washington	Washington	337,088	3,659,816	1,345.00	37.05	No	740.94	No
Georgia-Pacific Corp Chip-n-Saw Div. Warrenton	Warren	346,957	3,697,767	100.00	37.16	No	743.30	Yes
Dogwood Quarry	Columbia	383,226	3,709,658	100.00	40.36	No	807.19	Yes
Hanson Aggregates Southeast LLC - Sparta Quarry	Hancock	322,678	3,681,213	100.00	50.89	No	1,017.83	Yes
American Concrete - Gracewood	Richmond	402,911	3,693,445	100.00	37.96	No	759.13	Yes
Jebco, Inc.	Warren	343,844	3,697,225	100.00	39.00	No	779.96	Yes
Solvay Advanced Polymers - Augusta	Richmond	405,656	3,692,766	250.00	39.81			
Omni Oxide Corporation	Richmond	405,926	3,692,761	100.00	40.03			
US Battery Mfg. Co of Augusta	Richmond	405,926	3,692,761	100.00	40.03	No	800.67	Yes
Martin Marietta Aggregates	Columbia	385,159	3,709,414	100.00	40.68	No	813.68	Yes
Augusta Ready Mix, Inc.	Columbia	387,150	3,706,000	100.00	38.17			
Reeves Construction Co.	Columbia	384,120	3,709,694	100.00	40.64			
EKA Chemicals - Augusta GP Plant	Richmond	407,594	3,695,445	100.00	42.92			
Sample & Son Const and Demolition LF	Columbia	382,931	3,710,318	100.00	40.92			
The Procter & Gamble Manufacturing Company	Richmond	406,562	3,694,781	100.00	41.70			
Leco Corporation	Columbia	394,372	3,705,331	100.00	40.92	No	818.44	Yes
Milliken & Company Kingsley Plant	McDuffie	360,222	3,710,799	100.00	41.88	No	837.58	Yes

Table D-13. Hourly NO_2 Regional Source Inventory - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility NO_X Emissions[1] (tpy)	Distance from Facility (km)	W/in 2 km of another facility?	NO_X 20D	NO_X Exclude Per 20D Rule?[2]
Pryoflex Augusta LLC	Richmond	411,350	3,689,329	100.00	43.08	Yes	861.53	Yes
West Fraser - Augusta Lumber Mill	Richmond	410,417	3,688,499	22.79	41.88			
Deerfield Tissue, LLC	Richmond	411,063	3,687,063	9.64	41.89			
Farmers & Truckers Biodiesel LLC	Richmond	410,501	3,688,406	-	41.92			
International Paper - Augusta Mill	Richmond	411,198	3,688,017	4,761.60	42.39			
International Flavors and Fragrances	Richmond	410,509	3,688,702	34.78	42.05			
PVS Technologies, Inc.	Richmond	411,101	3,689,082	-	42.75			
Augusta Newsprint Co	Richmond	411,043	3,688,936	499.63	42.63			
Olin Corporation Augusta Plant	Richmond	411,642	3,689,877	18.31	43.58			
Lafarge Building Materials, Inc. - Martinez Concrete Plant	Columbia	395,868	3,705,928	100.00	42.24	No	844.75	Yes
Finnchem USA, Inc	Richmond	410,028	3,691,245	100.00	42.77	Yes	855.44	Yes
Garrett Aviation Services	Richmond	409,383	3,692,743	100.00	42.95			
Occidental Chemical Corp	Richmond	408,146	3,695,572	250.00	43.45	Yes	868.96	Yes
Prayon Inc	Richmond	407,850	3,695,193	100.00	42.99			
Keebler Foods Company	Richmond	408,029	3,695,528	100.00	43.33			
Augusta Select Tissue, LLC	Richmond	408,349	3,695,293	100.00	43.46			
Kendall Co Augusta Plant	Richmond	408,434	3,695,438	100.00	43.61			
Georgia-Pacific Corporation 1 LLC	Richmond	407,912	3,697,238	100.00	44.23			
American Concrete - Martinez	Richmond	398,414	3,706,473	100.00	44.14	No	882.77	Yes
Cobb EMC - Sandersville	Washington	331,802	3,652,098	76.60	44.76	No	895.10	Yes
Burgess Pigment Company, Sandersville Plant	Washington	329,707	3,649,412	79.58	47.80			
Thiele Kaolin Co . - Sandersville Plant	Washington	330,686	3,649,165	211.71	47.04			
Bulk Chemical Services, LLC	Washington	332,077	3,649,008	-	45.89			
KaMin - Sandersville	Washington	329,681	3,649,059	250.00	47.99			
Thermal Ceramics	Richmond	407,079	3,700,074	10.38	45.35	Yes	906.97	Yes
Boral Bricks #6 Augusta Plt	Richmond	408,218	3,699,805	30.66	46.05			
USVA Veterans Admin H	Richmond	404,725	3,703,684	63.97	46.09			
Augusta Hospital, LLC	Richmond	405,418	3,703,585	100.00	46.50			
University Hospital	Richmond	405,696	3,703,934	98.07	46.95			
Transflo Terminal Servies, Inc.	Richmond	406,412	3,702,582	-	46.52			
Southern Crushers, Inc.	Richmond	408,492	3,701,078	86.63	47.08			
Mabus Brothers Construction Company	Richmond	408,492	3,701,078	48.20	47.08			
FPL Food, LLC	Richmond	409,291	3,701,655	68.14	48.06			
Crawford Kitchens, Inc	Columbia	398,903	3,708,252	25.00	45.87	Yes	917.39	Yes
Martin Marietta Aggregates - Richmond County	Richmond	398,434	3,709,133	100.00	46.33			
KGEN Sandersville LLC	Washington	326,300	3,665,800	724.00	46.45	Yes	928.96	Yes
Paul Creek Energy Center	Washington	325,635	3,664,932	100.00	47.21			
Imerys Clays, Inc. Sandersville Calcine Plant	Washington	330,657	3,649,161	154.96	47.07	Yes	941.42	Yes
Kentucky-Tennessee Clay Company (Plts 51 & 52)	Washington	329,474	3,648,637	100.00	48.36			
World Color Printing (USA) II Corp.	Columbia	396,085	3,711,586	100.00	47.16	Yes	943.24	Yes
US Battery Manufacturing Company	Columbia	395,518	3,712,345	100.00	47.54			
Greenfield Industries, Inc.	Columbia	396,501	3,710,870	100.00	46.76			
Sandersville Ethanol, LLC	Washington	328,546	3,651,211	100.00	48.09	No	961.75	Yes
Elanco Augusta Technology Center	Richmond	412,216	3,698,452	100.00	48.43	Yes	968.69	Yes
The Nutrasweet Kelco Co	Richmond	412,217	3,698,455	250.00	48.44			
American Concrete - Downtown	Richmond	409,105	3,704,324	100.00	49.68	Yes	993.58	Yes
Boral Bricks, Inc. - Plants 3 & 5	Richmond	409,495	3,703,909	100.00	49.69			
Medical College of Georgia	Richmond	408,094	3,703,760	100.00	48.55			
Modern Welding Company of Georgia	Richmond	409,380	3,704,826	100.00	50.22			
Potters Industries, Inc. - Q-Cel Facility	Richmond	409,380	3,704,826	100.00	50.22			
Standard Textile Augusta, Inc.	Richmond	407,982	3,705,392	100.00	49.60			
Industrial Metal Finishing, Inc.	Richmond	409,399	3,704,113	100.00	49.76			
Top Bead Welding Services, Inc.	Richmond	409,806	3,702,494	100.00	48.99			
Reeves CC Inc. - Riverwatch HMAF	Richmond	403,644	3,709,732	100.00	49.90	Yes	998.04	Yes
Martin Marietta Materials, Inc. - Augusta Quarry	Richmond	404,023	3,711,378	100.00	51.43			
Kentucky-Tennessee Clay Company (Plt 53)	Washington	325,130	3,654,389	100.00	50.10	Yes	1,002.03	Yes
Cobb EMC - Robin Springs	Washington	324,916	3,654,516	100.00	50.26			
Imerys Clays Inc, Deepstep Road Plant Sandersville GA	Washington	324,393	3,655,700	142.87	50.39			

Table D-13. Hourly NO_2 Regional Source Inventory - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility NO_X Emissions[1] (tpy)	Distance from Facility (km)	W/in 2 km of another facility?	NO_X 20D	NO_X Exclude Per 20D Rule?[2]
General Chemical Corp., Augusta Plant	Richmond	413,066	3,700,330	-	50.22	Yes	1,004.33	Yes
PCS Nitrogen Fertilizer Inc	Richmond	413,506	3,700,701	4,096.56	50.79			
DSM Resins U.S. Inc	Richmond	413,697	3,701,994	10.42	51.72			
DSM Chemicals North America, Inc.	Richmond	413,727	3,702,063	700.00	51.78			
Pollard Lumber Co	Columbia	382,225	3,720,504	100.00	50.69	No	1,013.89	Yes
Martin Marietta Aggregates - Camak Rock Quarry	Warren	347,924	3,716,391	100.00	51.83	No	1,036.51	Yes
Burke County Concrete #29	Burke	428,354	3,667,098	-	55.99	Yes	1,119.81	Yes
Southern Nuclear Operating Co Plant Vogtle	Burke	428,854	3,667,231	101.00	56.48			
Shaw Group Inc - Vogtle Units 3 & 4	Burke	428,974	3,667,282	47.12	56.60			
Southern Nuclear - Allen B. Wilson Plant	Burke	430,251	3,665,827	189.85	57.98			
Georgia Industrial Minerals, Inc.	Washington	316,547	3,655,890	100.00	57.88	No	1,157.55	Yes
Corridor Mining LLC – Culverton Quarry	Hancock	315,971	3,683,610	100.00	57.96	No	1,159.11	Yes
Washington County Power LLC	Washington	314,748	3,663,978	250.00	58.13	No	1,162.62	Yes
MI Metals, Inc.- Millen	Jenkins	414,002	3,629,861	2.40	58.28	No	1,165.52	Yes

1. For conservatism, facility emissions were set to the PTE maximum thresholds in Section B1 (i.e., 50, 100, 250 tpy) unless further analysis was needed to evalate 20D applicability.

2. Emissions from facilities within 2 km of another site, as determined by a review of the coordinates when sorted by distance from the King site, were grouped together when completing the 20D screening.

Table D-14. Modeling Data for Southern Natural Gas - Wrens

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
C01S	SNGW01	368.33	3,679.75	144.80	2.47E+00	5.18	0.25	36.60	799.80
C02S	SNGW02	368.34	3,679.75	144.80	2.47E+00	5.18	0.25	36.60	799.80
C03S	SNGW03	368.35	3,679.76	144.80	5.00E+00	4.88	0.29	52.70	866.50
C05S	SNGW05	368.46	3,679.75	144.80	8.84E-01	11.28	1.07	12.80	732.00

Table D-15. Modeling Data for KaMin Wrens - Main

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
202S	KMWM202S	369.06	3,682.52	137.46	1.43E+00	4.88	0.26	4.57	327.59
378S	KMWM378S	369.06	3,682.52	137.46	3.57E+01	29.57	1.83	10.06	386.48
431S	KMWM431S	369.06	3,682.52	137.46	1.64E+01	15.85	1.07	3.66	327.59
501S	KMWM501S	369.06	3,682.52	137.46	2.74E+00	11.58	0.61	0.91	327.59
52S	KMWM52S	369.06	3,682.52	137.46	1.83E+01	22.86	1.34	60.96	372.04
62S	KMWM62S	369.06	3,682.52	137.46	2.56E+01	22.86	1.43	63.09	372.04
GG1S	KMWMGG1S	369.06	3,682.52	137.46	2.31E+02	3.35	0.26	4.57	327.59

Table D-16. Modeling Data for Plant Washington

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
S1	PWS1	337.09	3,659.82	94.00	4.18E+01	137.16	9.14	18.55	333.00
S45	PWS45	337.41	3,659.77	94.00	2.42E+00	32.43	1.52	19.81	408.00

Table D-17. Modeling Data for Continental Commercial Products Llc-Glit Div

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
ST2	CCPST2	371.89	3,675.46	124	7.12E-02	10.67	1.83	11.86	438.71
ST3	CCPST3	371.89	3,675.46	124	9.49E-02	10.67	1.83	11.86	438.71
ST4	CCPST4	371.89	3,675.46	124	4.75E-02	10.67	1.83	11.86	438.71
ST5	CCPST5	371.89	3,675.46	124	4.75E-02	10.67	1.83	11.86	438.71
ST6	CCPST6	371.89	3,675.46	124	9.88E-02	10.67	1.83	11.86	438.71
ST7	CCPST7	371.89	3,675.46	124	9.88E-02	10.67	1.83	11.86	438.71
ST1	CCPST1	371.89	3,675.46	124	1.09E-01	10.67	1.83	11.86	438.71
ST8	CCPST8	371.89	3,675.46	124	8.77E-02	10.67	1.83	11.86	438.71

Table D-18. Modeling Data for Mestek, Inc. (dba Air Balance, Inc.)

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	NO_X Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
EC1	MESEC1	369.62	3,673.97	121	7.59E-02	9.14	0.61	2.44	366.48

Table D-19. $PM_{10}/PM_{2.5}$ Regional Source Inventories - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility PM_{10} Emissions[1] (tpy)	Distance from Facility (km)	Within 2 km of another facility?	PM_{10} 20D	PM_{10} Exclude Per 20D Rule?[2]
Georgia Sources								
Continental Commercial Products Llc-Glit Div	Jefferson	371,893	3,675,464	1.87	4.75	No	94.92	Yes
Mestek, Inc. (dba Air Balance, Inc.)	Jefferson	369,624	3,673,972	0.33	4.30	No	86.08	Yes
Thiele Kaolin Co Reedy Creek Div	Glascock	366,517	3,682,647	178.04	13.30	No	266.10	Yes
Southern Natural Gas	Jefferson	368,097	3,679,656	5.80	9.92	No	198.46	Yes
KaMin - Wrens Calcine Plant	Jefferson	366,224	3,680,413	144.38	11.51		230.18	Yes
KaMin - Wrens Main	Jefferson	369,361	3,682,652	222.0	12.30	No	245.99	Yes
Thermo King Corporation	Jefferson	367,098	3,651,540	1.89	19.95	No	399.09	Yes
US Army Signal Ctr. & Ft. Gordon	Richmond	391,250	3,697,629	22.30	32.78	No	655.56	Yes
Erdene Materials Corporation - Dearing Plant	McDuffie	371,879	3,698,091	0.49	27.34	No	546.86	Yes
Georgia Vitrified Brick & Clay Ltd	Columbia	379,728	3,697,659	31.21	27.86	No	557.26	Yes
Unimin Corporation - Hephzibah	Richmond	395,896	3,686,999	82.37	28.50	No	569.93	Yes
Augusta-Richmond County Deans Bridge Road Landfill	Richmond	394,215	3,690,716	25.94	29.51	No	590.17	Yes
Georgia DOT - Davisboro Asphalt Plant	Washington	350,960	3,651,100	8.92	29.15	No	582.94	Yes
ASTA, Inc.	Burke	404,618	3,663,313	-	32.99	No	659.71	Yes
Farmers Gin & Storage	Jefferson	369,313	3,636,718	87.30	34.18	Yes	683.69	Yes
Fulghum Industries, Inc.	Jefferson	368,699	3,635,941	23.93	35.02		700.37	Yes
Battle Lumber Company Inc.	Jefferson	369,319	3,636,323	77.73	34.58		691.53	Yes
National Security Agency	Richmond	408,130	3,704,261	0.36	48.92	No	978.44	Yes
Tin Inc. dba Temple-Inland	Mcduffie	362,547	3,703,842	294.69	34.55	No	690.94	Yes
TRW Warrenton Foundry	Warren	346,921	3,697,931	100.00	37.31	No	746.19	Yes
Martin Marietta Aggregates - Warrenton Rock Quarry	Warren	347,946	3,695,382	98.10	34.76	No	695.29	Yes
HP Pelzer - Thomson	Mcduffie	357,093	3,702,062	22.02	34.89	Yes	697.71	Yes
Shaw Industries Group, Inc. - Plant 22/89	McDuffie	356,807	3,701,993	31.79	34.95		699.03	Yes
Mundy, Inc.	Burke	405,858	3,661,689	100.00	34.58	Yes	691.69	Yes
FIAMM Technologies Inc.	Burke	405,633	3,663,396	100.00	33.96		679.13	Yes
Georgia Iron Works Co	Columbia	389,655	3,702,550	60.94	36.14	No	722.71	Yes
Plant Washington	Washington	337,088	3,659,816	677.20	37.05	No	740.94	Yes
Georgia-Pacific Corp Chip-n-Saw Div. Warrenton	Warren	346,957	3,697,767	100.00	37.16	No	743.30	Yes
Dogwood Quarry	Columbia	383,226	3,709,658	100.00	40.36	No	807.19	Yes
Hanson Aggregates Southeast LLC - Sparta Quarry	Hancock	322,678	3,681,213	100.00	50.89	No	1,017.83	Yes
American Concrete - Gracewood	Richmond	402,911	3,693,445	100.00	37.96	No	759.13	Yes
Jebco, Inc.	Warren	343,844	3,697,225	100.00	39.00	Yes	779.96	Yes
Solvay Advanced Polymers - Augusta	Richmond	405,656	3,692,766	100.00	39.81			
Omni Oxide Corporation	Richmond	405,926	3,692,761	100.00	40.03			
US Battery Mfg. Co of Augusta	Richmond	405,926	3,692,761	100.00	40.03	No	800.67	Yes
Augusta Ready Mix, Inc.	Columbia	387,150	3,706,000	100.00	38.17	No	763.50	Yes
Martin Marietta Aggregates	Columbia	385,159	3,709,414	100.00	40.68	Yes	813.68	Yes
Reeves Construction Co.	Columbia	384,120	3,709,694	100.00	40.64			
Sample & Son Const and Demolition LF	Columbia	382,931	3,710,318	100.00	40.92			
EKA Chemicals - Augusta GP Plant	Richmond	407,594	3,695,445	100.00	42.92	Yes	858.46	Yes
The Procter & Gamble Manufacturing Company	Richmond	406,562	3,694,781	277.00	41.70			
Leco Corporation	Columbia	394,372	3,705,331	100.00	40.92	No	818.44	Yes
Milliken & Company Kingsley Plant	McDuffie	360,222	3,710,799	100.00	41.88	No	837.58	Yes
Pryoflex Augusta LLC	Richmond	411,350	3,689,329	100.00	43.08	Yes	861.53	No
West Fraser - Augusta Lumber Mill	Richmond	410,417	3,688,499	25.10	41.88			
Deerfield Tissue, LLC	Richmond	411,063	3,687,063	0.72	41.89			
Farmers & Truckers Biodiesel LLC	Richmond	410,501	3,688,406	-	41.92			
International Paper - Augusta Mill	Richmond	411,198	3,688,017	2,577.17	42.39			
International Flavors and Fragrances	Richmond	410,509	3,688,702	1.93	42.05			
PVS Technologies, Inc.	Richmond	411,101	3,689,082	-	42.75			
Augusta Newsprint Co	Richmond	411,043	3,688,936	134.21	42.63			
Olin Corporation Augusta Plant	Richmond	411,642	3,689,877	1.39	43.58			
Lafarge Building Materials, Inc. - Martinez Concrete Plant	Columbia	395,868	3,705,928	100.00	42.24	No	844.75	Yes
Finnchem USA, Inc	Richmond	410,028	3,691,245	100.00	42.77	Yes	855.44	Yes
Garrett Aviation Services	Richmond	409,383	3,692,743	100.00	42.95			

Table D-19. $PM_{10}/PM_{2.5}$ Regional Source Inventories - Georgia Major and Minor Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility PM_{10} Emissions[1] (tpy)	Distance from Facility (km)	Within 2 km of another facility?	PM_{10} 20D	PM_{10} Exclude Per 20D Rule?[2]
Occidental Chemical Corp	Richmond	408,146	3,695,572	100.00	43.45	Yes	868.96	Yes
Prayon Inc	Richmond	407,850	3,695,193	281.00	42.99			
Keebler Foods Company	Richmond	408,029	3,695,528	100.00	43.33			
Augusta Select Tissue, LLC	Richmond	408,349	3,695,293	100.00	43.46			
Kendall Co Augusta Plant	Richmond	408,434	3,695,438	100.00	43.61			
Georgia-Pacific Corporation 1 LLC	Richmond	407,912	3,697,238	100.00	44.23			
American Concrete - Martinez	Richmond	398,414	3,706,473	100.00	44.14	No	882.77	Yes
Cobb EMC - Sandersville	Washington	331,802	3,652,098	2.05	44.76	No	895.10	Yes
KaMin - Sandersville	Washington	329,681	3,649,059	127.16	47.99	Yes	959.74	Yes
Burgess Pigment Company, Sandersville Plant	Washington	329,707	3,649,412	250.00	47.80			
Thiele Kaolin Co . - Sandersville Plant	Washington	330,686	3,649,165	490.00	47.04			
Bulk Chemical Services, LLC	Washington	332,077	3,649,008	-	45.89			
Thermal Ceramics	Richmond	407,079	3,700,074	118.08	45.35	Yes	906.97	Yes
Boral Bricks #6 Augusta Plt	Richmond	408,218	3,699,805	17.47	46.05			
USVA Veterans Admin H	Richmond	404,725	3,703,684	7.77	46.09			
Augusta Hospital, LLC	Richmond	405,418	3,703,585	100.00	46.50			
University Hospital	Richmond	405,696	3,703,934	8.52	46.95			
Transflo Terminal Servies, Inc.	Richmond	406,412	3,702,582	63.07	46.52			
Southern Crushers, Inc.	Richmond	408,492	3,701,078	20.00	47.08			
Mabus Brothers Construction Company	Richmond	408,492	3,701,078	34.60	47.08			
FPL Food, LLC	Richmond	409,291	3,701,655	8.32	48.06			
crawford kitchens, inc	Columbia	398,903	3,708,252	100.00	45.87	Yes	917.39	Yes
Martin Marietta Aggregates - Richmond County	Richmond	398,434	3,709,133	100.00	46.33			
KGEN Sandersville LLC	Washington	326,300	3,665,800	490.00	46.45	Yes	928.96	Yes
Paul Creek Energy Center	Washington	325,635	3,664,932	100.00	47.21			
Imerys Clays, Inc. Sandersville Calcine Plant	Washington	330,657	3,649,161	136.17	47.07	Yes	941.42	Yes
Kentucky-Tennessee Clay Company (Plts 51 & 52)	Washington	329,474	3,648,637	100.00	48.36			
World Color Printing (USA) II Corp.	Columbia	396,085	3,711,586	100.00	47.16	Yes	943.24	Yes
US Battery Manufacturing Company	Columbia	395,518	3,712,345	100.00	47.54			
Greenfield Industries, Inc.	Columbia	396,501	3,710,870	100.00	46.76			
Sandersville Ethanol, LLC	Washington	328,546	3,651,211	100.00	48.09	No	961.75	Yes
Elanco Augusta Technology Center	Richmond	412,216	3,698,452	100.00	48.43	Yes	968.69	Yes
The Nutrasweet Kelco Co	Richmond	412,217	3,698,455	250.00	48.44			
American Concrete - Downtown	Richmond	409,105	3,704,324	100.00	49.68	Yes	993.58	Yes
Boral Bricks, Inc. - Plants 3 & 5	Richmond	409,495	3,703,909	250.00	49.69			
Medical College of Georgia	Richmond	408,094	3,703,760	100.00	48.55			
Modern Welding Company of Georgia	Richmond	409,380	3,704,826	100.00	50.22			
Potters Industries, Inc. - Q-Cel Facility	Richmond	409,380	3,704,826	100.00	50.22			
Standard Textile Augusta, Inc.	Richmond	407,982	3,705,392	100.00	49.60			
Industrial Metal Finishing, Inc.	Richmond	409,399	3,704,113	100.00	49.76			
Top Bead Welding Services, Inc.	Richmond	409,806	3,702,494	100.00	48.99			
Reeves CC Inc. - Riverwatch HMAF	Richmond	403,644	3,709,732	100.00	49.90	Yes	998.04	Yes
Martin Marietta Materials, Inc. - Augusta Quarry	Richmond	404,023	3,711,378	100.00	51.43			
Kentucky-Tennessee Clay Company (Plt 53)	Washington	325,130	3,654,389	100.00	50.10	Yes	1,002.03	Yes
Cobb EMC - Robin Springs	Washington	324,916	3,654,516	100.00	50.26			
Imerys Clays Inc, Deepstep Road Plant Sandersville GA	Washington	324,393	3,655,700	490.00	50.39			
General Chemical Corp., Augusta Plant	Richmond	413,066	3,700,330	15.33	50.22	Yes	1,004.33	Yes
PCS Nitrogen Fertilizer Inc	Richmond	413,506	3,700,701	250.00	50.79			
DSM Resins U.S. Inc	Richmond	413,697	3,701,994	0.02	51.72			
DSM Chemicals North America, Inc.	Richmond	413,727	3,702,063	110.00	51.78			
Pollard Lumber Co	Columbia	382,225	3,720,504	100.00	50.69	No	1,013.89	Yes
Martin Marietta Aggregates - Camak Rock Quarry	Warren	347,924	3,716,391	100.00	51.83	No	1,036.51	Yes

1. For conservatism, facility emissions were set to the PTE maximum thresholds in Section B1 (i.e., 50, 100, 250 tpy) unless further analysis was needed to evalate 20D applicability.

2. Emissions from facilities within 2 km of another site, as determined by a review of the coordinates when sorted by distance from the King site, were grouped together when completing the 20D screening.

Table D-20. $PM_{10}/PM_{2.5}$ Regional Source Inventories - South Carolina Source Review

SOURCE DESCRIPTION	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Potential Facility PM_{10} Emissions[1] (tpy)	Distance from Facility (km)	W/in 2 km of another facility?	PM_{10} 20D	PM_{10} Exclude Per 20D Rule?[2]
SCE&G - Urquhart	Aiken	415,224	3,699,571	3,233.75	51.55	No	1,030.95	No
Kimberly-Clark	Aiken	416,579	3,697,667	225.31	51.66	No	1,033.19	Yes
Halocarbon Products Corp	Aiken	413,005	3,705,005	1.97	53.06	Yes	1,061.15	Yes
Cytec Industries, Inc	Aiken	414,277	3,704,322	7.26	53.60			

1. For conservatism, facility emissions were calculated from hourly emissions (lb/hr) assuming continuous annual operation at 8,760 hr/yr.

2. Emissions from facilities within 2 km of another site, as determined by a review of the coordinates when sorted by distance from the King site, were grouped together when completing the 20D screening.

Table D-21. Modeling Data for International Flavors and Fragrances

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
B01	IFFB01	410.51	3,688.70	55	2.39E-02	9.14	0.66	0.58	449.82
B02	IFFB02	410.51	3,688.70	55	2.79E-02	9.14	0.66	0.58	449.82
B03	IFFB03	410.51	3,688.70	55	2.79E-02	9.14	0.66	0.58	449.82

Table D-22. Modeling Data for Augusta Newsprint Co.

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
S009	ANCS009	411.04	3,688.94	55	2.77E+00	42.67	2.90	11.83	338.71
S001	ANCS001	411.04	3,688.94	55	7.39E-02	36.88	2.13	14.19	588.15
PM1	ANCPM1	411.04	3,688.94	55	4.41E-01	32.61	1.52	15.24	310.93
PM2	ANCPM2	411.04	3,688.94	55	5.80E-01	25.91	1.52	15.24	310.93

Table D-23. Modeling Data for Olin Corporation Augusta Plant

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
E05A	OCOE05A	411.64	3,689.88	52	2.00E-02	11.28	0.61	10.06	422.04
E06A	OCOE06A	411.64	3,689.88	52	2.00E-02	11.28	0.61	10.06	422.04

Table D-24. Modeling Data for West Fraser Augusta Mill

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
KD01	WFLKD01	410.42	3,688.50	48.77	1.15E-01	8.99	0.53	5.18	394.26
KD02	WFLKD02	410.42	3,688.50	48.77	2.29E-01	9.14	0.53	5.18	394.26
KD03	WFLKD03	410.42	3,688.50	48.77	3.78E-01	9.14	0.53	5.18	394.26

Table D-25. Modeling Data for Deerfield Tissues, LLC

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
B02	DEERB02	411.06	3,687.06	44.20	2.07E-02	4.88	1.14	15.18	463.71

Table D-26. Modeling Data for International Paper - Augusta Mill

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
LK1	IPALK1	410.98	3,687.39	48.16	2.94E+00	61.57	1.73	4.88	349.26
LK2	IPALK2	410.98	3,687.39	48.16	2.82E-01	64.62	1.56	14.94	340.93
PB1	IPAPB1	410.98	3,687.39	48.16	2.76E+01	60.90	2.23	18.50	331.48
PB2	IPAPB2	410.98	3,687.39	48.16	2.34E+01	60.90	2.44	25.15	506.48
PB3	IPAPB3	410.98	3,687.39	48.16	5.22E+00	60.96	3.05	17.07	444.26
RB2	IPARB2	410.98	3,687.39	48.16	4.53E+00	60.96	2.44	24.38	428.71
RB3	IPARB3	410.98	3,687.39	48.16	4.68E+00	64.01	3.00	36.58	473.15
RLB	IPARLB	410.98	3,687.39	48.16	1.95E-01	36.58	1.52	12.92	477.59
ST2	IPAST2	410.98	3,687.39	48.16	2.42E+00	59.44	1.05	16.92	338.71
ST3	IPAST3	410.98	3,687.39	48.16	2.83E+00	64.01	1.83	6.10	347.04
PAPR	IPAPAPR	410.98	3,687.39	48.16	9.90E-02	17.74	1.04	8.42	497.59

Table D-27. Modeling Data for SCE&G - Urquhart

Stack ID	Model ID	UTM East (NAD83 Zone 17) (km)	UTM North (NAD83 Zone 17) (km)	Elevation (m)	$PM_{10}/PM_{2.5}$ Emissions (g/s)	Height (m)	Diam. (m)	Vel. (m/s)	Temp. (K)
Boiler #3	SCEGB3	415.22	3,699.57	44	8.32E+01	60.96	4.72	12.01	415.93
Turbine #1	SCEGT1	415.22	3,699.57	44	2.00E+00	9.14	3.05	23.16	697.59
Turbine #2	SCEGT2	415.22	3,699.57	44	1.79E+00	9.14	3.05	26.21	697.59
Turbine #3	SCEGT3	415.22	3,699.57	44	1.79E+00	9.14	3.05	26.21	697.59
Turbine (CT1)	SCEGCT1	415.22	3,699.57	44	2.14E+00	45.72	6.10	12.50	438.71
Turbine (CT2)	SCEGCT2	415.22	3,699.57	44	2.14E+00	45.72	6.10	12.50	438.71

Regional source inventory for the proposed site was compiled per the modeling protocol submitted to EPD on June 24, 2011. 20D screening was applied to the regional sources which eliminated sources with emissions less than 20 times the distance from the source to the center of the proposed site. In addition, source within 2 km of each other were grouped together before applying the 20D screening technique by summing emissions from the group. All sources within the significant impact area were included in modeling and no screening technique was applied to these sources. All sources that did not screen out in Tables D-1, D-13, D-19, and D-20 were potentially included in modeling.

Annual NO_2 Inventory Source Exclusion

Two of the sources that did not screen out using 20D procedures for annual NO_2 are not included in the modeling inventory. Specifically, from a file review conducted at EPD in June 2011, Farmers & Truckers Biodiesel LLC and PVS Technologies, Inc. both do not list any criteria emissions including NO_X emissions. Hence both the facilities were not included in annual NO_2 modeling. In addition, General Chemical Corp., Augusta Plant was also excluded from modeling because NO_X emissions from the source were specified to be zero per the Georgia Title V online database. In summary, the following is a table containing excluded sources:

Facility	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Reason for Exclusion
Farmers & Truckers Biodiesel LLC	Richmond	410,501	3,688,406	No criteria pollutant emissions, hence no NO_X emissions
PVS Technologies, Inc.	Richmond	411,101	3,689,082	Only chlorine emissions, hence no NO_X emissions
General Chemical Corp., Augusta Plant	richmond	413,066	3,700,330	Zero NO_X emissions per Georgia electronic Title V database

PM_{10} Inventory Source Exclusion

Similarly for PM_{10} modeling, as seen in Table D-13, nine sources were determined to be modeled, and all nine sources are grouped together since they are situated within 2 km of each other. However, three of the nine sources are not included in modeling because no PM_{10} emissions result from these facilities. Specifically, from a file review conducted at EPD in June 2011, Farmers & Truckers Biodiesel LLC and PVS Technologies, Inc. both do not list any criteria emissions. Additionally, a file review search for Pyroflex Augusta LLC did not result in sufficient information for modeling and was hence excluded from modeling. In summary, the following is a table containing excluded sources:

Facility	County	UTM East (NAD83 Zone 17) (m)	UTM North (NAD83 Zone 17) (m)	Reason for Exclusion
Farmers & Truckers Biodiesel LLC	Richmond	410,501	3,688,406	No criteria pollutant emissions, hence no PM_{10} emissions
PVS Technologies, Inc.	Richmond	411,101	3,689,082	Only chlorine emissions, hence no PM_{10} emissions
Pryoflex Augusta LLC	Richmond	411,350	3,689,329	Insufficient information from file review

APPENDIX E

ELECTRONIC MODEL FILES

MODEL FILES ON CD

The CD included with this application contains all of the input and output data files used to generate the results from the air quality analyses presented in Sections 3, 5 and 6. The following section provides a description of the contents of each folder included in the attached CD.

AERMAP

- Class I Receptors – Contains the AERMAP input and output files for the 50 km receptor ring used in the Class I SIL Analysis.
- Class II Receptors
    - NOx – Contains the AERMAP input and output files for the NO_x modeling grid.
        - Culpability – contains the AERMAP input and output files for the 1-hour culpability receptors.
    - All Other – Contains the AERMAP input and output files for the CO, SO_2 and PM modeling grid.

BPIP

- Contains the input, output, and summary files from the building downwash analysis. This analysis includes all modeled sources and buildings at the proposed facility.

Class I Significance

- NO2 – Contains the AERMOD input (.ami) and output (.aml) files for the NO_2 Class I SIL analysis
- PM10 – Contains the AERMOD input (.ami) and output (.aml) files for the PM_{10} Class I SIL analysis
- SO2 – Contains the AERMOD input (.ami) and output (.aml) files for the SO_2 Class I SIL analysis

Class II

- CO – includes zip files containing the AERMOD input (.ami), output (.aml) and plot (.plt) files from the SIL analysis
- NO2 – contains the AERMOD modeling files for each of the triggered analyses:
    - NAAQS – contains the AERMOD input and output files for each NAAQS averaging period. The same data was used for increment so these runs include the increment results as well.

- 1Hr – Contains the AERMOD input and output files for the 1-hour NO_2 NAAQS runs. The event run input and outputs are also included along with the culpability assessment spreadsheet.
  - Culpability - Contains the AERMOD input and output files for the violating receptor locations only. The event run input and outputs are also included along with the culpability assessment spreadsheet.
  - Annual – Contains the AERMOD input and output files for the annual NO_2 NAAQS runs.

- ▲ PM2.5 – includes zip files containing the AERMOD input (.ami), output (.aml) and plot (.plt) files from the SIL and NAAQS analyses. Both analyses were performed within a single run.
- ▲ PM10 - includes zip files containing the AERMOD input (.ami), output (.aml) and plot (.plt) files from the SIL and NAAQS analyses. Both analyses were performed within a single run.
- ▲ SO2 – contains the AERMOD input and output files from the SO_2 SIL analyses.
  - 1Hr – contains the AERMOD input (.ami), output (.aml), and plot (.plt) files for the 5-year combined SIL run.
  - LT – contains the AERMOD input (.ami), output (.aml), and plot (.plt) files for the annual SIL runs.

MET

- ▲ Contains the surface (.sfc) and profile (.pfl) meteorological data files from Augusta Daniel Field that were used in the analysis. A concatenated five-year file is also included as it was used for the 1-hour SO_2 and NO_2 analyses.

NED

- ▲ Contains the TIF format NED data file that was used in each of the AERMAP runs

TOXICS

- ▲ Contains the AERMOD files used in the GA state TAP modeling analyses. The files are zipped and organized into folders by the following modeled pollutants:
  - Ammonia
  - HCL
  - Hexane
  - HF
  - Methanol
  - Methyl Acetate

APPENDIX F

GEORGIA TAP ANALYSIS DOCUMENTATION

Table F-1. Derivation of Acceptable Ambient Concentrations (AAC) for Georgia EPD

Pollutant	CAS No.	Formula	Mol. Wt. (g/mol)	Unit Risk[1] $(\mu g/m^3)^{-1}$	Weight of Evidence[1]	RBAC[1, 2] $(\mu g/m^3)$	Inhalation RfC[1] (mg/m^3)	Annual AAC $(\mu g/m^3)$	24-hr Rating 1. OSHA TWA[3] (ppm)	(mg/m^3)	24-hr Rating 2. ACGIH TWA[4] (ppm)	(mg/m^3)	24-hour AAC[5] $(\mu g/m^3)$	OSHA Ceiling[6] (ppm)	(mg/m^3)	ACGIH STEL[7] (ppm)	(mg/m^3)	NIOSH STEL[8] (ppm)	(mg/m^3)	Ceiling or STEL (mg/m^3)	15-minute AAC[9] $(\mu g/m^3)$
Methanol	67-56-1	CH4O	32.04					None	200	260	200	262	619			250	328	250	325	328	32,750
Ammonia	7664-41-7	NH3	17.03				0.10	100	50	35	25	17.5	83.3			35	24.5	35	27	24.5	2,450
Chlorides	7647-01-0	HCL	34.46				0.02	20	5	7	2	2.98	16.7	5	7	2	2.98	5	7	7	700
Fluorides	7664-39-3	HF	20.01					None	3	2.46		0	5.86	2	1.64	3	2	6	5	2	164
Methyl Acetate	79-20-9	C3H6O2	74.08					None	200	610	200	606	1,452			250	758	250	760	758	75,750
Hexane	110-54-3	C6H14	86.18				0.70	700	500	1,800	50	177	4,286							None	None

1. Unit risk and Inhalation RfC values obtained from EPA IRIS database.
2. Risk Based Acceptable Concentration (RBAC) is calculated based on the weight of evidence of the unit risk.
3. OSHA TWA values obtained from 29 CFR 1910 Subpart Z
4. ACGIH TWA values obtained from 03-2004-TLVs.doc
5. Adjusted for occupational exposure. Applied safety factor of 100 for pollutants which are not known human carcinogens and safety factor of 300 for known human carcinogens per GA Air Toxics Guidance (June 21, 1998).
6. OSHA Ceiling values obtained from 29 CFR 1910 Subpart Z
7. ACGIH STEL values obtained from 03-2004-TLVs.doc
8. NIOSH STEL values obtained from www.cdc.gov/niosh/npg
9. Adjusted by safety factor of 10 per GA Air Toxics Guidance (June 21, 1998).

Table F-2. Derivation of Long-term Acceptable Ambient Concentrations (AAC) for Georgia EPD

Pollutant	CAS No.	Formula	Mol. Wt. (g/mol)	Unit Risk[1] ($\mu g/m^3$)$^{-1}$	Weight of Evidence	RBAC[2] ($\mu g/m^3$)	Inhalation RfC[1] (mg/m^3)	Annual AAC ($\mu g/m^3$)	24-hour AAC Required?
Methanol	67-56-1	CH4O	32.04					None	Need 24-hr TWA
Ammonia	7664-41-7	NH3	17.03				0.10	1.00E+02	Not Required
Chlorides	7647-01-0	HCL	34.46				0.02	2.00E+01	Not Required
Fluorides	7664-39-3	HF	20.01					None	Need 24-hr TWA
Methyl Acetate	79-20-9	C3H6O2	74.08					None	Need 24-hr TWA
Hexane	110-54-3	C6H14	86.18				0.70	7.00E+02	Not Required

1. Unit risk and Inhalation RfC values obtained from EPA IRIS database.
2. Risk Based Acceptable Concentration (RBAC) is calculated based on the weight of evidence of the unit risk.

Table F-3. Derivation of 24-hr Acceptable Ambient Concentrations (AAC) for Georgia EPD

Pollutant	24-hr AAC Required[1]?	CAS No.	Formula	Mol. Wt. (g/mol)	24-hr Rating 1. OSHA TWA (ppm)	24-hr Rating 1. OSHA TWA (mg/m^3)	24-hr Rating 2. ACGIH TWA (ppm)	24-hr Rating 2. ACGIH TWA (mg/m^3)	24-hr Rating 3. NIOSH TWA (ppm)	24-hr Rating 3. NIOSH TWA (mg/m^3)	24-hr Rating 4. LD50 (rat) (mg/kg)	Rating Available 24-hour TWA (mg/m^3)	24-hour AAC[4] (μg/m^3)
Methanol	Need 24-hr TWA	67-56-1	CH4O	32.04	200	260	200	262				260	619
Ammonia	Not Required	7664-41-7	NH3	17.03	Not Required		Not Required					Not Required	Not Required
Chlorides	Not Required	7647-01-0	HCL	34.46	Not Required		Not Required					Not Required	Not Required
Fluorides	Need 24-hr TWA	7664-39-3	HF	20.01	3	2.46						2.46	5.86
Methyl Acetate	Need 24-hr TWA	79-20-9	C3H6O2	74.08	200	610	200	606				200	476
Hexane	Not Required	110-54-3	C6H14	86.18	Not Required		Not Required					Not Required	Not Required

1. Per the *Guidelines* , one long-term value is required; TAP with an annual AAC do not require a 24-hr AAC.
2. OSHA TWA values obtained from 29 CFR 1910 Subpart Z
3. ACGIH TWA values obtained from 03-2004-TLVs.doc
4. Adjusted for occupational exposure. Applied safety factor of 100 for pollutants which are not known human carcinogens and safety factor of 300 for known human carcinogens per GA Air Toxics Guidance (June 21, 1998).

Table F-4. Derivation of 15-minute Acceptable Ambient Concentrations (AAC) for Georgia EPD

Pollutant	CAS No.	Formula	Mol. Wt. (g/mol)	OSHA Ceiling[1] (ppm)	OSHA Ceiling[1] (mg/m^3)	ACGIH STEL[2] (ppm)	ACGIH STEL[2] (mg/m^3)	NIOSH STEL[3] (ppm)	NIOSH STEL[3] (mg/m^3)	Ceiling or STEL (mg/m^3)	15-minute AAC[4] ($\mu g/m^3$)
Methanol	67-56-1	CH4O	32.04			250	328	250	325	328	32,750
Ammonia	7664-41-7	NH3	17.03			35	24.5	35	27	24.5	2,450
Chlorides	7647-01-0	HCL	34.46	5	7	2	2.98	5	7	7	700
Fluorides	7664-39-3	HF	20.01	2	1.64	3	2.46	6	5	1.64	164
Methyl Acetate	79-20-9	C3H6O2	74.08			250	758	250	760	758	75,750
Hexane	110-54-3	C6H14	86.18							None	None

1. OSHA Ceiling values obtained from 29 CFR 1910 Subpart Z
2. ACGIH STEL values obtained from 03-2004-TLVs.doc
3. NIOSH STEL values obtained from www.cdc.gov/niosh/npg
4. Adjusted by safety factor of 10 per GA Air Toxics Guidance (June 21, 1998).

APPENDIX G

DISPERSION MODELING PROTOCOL

Trinity Consultants

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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.

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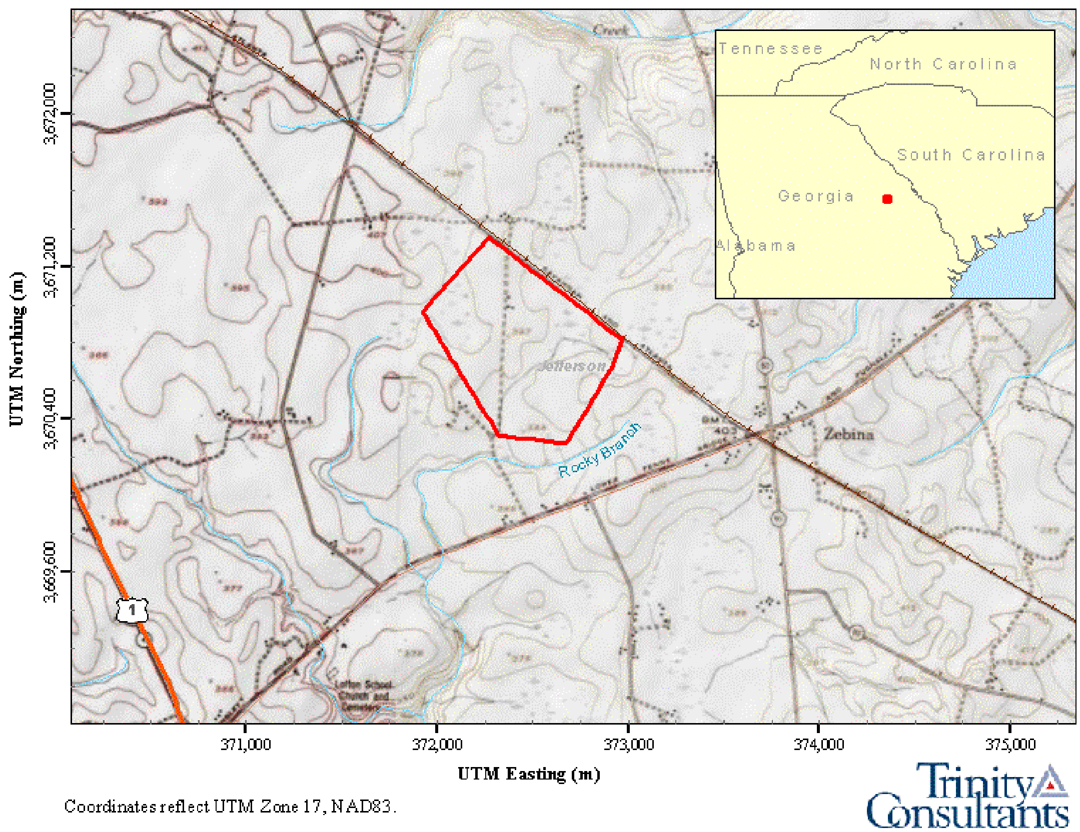
[1] CO_2e is carbon dioxide equivalents calculated as the sum of the six well-mixed GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) with applicable global warming potentials per 40 CFR 98 applied.

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

[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.

[3] 40 CFR §81.314

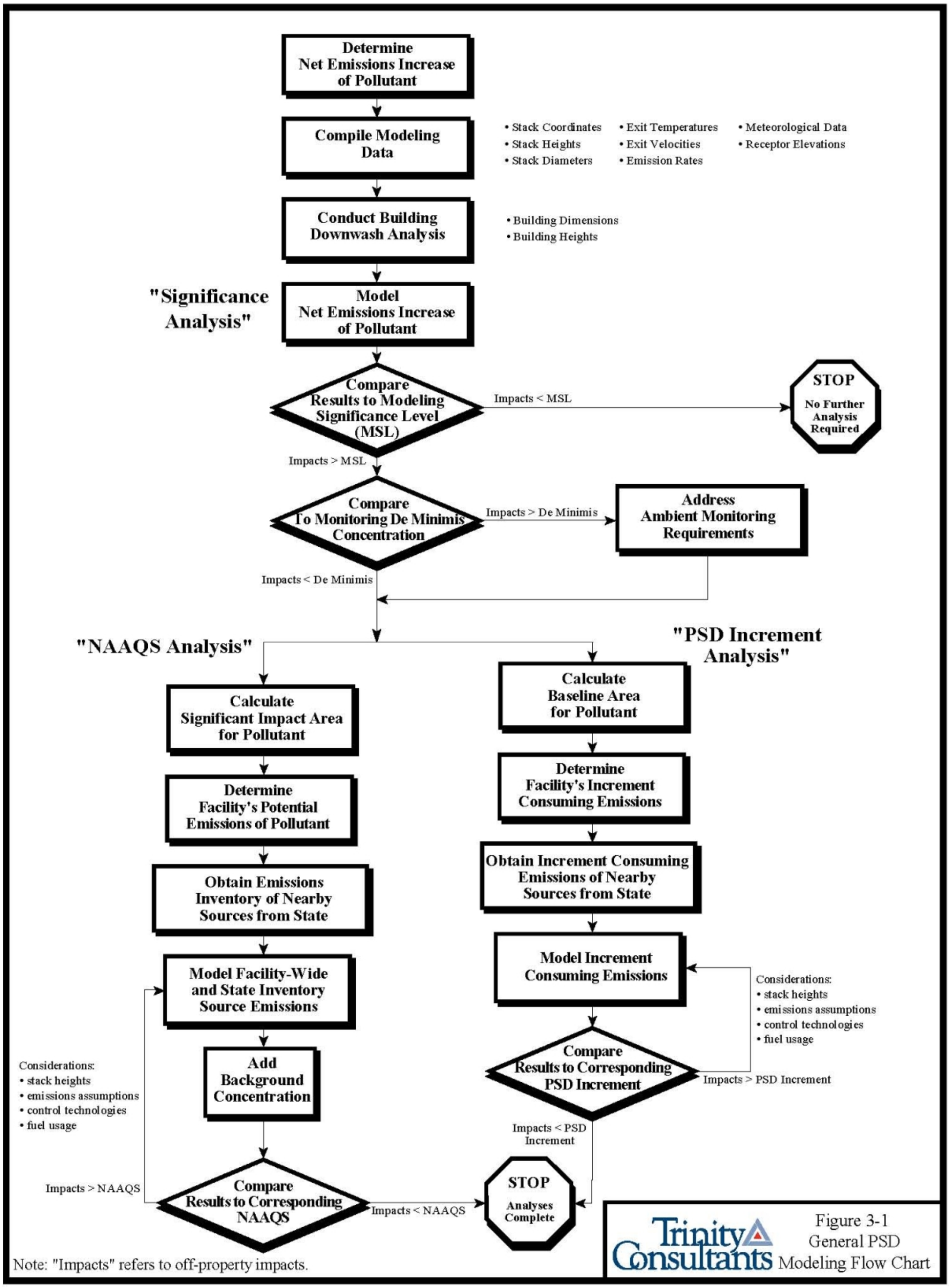
PSD MODELING ANALYSES

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 (μg/m³)	Primary and Secondary NAAQS (μg/m³)	Class II PSD Increment (μg/m³)	Significant Monitoring Concentration (μg/m³)
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 μg/m³ 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 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.

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 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.

The two Augusta airports (Bush and Daniel Field) are the closest meteorological stations to the Kings Mill facility, roughly 45 km northwest of the proposed site. Trinity reviewed the data quality for those two sites and Bush Field had excessive calm hours (28-40% for the 2006-2010 period) and the wind direction from Daniel Field was less than 90% complete on average over the same 2006-2010 period. As such, the Macon Airport (MCN) surface NWS observation station is proposed as a representative station for the Kings Mill site based on its proximity and similar topographic characteristics. The Macon NWS station is located approximately 130 km southwest of the Kings Mill site and the use of this station is further justified through the analysis provided below. PyraMax requests that EPD provide preprocessed meteorological data based on surface observations from Macon (station 03813) and upper air measurements from Centreville (station 3881) for the most recent years available.

LAND USE REPRESENTATIVENESS ANALYSIS

AERMOD utilizes planetary boundary layer (PBL) turbulence calculations to characterize the stability of the atmosphere, which is affected by the prevailing meteorological conditions and the land use and cover of the surrounding area. Because site-specific parameters are utilized in the meteorological data files, EPA made the following recommendation in the March 19, 2009 *AERMOD Implementation Guide*:[19]

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[19] http://www.epa.gov/scram001/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf, Sections 3.1 and 3.1.1, pages 3-4.

> *When applying the AERMET meteorological processor (EPA, 2004a) to prepare the meteorological data for the AERMOD model (EPA, 2004b), the user must determine appropriate values for three surface characteristics: surface roughness length {zo}, albedo {r}, and Bowen ratio {Bo}*
>
> *…*
>
> *When using National Weather Service (NWS) data for AERMOD, data representativeness can be thought of in terms of constructing realistic planetary boundary layer (PBL) similarity profiles and adequately characterizing the dispersive capacity of the atmosphere. As such, the determination of representativeness should include a comparison of the surface characteristics (i.e., zo, Bo and r) between the NWS measurement site and the source location, coupled with a determination of the importance of those differences relative to predicted concentrations.*
>
> *…*
>
> *If the proposed meteorological measurement site's surface characteristics are determined to NOT be representative of the application site, it may be possible that another nearby meteorological measurement site may be representative of both meteorological parameters and surface characteristics. Failing that, it is likely that site-specific meteorological data will be required.*

The surface characteristics of interest for AERMET – surface roughness, albedo, and Bowen ratio – are based on the land use cover (e.g., urban, agriculture, wetlands, forest, water) in the area upwind of the Kings Mill site (1 km for surface roughness, 10 km for albedo and Bowen ratio). If two locations have similar land use and cover, then the locations are expected to have similar surface characteristics. Thus, a land use analysis must be performed for the area immediately surrounding the source (the Kings Mill facility) and for the area immediately surrounding the NWS site. In its March 19, 2009 *AERMOD Implementation Guide*, the EPA states:[20]

> *Based on model formulations and model sensitivities, the relationship between the surface roughness upwind of the measurement site and the measured wind speeds is generally the most important consideration.*
>
> *The dependence of meteorological measurements and plume dispersion on Bowen ratio and albedo is very different than the dependence on surface roughness. Effective values for Bowen ratio and albedo are used to estimate the strength of convective turbulence during unstable conditions by determining how much of the incoming radiation is converted to sensible heat flux. These estimates of convective turbulence are not linked as directly with tower measurements as the linkage between the measured wind speed and the estimation of mechanical turbulence intensities driven by surface roughness elements.*

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[20] http://www.epa.gov/scram001/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf, Section 3.1.2, pages 4-5.

An analysis of the surface characteristics for the Kings Mill facility utilizing both pre- and post-construction land use and the nearby Macon NWS station was performed to demonstrate that the Macon NWS is representative of the Kings Mill site. In order to reflect post-construction conditions, a circular area covering 75 acres centered on the process lines was modified. The AERSURFACE input and output files along with the modified landuse file are included with this protocol. The tables and figures associated with several comparisons are included in Attachment A. These tables demonstrate that the Kings Mill facility's surface characteristics for albedo and Bowen ratio are similar to the Macon NWS station.

As shown in Attachment A, the Kings Mill facility's post-construction surface roughness parameter assignments are more similar to the Macon NWS station. The surface roughness is evaluated on a sector by sector (30°) basis and over a much smaller area than albedo and Bowen Ratio (1 km vs. 10 km); therefore, there is greater variability between the calculated surface roughness values at the two sites. Given the differing locations (airport vs. site location for pellet production facility), it is unlikely that any other NWS station within Georgia would have significantly better surface characteristics correlation; further, a more distant NWS station would likely have meteorological conditions that are more dissimilar to the Kings Mill facility than the Macon NWS station.

The Macon NWS station provides a reasonable match to the Kings Mill facility characteristics; the only area with significant difference is surface roughness, which is higher at the site than at the Macon NWS. It is worth noting that the most frequent wind directions (west, northwest and northeast) correlate well with the most similar surface roughness sectors. In addition, higher surface roughness tends to result in lower calculated concentrations, and thus using the lower surface roughness from Macon airport would likely be conservative.

Based on those results, PyraMax proposes to use the Macon NWS station for surface observational meteorological data. PyraMax will use AERMOD-ready surface and profile meteorological files provided by EPD for Macon for the modeling analyses. PyraMax will use preprocessed AERMET output files to be provided by EPD in completing the AERMOD analyses.

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).

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, it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) in the modeling analyses.

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. The minimum stack height not subject to the effects of downwash, called the GEP stack height, is defined by the following formula:

$H_{GEP} = H + 1.5L$, where:

H_{GEP} = minimum GEP stack height,
H = structure height, and
L = lesser dimension of the structure (height or projected width).

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.[21] A preliminary evaluation has indicated that none of the proposed emission units at the Kings Mill facility will exceed GEP height.

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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[21] 40 CFR §51.100(ii)

PyraMax 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.[22] 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, PyraMax 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), PyraMax will submit a separate NO_2 modeling protocol to EPD detailing the alternative approach.

ADDITIONAL IMPACTS MODELING METHODOLOGY

The required additional impacts evaluations include a growth analysis, a soil and vegetation analysis, and a plume visibility analysis. PyraMax 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.

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

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

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.

PyraMax will detail the methodology for identifying TAP in the analysis included as part of the application submittal.

A preliminary assessment of the air toxic impacts from the kilns, spray dryers, cage mills, and boilers will be conducted using the SCREEN3 model. If preliminary screening results show that refined modeling is required, either the AERMOD or ISCST3 (version 02035) models will be used to complete the air dispersion analysis.

If AERMOD will be used, all applicable elements of the modeling methodology outlined for the PSD air dispersion modeling analysis will be utilized as developed for that analysis, including the effects of building downwash. If ISCST3 will be used, the refined modeling procedures outlined in the *Guideline* will be utilized. Meteorological data for use with the ISCST3 model for Macon/Centreville (1974-1978), as available on the Georgia EPD website, will be used unless otherwise specified.[23]

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

SUMMARY AND APPROVAL OF MODELING PROTOCOL

PyraMax is supplying this written preliminary protocol so that EPD can formally comment on and approve the methodologies to be used for this analysis. PyraMax requests a written response to this protocol at your earliest convenience.

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
Senior Consultant

Attachment

cc: Ms. Susan Jenkins (Georgia EPD)
Mr. Don Anschutz (PyraMax Ceramics, LLC)
Mr. Michael Burgess (PyraMax Ceramics, LLC)
Mr. Tom Muscenti (Trinity Consultants)
Mr. Justin Fickas (Trinity Consultants)

Attachment A

Land Use Representativeness Comparison Information

To define the land use characteristics and micrometeorological parameters in the areas of interest, Trinity Consultants (Trinity) utilized the EPA program AERSURFACE (version 08009) to analyze a digital mapping of land use and cover; specifically the 30-meter resolution USGS digital National Land Cover Data (NLCD) from 1992, as is recommended for usage with AERSURFACE.[1]

AERSURFACE resolves predominant land cover types into a grid comprising 30 meter-by-30 meter cells extending out to a specified distance from the center of the Kings Mill or NWS site; the recommended distance is 1 km for surface roughness and 10 km for albedo and Bowen ratio. The data, which contain the land use category code and coordinates for each cell, are used by AERSURFACE to calculate the wind sectors and determine the weighted percentage of each land use type contained within each of the twelve 30-degree sectors; note that albedo and Bowen ratio are constant for each of the sectors, varying only seasonally. The weighted percentages of each land use type are then utilized to calculate the weighted average surface parameters (Bowen ratio, albedo, and surface roughness) for each of the sectors.

Figures A-1a and A-1b illustrate the land use and cover for the Kings Mill site based on the grid cell assignments contained in the AERSURFACE roughness domain output file. Figure A-1a shows pre-construction land use and Figure A-1b depicts post-construction landuse. The circle in the figures denotes a 1 km radius around the center of the Kings Mill site; individual sectors are also shown in black. A similar figure for the Macon NWS station was created by Trinity using the AERSURFACE grid cell assignments (from AERSURFACE runs prepared using the NWS coordinates provided by EPD) and is included as Figure A-2.[2]

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[1] http://seamless.usgs.gov/website/seamless/viewer.htm

[2] http://mi3.ncdc.noaa.gov/mi3qry/login.cfm

FIGURE A-1A. LAND USE CATEGORIES FOR THE 1-KM AREA SURROUNDING THE KINGS MILL FACILITY (PRE-CONSTRUCTION)

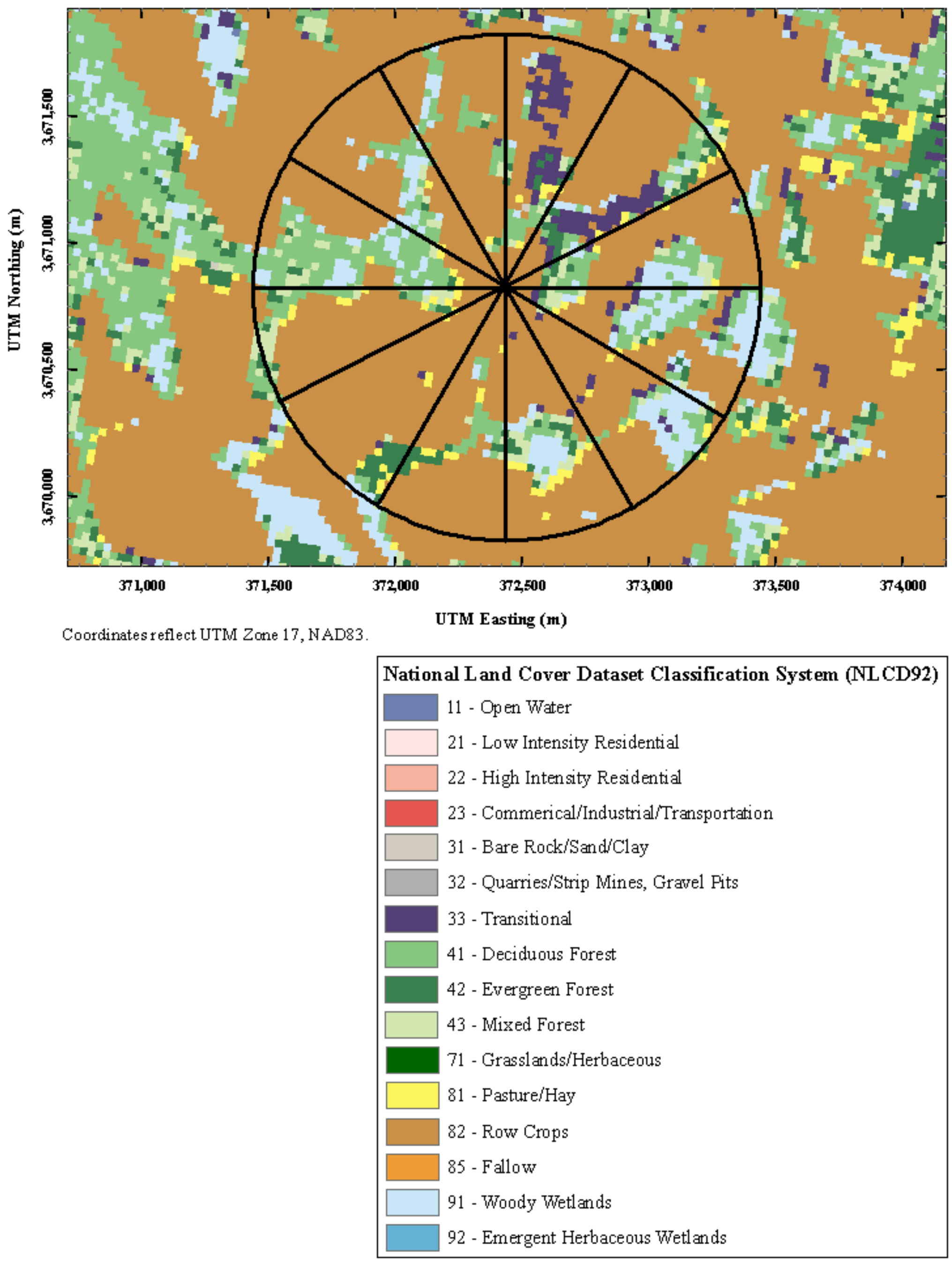


FIGURE A-1B. LAND USE CATEGORIES FOR THE 1-KM AREA SURROUNDING THE KINGS MILL FACILITY (POST-CONSTRUCTION)

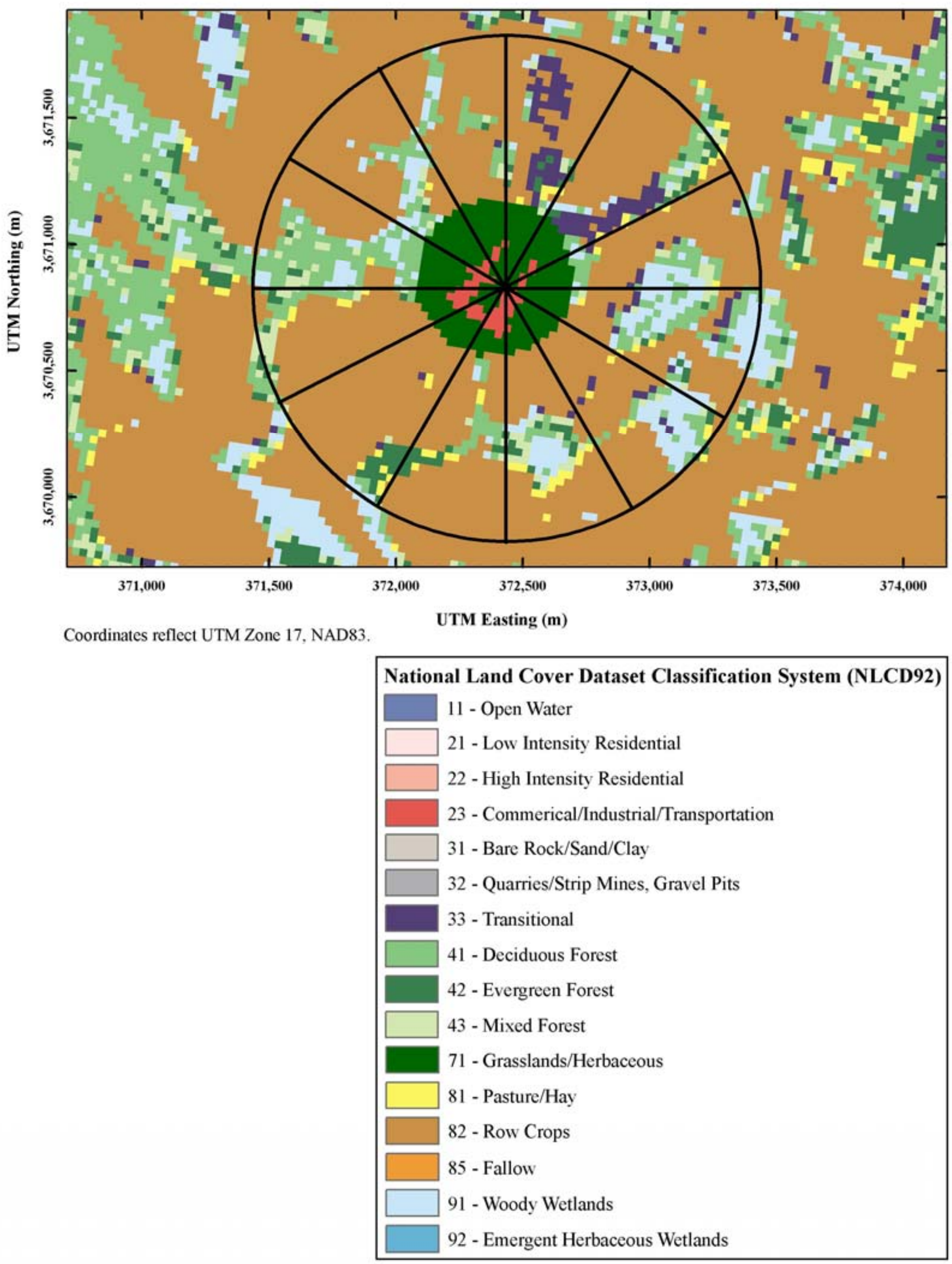
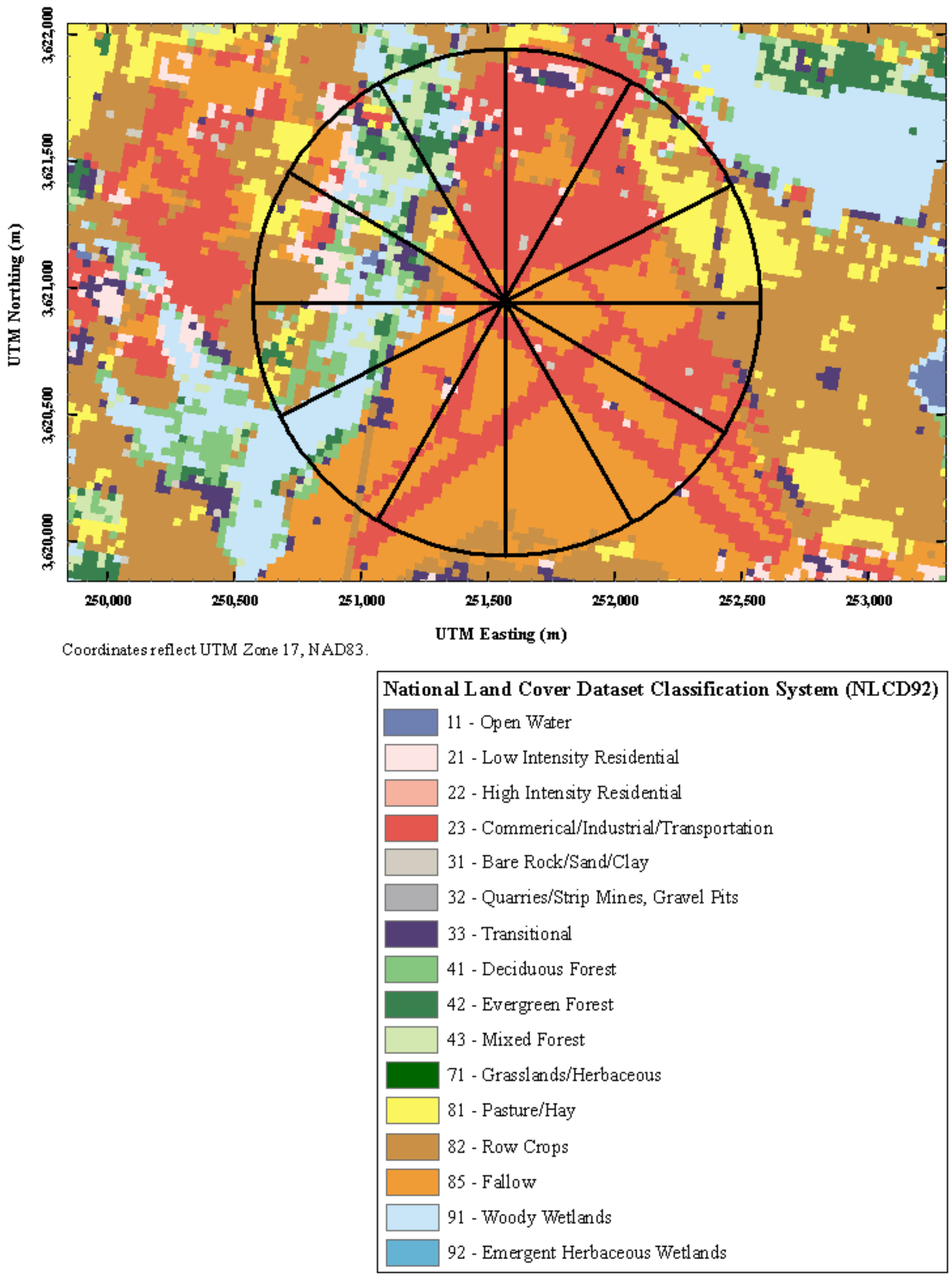


FIGURE A-2. LAND USE CATEGORIES FOR THE 1-KM AREA SURROUNDING THE MACON NWS



Inspection of the land use figures shows that the land use surrounding the Kings Mill site appears to be predominantly row crops and deciduous forest. Post-construction land use will also include areas of grassland and commercial/industrial/transportation. The Macon NWS station has large areas of urban and recreation grasses as well as low and high intensity residential, and commercial/industrial/transportation and some forested areas and agricultural characteristics.

To facilitate a quantitative comparison of surface characteristics, Trinity utilized AERSURFACE to determine the weighted average parameters for the Kings Mill site and the Macon NWS site based on the 1992 NLCD data, as well as modified NCLD data to reflect post-construction land use for the Kings Mill site.[3] The geographic coordinates for the NWS site extracted from the NOAA website were used for the center of the study area while an approximate central location was used as the center of the Kings Mill study area. Because the Kings Mill and NWS site are located in a temperate region that experiences weather conditions typical of varying seasons, seasonal average parameters were computed for each season; the seasonal assignment "Winter" values were assigned by AERSURFACE based on no "continuous snow cover for most of winter". The analysis was completed for dry, wet, and average moisture conditions (moisture conditions impact the Bowen ratio parameters assigned).

Table A-1 presents a summary of the parameter values utilized to compute the weighted average parameters, while Tables A-2a and A-2b present the surface characteristics determined by AERSURFACE for the Kings Mill site, both pre- and post-construction. All parameter values are based on the values recommended in EPA's *AERMET User's Guide*.[4]

Tables A-3 through A-5 present various comparisons of the parameter assignments, considering annual averages, seasonal averages, and overall differences.[5] Figures A-3a and A-3b include a quantitative review of the land use assignments for pre-and post-construction scenarios. These comparisons illustrate that the Macon NWS station is similar to the Kings Site under post-construction conditions for albedo and Bowen ratio (when considering all moisture conditions). The Kings Mill's post-construction surface roughness parameter assignments are similar to the Macon NWS station when considered on a sector-by-sector basis, and based on the windrose shown in Figure A-4.

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[3] Approximately 75 acres of land will be cleared surrounding the process lines.

[4] EPA, *User's Guide for the AERMOD Meteorological Preprocessor (AERME*T), EPA-454/B-03-002, November 2004.

[5] Analyses presented based on methodology recommended by the Alabama Department of Environmental Management (ADEM).

TABLE A-1. AERMET PARAMETER VALUES

	Albedo				Surface Roughness				Bowen Ratio (Average Moisture)				Bowen Ratio (Dry Conditions)				Bowen Ratio (Wet Conditions)			
Landuse	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Water	0.12	0.10	0.14	0.20	0.0001	0.0001	0.0001	0.0001	0.1	0.1	0.1	1.5	0.1	0.1	0.1	2.0	0.1	0.1	0.1	0.3
Deciduous Forest	0.12	0.12	0.12	0.50	1.00	1.30	0.80	0.50	0.7	0.3	1.0	1.5	1.5	0.6	2.0	2.0	0.3	0.2	0.4	0.5
Coniferous Forest	0.12	0.12	0.12	0.35	1.30	1.30	1.30	1.30	0.7	0.3	0.8	1.5	1.5	0.6	1.5	2.0	0.3	0.2	0.3	0.3
Swamp/Wetlands	0.12	0.14	0.16	0.30	0.20	0.20	0.20	0.05	0.1	0.1	0.1	1.5	0.2	0.2	0.2	2.0	0.1	0.1	0.1	0.5
Cultivated Land	0.14	0.20	0.18	0.60	0.03	0.20	0.05	0.01	0.3	0.5	0.7	1.5	1.0	1.5	2.0	2.0	0.2	0.3	0.4	0.5
Grassland	0.18	0.18	0.20	0.60	0.50	0.10	0.01	0.001	0.4	0.8	1.0	1.5	1.0	2.0	2.0	2.0	0.3	0.4	0.5	0.5
Urban	0.14	0.16	0.18	0.35	1.00	1.00	1.00	1.00	1.0	2.0	2.0	1.5	2.0	4.0	4.0	2.0	0.5	1.0	1.0	0.5
Desert Shrubland	0.30	0.28	0.28	0.45	0.30	0.30	0.30	0.15	3.0	4.0	6.0	6.0	5.0	6.0	10.0	10.0	1.0	1.5	2.0	2.0

TABLE A-2A. AERSURFACE ASSIGNMENTS FOR KINGS MILL (PRE-CONSTRUCTION)

	Albedo				Surface Roughness				Bowen Ratio (Average Moisture)				Bowen Ratio (Dry Conditions)				Bowen Ratio (Wet Conditions)			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1 (0-30 deg)	0.14	0.17	0.17	0.16	0.077	0.278	0.278	0.055	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
2 (30-60 deg)	0.14	0.17	0.17	0.16	0.083	0.282	0.282	0.062	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
3 (60-90 deg)	0.14	0.17	0.17	0.16	0.112	0.370	0.370	0.079	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
4 (90-120 deg)	0.14	0.17	0.17	0.16	0.149	0.401	0.401	0.107	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
5 (120-150 deg)	0.14	0.17	0.17	0.16	0.057	0.259	0.259	0.039	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
6 (150-180 deg)	0.14	0.17	0.17	0.16	0.062	0.275	0.275	0.043	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
7 (180-210 deg)	0.14	0.17	0.17	0.16	0.048	0.252	0.252	0.032	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
8 (210-240 deg)	0.14	0.17	0.17	0.16	0.036	0.216	0.216	0.024	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
9 (240-270 deg)	0.14	0.17	0.17	0.16	0.063	0.288	0.288	0.043	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
10 (270-300 deg)	0.14	0.17	0.17	0.16	0.180	0.491	0.491	0.120	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
11 (300-330 deg)	0.14	0.17	0.17	0.16	0.062	0.283	0.283	0.042	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
12 (330-360 deg)	0.14	0.17	0.17	0.16	0.055	0.272	0.272	0.037	0.41	0.41	0.69	0.71	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35

TABLE A-2B. AERSURFACE ASSIGNMENTS FOR KINGS MILL (POST-CONSTRUCTION)

	Albedo				**Surface Roughness**				**Bowen Ratio (Average Moisture)**				**Bowen Ratio (Dry Conditions)**				**Bowen Ratio (Wet Conditions)**			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1 (0-30 deg)	0.14	0.17	0.17	0.16	0.063	0.179	0.179	0.029	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
2 (30-60 deg)	0.14	0.17	0.17	0.16	0.084	0.224	0.224	0.045	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
3 (60-90 deg)	0.14	0.17	0.17	0.16	0.089	0.270	0.270	0.048	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
4 (90-120 deg)	0.14	0.17	0.17	0.16	0.134	0.318	0.318	0.076	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
5 (120-150 deg)	0.14	0.17	0.17	0.16	0.064	0.232	0.232	0.036	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
6 (150-180 deg)	0.14	0.17	0.17	0.16	0.088	0.282	0.282	0.054	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
7 (180-210 deg)	0.14	0.17	0.17	0.16	0.087	0.297	0.297	0.056	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
8 (210-240 deg)	0.14	0.17	0.17	0.16	0.086	0.266	0.266	0.052	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
9 (240-270 deg)	0.14	0.17	0.17	0.16	0.072	0.240	0.240	0.037	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
10 (270-300 deg)	0.14	0.17	0.17	0.16	0.187	0.389	0.389	0.097	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
11 (300-330 deg)	0.14	0.17	0.17	0.16	0.078	0.235	0.235	0.037	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35
12 (330-360 deg)	0.14	0.17	0.17	0.16	0.060	0.213	0.213	0.029	0.42	0.41	0.69	0.72	1.02	0.92	1.51	1.51	0.23	0.25	0.35	0.35

TABLE A-3A. COMPARISON OF AERSURFACE ASSIGNMENTS, ANNUAL AVERAGES (PRE-CONSTRUCTION)

Albedo Assignments

Sector	**Macon NWS (MCN)** Average	**Kings Mill** Average	**Kings Mill** % of MCN[1]
All	0.160	0.160	0.0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

Sector	**Macon NWS (MCN)** Average	**Kings Mill** Average	**Kings Mill** % of MCN[1]
All	0.48	0.56	16.2%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

Sector	**Macon NWS (MCN)** Average	**Kings Mill** Average	**Kings Mill** % of MCN[1]
All	0.90	1.24	38.5%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

Sector	**Macon NWS (MCN)** Average	**Kings Mill** Average	**Kings Mill** % of MCN[1]
All	0.25	0.30	18.0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

Wind Direction	**Macon NWS (MCN)** Average	**Kings Mill** Average	**Kings Mill** % of MCN[1]
30	0.070	0.172	146%
60	0.076	0.177	135%
90	0.036	0.233	551%
120	0.037	0.265	610%
150	0.035	0.154	342%
180	0.025	0.164	549%
210	0.030	0.146	395%
240	0.051	0.123	142%
270	0.163	0.171	4%
300	0.130	0.321	146%
330	0.158	0.168	6%
360	0.152	0.159	5%
All	0.080	0.188	134%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE A-3B. COMPARISON OF AERSURFACE ASSIGNMENTS, ANNUAL AVERAGES (POST-CONSTRUCTION)

Albedo Assignments

Sector	**Macon NWS (MCN)** Average	**Facility** Average	**Facility** % of MCN[1]
All	0.160	0.160	0.0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

Sector	**Macon NWS (MCN)** Average	**Facility** Average	**Facility** % of MCN[1]
All	0.48	0.56	17.3%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

Sector	**Macon NWS (MCN)** Average	**Facility** Average	**Facility** % of MCN[1]
All	0.90	1.24	38.5%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

Sector	**Macon NWS (MCN)** Average	**Facility** Average	**Facility** % of MCN[1]
All	0.25	0.30	18.0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

Wind Direction	**Macon NWS (MCN)** Average	**Facility** Average	**Facility** % of MCN[1]
1	0.070	0.113	61%
2	0.076	0.144	91%
3	0.036	0.169	373%
4	0.037	0.212	468%
5	0.035	0.141	306%
6	0.025	0.177	599%
7	0.030	0.184	525%
8	0.051	0.168	230%
9	0.163	0.147	10%
10	0.130	0.266	104%
11	0.158	0.146	7%
12	0.152	0.129	15%
All	0.080	0.166	107%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE A-4A. COMPARISON OF AERSURFACE ASSIGNMENTS, SEASONAL AVERAGES (PRE-CONSTRUCTION)

Albedo Assignments

	Macon NWS (MCN) Spring	Summer	Fall	Winter	Kings Mill (as % of MCN)[1] Spring	Summer	Fall	Winter
Seasonal Average	0.14	0.17	0.17	0.16	0.14	0.17	0.17	0.16
% of NWS[1]	n/a	n/a	n/a	n/a	0%	0%	0%	0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Macon NWS (MCN) Spring	Summer	Fall	Winter	Kings Mill (as % of MCN)[1] Spring	Summer	Fall	Winter
Seasonal Average	0.37	0.38	0.55	0.61	0.41	0.41	0.69	0.71
% of NWS[1]	n/a	n/a	n/a	n/a	11%	8%	25%	16%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Macon NWS (MCN) Spring	Summer	Fall	Winter	Kings Mill (as % of MCN)[1] Spring	Summer	Fall	Winter
Seasonal Average	0.76	0.74	1.04	1.04	1.02	0.92	1.51	1.51
% of NWS[1]	n/a	n/a	n/a	n/a	34%	24%	45%	45%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Macon NWS (MCN) Spring	Summer	Fall	Winter	Kings Mill (as % of MCN)[1] Spring	Summer	Fall	Winter
Seasonal Average	0.21	0.23	0.28	0.28	0.23	0.25	0.35	0.35
% of NWS[1]	n/a	n/a	n/a	n/a	10%	9%	25%	25%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Macon NWS (MCN) Spring	Summer	Fall	Winter	Kings Mill (as % of MCN)[1] Spring	Summer	Fall	Winter
Seasonal Average	0.070	0.100	0.093	0.057	0.082	0.306	0.306	0.057
% of NWS[1]	n/a	n/a	n/a	n/a	17%	205%	229%	.44%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE A-4B. COMPARISON OF AERSURFACE ASSIGNMENTS, SEASONAL AVERAGES (POST-CONSTRUCTION)

Albedo Assignments

	Macon NWS (MCN)				Facility (as % of MCN)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.14	0.17	0.17	0.16	0.14	0.17	0.17	0.16
% of NWS[1]	n/a	n/a	n/a	n/a	0%	0%	0%	0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Macon NWS (MCN)				Facility (as % of MCN)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.37	0.38	0.55	0.61	0.42	0.41	0.69	0.72
% of NWS[1]	n/a	n/a	n/a	n/a	14%	8%	25%	18%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Macon NWS (MCN)				Facility (as % of MCN)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.76	0.74	1.04	1.04	1.02	0.92	1.51	1.51
% of NWS[1]	n/a	n/a	n/a	n/a	34%	24%	45%	45%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Macon NWS (MCN)				Facility (as % of MCN)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.21	0.23	0.28	0.28	0.23	0.25	0.35	0.35
% of NWS[1]	n/a	n/a	n/a	n/a	10%	**9%**	25%	25%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Macon NWS (MCN)				Facility (as % of MCN)[1]			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Seasonal Average	0.070	0.100	0.093	0.057	0.091	0.262	0.262	0.050
% of NWS[1]	n/a	n/a	n/a	n/a	30%	162%	182%	13%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE A-5A. COMPARISON OF AERSURFACE ASSIGNMENTS, DIFFERENCES (PRE-CONSTRUCTION)

Albedo Assignments

	Macon NWS (MCN)				Kings Mill				Difference Between MCN & Kings Mill				Kings Mill (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.14	0.17	0.17	0.16	0.14	0.17	0.17	0.16	-	-	-	-	0%	0%	0%	0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Macon NWS (MCN)				Kings Mill				Difference Between MCN & Kings Mill				Kings Mill (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.37	0.38	0.55	0.61	0.41	0.41	0.69	0.71	(0.04)	(0.03)	(0.14)	(0.10)	11%	8%	25%	16%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Macon NWS (MCN)				Kings Mill				Difference Between MCN & Kings Mill				Kings Mill (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.76	0.74	1.04	1.04	1.02	0.92	1.51	1.51	(0.26)	(0.18)	(0.47)	(0.47)	34%	24%	45%	45%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Macon NWS (MCN)				Kings Mill				Difference Between MCN & Kings Mill				Kings Mill (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.21	0.23	0.28	0.28	0.23	0.25	0.35	0.35	(0.02)	(0.02)	(0.07)	(0.07)	10%	9%	25%	25%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Macon NWS (MCN)				Kings Mill				Difference Between MCN & Kings Mill				Kings Mill (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	0.069	0.077	0.072	0.062	0.077	0.278	0.278	0.055	-0.008	-0.201	-0.206	0.007	12%	261%	286%	11%
2	0.061	0.096	0.093	0.052	0.083	0.282	0.282	0.062	-0.022	-0.186	-0.189	-0.010	36%	194%	203%	19%
3	0.027	0.052	0.045	0.019	0.112	0.370	0.370	0.079	-0.085	-0.318	-0.325	-0.060	315%	612%	722%	316%
4	0.034	0.048	0.041	0.026	0.149	0.401	0.401	0.107	-0.115	-0.353	-0.360	-0.081	338%	735%	878%	312%
5	0.035	0.041	0.035	0.028	0.057	0.259	0.259	0.039	-0.022	-0.218	-0.224	-0.011	63%	532%	640%	39%
6	0.025	0.032	0.026	0.018	0.062	0.275	0.275	0.043	-0.037	-0.243	-0.249	-0.025	148%	759%	958%	139%
7	0.029	0.037	0.030	0.022	0.048	0.252	0.252	0.032	-0.019	-0.215	-0.222	-0.010	66%	581%	740%	45%
8	0.050	0.062	0.053	0.038	0.036	0.216	0.216	0.024	0.014	-0.154	-0.163	0.014	28%	248%	308%	37%
9	0.135	0.213	0.201	0.104	0.063	0.288	0.288	0.043	0.072	-0.075	-0.087	0.061	53%	35%	43%	59%
10	0.097	0.180	0.170	0.074	0.180	0.491	0.491	0.120	-0.083	-0.311	-0.321	-0.046	86%	173%	189%	62%
11	0.136	0.197	0.187	0.110	0.062	0.283	0.283	0.042	0.074	-0.086	-0.096	0.068	54%	44%	51%	62%
12	0.144	0.166	0.163	0.133	0.055	0.272	0.272	0.037	0.089	-0.106	-0.109	0.096	62%	64%	67%	72%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

TABLE A-5B. COMPARISON OF AERSURFACE ASSIGNMENTS, DIFFERENCES (POST-CONSTRUCTION)

Albedo Assignments

	Macon NWS (MCN)				Facility				Difference Between MCN & Facility				Facility (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.14	0.17	0.17	0.16	0.14	0.17	0.17	0.16	-	-	-	-	0%	0%	0%	0%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Average Moisture

	Macon NWS (MCN)				Facility				Difference Between MCN & Facility				Facility (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.37	0.38	0.55	0.61	0.42	0.41	0.69	0.72	(0.05)	(0.03)	(0.14)	(0.11)	14%	8%	25%	18%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Dry Conditions

	Macon NWS (MCN)				Facility				Difference Between MCN & Facility				Facility (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.76	0.74	1.04	1.04	1.02	0.92	1.51	1.51	(0.26)	(0.18)	(0.47)	(0.47)	34%	24%	45%	45%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Bowen Ratio Assignments - Wet Conditions

	Macon NWS (MCN)				Facility				Difference Between MCN & Facility				Facility (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
All	0.21	0.23	0.28	0.28	0.23	0.25	0.35	0.35	(0.02)	(0.02)	(0.07)	(0.07)	10%	**9%**	25%	25%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

Surface Roughness Assignments

	Macon NWS (MCN)				Facility				Difference Between MCN & Facility				Facility (as % of MCN)[1]			
Sector	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	0.069	0.077	0.072	0.062	0.063	0.179	0.179	0.029	0.006	-0.102	-0.107	0.033	9%	132%	149%	53%
2	0.061	0.096	0.093	0.052	0.084	0.224	0.224	0.045	-0.023	-0.128	-0.131	0.007	38%	133%	141%	13%
3	0.027	0.052	0.045	0.019	0.089	0.270	0.270	0.048	-0.062	-0.218	-0.225	-0.029	230%	419%	500%	153%
4	0.034	0.048	0.041	0.026	0.134	0.318	0.318	0.076	-0.100	-0.270	-0.277	-0.050	294%	563%	676%	192%
5	0.035	0.041	0.035	0.028	0.064	0.232	0.232	0.036	-0.029	-0.191	-0.197	-0.008	83%	466%	563%	29%
6	0.025	0.032	0.026	0.018	0.088	0.282	0.282	0.054	-0.063	-0.250	-0.256	-0.036	252%	781%	985%	200%
7	0.029	0.037	0.030	0.022	0.087	0.297	0.297	0.056	-0.058	-0.260	-0.267	-0.034	200%	703%	890%	155%
8	0.050	0.062	0.053	0.038	0.086	0.266	0.266	0.052	-0.036	-0.204	-0.213	-0.014	72%	329%	402%	37%
9	0.135	0.213	0.201	0.104	0.072	0.240	0.240	0.037	0.063	-0.027	-0.039	0.067	47%	13%	19%	64%
10	0.097	0.180	0.170	0.074	0.187	0.389	0.389	0.097	-0.090	-0.209	-0.219	-0.023	93%	116%	129%	31%
11	0.136	0.197	0.187	0.110	0.078	0.235	0.235	0.037	0.058	-0.038	-0.048	0.073	43%	19%	26%	66%
12	0.144	0.166	0.163	0.133	0.060	0.213	0.213	0.029	0.084	-0.047	-0.050	0.104	58%	28%	31%	78%

1. Calculated as the absolute value of (NWS average - facility average)/NWS average.

FIGURE A-3A. COMPARISON OF LAND USE CATEGORIES (PRE-CONSTRUCTION)

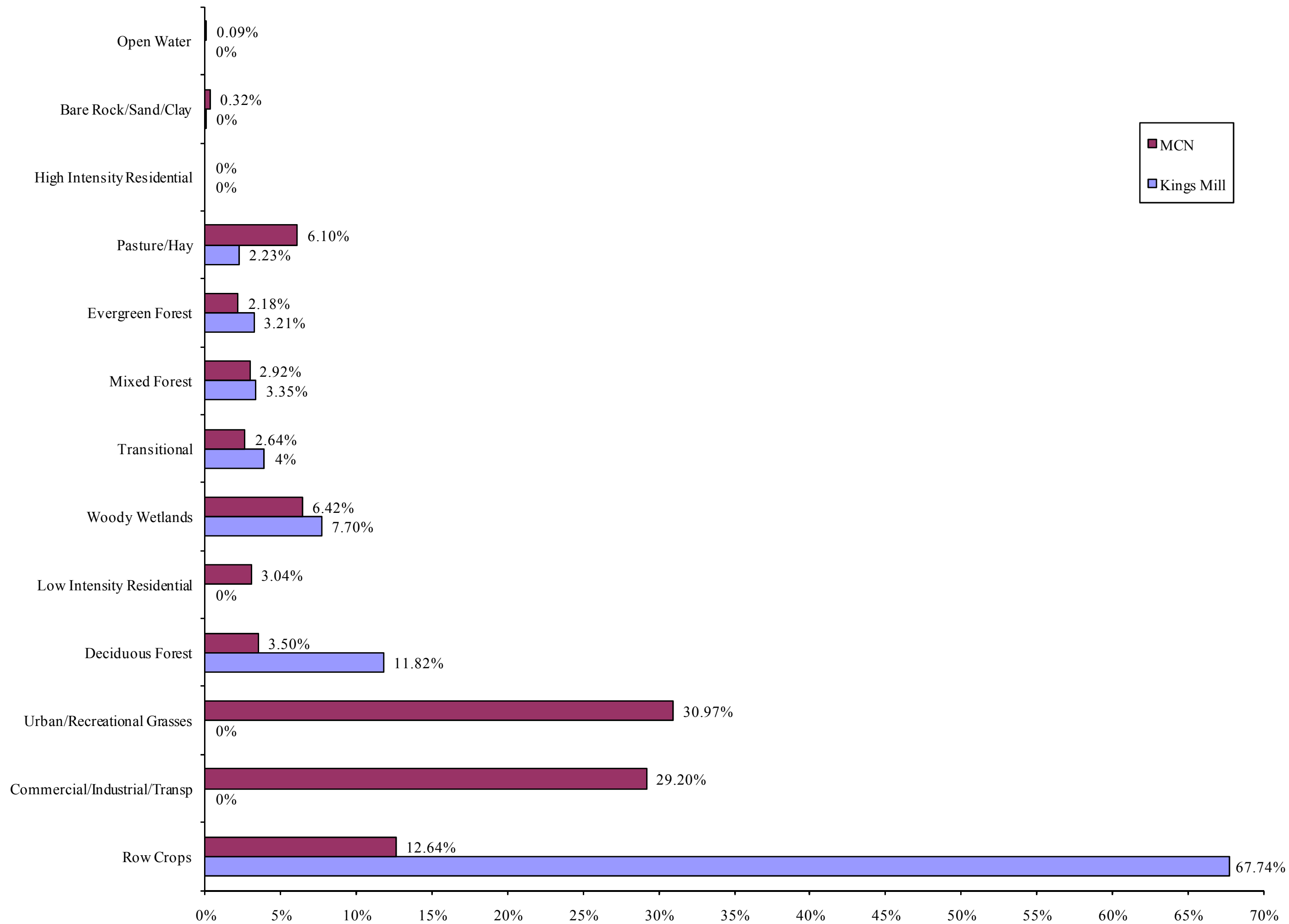


FIGURE A-3B. COMPARISON OF LAND USE CATEGORIES (POST-CONSTRUCTION)

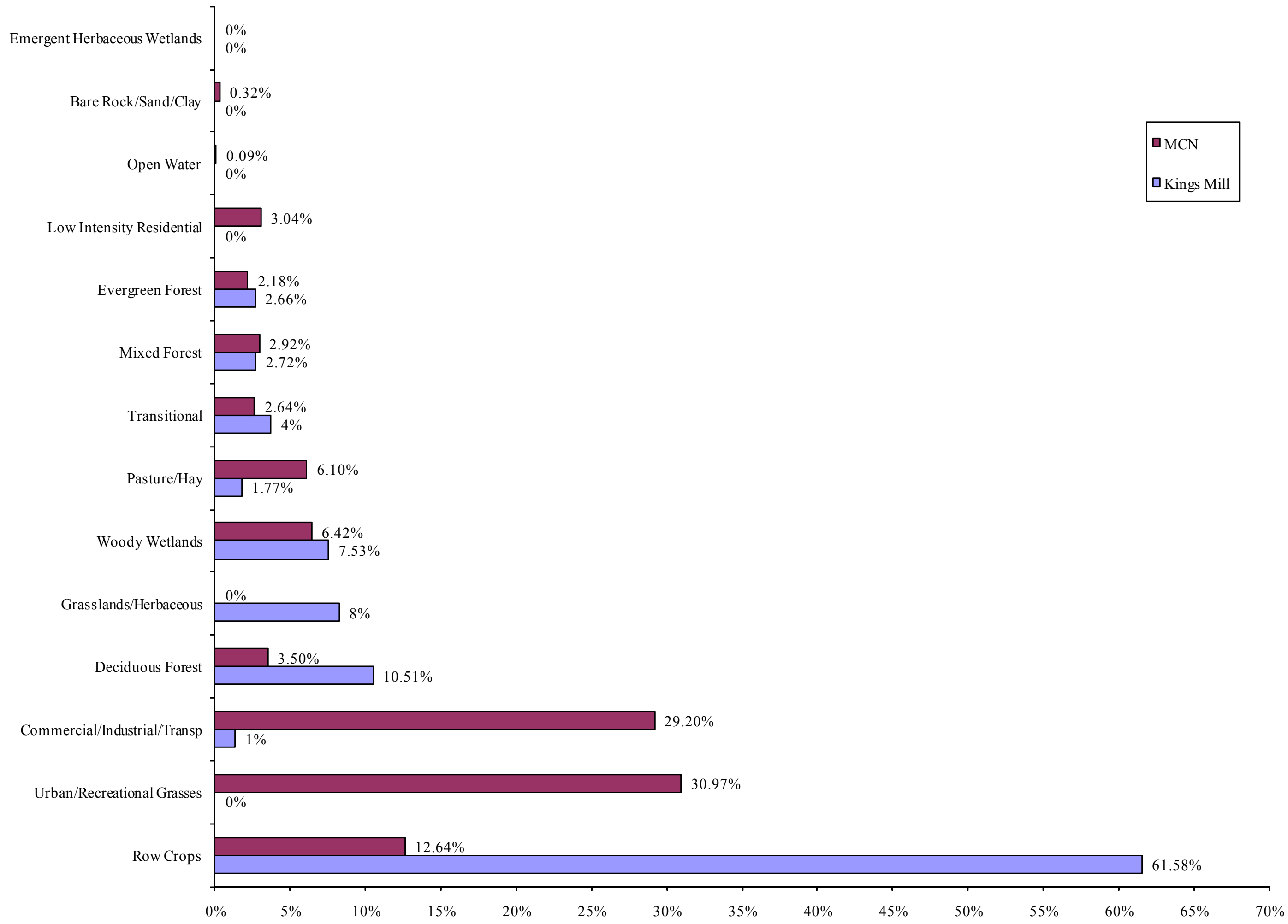
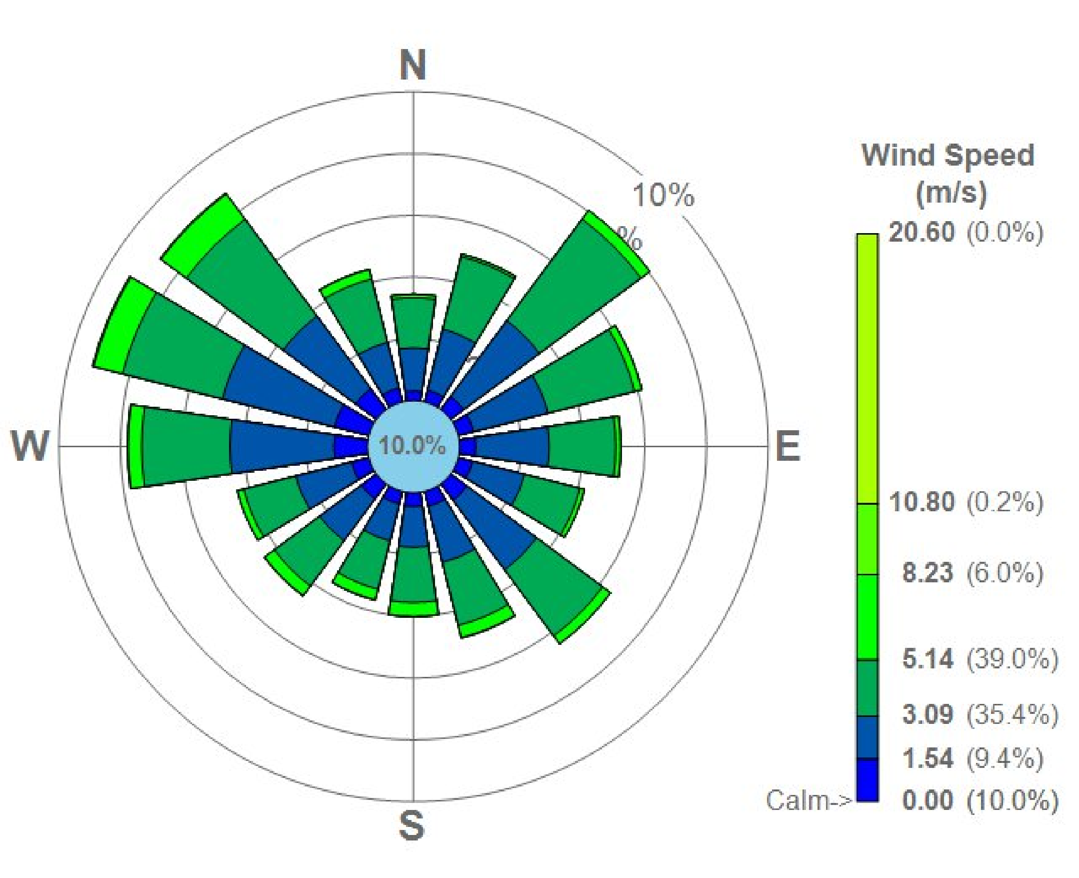


FIGURE A-4. FIVE-YEAR WINDROSE FOR MCN NWS STATION (1987-1991)



What Meteorological Data Should I Use for My PSD Project in Georgia?

Georgia EPD has been providing AERMET-processed meteorological data sets to PSD permit applicants since 2005. This data, up to present, was compiled based on prior permitting decisions of data representation for selected areas of the state. The data currently available are pre-ASOS (pre-mid-1990's) vintage because of the inability of AERMET to process variable (coded VAR) wind directions. GA EPD believes this results in too many calms in processed data derived from the DS-3505 formatted files to warrant use in modeling (up to 40% total missing data, including periods of meteorological calms and missing data). Until recently (2011), this data has been satisfactory for GA EPD's purposes, and may continue to be adequate for selected projects. The evolving EPA modeling guidance, precipitated by the requirements to model PM2.5 and the new 1-hr NO_2 and SO_2 standards, is changing GA EPD's priorities.

The recent development of the AERMINUTE utility allows the processing of data as recent as last month. Such recent data can be processed (on a calendar year basis) for use with concurrent ambient air quality background concentrations to result in improved modeled design concentration estimates. Also, 5-year data sets are becoming available for second-order airport stations which may attain satisfactory completeness criteria for air dispersion modeling. For these reasons, GA EPD is contemplating revisions to its meteorological data approach.

Rather than provide pre-processed data files based primarily on project location to applicants or their consultants for PSD modeling, we now expect to receive answers to the following questions prepared by the applicant prior to such processing by GA EPD. Information requested pertains to:

- site and project characteristics which may influence representation decisions
- the terrain surrounding the project site, including input and output files from the three moisture-class runs of AERSURFACE, as may be needed for comparison to the site characteristics of the meteorological observing site deemed by GA EPD to be appropriate for the project, if not to process such data through AERMET.
- A list of hourly surface meteorological data observing stations (ASOS or AWOS) within a 50-mile or more radius of the project (including out-of-state stations), together with an assessment of data completeness and data suitability for processing with AERMINUTE and/or AERMET.
- A list of other meteorological observation stations that may be suitable substitutes for near-site, or on-site meteorological data. Such lists should be accompanied by an assessment of data completeness and data suitability for processing with AERMINUTE and/or AERMET.

Site Data: (Use additional pages for answers, as may be necessary)

UTM coordinates (NAD83 datum, including UTM Zone) of the project site: ________mE, _________mN, Z__
Size of the project site _______ (acres). (How does the site compare with the 10-km and 1-km AERSURFACE characteristics regions of influence?)
Developed extent of project site ________ (acres). Will development of the site influence Albedo/Bowen ratio/ surface-roughness values? ____
Fenced extent of project site ___________ (acres). Is the extent of fencing likely to be an AMBIENT AIR issue? ____
Plant grade elevation ________ (feet above Mean Sea Level, AMSL)

Closest distance to terrain in excess of the highest model-able (if in excess of GEP height) project stack tip.
Stack Tip Elev(ft AMSL)____Distance to Terrain (km)____Max Terrain Feature Height (ft AMSL)____

Closest distance to terrain in excess of the highest model-able stack tip on site.
Stack Tip Elev(ft AMSL)____Distance to Terrain (km)____Maximum Terrain Feature Height (ft AMSL)___

Closest distance to terrain in excess of the lowest project stack tip.
Stack Tip Elev(ft AMSL)____Distance to Terrain (km)____Maximum Terrain Feature Height (ft AMSL)___

Closest distance to terrain in excess of the lowest stack tip on site.
Stack Tip Elev(ft AMSL)____Distance to Terrain (km)____Maximum Terrain Feature Height (ft AMSL)___
How may potential complex terrain influence observed surface meteorological parameters?

If complex terrain has the potential to modify observed meteorological parameters, does a year or more of on-site met data exist? If so, include in list of Potential Surface Meteorological Stations, below.
If complex terrain has the potential to modify observed meteorological parameters, does a year or more of near-site met data exist? If so, include in list of Potential Surface Meteorological Stations, below.
Please submit a copy (preferably electronic in .dxf format) of the proposed project site plan.
Project Data:

Project net emissions increase of each criteria pollutant (tons-per-year only if in excess of PSD Significant Emission Rates, 40 CFR 52.21(b)(23)(i)):

	TPY
PM10 (includes PM2.5, H_2SO_4, Pb, & condensables)	_____
PM2.5 (includes H_2SO_4, Pb, & condensables)	_____
NOx	_____
SO_2	_____
CO	_____
Pb	_____
VOC	_____

Greenfield site or existing site modification?_____________________

Project Class I AQRV requirements: Ratio of tons(maximum 24-hr emission rate basis times 8760 hrs)-per-yr of visibility-affecting (V-A) pollutant emissions to distance to each Class I area within 300 km of project site.

V-A Pollutant	TPY (24-hr basis)	Class I Area	Dist. from Project (km)	TPY:KM
SO_2	_________	___________________	______	______
H_2SO_4	_________	___________________	______	______
NOx	_________	___________________	______	______
PM2.5 (defined above*)	_________	___________________	______	______
PM10 (defined above)	_________	___________________	______	______
Sum Total V-A Emissions:	_____ tpy	___________________	______	______

*Note: PM2.5 emissions listed above should not be counted in V-A total. They are included in PM10.

AERSURFACE Utility Data Evaluated at Project Site:
3 Input files: Each with 12 30-degree sectors, 4 non-winter seasons, one for each Bowen Ratio moisture class
3 Output files: 3 utility output format (AERMET input) ASCII files and
1 surface roughness-only spreadsheet format (by sector and season).
Discussion of AERSURFACE site appropriateness (did site exist 'as-is'in AERSURFACE database year, or have substantial landuse changes occurred? Especially within 1 km of project site?):

NLCD92 data was modified to reflect 75 cleared acres around the site.

How does applicant propose to account for substantial landuse changes, if any, in the surface characteristics matrix?

AERSURFACE was run on the modified files to perform comparison to airport landuse.

Potential Surface Meteorological Stations within 50-mile radius (or closest, listed in order of increasing distance):

NWS Station	Type/Processor (AERMET/AERMIN) (ASOS/AWOS)	Period of Record	% Completeness	Distance from Project (km)
Augusta Bush	**ASOS**	**2006-2010**	**28-40% calms**	**43 km**
Augusta Daniel	**ASOS**	**2006-2010**	**WD<90%**	**45 km**
Macon	**ASOS**	**2006-2010**	**??**	**130 km**

USFS Station	(AERMET/AERMIN) ()	Period of Record	% Completeness	Distance from Project (km)
______				
______				
______				

Southern Co. Nuclear Station	(AERMET) (EXCEL)	Period of Record	% Completeness	Distance from Project (km)
Vogel_		1998-2002, 2006	81.9%, 98.3%	
Hatch_		2001-2005		
Farley_		2001-2005		

StateClimatologist Station	(AERMET/AERMIN) ()	Period of Record	% Completeness	Distance from Project (km)
______				
______				
______				

AgExtension Station	(AERMET/AERMIN) ()	Period of Record	% Completeness	Distance from Project (km)
______				
______				
______				

GA EPD (AERMET/AERMIN)

Station	**()**	**Period of Record**	**% Completeness**	**Distance from Project (km)**

SEARCH (AERMET/AERMIN)

Station	**()**	**Period of Record**	**% Completeness**	**Distance from Project (km)**
S. Dekalb				
Paulding Co.				

CASTNET (AERMET/AERMIN)

Station	**()**	**Period of Record**	**% Completeness**	**Distance from Project (km)**
GAS153				

Note: % completeness is determined from raw data files on a quarterly basis (using AERMET Stage 1, Lakes Environmental's WRPLOT View, or other utility software). This value should represent the minimum amount of data available in any quarter over the period of record for any single parameter measured and needed for modeling. GA EPD does NOT expect applicants to complete data sets without prior GA EPD approval of completion process.

Applicant data set preference(s), including upper air station(s), and reason(s):

Macon/Centreville – see protocol for rationale

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
Mark Williams, Commissioner
F. Allen Barnes, Director

July 7, 2011

Mr. Jon Hill
Trinity Consultants, Inc.
53 Perimeter Center East, Suite 230
Atlanta, GA 30346

Forwarded to: Jhill@TrinityConsultants.com
Jfickas@TrinityConsultants.com

Subject: **Review of PSD Air Dispersion Modeling Protocol**
Pyramax Greenfield Site PSD, Jefferson Co., Georgia

Dear Mr. Hill:

We have reviewed the air quality dispersion modeling protocol dated June 20, 2011, which addresses the proposed modeled conformance of the Pyramax kaolin processing facility to be located in Jefferson 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) modeling projects. However, we do have the following comments:

1. EPA/EPD retain purview over Class I Increment consumption, so both agencies should get a copy of any project correspondence you may have with the any FLM. In addition, 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, as you proposed. 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. Class II Meteorological Data: We have processed Daniel Field NWS hourly meteorological surface observations with daily Peachtree City upper air observations using the recently promulgated, final versions of AERMINUTE and AERMET (both versions 11059). These observations were collected over the period 2006-2010, in case you need to use 2006-2010 concurrent ambient monitoring data. We have confirmed with the EPA Region 4 modeling contact that the use of AERMINUTE is not a data replacement technique, since the data is collected by the same instrumentation at the same location. We have been instructed by Region 4 to avoid filling-in any surface observations beyond AERMINUTE processing.

   We have processed this data using the Daniel Field airport's surface characteristics and the Pyramax site's surface characteristics. Each of these two resulting data sets was initially used to model the project's1-hr and annual-averaged SO_2 impacts over the 5-yr period. This modeling showed slightly higher maximum annual impacts using the Daniel Field site characteristics (at the second significant digit) and slightly higher maximum one-hour impacts using the Pyramax surface characteristics (at the fourth significant figure). The differences in surface characteristics, ie. surface roughness, are most variable at the Pryamax site, and most stable at the Daniel Field site over the period 1992-present.

   Since AERSURFACE can currently only use the 1992 land use/land cover data, and Daniel Field has the greater stability for these parameters, EPD prefers you use the Daniel Field data exclusively for all project AERMOD modeling. Note that when the met data were compiled thru AERMET(11059), a thirty-yr period of record (1980-2010) of annual precip in Augusta was reviewed, and resolved the 2006-2010 period into years of wet, dry, and average conditions following the latest AERMOD Implementation Guidance. These were:

dry: '07 & '10,
avg: '06 & '08, and
wet: '09

3. Offsite Inventory Preparation: Please provide (in the modeled air quality assessment) dimensions and/or alternate emission source characteristics for any fugitive sources modeled, and indicate how such dimensions are represented in the model(s). 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 you were sent on 6/30/11.

   The Permitting Program will also review and, if acceptable, approve your on- and off-site emissions inventories, including PM2.5, NOx, and SO2 emissions. 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.

4. 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 11059, 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. If the ISCST3 model (version 02035) is to be used for air toxics, with receptors assigned terrain elevations, let us know and we will attempt to process an ISCST3-compatible meteorological file from the Daniel Field data we have. This may be useful if Class II visibility is to be assessed beyond Level I. A concatenated 5-yr meteorological data set may be used to assess 1-hr, 24-hr, and/or PERIOD (instead of annual) averaging periods. In this way, EPD expects a single model run for each toxic impact requiring refined modeling. 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 will advise you as to which air toxics contaminants are required to be assessed.

5. Class II criteria pollutant dispersion modeling should use the 11103 version 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, ie., 1-hr NO_2, 1-hr SO_2, and PM2.5) should be evaluated using the guidance memos listed on page 63 of the updated AERMOD User's Guide, and in conjunction with the modeling guidance you were sent on 6/30/11, in which we provided a discussion of methods we believe to be allowable based on the latter guidance. As provided in the AERMOD User's Guide, any DEFAULT option may be employed in the modeling. Use of Non-Default options is subject to individual approval, preferably from EPA.

The largest Significant Impact Distance (SID) for each pollutant, plus 50 km, will establish the size of any model screening area to be inventoried for offsite sources of pre-2008 pollutants (those addressed in the 1990 Draft NSR Workshop Manual) for cumulative modeling. The "20D" screening technique may be used for eliminating sources from all but the 1-hr averaging period models, but the screening should be conducted using both a short-term "d" and a long-term "D". No source located within the pollutant-specific largest Significant Impact Areas (SIAs) may be screened from the cumulative inventory. The1-hr NO_2 and SO_2 inventories will be developed based on the guidance you were sent on 6/30/11 (see the attachments). When applying the 20D screening method, the pollutant-specific emissions of facilities within 2 km of each other outside the SIA should be added prior to applying the 20D screening test.

6. Increment Issues: The Jefferson Co. Air Quality Control Region (AQCR) minor source baseline date for annual NO2 is 1/10/02, per GA EPD records. This is the only date that has been triggered in the AQCR. If you have alternative information, please submit it for EPD review. The facility will not be required to assess PM2.5 Increment consumption by this project (if the application is deemed complete by 10/20/11).

7. Ambient Concentrations: The project 1- and 8-hr background ambient concentrations of CO are 943 and 802 $\mu g/m^3$, respectively (Paulding Co. monitor, 2010). The annual NO_2 background ambient concentration is 5.2 $\mu g/m^3$, as a 5-yr avg of the annual max, Paulding Co. monitor, 2010. The 1-hr NO_2 background ambient concentration (2008-2010) is 35.8 $\mu g/m^3$, based on the March 1, 2011 EPA memo indicating the 98th %-ile of the daily maximum 1-hr concentration over a 3-yr period may be used for this purpose (Paulding Co. monitor, 2008-2010). The 3-yr average of the daily 98th percentile concentrations of PM2.5 at Bungalow Road in Augusta ('08-'10) is 25.0 $\mu g/m^3$, the annual average PM2.5 concentration at that site is ('08-'10) is 12.7 $\mu g/m^3$. The

   1-hr SO_2 ambient concentration (Macon SE, 2008-2010) is 67 $\mu g/m^3$. The
   3-hr SO_2 ambient background (same monitor and period) is 51.5 $\mu g/m^3$, the
   24-hr SO_2 ambient background (same monitor and period) is 16.8 $\mu g/m^3$, the
   annual average SO_2 ambient background (same monitor and period) is 3.89 $\mu g/m^3$.

   The PM10 regional background ambient concentrations for 24-hr and annual are 38 and 20 $\mu g/m^3$, respectively. You indicated you may wish to employ a concurrent PM2.5 hourly ambient background concentrations in the modeling of that pollutant. A 2008-2010 file of such concentrations is available upon request.

8. 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 BPIPPrm (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. Stacks below GEP height must be modeled to assess building downwash influences on their plumes. 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 11103).

9. Model Receptors: For the pre-2008 air quality standards, the extent of the receptors modeled should be 100m at the fenceline and out to 2km from the primary project emission source (PPES), 250m from 2 km to 5 km, and 500m beyond 5km to 10 km, or the extent of the largest SIA. All design concentrations should be resolved to the nearest 100 meters. The SID receptors 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, see the discussion you were sent on 6/30/11 (and attached) as regards receptor placement.

10. Additional Impacts:
    a. 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.
    b. Preliminary Class II visibility assessment guidance is attached (also sent on 6/30/11).
    c. Only four trace elements, Cu, B, V, and Zn are included in EPA's 1980 publication, "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" which are not included on the Hazardous Air Pollutants list of Title 3 of the 1990 Clean Air Act Amendments. Additional impacts assessments of those four elements, and the criteria air pollutants should be conducted in accordance with that guidance, more recent literature, and the applicable attached guidance which you were sent on 6/30/11. Note that EPA is expected to propose modifications of the secondary SO2 and NO2 standards in the near future (July 12, 2011) which are projected to be final around March 20, 2012.
    d. Please include a discussion, and if warranted, an assessment of air emissions expected to occur as a result of the project as indicated on pages D.3-D.4 of EPA's Draft 1990 New Source Review Workshop Manual.

11. Fugitives: We would like to accommodate your request to omit fugitive emissions from the modeled assessments. However, we believe we need more information before allowing their omission:
    a. A site plan indicating travel routes use for delivery and removal of materials from the site.
    b. Extent of travel routes to be paved.
    c. Vehicle-miles traveled per day, and per hour conveying materials on site, weights, capacities, and resulting PM10/PM2.5 emission rates.
    d. Specific emission control options to be available on site.
    e. A description of the vehicles traveling the material conveyance routes.
    f. A description of other fugitive emissions sources, projected emission rates, control techniques/equipment.

12. Intermittent Sources: We would like to accommodate your request to omit intermittent source emissions from the modeled assessments. However, we believe we need more information before allowing their omission:
    a. Dates of intermittent equipment manufacture/re-manufacture
    b. Potential NSPS applicability
    c. Fuels
    d. Estimated emissions during maintenance/testing, and under load
    e. Description of anticipated emergency condition(s), including duration.
    f. Typical duration of regular testing/maintenance (1-hour, 30-minutes, 5 hours?)
    g. Frequency of typical regular testing/maintenance (weekly, monthly, 7-times-per-week?)
    h. Necessity of varying the testing/maintenance schedule

13. Alternative Operating Scenarios: Please address any alternative operating scenarios in the modeled assessments as well as in the air permit application. This should include:
    a. A discussion of why alternative operating scenarios are not anticipated, if true
    b. A discussion of the expected variation of emission rates during equipment start-up conditions
    c. The anticipated frequency and duration of start-up conditions
    d. The anticipated frequency and duration of alternative operating capacity scenarios

Please contact me at 404-363-7095 if you have any questions. If EPA issues guidance, or models which you believe may affect the modeling of this project subsequent to this protocol approval letter, please contact me 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 me. This protocol is valid for 6 months, unless otherwise stipulated.

Sincerely,

Peter S. Courtney, P.E.
Environmental Specialist
GA EPD

Attachments: Generally Applicable Modeling References
Model Receptor Development.doc Guidance
Additional Impact Air Quality Analysis.doc Guidance

Generally Applicable Modeling References

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

1990, Draft New Source Review Workshop Manual.

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

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

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

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

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

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.

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.

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

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

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.

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.

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.

1998, Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions, Revised June 21, 1998, Georgia Environmental Protection Division (GA EPD).

2006, Interim Dispersion Modeling Guidance, Last Revised Dec 28, 2006, GA EPD (georgiaair.org).

Initial Model Receptor Development

GA EPD believes most projects will benefit from developing a standard receptor grid for initial modeling:

- The grid should be centered near the primary project emission source (PPES), and be aligned along True North in the UTM coordinate system (as opposed to Plant North, or some other alignment).
- The grid should be square, with a receptor spacing of 100m, in the direction of the grid axes, out to 2 km from the PPES.
- Between 2 and 5 km from the PPES, receptors may be located to form a square grid and spaced 250m from each other parallel to the grid axes.
- Between 5 and 10 km from the PPES, receptors may be located to form a square grid and spaced 250m from each other parallel to the grid axes.
- The area within the facility fenceline should be free of receptors, but receptors should be located along the fenceline within no more than 100m of each other.

The AERMAP (11103) utility from the EPA modeling website (epa.gov/scram001) should be used to assign terrain elevations, in meters above mean sea level, to all model receptors and sources that will not be located on one or more plant grade elevations. The latter should be assigned each different plant grade elevation in meters above mean sea level. AERMAP should be run using a square National Elevation Dataset (NED), based on the 1983 North American Datum (NAD83), intended to provide AERMAP with all 30m-resolution (1-arcsecond) elevations within 60 kilometers of the PPES. This should assure the AERMAP-developed hill heights will be accurate throughout the initial (or, significance) model domain. Refined modeling receptor grids may require a larger NED database, since the receptors will be located throughout the significant impact area (SIA) developed for the project, which may extend to 50 km from the PPES.

As implied, GA EPD anticipates this initial receptor grid will be useful for:

- Significance models, to include alternative operating scenarios, including start-up;
- Models run to determine worst-case operating capacities (unless AERSCREEN is used); and
- Air-toxics modeled assessments.

There may be some projects which would benefit from an initial receptor grid spacing of 100m directly out to 10 km from the PPES. Logistically, such grids will probably be limited to PSD projects for which only carbon monoxide exceeds the applicable significant emission rates. Region 4 EPA has a policy, developed under the ISCST model, which requires design concentrations to be resolved to the nearest 100m. Where Significant Impact Levels (SILs) are exceeded, this requirement extends to the determination of the significant impact distance (SID), defined in the EPA 1990 Draft New Source Review (DNSRW) Manual as the farthest distance (from the PPES) to a concentration greater than, or equal to, the applicable SIL. The SIA for a pollutant is defined as the circular area drawn from the central PPES using the largest SID for any regulated time-averaging period for the specific pollutant.

Refined Model Receptor Development

The refined model receptor grid, for pollutants addressed in the 1990 DNSRW Manual, is dependent on the size of the pollutant-specific SIA. Regardless of size, the refined model receptors (for 1990 DNSRW Manual pollutants) is expected to be assessed by filling, at least, the circular SIA with 100m-spaced receptors. If this is too burdensome, receptors may be spaced at some greater interval, as long as the design value concentration is resolved to the nearest 100m. The initial modeling grid may be used to approximate the design value. If the design value is located within, for instance, 1.9 km of the PPES, this should be sufficient, since the receptors are spaced at 100m beyond this distance. If the design value were located 4km from the PPES, a refinement of the design value would have to be modeled by:

1. Locating the maximum receptor concentration in the 250m-spaced receptor area;
2. Developing a small refined grid of 100m-spaced receptors bounded by the four closest 250m-spaced receptors to the receptor showing the approximate design value. In this case the refined grid would be 500m on a side, and consist of 25 100m-spaced receptors.
3. Re-model all sources, but only to the 25 receptors of the new refined grid, to assess the deterministic design value.

If the design value were located 8km from the PPES, a refinement of the design value would have to be modeled by:

1. Locating the maximum receptor concentration in the 500m-spaced receptor area;
2. Developing a small refined grid of 100m-spaced receptors bounded by the four closest 500m-spaced receptors to the receptor showing the approximate design value. In this case the refined grid would be 1000m on a side, and consist of 100, 100m-spaced receptors.
3. Re-model all sources, but only to the 100 receptors of the new refined grid, to assess the deterministic design value.

In both these cases, it will be necessary to re-run the AERMAP utility to associate terrain elevations with the new receptor locations in the refined grids.

NAAQS and Increment inventory sources for the 1990 DNSRW Manual refined models will lie within the largest SID + 50km. Those located within the SIA cannot be screened, but must be modeled. Those outside the SIA should be listed by name (and model name), with their corresponding annual potential emissions and UTM coordinates, and subsequently subject to screening from the modeled inventory using professional judgment, supported by the 20D screening technique. Region 4 EPA supports such screening if applied conservatively. In some cases, this means combining the emissions of selected sources prior to screening them with the 20D technique. Often such sources are within 2 km of each other.

PM2.5 Model Refined Grids- GA EPD proposes it may be acceptable, depending on project specifics, to base refined model PM2.5 receptor grids on the size of the SIA (determined as the area with the largest SID as a radius, 24-hr or annual). As above, receptors should be located throughout the circular SIA.

Until EPA issues alternate guidance, or unless GA EPD indicates otherwise for the specific project, an offsite inventory of PM10 sources should be developed within at least 10 km of the SIA. Normally, it is expected that the extent of the offsite inventory should not exceed the distance from the PPES to the ambient PM2.5 monitor. It will be necessary for the applicant to negotiate with EPD as to the specific size of the area of the offsite inventory. Such negotiations will require a diagram of the significant receptors for the SIA-determining averaging period, and a list and plot of the offsite PM10 sources indicating the facility name (and proposed modeled name), with their corresponding annual potential PM10 emissions and UTM coordinates. No minor PM10 sources outside the PM2.5 SIA should be modeled for PM2.5 impacts. No PM2.5 source emissions within the PM2.5 SIA may be screened from the refined PM2.5 model. An initial screen based on professional judgment, using the 20D technique for support, may exclude qualifying PM10 sources. Remaining inventory sources outside the SIA will require estimation of PM2.5 maximum 24-hr (and annual, if desired) emission rates prior to screening (with 20D) or modeling.

1-hr NO2 & SO2 Model Refined Grids- EPA has issued guidance indicating the refined model receptors for these pollutants are the significant receptors themselves. Based on GA EPD limited experience, the SIAs for these pollutants are often larger than the standard initial grid described above. EPD therefore proposes that the receptors located beyond the 10km limit of the initial grid be supplemented with 500m-spaced receptors out to the necessary distance (the location where the predicted concentration decreases below the SIL), plus one more receptor spaced the same as the last receptor which shows a concentration above the SIL (unless there is reason to believe high concentrations may persist to greater distances due to positive terrain influences). The shape of the overall grid should be square, to assist in demonstrating that the significant receptors were conservatively determined.

For each pollutant, it will be necessary to plot the receptors with concentrations greater than the SIL using (for instance) one color in SURFER's Classed Post File plots AND necessary to plot, as a separate class and color, receptors with concentrations between 7 $\mu g/m^3$ and the appropriate EPA-interim SIL (7.5 or 7.8 $\mu g/m^3$). Receptors with concentrations in excess of the SIL are the receptors needed for the refined model and constitute the Significant Receptor Array (SRA). Receptors with concentrations between 7 $\mu g/m^3$ and the applicable SIL form a limited buffer about the SRA, and represent a 1st approximation of the minimum extent (closest to the project site) of the mandatory offsite inventory subject to potential screening. Any source of the respective pollutant lying within the SIL buffer area or the SRA will be required to be assessed in the refined model.

It will be necessary for the applicant to negotiate with EPD as to the specific size of the area of the offsite inventory. Such negotiations will require a diagram of the SRA for each pollutant, and a list and plot of the offsite respective pollutant sources indicating the facility name (and proposed modeled name), with their corresponding annual potential pollutant emissions and UTM coordinates.

A second item of use in the negotiation of the maximum extent of the offsite inventory from which sources may be screened is a five-year, 36-sector wind ('from which' the wind blows) rose and the maximum wind speed in each direction (Lakes WRPLOT freeware provides a rose 'from which', and a frequency distribution table of wind speed classes by sector that have been useful in developing this method). Convert the maximum wind speed (m/s) in each sector to the number of km the wind can travel at that speed in one hour. This, per azimuth, should assist to indicate the maximum distance, measured upwind of the PPES, to which the offsite inventory should extend. This is based on the one-hour steady-state basis of the AERMOD model, in that, if the wind cannot blow the pollutant to the project site from the offsite facility within one hour, then that offsite facility cannot contribute to a contaminant impact which is simultaneously impacted (on an hourly basis) by the project emissions.

Therefore, the extent of the negotiated offsite inventory subject to screening is expected to lie between the (conservatively located) minimum SRA (+ buffer), and the maximum wind speed of the meteorological data set in each of the 36 sectors of the meteorological data set.

Receptor Grids Used to Refine Concentrations in Excess of a Standard – Individual 100m-spaced receptors showing concentrations in excess of the design value will be included in the assessment of culpability. Receptors indicating concentrations in excess of the design value located at spacings in excess of 100m should first be re-modeled to resolve such excesses at 100m spacing. Receptors modeled for design value excess "culpability" should include only those, but all of those, at which the design value excess has been resolved to the nearest 100 meters.

All PSD permit applicants are required to conduct additional impact analyses for each pollutant subject to PSD and which will be emitted by the proposed new or modified sources. The additional impact analysis assesses the impacts of air pollution on soils and vegetation, and visibility caused by any increase in emissions of any regulated pollutant from the source or modification under review, and from associated growth. The additional impacts analysis generally has three parts: 1) growth; 2) soil and vegetation; and 3) visibility impairment. See EPA's Draft (1990) New Source Review Workshop Manual or 1980 New Source Review Workshop Manual for examples of such analyses.

Growth

This analysis consists of an estimation of the associated industrial, commercial, and residential source growth that will occur in the area due to the proposed project and an estimate of the air emissions generated by this growth. Increases in human population and associated activities (e.g., road traffic, other industrial growth, etc.) may contribute to air pollution. If such activities are projected to occur within the Significant Impact Area(s) assessed for the pollutant(s) emitted by the project, the estimated emissions of such growth should be considered in the refined air quality impact assessment for the respective pollutant(s), including PM2.5 (annual & 24-hr average) and the 1-hr average SO_2 & NO_2 standards.

The net growth in population due to the project and ancillary support activities should be estimated as a percentage of the existing population of the county, or affected counties. The potential for such population growth to warrant associated increases in public facilities (such as schools) or commercial facilities (such as shopping centers) should be evaluated and discussed.

Soil and Vegetation

The analysis of soil and vegetation air pollution impacts should be based on an inventory of the soil and vegetation types found in the pollutant-specific Significant Impact Area. This inventory should include all vegetation with any commercial or recreational value, and may be available from conservation groups, State agencies, and universities. GA EPD considers this requirement to apply to only those criteria pollutants with deterministic NAAQS (those which are assessed in accordance with the Draft 1990 New Source Review Workshop Manual modeling guidance). Thus, PM2.5 (annual & 24-hr avg.), and the 1-hr avg. NO_2 and SO_2 primary NAAQS do not apply to this assessment.

The applicant should refer to EPA Screening Guidance - 'A *Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals'*, US EPA 450/2-81-078, 12/1980. Table 2.1 and 2.2 of this screening guidance list the regulated pollutants and indicates which has potential impacts on plants and animals directly and indirectly. The Clean Air Act Amendments of 1990, Title III, lists Hazardous Air Pollutants. Many trace elements identified in the 1980 guidance document are specifically excluded from assessment during the PSD permitting process by the 1990-amended Section 112(b)(6) of the Clean Air Act (exempt are all but boron, copper, non-HF-fluorides, vanadium, & zinc). Analysis of particulate forms of the listed trace elements should be limited to the larger of the project's Significant Impact Area(s) of 24-hr averaged, or annual averaged PM10. Tables 5.6 & 5.7 of the screening guidance list Significant Emission Rates (SERs) for such trace elements. Project emissions of trace elements less than the respective SERs, adjusted as indicated for life-of-project considerations, are exempt from further review.

Tables 3.1, 3.3 and 5.3 of the screening guidance list the screening threshold concentrations for exposure to ambient air concentrations (directly). A representative ambient background concentration is to be added to the maximum refined-model concentration (including appropriate off-site NAAQS sources) prior to comparison with these threshold concentrations. The Applicant is expected to refer to these tables for comparison at each applicable averaging period. Each pollutant/time-averaged standard should be modeled explicitly.

If the maximum refined-model concentration exceeds the screening level (use lower level if applicable), further analysis is required on soil deposition and plant uptake (indirect impact). Table 3.4 lists screening concentrations for exposure of vegetation to pollutant concentrations in soil and tissue. To obtain the appropriate modeled concentration for comparison, use Equations 5.1 and 5.5 with reasonable assumptions (See also Table 5.1- Steps in Screening Guidance and Page 27).

In case no threshold level data/info is available from the above screening guidance, the applicant should review peer-reviewed scientific literature to determine the concentration level (for appropriate averaging times) of regulated project pollutants that would be harmful to vegetation; if no information is available in the literature, assume the secondary NAAQS is protective if one exists for the regulated pollutant under review. A secondary NAAQS promulgated more than 10-years ago should be used as the threshold-to-potential-harm of last resort. If the potential impact is determined to exceed the applicable threshold, discuss the nature and intensity of the potential harm and its areal extent in the modeling report.

Visibility Impairment

The visibility impairment analysis evaluates the impacts that may occur within the Class II SIA and is **distinct from the Class I area visibility analysis requirement**. The visibility impairment analysis consists of: a determination of the visual quality of the area, an initial screening of emission sources to assess the possibility of visibility impairment, and if warranted, a more in-depth analysis involving computer models. The *Workbook for Plume Visual Impact Screening and Analysis,* EPA-450/4-88-015, 1988 was revised in 1992. Both documents should be used to conduct the visibility impairment initial screening analysis. A tutorial for the Workbook methods, and the workbooks themselves are available at the www.epa.gov/scram001 website. A Class II visibility analyst may benefit from review of Appendix V. GA EPD can provide assistance in identifying the appropriate persistence of meteorological conditions suitable for Level II analyses. Based on prior GA EPD policy.,potentially sensitive receptors for this analysis include: State Parks, State Historic Sites, and airports which occur within the largest project Significant Impact Area of pollutants considered by the VISCREEN model (generally, NO_2 annual-only, and PM10 annual average or 24-hr average).

Impacts on Class II Areas Administered by Federal Land Managers

The new major stationary source or major modification subject to PSD may need to consider impacts on Class II areas administered by Federal Land Managers (FLM). The protection of Class II Parks, Wildlife Management, and Wilderness areas can usually be achieved solely through Best Available Control Technology (BACT) requirements. However, it may be necessary under certain circumstances to complete a modeling analysis to evaluate potential impairment to visibility, soils and vegetation in affected Class II areas. If an FLM-managed area exists near the Significant Impact Area of a project, the applicable FLM should be contacted to ascertain potential permitting requirements.

Any questions should be directed to a member of the GA EPD air dispersion modeling group.

APPENDIX H

CLASS I NOTIFICATION LETTERS

Trinity Consultants

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July 25, 2011

Mr. Bill Jackson
Air Program Staff
USDA Forest Service (FS)
National Forests in North Carolina
P.O. Box 2750
Ashville, NC 28802
bjackson02@fs.fed.us

RE: PyraMax Ceramics, LLC – Wrens, GA
Notification of PSD Project in Reference to FS Class I Areas

Dear Mr. Jackson,

Trinity Consultants (Trinity) is submitting this letter to your attention on behalf of our client PyraMax Ceramisc, LLC (PyraMax) for a proposed greenfield facility to be located south of Wrens, Georgia (Jefferson County). PyraMax plans to construct a greenfield proppant facility for the production of proppant beads for use in the oil and gas industry. The major raw material is clay. The clay is mixed with chemicals and then fired in a kiln process to produce ceramic beads. Expected emissions from the facility are NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, VOC, GHG and combustion emissions associated with natural gas and propane combustion. Additionally, hydrogen fluoride (HF), hydrogen chloride (HCl), and methanol will be emitted from the process either due to the presence in the raw material (HF and HCl) or as an impurity in the chemicals added (methanol).

The proposed project presently requires Prevention of Significant Deterioration (PSD) permitting for projected emission increases of CO, NO_x, SO_2, VOC, $PM/PM_{10}/PM_{2.5}$, and greenhouse gases (GHG). A PSD construction permit application was submitted to the Georgia Environmental Protection Division (EPD) in July 2011.

As part of the PSD application process, PyraMax has qualitatively evaluated its 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).[1] "Q" is the sum of the annual NO_X, PM_{10}, SO_2, and H_2SO_4 emissions, in tons per

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

year (tpy) [2] and "D" is the distance, in kilometers (km), from the proposed facility to the corresponding Class I area.

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

TABLE 1. SUMMARY OF VISIBILITY-AFFECTING POLLUTANT EMISSIONS

Pollutant	Facility-Wide Maximum 24-Hr Emissions[2] (lb/hr)	FLAG 2010 Approach Annual Emissions[2] (Q - tpy)
NO_X	80	351
Direct Particulate[1]	36	157
SO_2	23	103
Sum of Emissions	139	610

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

As shown in Table 2, eight (8) Class I areas are located within 300 km of the proposed project in Jefferson County, Georgia. The only Class I areas within 300 km of the proposed facility managed by the Forest Service (FS) are Shining Rock, Cohutta, Joyce Kilmer/Slickrock, and Linville Gorge, which are between 244 and 297 kilometers away.

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

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	222	610	2.74
Okefenokee Fish & Wildlife	FWS	233		2.62
Shining Rock Wilderness	FS	244		2.50
Cape Romain Fish & Wildlife	FWS	255		2.39
Great Smoky Mountains National Park	NPS	271		2.25
Cohutta Wilderness	FS	276		2.21
Joyce Kilmer - Slick Rock Wilderness	FS	282		2.16
Linville Gorge Wilderness	FS	297		2.06

[2] 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 2 shows the results of the Q/D screening analysis for the FLAG 2010 Approach. As shown in Table 2, all of the eight 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 AQRVs at near-by Class I areas; therefore, PyraMax plans no AQRV analyses for the proposed project. Based on Table 2, PyraMax requests that the FS provide written concurrence of this finding of no impact.

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PyraMax greatly appreciates your feedback on this conclusion regarding no presumptive impacts to AQRVs at Class I areas under management of the FS. Please feel free to contact me at 678-441-9977 with any questions that you have.

Sincerely,

TRINITY CONSULTANTS

Justin Fickas
Managing Consultant

cc: Mr. Eric Cornwell (Georgia EPD)
Mr. Pete Courtney (Georgia EPD)
Mr. John Notar (National Park Service)
Ms. Catherine Collins (Fish and Wildlife Service)
Mr. Don Anschutz (PyraMax)
Mr. Tom Muscenti (Trinity)
~~~~~~

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July 25, 2011

Ms. Catherine Collins
Environmental Engineer
United States Fish and Wildlife Service (FWS)
Branch of Air Quality
7333 West Jefferson Avenue, Suite 375
Lakewood, CO 80235-2017
Catherine_Collins@fws.gov

RE: PyraMax Ceramics, LLC – Wrens, 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 PyraMax Ceramisc, LLC (PyraMax) for a proposed greenfield facility to be located south of Wrens, Georgia (Jefferson County). PyraMax plans to construct a greenfield proppant facility for the production of proppant beads for use in the oil and gas industry. The major raw material is clay. The clay is mixed with chemicals and then fired in a kiln process to produce ceramic beads. Expected emissions from the facility are NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, VOC, GHG and combustion emissions associated with natural gas and propane combustion. Additionally, hydrogen fluoride (HF), hydrogen chloride (HCl), and methanol will be emitted from the process either due to the presence in the raw material (HF and HCl) or as an impurity in the chemicals added (methanol).

The proposed project presently requires Prevention of Significant Deterioration (PSD) permitting for projected emission increases of CO, NO_x, SO_2, VOC, $PM/PM_{10}/PM_{2.5}$, and greenhouse gases (GHG). A PSD construction permit application was submitted to the Georgia Environmental Protection Division (EPD) in July 2011.

As part of the PSD application process, PyraMax has qualitatively evaluated its 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).[1] "Q" is the sum of the annual NO_X, PM_{10}, SO_2, and H_2SO_4 emissions, in tons per

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

year (tpy) [2] and "D" is the distance, in kilometers (km), from the proposed facility to the corresponding Class I area.

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

TABLE 1. SUMMARY OF VISIBILITY-AFFECTING POLLUTANT EMISSIONS

Pollutant	Facility-Wide Maximum 24-Hr Emissions[2] (lb/hr)	FLAG 2010 Approach Annual Emissions[2] (Q - tpy)
NO_X	80	351
Direct Particulate[1]	36	157
SO_2	23	103
Sum of Emissions	139	610

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

As shown in Table 2, eight (8) Class I areas are located within 300 km of the proposed project in Jefferson County, Georgia. The only Class I areas within 300 km of the proposed facility managed by the Fish and Wildlife Service (FWS) are Wolf Island, Okefenokee, and Cape Romain, which are between 222 and 255 kilometers away.

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

Class I Area	Responsible FLM	Minimum Distance from Site (km)	Sum of Annualized VAP Emissions - Q (tpy)	FLAG 2010 Approach Q/D
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Joyce Kilmer - Slick Rock Wilderness	FS	282		2.16
Linville Gorge Wilderness	FS	297		2.06

[2] 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 2 shows the results of the Q/D screening analysis for the FLAG 2010 Approach. As shown in Table 2, all of the eight 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 AQRVs at near-by Class I areas; therefore, PyraMax plans no AQRV analyses for the proposed project. Based on Table 2, PyraMax requests that the FWS provide written concurrence of this finding of no impact.

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PyraMax greatly appreciates your feedback on this conclusion regarding no presumptive impacts to AQRVs at Class I areas under management of the FWS. Please feel free to contact me at 678-441-9977 with any questions that you have.

Sincerely,

TRINITY CONSULTANTS

Justin Fickas
Managing Consultant

cc: Mr. Eric Cornwell (Georgia EPD)
Mr. Pete Courtney (Georgia EPD)
Mr. John Notar (National Park Service)
Mr. Bill Jackson (Forest Service)
Mr. Don Anschutz (PyraMax)
Mr. Tom Muscenti (Trinity)
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July 25, 2011

Mr. John Notar
National Park Service (NPS)
Air Resource Division
12795 W. Alameda Pkwy.
Lakewood, CO 80228
john_notar@nps.gov

RE: PyraMax Ceramics, LLC – Wrens, GA
Notification of PSD Project in Reference to NPS Class I Areas

Dear Mr. Notar,

Trinity Consultants (Trinity) is submitting this letter to your attention on behalf of our client PyraMax Ceramisc, LLC (PyraMax) for a proposed greenfield facility to be located south of Wrens, Georgia (Jefferson County). PyraMax plans to construct a greenfield proppant facility for the production of proppant beads for use in the oil and gas industry. The major raw material is clay. The clay is mixed with chemicals and then fired in a kiln process to produce ceramic beads. Expected emissions from the facility are NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, VOC, GHG and combustion emissions associated with natural gas and propane combustion. Additionally, hydrogen fluoride (HF), hydrogen chloride (HCl), and methanol will be emitted from the process either due to the presence in the raw material (HF and HCl) or as an impurity in the chemicals added (methanol).

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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

As shown in Table 2, eight (8) Class I areas are located within 300 km of the proposed project in Jefferson County, Georgia. The only Class I area within 300 km of the proposed facility managed by the National Park Service (NPS) is the Great Smoky Mountains, located approximately between 271 kilometers away.

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

Class I Area	Responsible FLM	Minimum Distance from Site (km)	Sum of Annualized VAP Emissions - Q (tpy)	FLAG 2010 Approach Q/D
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Linville Gorge Wilderness	FS	297		2.06

[2] 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 2 shows the results of the Q/D screening analysis for the FLAG 2010 Approach. As shown in Table 2, all of the eight 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 AQRVs at near-by Class I areas; therefore, PyraMax plans no AQRV analyses for the proposed project. Based on Table 2, PyraMax requests that the NPS provide written concurrence of this finding of no impact.

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PyraMax greatly appreciates your feedback on this conclusion regarding no presumptive impacts to AQRVs at Class I areas under management of the NPS. Please feel free to contact me at 678-441-9977 with any questions that you have.

Sincerely,

TRINITY CONSULTANTS

Justin Fickas
Managing Consultant

cc: Mr. Eric Cornwell (Georgia EPD)
Mr. Pete Courtney (Georgia EPD)
Ms. Catherine Collins (Fish and Wildlife Service)
Mr. Bill Jackson (Forest Service)
Mr. Don Anschutz (PyraMax)
Mr. Tom Muscenti (Trinity)
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