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1.0 INTRODUCTION

CARBO Ceramics, Inc. (CARBO) manufactures ceramic pellets, or proppants, from nonmetallic minerals for use primarily in the oil and natural gas production industries. CARBO is proposing to construct a new processing plant, approximately 6 km southeast of Millen, Georgia at the intersection of GA State Route 17 and Clayton Road, in Jenkins County. The proposed plant will be a four-line, wet processing facility, similar to its Toomsboro plant in Wilkinson County, Georgia, where proppants are manufactured from kaolin clay slurry which is pelletized in spray dryers and later calcined in direct-fired rotary kilns. In addition to slurry preparation, spray drying and calcining, the processing lines each consist of an associated natural gas-fired boiler, materials handling, product storage and railcar loadout systems.

The construction of the proposed new processing facility will be a subject to PSD preconstruction review since the facility will be a major stationary source with potential emissions of NO_x, SO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and CO_2e greater than the significant emission rate thresholds for each pollutant. The facility will also be a new major source of hazardous air pollutants (HAP) for emissions of HF, HCl, and methanol and be subject to case-by-case maximum achievable control technology (MACT) review.

Volume I of this application contains the project description, emission calculations, review of PSD applicability and preconstruction requirements, case-by-case MACT review, overview of state and federal regulatory applicability and a summary of best available control technology (BACT) review. The complete BACT review is contained in Volume II of this application. This Volume III addresses the source impact, air quality, and additional impact analyses required of PSD applicants as part of major source preconstruction review. This volume also addresses the requirements of Georgia's state-only program regulating emissions of toxic air pollutants (TAP).

This Volume is organized into five main sections. In this Section 1, an overview of the project location, facility layout, building and emission source locations (stack and fugitive), and project emissions used as input for the dispersion modeling analyses is provided. Section 2 describes the Class II air quality analysis that was conducted for criteria pollutants proposed to be emitted in significant amounts, including the preliminary impact, NAAQS, PSD increment, and additional impact analyses. Section 3 describes the Class I air quality analysis that was conducted for the visibility and acidic deposition air quality related values (ARQV's) and PSD increments for four Class I areas that may be affected by the project. Section 4 describes the toxic impact assessment that was conducted for TAP emitted from the proposed Millen facility. Finally, Section 5 describes the electronic files included as an attachment to this Volume.

As a result of the air quality analyses, CARBO has made the following conclusions regarding the construction and operation of the Millen facility, as proposed in this PSD application:

- The facility will not cause or contribute to a violation in any area, designated attainment or otherwise, for any NAAQS effective at the time of this application;
- The facility will not cause or contribute to a violation in any area for any PSD increment effective at the time of this application;
- The facility will not have an adverse impact to soils or vegetation or impair visibility at any sensitive receptor as a result of emissions from the facility and associated growth;
- The facility will not have any adverse impact at any Class I area for any AQRV;
- The facility will not have a significant impact at any Class I area for any PSD increment effective at the time of this application; and
- The facility will not have an air quality impact for any toxic air pollutant in excess of the levels defined by the State of Georgia to protect the public's health, safety, and welfare

To support the air quality analyses and conclusions reached in this Volume, eight attachments are provided as follows:

- Attachment A contains the Class II modeling protocol submitted to GA EPD on July 19, 2011;
- Attachment B contains GA EPD's July 27, 2011 Class II modeling protocol approval letter and any associated correspondence;
- Attachment C contains the modeling protocol submitted to US EPA Region 4 and GA EPD on July 25, 2011 to address the use of the Plume Volume Molar Ratio Method (PVMRM) as a detailed Tier 3 screening technique for the 1-hour NO_2 NAAQS;
- Attachment D contains any agency correspondence associated with the PVMRM protocol;
- Attachment E contains the Class I modeling protocol submitted to the FLM's, GA EPD, and US EPA Region 4 on August 1, 2011;
- Attachment F contains any FLM correspondence associated with the Class I modeling protocol;
- Attachment G contains the regional inventories developed for the NAAQS and PSD air quality analysis; and
- Attachment H contains all electronic files associated with all air quality analyses conducted as part of this Volume

1.1 Project Location, Emissions and Source Characterization

1.1.1 Project Location

The PSD program applies to new and modified major stationary sources proposing to located in areas meeting the NAAQS ("attainment" areas) and in areas for which there is insufficient data to designate an area as attainment or nonattainment ("unclassifiable" areas). The Millen facility will be located in the eastern-central part of Georgia in Jenkins County which is currently designated as attainment or unclassifiable for all NAAQS. Figure 1.1.1-1 shows the project county location.

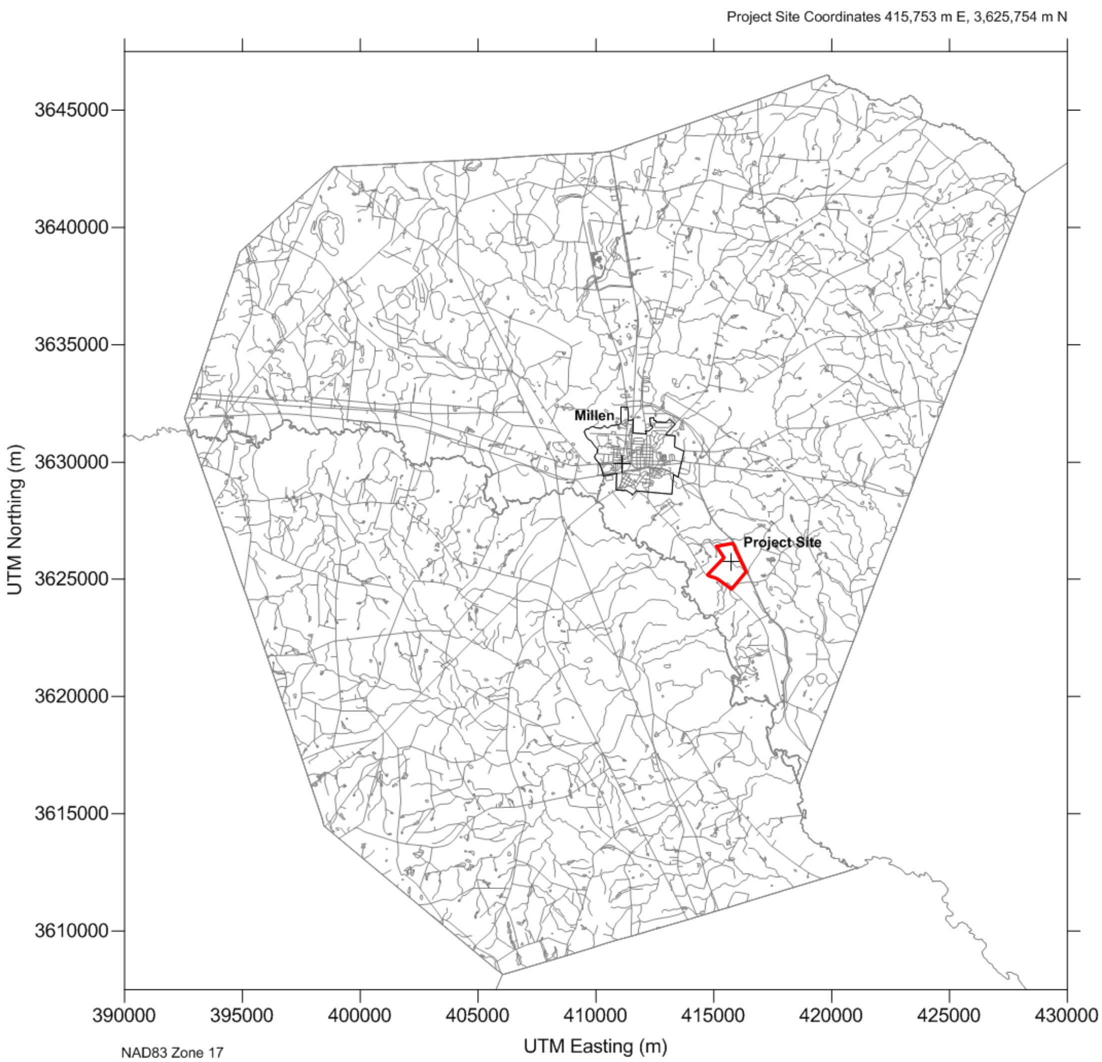


Figure 1.1.1-1: Project Location – Millen, Jenkins County, Georgia

Jenkins is located in the Vidalia Upland District of the Upper Coastal Plain. The county is situated in the Ogeechee river basin and is bounded by Bulloch County to the south, Emanuel County to the west, Burke County to the north and by the Screven County to the east. Elevations within 50 km of the county range from 25 feet (8 m) above mean sea level (MSL) along the Savannah River to 400 feet (122 m) in southwest Burke. Elevations within the proposed project site range from 165 feet (50 m) along the property boundary alongside GA S.R. 17 to 280 feet (85 m) along the northwest property boundary.

All counties adjoining Jenkins and within 50 km of the project site are also designated as attainment or unclassifiable for all NAAQS. The boundary of the nearest nonattainment area, Bibb County, is located approximately 150 km due west of the project site (through Twiggs) approximately 3 km north of Dry Branch. Bibb and portions of Monroe County were designated nonattainment for the 1997 annual $PM_{2.5}$ NAAQS on April 5, 2005. Previously, portions of Bibb and Monroe were designated nonattainment for the 1997 8-hour O_3 NAAQS on April 30, 2004, but were redesignated to attainment on October 19, 2007 forming the Macon ozone maintenance area. However, on March 12, 2009, GA EPD recommended designating Bibb and portions of Monroe nonattainment for the 2008 revised 8-hour O_3 NAAQS.

1.1.2 <u>Dispersion Model Facility Layout and Emission Source Locations</u>

The proposed Millen facility will consist of four processing lines, installed in pairs of two. Figure 1.1.2-1 provides an overview of the facility as represented in the dispersion model and Figure 1.1.2-2 provides a more detailed view of the facility buildings and building heights. Additionally, Figure 1.1.2-3 shows the location of fenceline receptors and elevations. Each processing line will consist of two spray dryers (fluidizers), a pellet feed system, direct-fired rotary kiln and cooler, product system, and natural gas-fired boiler. Product from each pair of processing lines will be stored in 8 product storage silo and shipped via railcars through a loadout system. In total, there are 42 modeled point sources associated with the four processing lines. Figure 1.1.2-4 shows the location of each stack relative to the facility buildings.

Prior to processing, kaolin clay will be delivered to the facility by truck and stored in covered clay sheds via one of two truck routes. The first route begins at the facility entrance off State Route 17 and proceeds to the clay storage sheds for Processing Lines 2 and 4. There are 27 volume sources associated with fugitive dust from truck traffic along this route. The other route also begins at the facility entrance off State Route 17 but proceeds to the clay storage sheds for Processing Lines 1 and 3, which are located further within the property, north and east of the clay storage sheds for Processing Lines 2 and 4. There are 32 volume sources associated with fugitive dust from truck traffic along this route. The portion of the truck routes prior to the clay storage sheds for Processing Lines 2 and 4 are identical for both routes. Because of this, the first 16 volume sources for both routes are at identical locations. Figure 1.1.2-5 shows the volume source locations for both truck routes.

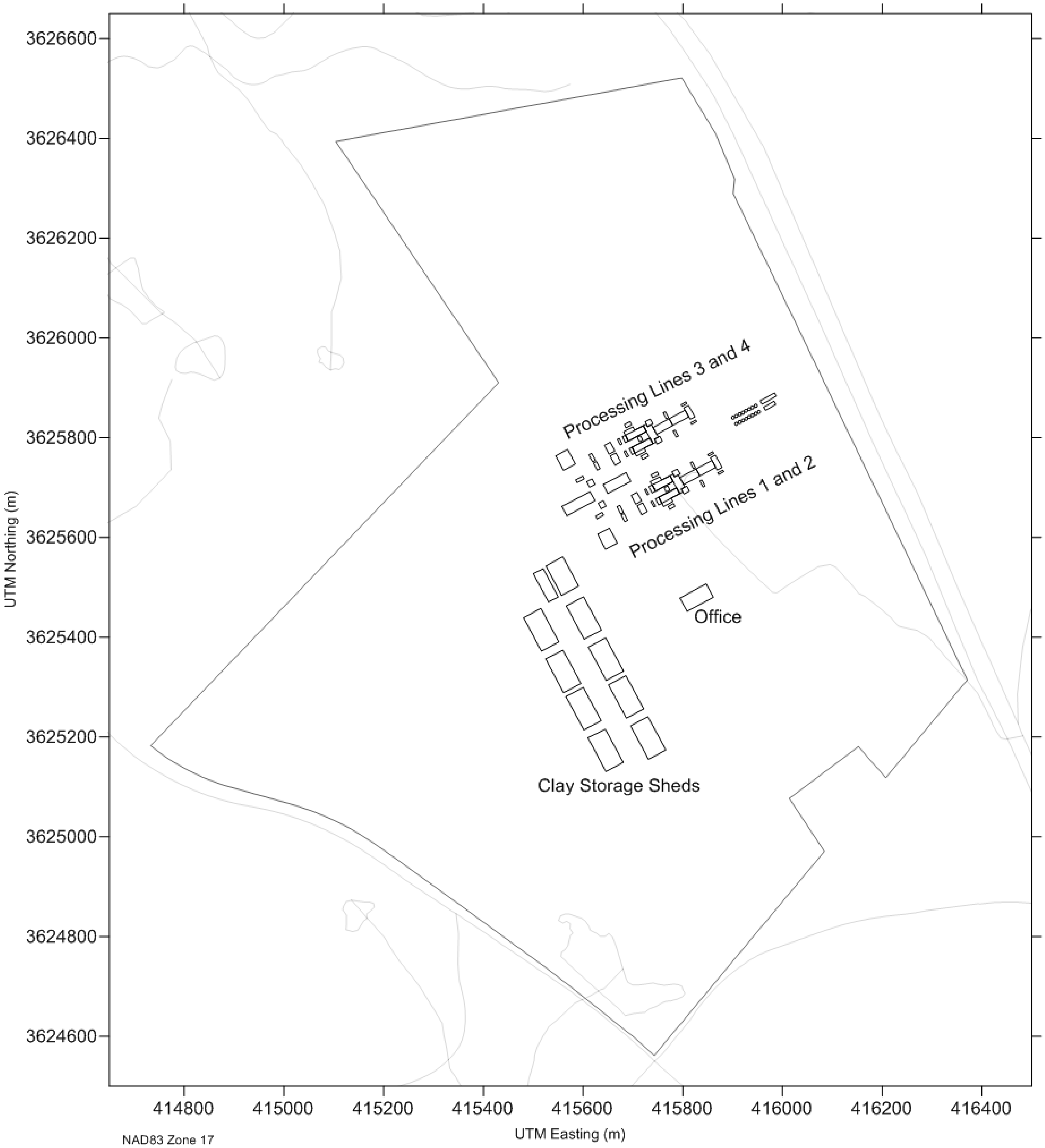


Figure 1.1.2-1: Dispersion Model Facility Layout Overview

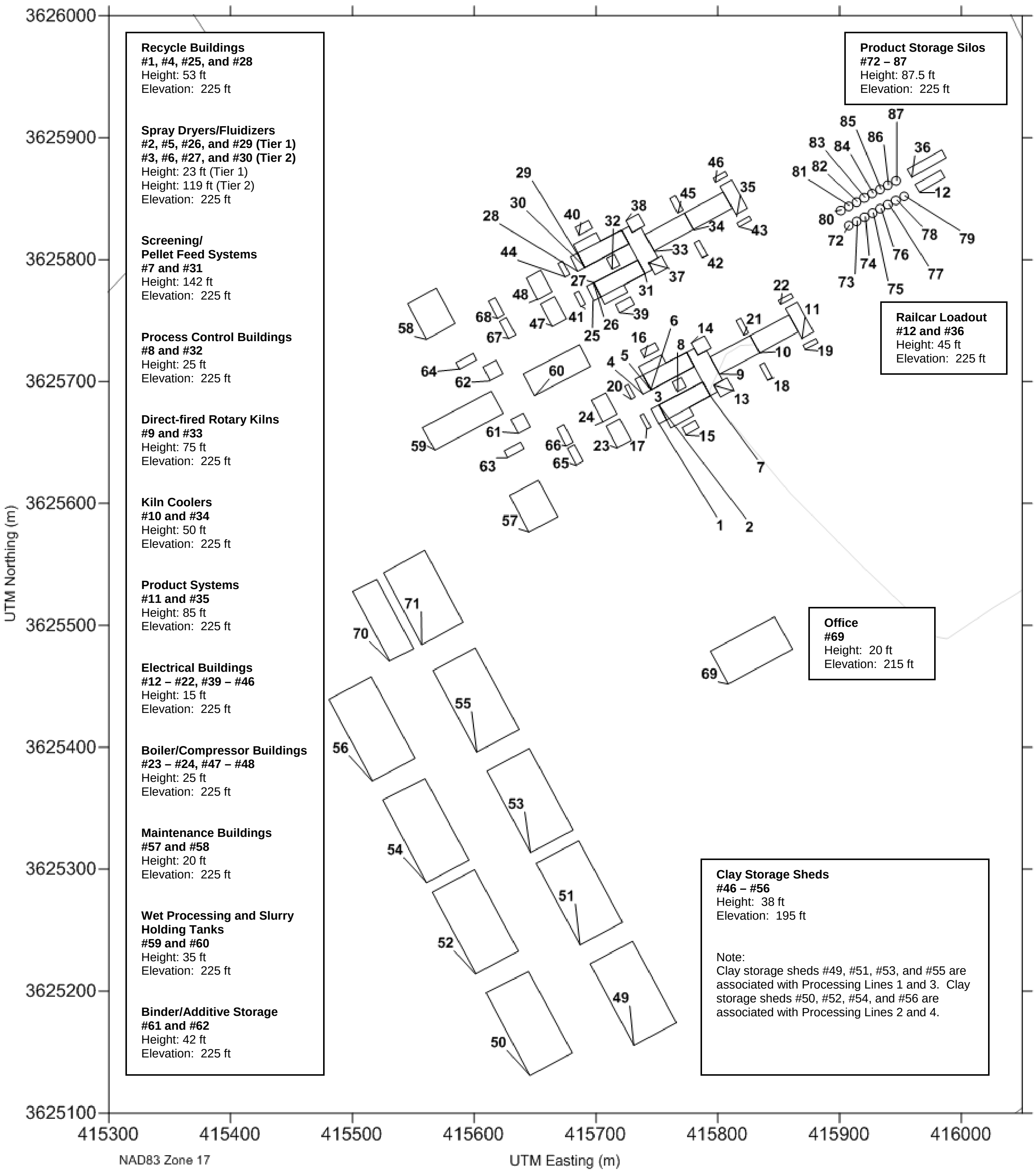


Figure 1.1.2-2: Dispersion Model Facility Buildings

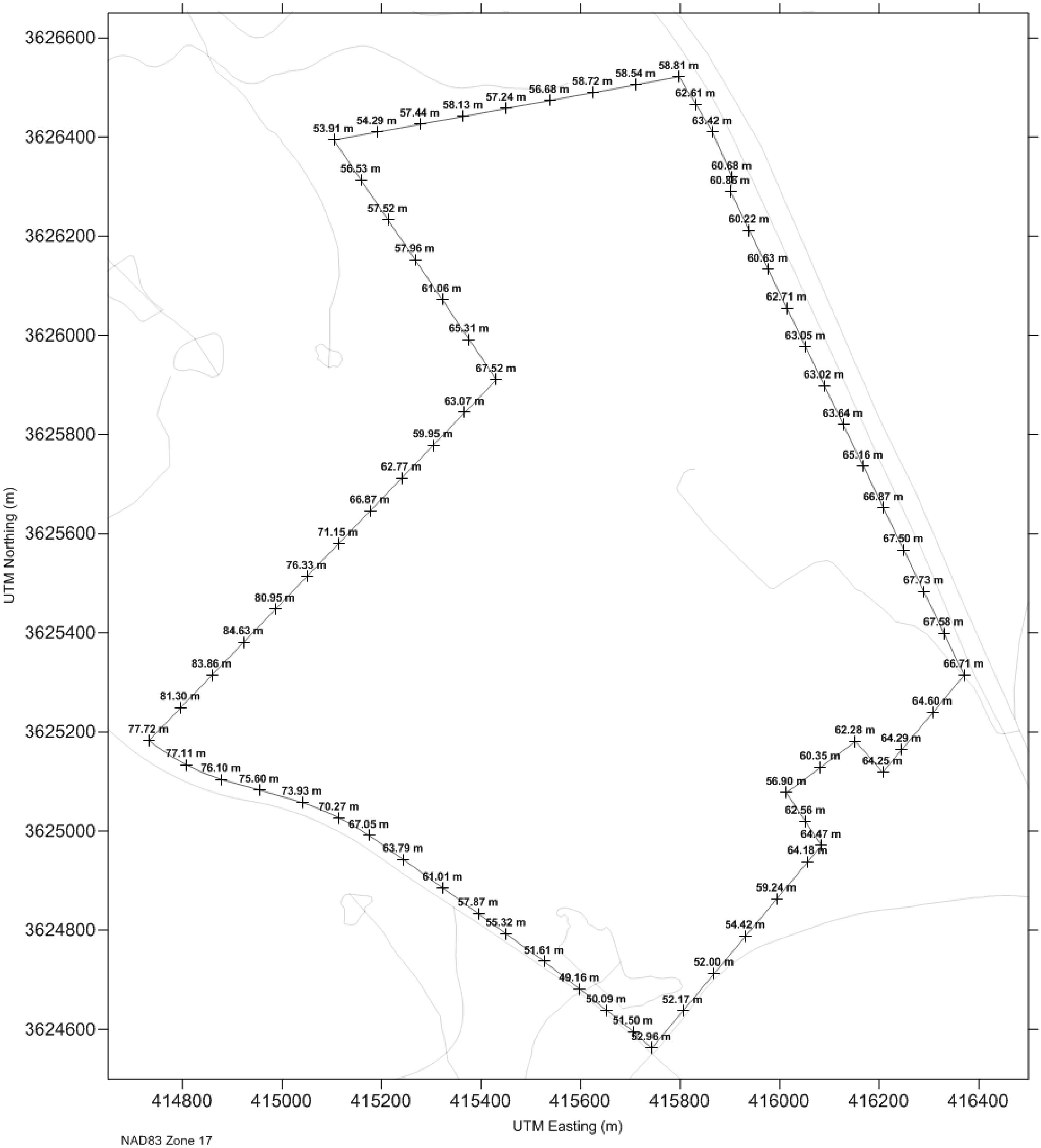


Figure 1.1.2-3: Fenceline Receptors and Elevations

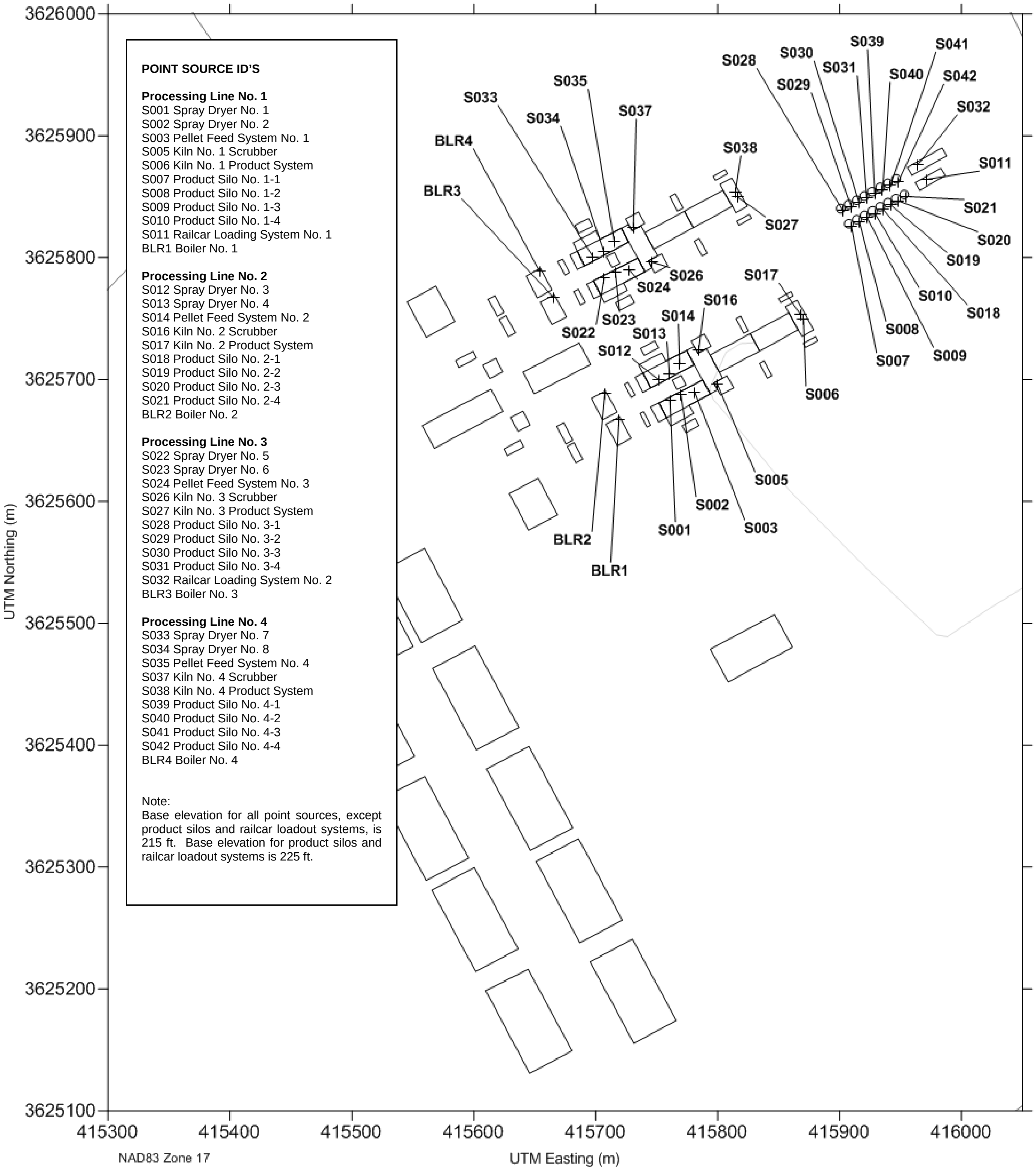


Figure 1.1.2-4: Stack Locations

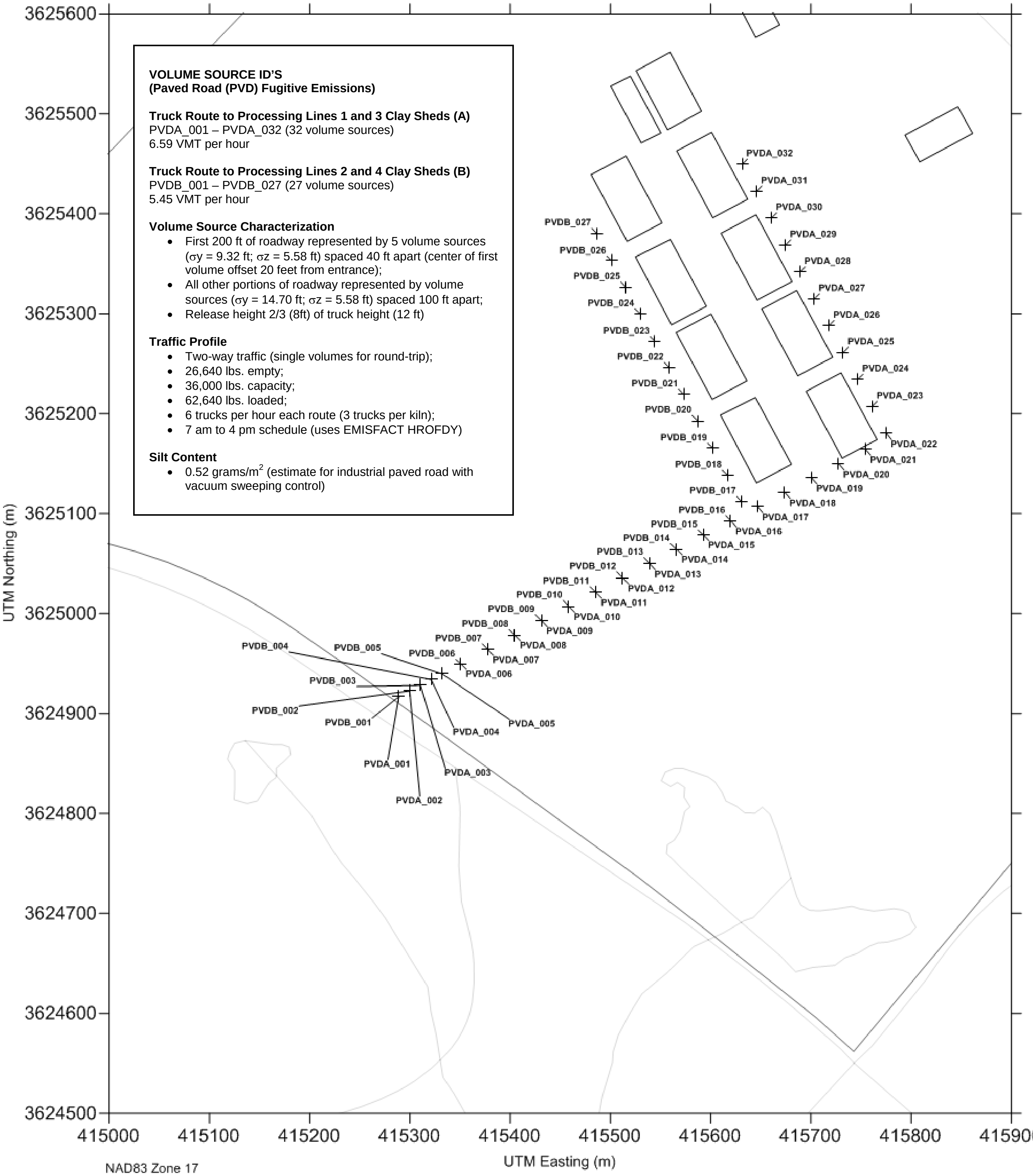


Figure 1.1.2-5: Paved Road Fugitive Dust Volume Source Locations

1.1.3 Project Emissions and Source Characterization

1.1.3.1 Stack Emissions and Source Parameters

Table 1.1.3.1-1 and Table 1.1.3.1-2 list the maximum hourly emission rates of criteria pollutants, HAP and TAP used for all air quality analyses presented in this Volume. These emission rates are consistent with the BACT limitations proposed for each emission unit in Volume II, the new source case-by-case MACT limitations proposed in Attachment D to Volume I, or other calculations representing potential or maximum hourly allowable emissions provided in Attachment B to Volume I of this application. The maximum hourly emission rate for each pollutant was used for both short and long term averaging periods.

For all air quality analysis relating to NO_2, total NO_x ($NO + NO_2$) was used as emission input into the dispersion model for the project sources as well as all sources included in an applicable regional source inventory.

For point sources, the dispersion model requires the stack height, inside stack exit diameter, temperature and volumetric exhaust gas flow rate or exit gas velocity to be specified. Table 1.1.3.1-3 summarizes each unit's point source parameters that were used as input into the dispersion model. CARBO is not a source type that is associated with operation at varying "loads" or operating conditions and will operate emission units at or near maximum design capacity with infrequent occurrences of startup and shutdown. Therefore, the emission rates and source parameters used in the air quality analysis reflect the maximum allowable hourly emission rates and design capacity of each emission unit.

Each processing line will also be associated with an emergency diesel-fired generator (EDG). However, EDG's have been excluded from the air quality analysis in its entirety. Outside of brief, periodic readiness testing, these units are used solely in the event of an emergency due to conditions beyond CARBO's control to prevent catastrophic mechanical failure of the direct-fired rotary kilns by maintaining power to the kiln drive (for rotary motion), process cooling and product recycle systems. No other systems, including the kiln burners, are in operation at the plant during such events. Since the EDG's will not operate simultaneously with the plant equipment in a continuous fashion on a defined schedule, CARBO is unable to characterize an operating scenario capable of being represented in a dispersion model.

Table 1.1.3.1-1: Maximum Hourly Emissions of Criteria Pollutants

Source Description	Modeled Source ID	NO_x (lb/hr)	SO_2 (lb/hr)	CO (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)
Processing Line No. 1						
Spray Dryer No. 1	S001	8.3	0.5	16.6	4.543	1.704
Spray Dryer No. 2	S002	8.3	0.5	16.6	4.543	1.704
Pellet Feed System No. 1	S003	--	--	--	1.629	0.814
Kiln No. 1	S005	121	34.25	24.7	2.759	2.759
Kiln No. 1 Product System	S006	--	--	--	0.129	0.064
Product Silo No. 1-1	S007	--	--	--	0.086	0.043
Product Silo No. 1-2	S008	--	--	--	0.086	0.043
Product Silo No. 1-3	S009	--	--	--	0.086	0.043
Product Silo No. 1-4	S010	--	--	--	0.086	0.043
Railcar Loading System No. 1	S011	--	--	--	0.300	0.150
Boiler No. 1	BLR1	0.14	0.01	0.81	0.075	0.075
Processing Line No. 2						
Spray Dryer No. 3	S012	8.3	0.5	16.6	4.543	1.704
Spray Dryer No. 4	S013	8.3	0.5	16.6	4.543	1.704
Pellet Feed System No. 2	S014	--	--	--	1.629	0.814
Kiln No. 2	S016	121	34.25	24.7	2.759	2.759
Kiln No. 2 Product System	S017	--	--	--	0.129	0.064
Product Silo No. 2-1	S018	--	--	--	0.086	0.043
Product Silo No. 2-2	S019	--	--	--	0.086	0.043
Product Silo No. 2-3	S020	--	--	--	0.086	0.043
Product Silo No. 2-4	S021	--	--	--	0.086	0.043
Boiler No. 2	BLR2	0.14	0.01	0.81	0.075	0.075
Processing Line No. 3						
Spray Dryer No. 5	S022	8.3	0.5	16.6	4.543	1.704
Spray Dryer No. 6	S023	8.3	0.5	16.6	4.543	1.704
Pellet Feed System No. 3	S024	--	--	--	1.629	0.814
Kiln No. 3	S026	121	34.25	24.7	2.759	2.759
Kiln No. 3 Product System	S027	--	--	--	0.129	0.064
Product Silo No. 3-1	S028	--	--	--	0.086	0.043
Product Silo No. 3-2	S029	--	--	--	0.086	0.043
Product Silo No. 3-3	S030	--	--	--	0.086	0.043
Product Silo No. 3-4	S031	--	--	--	0.086	0.043
Railcar Loading System No. 2	S032	--	--	--	0.300	0.150
Boiler No. 3	BLR3	0.14	0.01	0.81	0.075	0.075
Processing Line No. 4						
Spray Dryer No. 7	S033	8.3	0.5	16.6	4.543	1.704
Spray Dryer No. 8	S034	8.3	0.5	16.6	4.543	1.704
Pellet Feed System No. 4	S035	--	--	--	1.629	0.814
Kiln No. 4	S037	121	34.25	24.7	2.759	2.759
Kiln No. 4 Product System	S038	--	--	--	0.129	0.064
Product Silo No. 4-1	S039	--	--	--	0.086	0.043
Product Silo No. 4-2	S040	--	--	--	0.086	0.043
Product Silo No. 4-3	S041	--	--	--	0.086	0.043
Product Silo No. 4-4	S042	--	--	--	0.086	0.043
Boiler No. 4	BLR4	0.14	0.01	0.81	0.075	0.075

Table 1.1.3.1-2: Maximum Hourly Emissions of HAP and TAP

Source Description	Modeled Source ID	HF (lb/hr)	HCl (lb/hr)	Methanol (lb/hr)	Ammonia (lb/hr)	Hexane (lb/hr)
Processing Line No. 1						
Spray Dryer No. 1	S001	--	--	2.4	38.52	0.083
Spray Dryer No. 2	S002	--	--	2.4	38.52	0.083
Kiln No. 1 Scrubber	S005	8.66	1.98	--	--	0.106
Boiler No. 1	BLR1	--	--	--	--	0.017
Processing Line No. 2						
Spray Dryer No. 3	S012	--	--	2.4	38.52	0.083
Spray Dryer No. 4	S013	--	--	2.4	38.52	0.083
Kiln No. 2 Scrubber	S016	8.66	1.98	--	--	0.106
Boiler No. 2	BLR2	--	--	--	--	0.017
Processing Line No. 3						
Spray Dryer No. 5	S022	--	--	2.4	38.52	0.083
Spray Dryer No. 6	S023	--	--	2.4	38.52	0.083
Kiln No. 3 Scrubber	S026	8.66	1.98	--	--	0.106
Boiler No. 3	BLR3	--	--	--	--	0.017
Processing Line No. 4						
Spray Dryer No. 7	S033	--	--	2.4	38.52	0.083
Spray Dryer No. 8	S034	--	--	2.4	38.52	0.083
Kiln No. 4 Scrubber	S037	8.66	1.98	--	--	0.106
Boiler No. 4	BLR4	--	--	--	--	0.017

Table 1.1.3.1-3: Project Point Source Locations and Parameters

Source Description	Modeled Source ID	NAD83 UTM East (m)	NAD83 UTM North (m)	Base Elev. (ft)	Stack Height (ft)	Stack Temp. (F)	Velocity (fps)	Exit Diam. (in)
Processing Line No. 1								
Spray Dryer No. 1	S001	415,760.82	3,625,682.54	215	180.0	206	108.46	36
Spray Dryer No. 2	S002	415,769.78	3,625,687.18	215	180.0	206	108.46	36
Pellet Feed System No. 1	S003	415,781.00	3,625,689.88	215	160.0	80	85.75	28
Kiln No. 1	S005	415,799.74	3,625,696.01	215	245.0	160	83.56	48
Kiln No. 1 Product System	S006	415,870.09	3,625,749.18	215	125.0	150	16.93	19
Product Silo No. 1-1	S007	415,909.49	3,625,825.89	225	95.5	80	7.64	20
Product Silo No. 1-2	S008	415,916.03	3,625,829.36	225	95.5	80	7.64	20
Product Silo No. 1-3	S009	415,922.54	3,625,832.80	225	95.5	80	7.64	20
Product Silo No. 1-4	S010	415,928.97	3,625,836.19	225	95.5	80	7.64	20
Railcar Loading System No. 1	S011	415,970.89	3,625,864.11	225	65.0	80	54.57	14
Boiler No. 1	BLR1	415,719.00	3,625,666.95	215	29.0	380	23.58	18
Processing Line No. 2								
Spray Dryer No. 3	S012	415,751.49	3,625,700.04	215	180.0	206	108.46	36
Spray Dryer No. 4	S013	415,760.38	3,625,704.89	215	180.0	206	108.46	36
Pellet Feed System No. 2	S014	415,768.91	3,625,712.53	215	160.0	80	85.75	28
Kiln No. 2	S016	415,784.52	3,625,724.49	215	245.0	160	83.56	48
Kiln No. 2 Product System	S017	415,868.18	3,625,752.93	215	125.0	150	16.93	19
Product Silo No. 2-1	S018	415,935.26	3,625,839.87	225	95.5	80	7.64	20
Product Silo No. 2-2	S019	415,941.81	3,625,843.17	225	95.5	80	7.64	20
Product Silo No. 2-3	S020	415,948.17	3,625,846.58	225	95.5	80	7.64	20
Product Silo No. 2-4	S021	415,954.84	3,625,850.07	225	95.5	80	7.64	20
Boiler No. 2	BLR2	415,707.61	3,625,688.73	215	29.0	380	23.58	18
Processing Line No. 3								
Spray Dryer No. 5	S022	415,707.04	3,625,782.98	215	180.0	206	108.46	36
Spray Dryer No. 6	S023	415,716.00	3,625,787.62	215	180.0	206	108.46	36
Pellet Feed System No. 3	S024	415,727.22	3,625,790.32	215	160.0	80	85.75	28
Kiln No. 3	S026	415,745.96	3,625,796.45	215	245.0	160	83.56	48
Kiln No. 3 Product System	S027	415,816.31	3,625,849.62	215	125.0	150	16.93	19
Product Silo No. 3-1	S028	415,902.85	3,625,838.35	225	95.5	80	7.64	20
Product Silo No. 3-2	S029	415,909.39	3,625,841.82	225	95.5	80	7.64	20
Product Silo No. 3-3	S030	415,915.90	3,625,845.26	225	95.5	80	7.64	20
Product Silo No. 3-4	S031	415,922.33	3,625,848.65	225	95.5	80	7.64	20
Railcar Loading System No. 2	S032	415,964.25	3,625,876.57	225	65.0	80	54.57	14
Boiler No. 3	BLR3	415,665.22	3,625,767.39	215	29.0	380	23.58	18
Processing Line No. 4								
Spray Dryer No. 7	S033	415,697.71	3,625,800.48	215	180.0	206	108.46	36
Spray Dryer No. 8	S034	415,706.60	3,625,805.33	215	180.0	206	108.46	36
Pellet Feed System No. 4	S035	415,715.13	3,625,812.97	215	160.0	80	85.75	28
Kiln No. 4	S037	415,730.74	3,625,824.93	215	245.0	160	83.56	48
Kiln No. 4 Product System	S038	415,814.40	3,625,853.37	215	125.0	150	16.93	19
Product Silo No. 4-1	S039	415,928.62	3,625,852.33	225	95.5	80	7.64	20
Product Silo No. 4-2	S040	415,935.17	3,625,855.63	225	95.5	80	7.64	20
Product Silo No. 4-3	S041	415,941.53	3,625,859.04	225	95.5	80	7.64	20
Product Silo No. 4-4	S042	415,948.20	3,625,862.53	225	95.5	80	7.64	20
Boiler No. 4	BLR4	415,653.83	3,625,789.17	215	29.0	380	23.58	18

1.1.3.2 Paved Road Fugitive Dust Emissions and Volume Source Parameters

Although the Millen facility does not belong to one of the source categories required to include fugitive emissions for the purposes of PSD applicability, fugitive emissions, to the extent quantifiable, are required to be included in the NAAQS and PSD increment air quality analysis. Sources of quantifiable fugitive emissions from the Millen facility include the reentrainment of particulate matter becoming airborne from truck traffic on the facility's paved roads. As shown in Figure 1.1.2-5, there are two routes that trucks travel when transporting kaolin to the clay storage sheds: one route to the storage sheds for Processing Lines 1 and 3 and another shorter route to the storage sheds for Processing Lines 2 and 4. Each route was represented as a series of volume sources which were characterized in accordance with guidance provided in GA EPD's *Draft Guideline for Modeling of Crushed Stone Operations*, revised September 21, 1999. For the portion of roadway within 200 feet of the facility entrance off State Route 17, five volume sources with initial lateral and vertical dimensions of 9.32 ft and 5.58 ft, respectively, were spaced at 40 foot intervals with the first volume source offset 20 ft from the boundary. For the portion of the roadway past 200 ft of the facility entrance, the remaining volume sources have initial lateral and vertical dimensions of 14.70 ft and 5.58 ft, respectively, and were spaced at 100 foot intervals. The release height for all volume sources was specified as 8 ft, or two-thirds the 12 ft vehicle height. In total, there are 32 volume sources representing the 5,800 feet of travel from the facility entrance to the clay storage sheds for Processing Lines 1 and 3 and there are 27 volume sources representing the 4,800 feet of travel from the facility entrance to the clay storage sheds for Processing Lines 2 and 4.[1] Table 1.1.3.2-1 lists the locations of the volume sources for each truck route.

[1] The travel lengths for each truck route reflect round-trip distances to and from the facility entrance to the furthest clay storage shed for each route.

Table 1.1.3.2-1: Project Volume Source Locations

Processing Lines 1 and 3			Processing Lines 2 and 4		
Volume Source ID	NAD83 UTM East (m)	NAD83 UTM North (m)	Volume Source ID	NAD83 UTM East (m)	NAD83 UTM North (m)
PVDA_001 [1]	415,288.88	3,624,916.76	PVDB_001 [1]	415,288.88	3,624,916.76
PVDA_002 [1]	415,299.65	3,624,922.48	PVDB_002 [1]	415,299.65	3,624,922.48
PVDA_003 [1]	415,310.41	3,624,928.20	PVDB_003 [1]	415,310.41	3,624,928.20
PVDA_004 [1]	415,321.18	3,624,933.93	PVDB_004 [1]	415,321.18	3,624,933.93
PVDA_005 [1]	415,331.95	3,624,939.65	PVDB_005 [1]	415,331.95	3,624,939.65
PVDA_006	415,350.79	3,624,949.66	PVDB_006	415,350.79	3,624,949.66
PVDA_007	415,377.70	3,624,963.97	PVDB_007	415,377.70	3,624,963.97
PVDA_008	415,404.62	3,624,978.27	PVDB_008	415,404.62	3,624,978.27
PVDA_009	415,431.53	3,624,992.58	PVDB_009	415,431.53	3,624,992.58
PVDA_010	415,458.45	3,625,006.88	PVDB_010	415,458.45	3,625,006.88
PVDA_011	415,485.36	3,625,021.19	PVDB_011	415,485.36	3,625,021.19
PVDA_012	415,512.28	3,625,035.49	PVDB_012	415,512.28	3,625,035.49
PVDA_013	415,539.19	3,625,049.80	PVDB_013	415,539.19	3,625,049.80
PVDA_014	415,566.10	3,625,064.10	PVDB_014	415,566.10	3,625,064.10
PVDA_015	415,593.02	3,625,078.40	PVDB_015	415,593.02	3,625,078.40
PVDA_016	415,619.93	3,625,092.71	PVDB_016	415,619.93	3,625,092.71
PVDA_017 [2]	415,646.85	3,625,107.01	PVDB_017	415,631.10	3,625,111.80
PVDA_018	415,673.76	3,625,121.32	PVDB_018	415,616.63	3,625,138.63
PVDA_019	415,700.68	3,625,135.62	PVDB_019	415,602.17	3,625,165.46
PVDA_020	415,727.59	3,625,149.93	PVDB_020	415,587.70	3,625,192.29
PVDA_021	415,754.51	3,625,164.23	PVDB_021	415,573.23	3,625,219.12
PVDA_022	415,775.25	3,625,180.42	PVDB_022	415,558.77	3,625,245.95
PVDA_023	415,760.89	3,625,207.30	PVDB_023	415,544.30	3,625,272.77
PVDA_024	415,746.53	3,625,234.19	PVDB_024	415,529.84	3,625,299.60
PVDA_025	415,732.17	3,625,261.07	PVDB_025	415,515.37	3,625,326.43
PVDA_026	415,717.81	3,625,287.96	PVDB_026	415,500.90	3,625,353.26
PVDA_027	415,703.45	3,625314.84	PVDB_027	415,486.44	3,625,380.09
PVDA_028	415,689.09	3,625,341.73			
PVDA_029	415,674.73	3,625,368.61			
PVDA_030	415,660.36	3,625,395.50			
PVDA_031	415,646.00	3,625,422.38			
PVDA_032	415,631.64	3,625,449.27			

[1] First five volume sources for each truck route within 200 feet of the facility entrance off State Route 17.

[2] The first 16 volume sources for each truck route are identical since trucks transporting kaolin to the clay sheds for all processing lines shares the first 1,300 feet of paved road. The coordinates for the 17th volume sources show the divergence of the two routes as represented in Figure 1.1.2-5.

In order to calculate fugitive emissions for each volume source, the most recent version of the predictive emission factor equation for vehicle traffic on paved roads published in AP-42 Chapter 13.2.1 was used (January 2011). This equation requires a particle size multiplier, average vehicle weight (tons) and silt loading of the road surface (g/m^2) to be specified. Particle size multipliers for PM_{10} and $PM_{2.5}$ were determined from AP-42 Table 13.2.1-1. An average vehicle weight of 22.3 tons (13.3 tons unloaded with 18 ton capacity) was used based data available to CARBO. For silt loading, AP-42 Table 13.2.1-3 does not specify a value for CARBO's industry based on the type of control that will be used to minimize fugitive dust from traffic on paved roads; CARBO will use vacuum sweeping to control particulate emissions from paved roads. In lieu of claiming that fugitive dust can not be quantified, CARBO reviewed the background documentation for AP-42 Chapter 13.2.1 to develop a value for silt content that was used to estimate particulate matter emissions from paved road truck traffic.

In order to develop the predictive emission factor equation for vehicle traffic on paved roads, US EPA performed a stepwise, multiple nonlinear regression analysis based on test data gathered over a number of decades for vehicle traffic on public streets, highways and industrial paved roads. A summary of the final test data set, including silt content, used to develop the emission factor algorithm is provided in Table 4-17 of the background document. Based on the descriptions of each reference and test provided in the background documentation, CARBO isolated 18 measurements for silt content at various industrial sites utilizing vacuum sweeping controls.[2] From this data, CARBO estimated a silt content of 0.52 g/m^2 for industrial paved roads with vacuum sweeping control by taking the arithmetic average of all data across all industries and multiplying the average by a factor of 2.

Table 1.1.3.2-2 summarizes the emission rates for each volume source. It should be noted that kaolin will be delivered to the facility during a 9 hour period, from 7 am to 4 pm. Table 1.1.3.2-2 reflects the maximum hourly emissions of fugitive particulate matter for each volume source during any one hour period based on vehicle miles traveled per hour along each route. The 9 hour schedule was incorporated into the dispersion model by using a variable emission rate for each hour of day using the EMISFACT and HRODAY keywords for each volume source in the source pathway. It should also be noted that no control efficiency for natural mitigation was incorporated into the calculated emission rates.

[2] *Table 4-17, Emission Factor Documentation for AP-42, Section 13.2.1, Paved Roads, January 2011.* Please see Reference ID USX 5/1990, Run ID's AUC6, AUC7, and AUC8; Reference ID EPA 8/1983, Run ID's F36, F37, F38, and F39; and Reference ID CRA 5/2008, Run ID's CI-1, CI-2, CI-3, CI-4, CI-7, CI-8, CI-11, CI-12, CM-I, CM-2, and CM-4.

Table 1.1.3.2-2: Maximum Hourly Emissions for Fugitive Particulate Matter

Pollutant	Volume Source ID	Road Length, (ft)	Number of Volume Sources	Vehicle Fugitive Road Dust Emissions Factor: Particle Size Mulitplier, k (lb/VMT)[1]	Silt Loading, sL (g/m^2)[2]	Average Vehicle Weight, W (tons)[3]	Vehicle Particulate Emission Factor, (lb/VMT)[4]	Number of Kilns	Number of Trucks per Hour per Kiln	Average Vehicle Capacity, (tons)	Truck Schedule 9 hrs/day	Number of Vehicles per Hour	Vehicle Miles Traveled per Hour, VMT[5]	Emissions per Volume Source: Particulate Emissions, (lbs/hr)	Hourly Emissions per Volume Source (g/s)
Two-way traffic to clay sheds for Processing Lines 1 and 3, entrance off GA State Route 17, paved, first 5 volume sources, within 200 ft of property boundary, 40 ft spacing (Volume Sources PVDA_001-PVDA_005)															
PM_{10}	PVDA_001-005	200.00	5	0.00220	0.52	22.3	0.0288	2	3	18	7am-4pm	6	0.45	0.0131	3.2957E-04
$PM_{2.5}$	PVDA_001-005	200.00	5	0.00054	0.52	22.3	0.0071	2	3	18	7am-4pm	6	0.45	0.0032	8.0895E-05
Two-way traffic to clay sheds for Processing Lines 1 and 3, paved, next 27 volume sources, beyond 200 ft of property boundary, 100 ft spacing (Volume Sources PVDA_006-PVDA_032)															
PM_{10}	PVDA_006-030	2700.00	27	0.00220	0.52	22.3	0.0288	2	3	18	7am-4pm	6	6.14	0.1766	8.2393E-04
$PM_{2.5}$	PVDA_006-030	2700.00	27	0.00054	0.52	22.3	0.0071	2	3	18	7am-4pm	6	6.14	0.0433	2.0224E-04
Two-way traffic to clay sheds for Processing Lines 2 and 4, entrance off GA State Route 17, paved, first 5 volume sources, within 200 ft of property boundary, 40 ft spacing (Volume Sources PVDB_001-PVDB_005)															
PM_{10}	PVDB_001-005	200.00	5	0.00220	0.52	22.3	0.0288	2	3	18	7am-4pm	6	0.45	0.0131	3.2957E-04
$PM_{2.5}$	PVDB_001-005	200.00	5	0.00054	0.52	22.3	0.0071	2	3	18	7am-4pm	6	0.45	0.0032	8.0895E-05
Two-way traffic to clay sheds for Processing Lines 2 and 4, paved, next 22 volume sources, beyond 200 ft of property boundary, 100 ft spacing (Volume Sources PVDB_006-PVDB_027)															
PM_{10}	PVDB_006-046	2200.00	22	0.00220	0.52	22.3	0.0288	2	3	18	7am-4pm	6	5.00	0.1439	8.2393E-04
$PM_{2.5}$	PVDB_006-046	2200.00	22	0.00054	0.52	22.3	0.0071	2	3	18	7am-4pm	6	5.00	0.0353	2.0224E-04

1 Particle size multipliers for PM_{10} and $PM_{2.5}$ determined from Table 13.2.1-1 of AP-42
2 Silt loading determined as average silt loading for all test data from industrial sites utilizing vacuum sweeping controls used to develop the paved road fugitive dust predictive emission factor algorithm multiplied by a factor of 2 (please refer to Section 1.1.3.2 and footnote 2 of this application).
3 Trucks are 26,640 lbs. empty with 36,000 lbs. capacity
4 Equation 1, AP-42 Section 13.2.1.3 (particle size multiplier, *k*)*((silt loading, *sL*, g/m^2)^0.91)*((average vehicle weight, *W*, tons)^1.02)
5 Vehicle miles traveled road length multiplied by the number of vehicles per hour; VMT is multiplied by a factor of 2 to account for round-trips (i.e., incoming and outgoing traffic represented by the same volume sources)

2.0 CLASS II AIR QUALITY ANALYSIS

2.1 Modeling Methodology

2.1.1 Model Selection and Options

US EPA's guideline was revised in 2005 to replace the Industrial Source Complex (ISC3) model with the American Meteorological Society (AMS)/EPA model (AERMOD) as the preferred regulatory model. AERMOD is a steady-state plume dispersion model that is considered to be the best state-of-the-art practice of Gaussian dispersion. The AERMOD model incorporates parameterized dispersion in both stable and convective conditions using planetary boundary layer (PBL) characteristics developed from directly observed meteorological data and surface characteristics preprocessed in AERMET and AERSURFACE, respectively. To reduce the number of calm, variable, and missing winds typically encountered in standard archives of observed meteorological data, AERMINUTE is used to calculate hourly average wind speed and direction to supplement the data processed in AERMET, increasing completeness of the meteorological dataset used with AERMOD. A terrain preprocessor, AERMAP, is used to process a variety of United States Geological Survey (USGS) gridded terrain datasets to determine receptor-specific terrain-influence heights and source and receptor elevations for input into AERMOD. The terrain-influence height at each receptor is used by AERMOD to incorporate the dividing streamline height concept to better characterize plume behavior in elevated terrain. AERMOD also incorporates the plume rise model enhancements (PRIME) downwash algorithm which has been evaluated and found to perform better than the ISC3 downwash algorithm using a variety of data sets.

For these reasons, the most recent version of AERMOD (v11103) and its preprocessors AERMET (v11059), AERMINUTE (11059), AERMAP (v11103), and AERSURFACE (v08009) were used to estimate ambient impacts for all Class II PSD air quality analyses. Because of this model selection, additional guidance on the recommend use of AERMOD for certain concerns was performed in accordance with the most recent revision of implementation guidance for AERMOD (US EPA 2010). Except as discussed below, AERMOD was executed using the regulatory default model options, i.e., the parameter "DFAULT" was specified in the MODELOPT record in the control pathway.

For the 1-hour NO_2 NAAQS, CARBO used the Plume Volume Molar Ratio Method (PVMRM) which simulates the first-order reaction of nitric oxide (NO) with ozone to determine the NO_2/NO_x conversion rate during plume expansion. PVMRM is available as a non-regulatory default model option within AERMOD and it application makes AERMOD no longer a preferred guideline model. In such cases, use of this technique must be approved as an alternate model by US EPA Region 4 on a case-by-case basis under Section 3.2.2 of US EPA's guideline. Generally, the Air Quality Modeling Group

(AQMG) at US EPA's Office of Air Quality Planning and Standards (OAQPS) recommends accepting the use of PVMRM provided that a reasonable demonstration can be made regarding the appropriateness of the in-stack NO_2/NO_x ratios and background ozone database proposed to be used. On July 25, 2011, CARBO submitted to US EPA Region 4 and GA EPD a modeling protocol regarding application of PVMRM. With regard to in-stack NO_2/NO_x ratios, CARBO obtained 180 minutes of NO and NO_2 measurements from the exhaust stack of a similar operating kiln, spray dryer, and boiler at CARBO's Toomsboro facility during the second week of July 2011 – the emission units associated with the construction of the proposed Millen facility will be substantially similar, if not identical, to the units on which stack sampling was conducted. From this data, CARBO determined in-stack NO_2/NO_x ratios for the project sources as 0.01 for kilns, 0.06 for spray dryers and 0.12 for boilers – the NO_2/NO_x ratios were determined as the average of three 60-min periods of data (i.e., 3-run averages). For all other sources in the PSD inventory, except combustion turbines, the default NO_2/NO_x ratio of 0.50 was used in the absence of source-specific information. For combustion turbines, an in-stack NO_2/NO_x ratio of 0.20 was used, which is substantiated by documentation submitted along with the PVMRM protocol. For background ozone concentrations, CARBO developed a database using the maximum of contemporaneous 1-hour observations of ozone measured at seven monitors surrounding the modeling domain with one monitor used as secondary source for periods of missing data not within Georgia's statutory ozone monitoring season, March through October. Having combined the observations in this manner, the background ozone concentrations used with PVMRM are representative and conservative for both the project site and averaging period so that the controlling NO_2 concentrations were not underestimated. Please refer to the PVMRM protocol provided in Attachment C to this Volume.

Additionally, for PM_{10} significance modeling, AERMOD runs were conducted using the regulatory default model options as well as the non-default control ("FLAT" and "ELEV") and source options (use of "FLAT" in place of source elevation) to specify use of flat, level terrain for fugitive emissions below the level of surrounding terrain; elevations for all volume sources representing fugitive particulate matter emissions from truck traffic on paved roads are below the level of most terrain immediately adjacent to and surrounding the Millen facility. As discussed in implementation guidance, AERMOD may tend to underestimate the air quality impact of low-level, non-buoyant sources (i.e., volume sources) in up-sloping terrain when compared to flat terrain results. The dual AERMOD runs were conducted to perform sensitivity testing to determine which model option would be more appropriate for the remaining particulate matter air quality analyses.

2.1.2 Dispersion Coefficients

Based on the land use analysis provided in the Class II modeling protocol, the urban modeling option in AERMOD was not used for any air quality analysis.

2.1.3 Meteorological Data and Representativeness

In the absence of at least one year of site-specific data, GA EPD provided CARBO with five-years (2006-2010) preprocessed hourly meteorological observations collected at Augusta Daniel Field (WBAN #13873) using the recently promulgated, final versions of AERMINUTE and AERMET, incorporating upper air observations of the Peachtree City NWS station (WBAN #53819). Because of the selection of Daniel Field as the representative surface station, the base elevation for the NWS measurement location, 410.43 ft, was specified as the "profile base elevation" (PROFBASE) for computation of vertical profiles of potential temperature for use in the plume rise calculations.[3]

The NWS data were processed using AERSURFACE outputs for the wet, dry, and average Bowen moisture conditions, by season and 30° sector. Two sets of meteorological data were compiled, one for the surface characteristics of the NWS site, and one for the characteristics of the project site. Table 2.1.3-1 summarizes the surface characteristics for the NWS and project site locations and Table 2.1.3-2 compares the surface characteristics in terms of the absolute and relative percent differences between the two.

[3] Elevation corresponding to the location of the meteorological tower (33.466829 latitude, -82.038479 longitude)

Table 2.1.3-1: Seasonal Albedo, Bowen, and Surface Roughness Length Values for the Daniel Field NWS Surface Station and Project Site

SECTOR	DANIEL FIELD NWS SURFACE STATION				CARBO MILLEN PROJECT SITE			
	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
Albedo								
0-360	0.17	0.16	0.16	0.16	0.15	0.14	0.16	0.16
Bowen (Average Surface Moisture Condition)								
0-360	1.05	0.91	0.74	1.05	0.64	0.41	0.34	0.58
Bowen (Dry Surface Moisture Condition)								
0-360	2.20	1.98	1.57	2.20	1.07	0.84	0.65	1.07
Bowen (Wet Surface Moisture Condition)								
0-360	0.58	0.56	0.51	0.58	0.27	0.22	0.20	0.27
Surface Roughness Length								
0-30	0.112	0.119	0.125	0.121	0.487	0.551	0.775	0.775
30-60	0.090	0.095	0.099	0.096	0.397	0.473	0.773	0.773
60-90	0.173	0.185	0.194	0.186	0.377	0.438	0.750	0.750
90-120	0.124	0.136	0.145	0.137	0.116	0.147	0.378	0.378
120-150	0.180	0.191	0.200	0.193	0.121	0.160	0.396	0.396
150-180	0.145	0.159	0.170	0.160	0.548	0.586	0.682	0.682
180-210	0.053	0.061	0.069	0.062	0.601	0.662	0.892	0.892
210-240	0.067	0.078	0.091	0.082	1.149	1.205	1.260	1.260
240-270	0.229	0.252	0.270	0.253	0.651	0.716	0.963	0.963
270-300	0.060	0.073	0.085	0.074	0.446	0.534	0.765	0.765
300-330	0.196	0.214	0.228	0.216	1.028	1.104	1.201	1.201
330-360	0.406	0.421	0.432	0.427	1.119	1.186	1.257	1.257

Table 2.1.3-2: Absolute and Relative Percent Difference of Seasonal Surface Characteristic Values for NWS Station and Project Site

SECTOR	ABSOLUTE DIFFERNCE				RELATIVE PERCENT DIFFERNCE			
	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
Albedo								
0-360	0.02	0.02	0.00	0.00	13%	13%	0%	0%
Bowen (Average Surface Moisture Condition)								
0-360	0.41	0.50	0.40	0.47	49%	76%	74%	58%
Bowen (Dry Surface Moisture Condition)								
0-360	1.13	1.14	0.92	1.13	69%	81%	83%	69%
Bowen (Wet Surface Moisture Condition)								
0-360	0.31	0.34	0.31	0.31	73%	87%	87%	73%
Surface Roughness Length								
0-30	0.375	0.432	0.650	0.654	125%	129%	144%	146%
30-60	0.307	0.378	0.674	0.677	126%	133%	155%	156%
60-90	0.204	0.253	0.556	0.564	74%	81%	118%	121%
90-120	0.008	0.011	0.233	0.241	7%	8%	89%	94%
120-150	0.059	0.031	0.196	0.203	39%	18%	66%	69%
150-180	0.403	0.427	0.512	0.522	116%	115%	120%	124%
180-210	0.548	0.601	0.823	0.830	168%	166%	171%	174%
210-240	1.082	1.127	1.169	1.178	178%	176%	173%	176%
240-270	0.422	0.464	0.693	0.710	96%	96%	112%	117%
270-300	0.386	0.461	0.680	0.691	153%	152%	160%	165%
300-330	0.832	0.890	0.973	0.985	136%	135%	136%	139%
330-360	0.713	0.765	0.825	0.830	94%	95%	98%	99%

As shown in Table 2.1.3-2, there are some large differences, in both absolute and relative terms, between the seasonal surface characteristic values between the two sites for each of the 12 30-degree sectors. Because of this, a site-specific sensitivity analysis was conducted during the preliminary impact assessment to determine the degree to which predicted air quality impacts were influenced by differences in surface characteristics.

2.1.4 Good Engineering Practice Stack Height and Building Downwash

Credit for emissions reductions achieved by using a stack with a height in excess of what is considered to be Good Engineering Practice (GEP) is prohibited. GEP stack height, as measured from the base elevation of a stack, is defined in 40 CFR 51.100(ii) as the greater of 213 feet (65 meters) or the stack height determined based on the dimensions of nearby structures ("refined formal height") or EPA approved fluid model studies.

US EPA has created a software application to determine GEP stack height based on the refined formula and the appropriate building downwash dimensions for input into AERMOD. The most recent version (v04274) of the Building Profile Input Program for the PRIME (BPIPPRM) software application was used to determine the GEP height and wind direction-specific downwash dimensions and the dominant downwash structures for each stack for use in the AERMOD input control files. All data generated by BPIPPRM in processing stack heights and building and tank dimensions for are provided in the attached electronic files.

With the exception of the kiln stacks, all point source stacks associated with the project are less than 65 m; each kiln stack is planned to be constructed at a height of 245 ft (75m). The BPIPPRM summary output file shows that the GEP stack height of each kiln stack is 344 ft (105 m). Therefore, all stacks were modeled at their actual release heights.

2.1.5 Coordinate System

For all air quality analyses, the location of all source, building corner and receptors locations were specified in the Universal Transverse Mercator (UTM) coordinate system in the North American Datum of 1983 (NAD83).

2.1.6 Receptor Grids

Receptor grids used for each air quality analysis for each pollutant (e.g., preliminary impact, NAAQS, PSD increment, etc.) are discussed in detail in each section describing the particular air quality analysis being conducted.

2.1.7 Elevation Processing

The most recent version of AERMAP (v11103) supports processing terrain elevations extracted from the USGS National Elevation Dataset (NED) in the GeoTIFF format. The NED elevation data are currently available for the conterminous United States, Hawaii, Puerto Rico, and the Virgin Islands at a horizontal resolution of one arc-second (approximately 30-meters) and at a resolution of two arc-seconds for Alaska. Higher resolution, 1/3 arc-second (approximately 10-meters) data are available for most areas outside of Alaska. US EPA has encouraged users of AERMOD to transition from the Digital Elevation Model (DEM) files to the NED as soon as practical since the DEM data will not be updated in the future and the NED are being actively supported and quality assured by the USGS. Additionally, problems that should be avoided by using the NED data but have been reported with the DEM data include incorrect geo-referencing information for entire DEM files and elevations that reflect the tops of buildings and trees. The NED data represent the ground elevation, which is a more appropriate input for determining receptor elevations and hill height scales for use in AERMOD. For these reasons, receptor-specific terrain-influence heights and source and receptor elevations will be determined by processing NED data in AERMAP for input into AERMOD. USGS NED data files at 1 arc-second resolution were obtained from the USGS National Map Seamless Server, available online at http://seamless.usgs.gov/, and are provided in the in the attached electronic files.

2.2 Preliminary Impact Assessment

For the purposes of this PSD application, a preliminary impact assessment, or significance modeling, was conducted for PM_{10}, $PM_{2.5}$, NO_2, SO_2 and CO in order to determine the need for a full impact analysis involving the cumulative evaluation of the emissions from the proposed Millen facility and nearby sources affecting the area as well as to perform site-specific analyses to determine the sensitivity of design concentrations to different modeling techniques as well as to the differences in surface characteristics between the NWS surface measurement (Augusta Daniel Field) and project locations. The surface characteristics sensitivity analysis is important both in terms of evaluating meteorological data representativeness as well as ensuring that emissions limitations will be established based on the averaging time that results in the most stringent control requirements. For each pollutant predicted to have a significant impact, the preliminary impact assessment was also used to define the significant impact area (SIA) within which the full impact analysis was carried out (i.e., the geographic locations where receptors were placed) and the screening area, or total impact area (TIA), within which the NAAQS and PSD increment inventories were developed. Additionally, the preliminary impact assessment was also used to determine whether preconstruction monitoring for PM_{10}, $PM_{2.5}$, NO_2, SO_2 or CO should be considered.

In order to evaluate whether the Millen facility would result in a significant impact and preconstruction monitoring requirements, the maximum impacts (highest first-high concentrations) for each pollutant and averaging period were compared to the significant impact levels (SIL's) and significant monitoring concentrations (SMC's). The SIL's were established for the nonattainment major NSR program but are widely used in the PSD program to determine whether a source's emissions would "cause or contribute" to violations of the NAAQS or increments since the SIL's are actually applicable to sources proposing to locate in areas designated as attainment or unclassifiable (please see 40 CFR 51.165(b)). The SMC's, or monitoring *de minimis* levels, are the predicted or existing levels of pollutant concentrations in the ambient air below which GA EPD has the discretionary authority to waive preconstruction monitoring requirements. However, even if pollutant concentrations are shown to be above *de minimis* levels, GA EPD typically waives preconstruction requirements for PSD applicants since the agency operates an extensive monitoring network throughout the state which provides quality assured data that is contemporaneous, representative and suitable for use in PSD review. Table 2.2-1 and Table 2.2-2 summarize the SIL's and SMC's for each pollutant emitted in significant amounts.

Table 2.2-1: Summary of Significant Impact Levels (SIL's)

Pollutant	Averaging Period				
	1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	7.4 [1]	--	--	--	1
SO_2	7.8 [1]	25	--	5	1
CO	2,000	--	500	--	--
PM_{10}	--	--	--	5	1
$PM_{2.5}$ [2]	--	--	--	1.2	0.3
O_3 [3]	--	--	--	--	--

[1] Values provided by GA EPD based on the interim SIL of 4% of the NAAQS proposed by US EPA for each pollutant for the same averaging period.
[2] The SIL's for the $PM_{2.5}$ NAAQS take into account for the statistical form of the NAAQS (i.e., are based on the five-year average of the highest first-high concentrations at each receptor location). US EPA intends to provide guidance on interpreting the form of the SIL's for the $PM_{2.5}$ increments.
[3] No SIL has been established for ozone (O_3); an ambient impact analysis is required for a significant net emission increase of NO_x or VOC greater than 100 tons per year.

Table 2.2-2: Summary of Significant Monitoring Concentrations

Pollutant	Averaging Period				
	1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	--	--	--	--	14
SO_2	--	--	--	13	--
CO	--	--	575	--	--
PM_{10}	--	--	--	10	--
$PM_{2.5}$	--	--	--	4	--
O_3 [1]	--	--	--	--	14

[1] No *de minimis* monitoring concentration has been established for ozone (O_3); however, an ambient impact analysis, including collection of air quality monitoring data, is required for a significant net emission increase of NO_x or VOC greater than 100 tons per year

Since the preliminary impact assessment involved multiple components, significance modeling was carried out in coordination with GA EPD. First, emissions of SO_2 from the Millen facility were modeled to determine the highest first-high concentrations for the 3-hour, 24-hour, and annual averaging periods for each year of both meteorological data sets. The results of this analysis were used to determine the SIA for these averaging periods, the maximum impact for comparison to the 24-hour *de minimis* monitoring concentration, and to determine the sensitivity of design concentrations to the differences in surface characteristics between the NWS surface measurement and project locations. Only the meteorological data set that resulted in more conservative annual impacts for

SO_2 was used to assess the annual NO_2 SIL, SIA and SMC. Then, emissions of SO_2 were modeled for the form of the 1-hour SO_2 SIL (five-year average of highest first-high concentrations) using five-year concatenated files for both meteorological data sets to determine the maximum impacts, SIA, "buffered SIA", array of significant receptors, and sensitivity of design concentrations to differences in surface characteristics.[4] Emissions of CO were then modeled to determine the highest first-high concentrations for the 1-hour and 8-hour averaging periods for each year of both meteorological data sets to determine whether a significant impact would occur and for comparison to the 8-hour *de minimis* monitoring concentration. Based on previous experience, CARBO indicated to GA EPD that the air quality analysis for the 1-hour NO_2 NAAQS would use a 50 km significant impact area. Therefore, the 1-hour NO_2 SIA or significant array of receptors was not determined during the preliminary impact assessment and significance modeling for the 1-hour averaging period only involved using the five-year concatenated files for both meteorological data sets to determine which set of surface characteristics resulted in more conservative impacts for the form of the 1-hour NO_2 SIL (five-year average of highest first-high concentrations).

For the 24-hour and annual averaging periods for PM_{10} and $PM_{2.5}$, the same approach used to limit the annual NO_2 assessment was used. First, emissions of PM_{10} were modeled to determine the highest first-high concentrations for the 24-hour and annual averaging periods for each year of both meteorological data sets. The results of this analysis were used to determine the SIA, the maximum impact for comparison to the 24-hour *de minimis* monitoring concentration, and to determine the sensitivity of design concentrations to the differences in surface characteristics between the NWS surface measurement and project locations. Then, an assessment of the $PM_{2.5}$ SIL's, SIA, and 24-hour *de minimis* monitoring concentration was conducted using only the meteorological data set that resulted in more conservative impacts for PM_{10} on the same averaging period. Based on guidance from GA EPD, only the statistical form of the $PM_{2.5}$ SIL's based on the NAAQS (five-year average of highest first-high concentrations) was evaluated during significance modeling. This is because this PSD application will not set the minor source baseline date for $PM_{2.5}$ and the first increment analysis will not be required until after the minor source baseline date is established for Jenkins County, or any other area, under the Georgia's state implementation plan (SIP) when revised to incorporate the final $PM_{2.5}$ increments, SIL's and SMC rule.

Additionally, PM_{10} significance modeling was conducted twice: once using AERMOD in the regulatory default mode and again using the non-default control and source options to specify use of flat, level terrain for volume sources (fugitive emissions) below the level of surrounding terrain in order to ensure that the impacts of low-level, non-buoyant sources are not underestimated. Based on the results of this modeling, it was determined that by allowing the air quality impacts of fugitive emissions to be handled in this manner, certain receptors showed higher concentrations, although the overall largest significant impact and furthest receptors at which a significant impacts were predicted were not influenced. However, in order to ensure that the design concentrations at all receptors were not underestimated, the non-default option for flat treatment of fugitive

[4] The significant impact area for the 1-hour SO_2 NAAQS was determined by using the furthest distance out to which 7 $\mu g/m^3$ was predicted for the statistical form of the SIL, thus providing sufficient "buffer" so as not to require resolving the SIA to 100 meter spacing. This was found to provide a buffer of an additional 3.4 km.

emissions was used for all remaining particulate matter air quality analyses since certain receptors showed sensitivity using this approach.

For all significance modeling, except the 1-hour averaging period for SO_2, the following Cartesian coordinate receptor grid, centered on UTM 415,753 meters east and 3,3625,754 meters north, was used:

- Fenceline receptors spaced no further than 100 meters apart;
- 100 meter spaced receptors out to 2.5 km;
- 250 meter spaced receptors out to 5.0 km; and
- 500 meter spaced receptors out to 10.0 km

For the 1-hour SO_2 for the preliminary impact assessment, 500 meter spaced receptors were carried out to 50 km to establish the array of significant receptors using the recommended buffer of 7 $\mu g/m^3$. As shown in the following sections, all areas of maximum impact and furthest receptors at which significant impacts were predicted were all resolved to 100 meter spacing. Generally, when a receptor within the 250 meter spaced portion of the grid required resolution, a circular grid centered on the receptor being resolved with a radius of 500 meters (twice the spacing) was used. Similarly, a circular grid with a radius of 1,000 meters was used to resolve receptors at and beyond 5 km from the project site.

As a result of the preliminary impact assessment, the following were determined in consultation with GA EPD:

- A full impact analysis was required for emissions of PM_{10}, $PM_{2.5}$, NO_2, and SO_2 since each pollutant was predicted to have a significant impact for all applicable averaging periods;
- A full impact analysis was not required for emissions of CO since the highest first-high concentrations for both the 1-hour and 8-hour averaging periods were predicted to be below their respective SIL's;
- The baseline area established by this PSD application for PM_{10} and SO_2 does not include any portion of an adjoining attainment or unclassifiable area since all receptors predicted to be significant for the annual averaging period (1 $\mu g/m^3$) are within Jenkins County;
- This PSD application does not set the minor source baseline date or establish Jenkins County as a baseline area for NO_2 since the entire state was established as a baseline area for NO_2 on May 5, 1988 (Georgia-Pacific Brunswick Operations, now Brunswick Cellulose, Inc.); at the time the first PSD application was submitted after the trigger date for NO_2, the designated area for air quality planning purposes was, and still is, listed as "statewide" in 40 CFR 81.311;
- This PSD application will not set the minor source baseline date or establish Jenkins County as a baseline area for $PM_{2.5}$ if deemed completed prior to the trigger date of October 20, 2011, or possibly at a later date given the fact that Georgia's SIP has not been revised to include the final $PM_{2.5}$ increments, SIL's and SMC rule;

- Short-term design concentrations were more sensitive to the surface characteristics of the NWS measurement location whereas long-term design concentrations were more sensitive to the project location surface characteristics;
- Despite sensitivity to the project location surface characteristics, all annual increment and NAAQS air quality analyses were conducted using the surface characteristics of the NWS measurement location since design concentrations for short-term averaging periods will result in the most stringent emission limitations (please refer to the July 27, 2011 Class II modeling protocol approval letter including as Attachment A to this Volume);
- Design concentrations for PM_{10} were not sensitive to flat terrain treatment for fugitive emissions although highest first-high concentrations at certain receptors were slightly greater indicating that this non-default option should be used for particulate matter air quality analysis;
- Preconstruction monitoring for NO_2 and CO should not be considered since the maximum air quality impacts were below their respective *de minimis* monitoring concentrations; and
- Preconstruction monitoring for PM_{10}, $PM_{2.5}$ and SO_2 should be waived since quality assured data that is contemporaneous and representative is available despite maximum air quality impacts being above the SMC's

2.2.1 SO_2

Table 2.2.1-1 summarizes the results of the preliminary impact assessment for SO_2. The results show that a full impact analysis for SO_2 is required since a significant impact was predicted for the 1-hour, 3-hour, 24-hour and annual averaging periods. As shown in Figure 2.2.1-1 and Figure 2.2.1-2, the largest significant impact for each averaging period occurred within the 100 meter spaced portion of the receptor grid within 2.5 km of the project site. Looking at the results for each set of meteorological data, the higher surface moisture condition and lower surface roughness of the NWS measurement location resulted in the highest significant impacts for all short term averaging periods with the opposite being true of the annual averaging period. Although the sensitivity of Bowen and surface roughness were not tested independently, it is well known that it is typical for the NWS measurement location to result in higher short-term impacts because of the lower surface roughness values associated with the surrounding land use. Because of this, the five years of meteorological data using the airport site surface characteristics were used for all remaining short-term air quality analyses for SO_2. After consultation with GA EPD regarding sensitivity of the annual averaging period to differences in surface characteristics, it was decided that the NWS measurement location would also be used for the annual SO_2 NAAQS and increment since it is more than likely that the "limiting" averaging period, or averaging period that would result in the most stringent control requirements, would be the 1-hour SO_2 NAAQS. However, since annual average estimates of SO_2 were more conservative using the surface characteristics of the project location, this meteorological data set was used for the annual NO_2 preliminary impact assessment to determine a more conservative

SIA and maximum impact for comparison to the annual *de minimis* monitoring concentration.

In total, nine receptors within the 250 meter spaced portion of the receptor grid were resolved to 100 meter spacing to identify the furthest receptor at which a significant impact was predicted for all averaging periods. After resolving these receptors, the largest SO_2 SIA for the 3-hour, 24-hour, and annual averaging periods was determined to be 4 km.

As shown in Figure 2.2.1-2, the SIA for the 1-hour SO_2 NAAQS was determined to be 26.6 km and the modeling buffer (i.e., distance to the receptor having a five-year average of highest first-high concentrations greater than 7 $\mu g/m^3$) was 29 km. For the 1-hour SO_2 NAAQS assessment, only those receptors greater than 7 $\mu g/m^3$ for the 1-hour SIL were included.

Table 2.2.1-1: Class II Significance Results for SO_2 and Surface Characteristics Sensitivity

Pollut-ant	Avg. Period	SIL (µg/m^3)	Year	Maximum Significant Impact			Furthest Significant Receptor			
				UTM NAD83		Conc. (µg/m^3)	UTM NAD83		Conc. (µg/m^3)	Dist-ance (km)
				East (m)	North (m)		East (m)	North (m)		
Augusta Daniel Field Surface Characteristics										
SO_2	1-hr	7.8	5YR	**416,400.00**	**3,626,300.00**	**55.51**	**437,500.00**	**3,645,000.00**	**7.80**	**26.6**
SO_2	3-hr	25	2006	**416,200.00**	**3,626,300.00**	**46.05**	417,300.00	3,626,600.00	25.64	1.8
			2007	416,100.00	3,626,400.00	38.27	416,300.00	3,626,800.00	26.06	1.2
			2008	416,000.00	3,626,300.00	37.47	415,500.00	3,627,300.00	25.77	1.6
			2009	416,100.00	3,626,400.00	40.93	**412,550.00**[1]	**3,627,950.00**[1]	**25.03**[1]	**3.9**[1]
			2010	415,367.10	3,625,844.20	38.41	416,700.00	3,627,800.00	25.14	2.3
SO_2	24-hr	5	2006	414,986.30	3,625,447.20	14.82	416,200.00	3,623,400.00	5.28	2.4
			2007	415,114.90	3,625,026.20	16.13	416,450.00[1]	3,623,350.00[1]	5.06[1]	3.3[1]
			2008	414,877.90	3,625,104.00	16.99	416,000.00[1]	3,622,500.00[1]	5.00[1]	3.3[1]
			2009	**415,114.90**	**3,625,026.20**	**18.15**	415,300.00[1]	3,622,850.00[1]	5.11[1]	2.9[1]
			2010	416,500.00	3,625,600.00	15.32	416,200.00	3,623,400.00	5.10	2.4
SO_2	Annual	1	2006	416,300.00	3,625,900.00	2.27	417,000.00	3,626,300.00	1.00	1.4
			2007	416,300.00	3,626,000.00	2.08	414,800.00	3,625,000.00	1.04	1.2
			2008	416,300.00	3,625,900.00	2.07	416,700.00	3,626,600.00	1.01	1.3
			2009	416,300.00	3,626,100.00	1.84	416,700.00	3,626,500.00	1.04	1.2
			2010	416,300.00	3,625,600.00	2.39	417,000.00	3,625,300.00	1.01	1.3
CARBO Ceramics Millen Facility Project Site Surface Characteristics										
SO_2	1-hr	7.8	5YR	416,208.80	3,625,651.30	44.50	396,000.00	3,638,500.00	7.85	23.5
SO_2	3-hr	25	2006	415,376.20	3,625,991.00	39.42	414,900.00	3,626,300.00	26.32	1.0
			2007	415,376.20	3,625,991.00	40.33	415,277.50	3,626,425.70	25.06	0.8
			2008	415,367.10	3,625,844.20	38.39	415,190.80	3,626,409.80	25.01	0.9
			2009	416,200.00	3,625,900.00	38.74	412,850.00[1]	3,627950.00[1]	25.45[1]	3.6[1]
			2010	416,052.30	3,625,976.40	39.26	415,100.00	3,626,400.00	25.61	0.9
SO_2	24-hr	5	2006	414,986.30	3,625,447.20	15.53	419,100.00[1]	3,624,400.00[1]	5.06[1]	3.6[1]
			2007	415,114.90	3,625,026.20	15.30	416,150.00[1]	3,628,800.00[1]	5.06[1]	3.1[1]
			2008	415,175.20	3,624,990.80	16.10	**419,400.00**[1]	**3,624,200.00**[1]	**5.07**[1]	**4.0**[1]
			2009	415,114.90	3,625,026.20	16.05	419,500.00[1]	3,625,000.00[1]	5.00[1]	3.8[1]
			2010	416,700.00	3,625,500.00	15.76	419,550.00[1]	3,624,850.00[1]	5.13[1]	3.9[1]
SO_2	Annual	1	2006	416,300.00	3,625,900.00	2.40	417,200.00	3,625,200.00	1.01	1.5
			2007	416,200.00	3,626,000.00	2.32	417,100.00	3,625,100.00	1.02	1.5
			2008	416,300.00	3,625,900.00	2.22	417,200.00	3,625,200.00	1.02	1.5
			2009	416,200.00	3,626,100.00	1.95	417,100.00	3,625,300.00	1.04	1.4
			2010	**416,249.20**	**3,625,567.10**	**2.54**	**417,300.00**	**3,625,100.00**	**1.00**	**1.7**

[1] The furthest receptor at which a significant impact was predicted was resolved to 100 meter spacing using a circular grid with a radius of 500 meters (80 receptors each) centered on the receptor being resolved

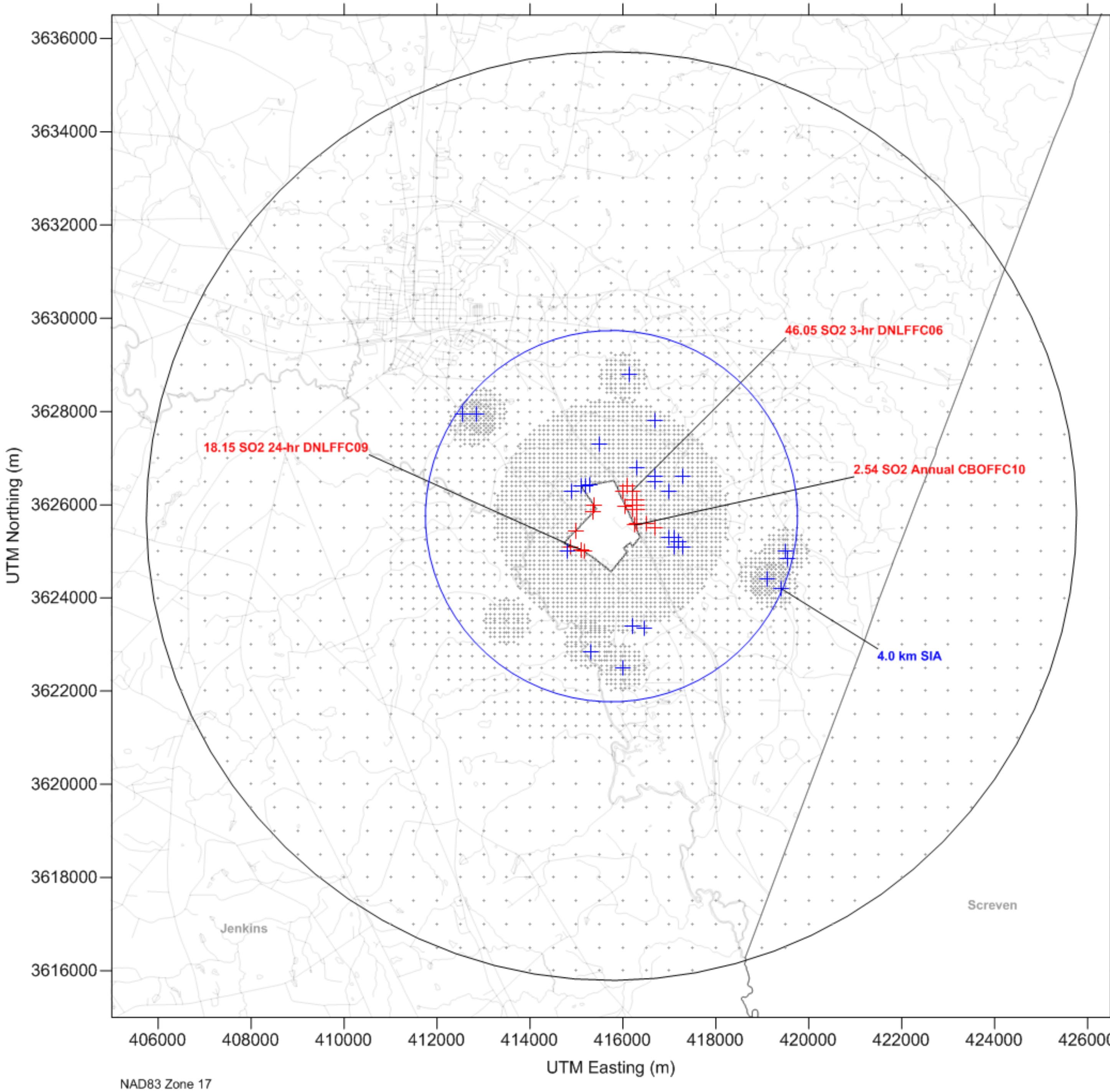
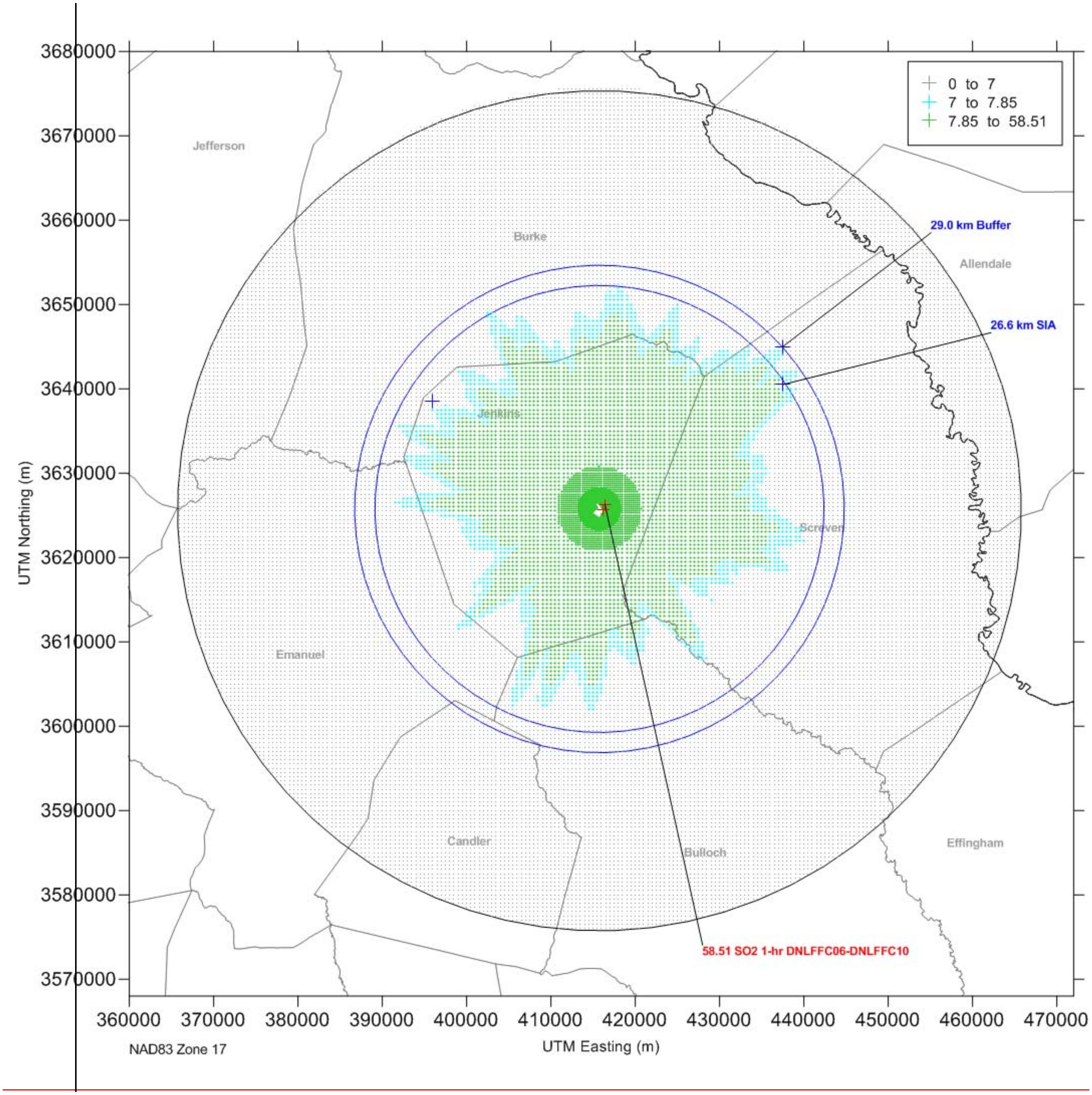


Figure 2.2.1-1: Maximum Significant Impacts for 3-hour, 24-hour and Annual SO_2 and Determination of Significant Impact Area


0 to 7
7 to 7.85
7.85 to 58.51
29.0 km Buffer
26.6 km SIA
58.51 SO2 1-hr DNLFFC06-DNLFFC10
Jefferson
Burke
Allendale
Jenkins
Screven
Emanuel
Candler
Bulloch
Effingham
UTM Northing (m)
UTM Easting (m)
NAD83 Zone 17
3680000
3670000
3660000
3650000
3640000
3630000
3620000
3610000
3600000
3590000
3580000
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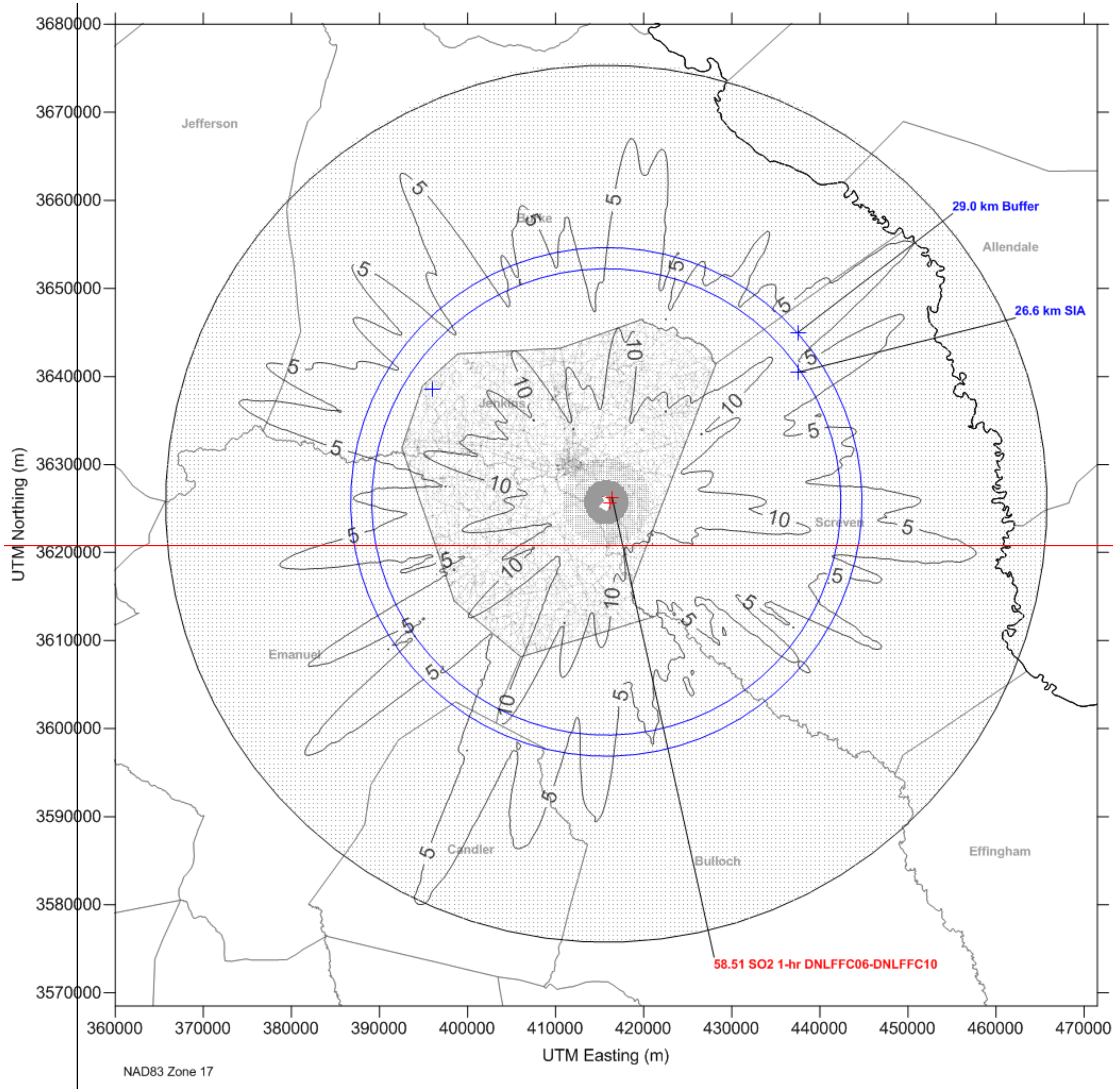

Figure 2.2.1-2: Maximum Significant Impacts for 1-hour SO_2, Contour Plot and Determination of Significant Impact Area

2.2.2 CO

Table 2.2.2-1 summarizes the results of the preliminary impact assessment for CO. The results show that a full impact analysis for CO is not required since a significant ambient impact was not predicted for either the 1-hour or 8-hour averaging periods. Therefore, construction of the Millen facility will not cause or contribute to a violation of the CO NAAQS.

Table 2.2.2-1: Class II Significance Results for CO and Surface Characteristics Sensitivity

Pollut-ant	Avg. Period	SIL (µg/m³)	Year	Maximum Significant Impact			Furthest Significant Receptor			
				UTM NAD83		Conc. (µg/m³)	UTM NAD83		Conc. (µg/m³)	Distance (km)
				East (m)	North (m)		East (m)	North (m)		
Augusta Daniel Field Surface Characteristics										
CO	1-hr	2,000	2006	415,100.00	3,625,700.00	154.82	N/A	N/A	N/A	N/A
			2007	415,176.70	3,625,645.70	155.47	N/A	N/A	N/A	N/A
			2008	415,100.00	3,625,700.00	155.43	N/A	N/A	N/A	N/A
			2009	415,176.70	3,625,645.70	160.40	N/A	N/A	N/A	N/A
			2010	**416,500.00**	**3,626,600.00**	**170.44**	N/A	N/A	N/A	N/A
CO	8-hr	500	2006	415,113.20	3,625,579.50	116.23	N/A	N/A	N/A	N/A
			2007	415,113.20	3,625,579.50	107.81	N/A	N/A	N/A	N/A
			2008	**415,100.00**	**3,625,600.00**	**116.39**	N/A	N/A	N/A	N/A
			2009	415,100.00	3,625,700.00	111.66	N/A	N/A	N/A	N/A
			2010	414,986.30	3,625,447.20	111.45	N/A	N/A	N/A	N/A
CARBO Ceramics Millen Facility Project Site Surface Characteristics										
CO	1-hr	2,000	2006	415,100.00	3,625,700.00	156.40	N/A	N/A	N/A	N/A
			2007	415,100.00	3,625,700.00	159.56	N/A	N/A	N/A	N/A
			2008	415,100.00	3,625,700.00	163.04	N/A	N/A	N/A	N/A
			2009	415,100.00	3,625,700.00	158.58	N/A	N/A	N/A	N/A
			2010	415,100.00	3,625,700.00	159.73	N/A	N/A	N/A	N/A
CO	8-hr	500	2006	415,113.20	3,625,579.50	102.68	N/A	N/A	N/A	N/A
			2007	415,113.20	3,625,579.50	111.07	N/A	N/A	N/A	N/A
			2008	415,176.70	3,625,645.70	115.24	N/A	N/A	N/A	N/A
			2009	415,049.80	3,625,513.40	98.10	N/A	N/A	N/A	N/A
			2010	415,176.70	3,625,645.70	108.33	N/A	N/A	N/A	N/A

2.2.3 NO_2

Table 2.2.3-1 summarizes the results of the preliminary impact assessment for NO_2. The results show that a full impact analysis for NO_2 is required since a significant impact was predicted for the 1-hour and annual averaging periods. As discussed in Section 2.2.1, only the project location meteorological data were used for annual NO_2 significance modeling since annual average estimates for SO_2 indicated that this model input data would result in a more conservative SIA and greater maximum impact for comparison to the annual *de minimis* monitoring concentration.

Table 2.2.3-1: Class II Significance Results for NO_2 and Surface Characteristics Sensitivity

Pollut-ant	Avg. Period	SIL (µg/m³)	Year	Maximum Significant Impact			Furthest Significant Receptor			
				UTM NAD83		Conc. (µg/m³)	UTM NAD83		Conc. (µg/m³)	Distance (km)
				East (m)	North (m)		East (m)	North (m)		
Augusta Daniel Field Surface Characteristics										
NO_2	1-hr	7.4	5YR	**416,250.00**[1]	**3,628,500.00**[1]	**115.16**[1,3]	N/A[5]	N/A[5]	N/A[5]	**50.0**[5]
NO_2	Annual	1	2006	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			2007	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			2008	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CARBO Ceramics Millen Facility Project Site Surface Characteristics										
NO_2	1-hr	7.4	5YR	414,100.00	3,627,600.00	73.68[3]	N/A	N/A	N/A	50.0
NO_2	Annual	1	2006	416,300.00	3,625,900.00	7.72[4]	420,250	3,624,000	1.03[4]	4.8
			2007	416,200.00	3,626,000.00	7.39[4]	420,250	3,623,750	1.02[4]	4.9
			2008	416,300.00	3,625,900.00	7.17[4]	420,500	3,624,250	1.01[4]	5.0
			2009	416,300.00	3,625,600.00	6.33[4]	420,250	3,624,000	1.01[4]	4.8
			2010	**416,249.20**	**3,625,567.10**	**8.30**[4]	**421,900**[2]	**3,623,700**[2]	**1.00**[2,4]	**6.5**[2,4]

1 The receptor at which the maximum significant impact was predicted was resolved to 100 meter spacing using a circular grid with a radius of 500 meters (80 receptors) centered on the receptor being resolved (416,250.00 m east, 3,628,500.00 m north)

2 The furthest receptor at which a significant impact was predicted were resolved to 100 meter spacing using a circular grid with a radius of 1,000 meters (317 receptors) centered on the receptor being resolved (421,500.00 m east, 3,623,500.00 m north)

3 Using Tier 3 Plume Volume Molar Ratio Method (PVMRM) with a contemporaneous ozone database consisting of measured observations from eight monitoring sites ("5YR 2006-2010 OZONEFIL.v2.csv"), site-specific in-stack NO_2/NO_x ratios for direct-fired rotary kilns (0.01), spray dryers (0.06), and boilers (0.12), and equilibrium ratio of 0.90

4 Using Tier 2 ambient ratio method (ARM) and default national average of 0.75 NO_2/NO_x

5 Based on previous modeling experience against the level of the interim 1-hour NO_2 SIL, CARBO has accepted a 50 km SIA for the 1-hour NO_2 NAAQS without conducting significance modeling

For significance modeling, results for the annual averaging period reflect application of the Tier 2 ambient ratio method (ARM) and national default NO_2/NO_x ratio of 0.75 to modeled NO_x ($NO + NO_2$) emissions whereas the results for the 1-hour averaging period reflect use of the Plume Volume Molar Ratio Method (PVMRM) to account for atmospheric conversion of NO to NO_2 in the presence of ozone. Looking at the results for each meteorological data set, the surface characteristics of the NWS measurement location resulted in a much higher maximum significant impact for the 1-hour averaging period. However, as discussed in the preliminary impact assessment for SO_2, GA EPD and CARBO determined that it would be appropriate to use the surface characteristics of the NWS measurement location to assess the annual NO_2 NAAQS and increment since the 1-hour averaging period will result in the most stringent emission limitations; the maximum significant impact for the 1-hour NO_2 SIL is 79% of the NAAQS (with background of 33.24 $\mu g/m^3$) while the maximum significant impact for the annual NO_2 SIL is only 33% of the increment.

As shown in Figure 2.2.3-1 and Figure 2.2.3-2, the maximum significant impact for the annual averaging period occurred within the 100 meter spaced portion of the receptor grid within 2.5 km of the project site whereas the maximum significant impact for the 1-hour averaging period was resolved to 100 meter spacing within the 250 meter spaced portion of the receptor grid. For the annual averaging period, the furthest distance out to which a significant impact was predicted with resolved to 100 meter spacing within the 500 meter spaced portion of the grid beyond 5 km from the project location. After resolving this receptor, the largest NO_2 SIA for the annual averaging period was determined to be 6.5 km.

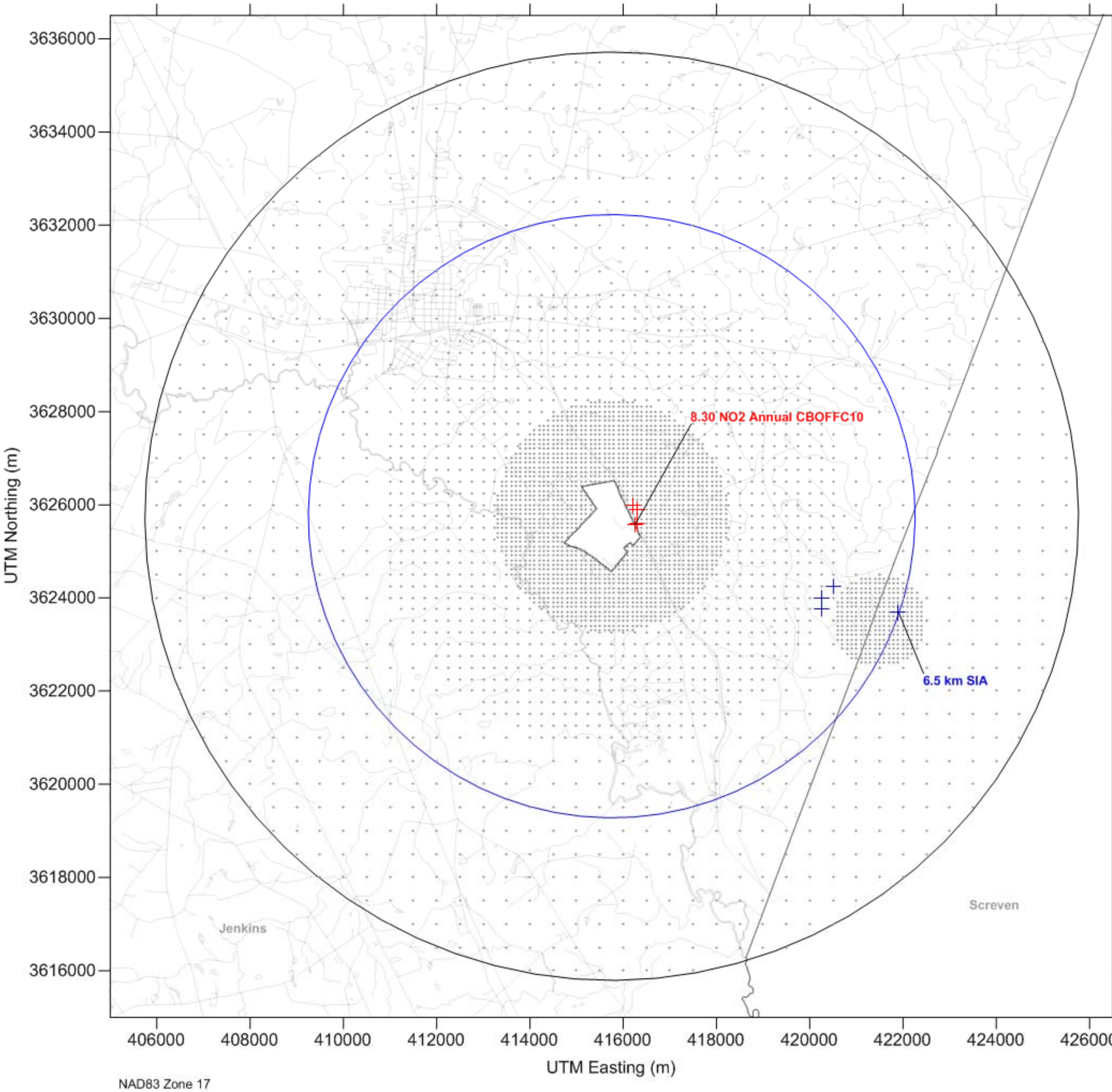

Figure 2.2.3-1: Maximum Significant Impacts for Annual NO_2 and Determination of Significant Impact Area

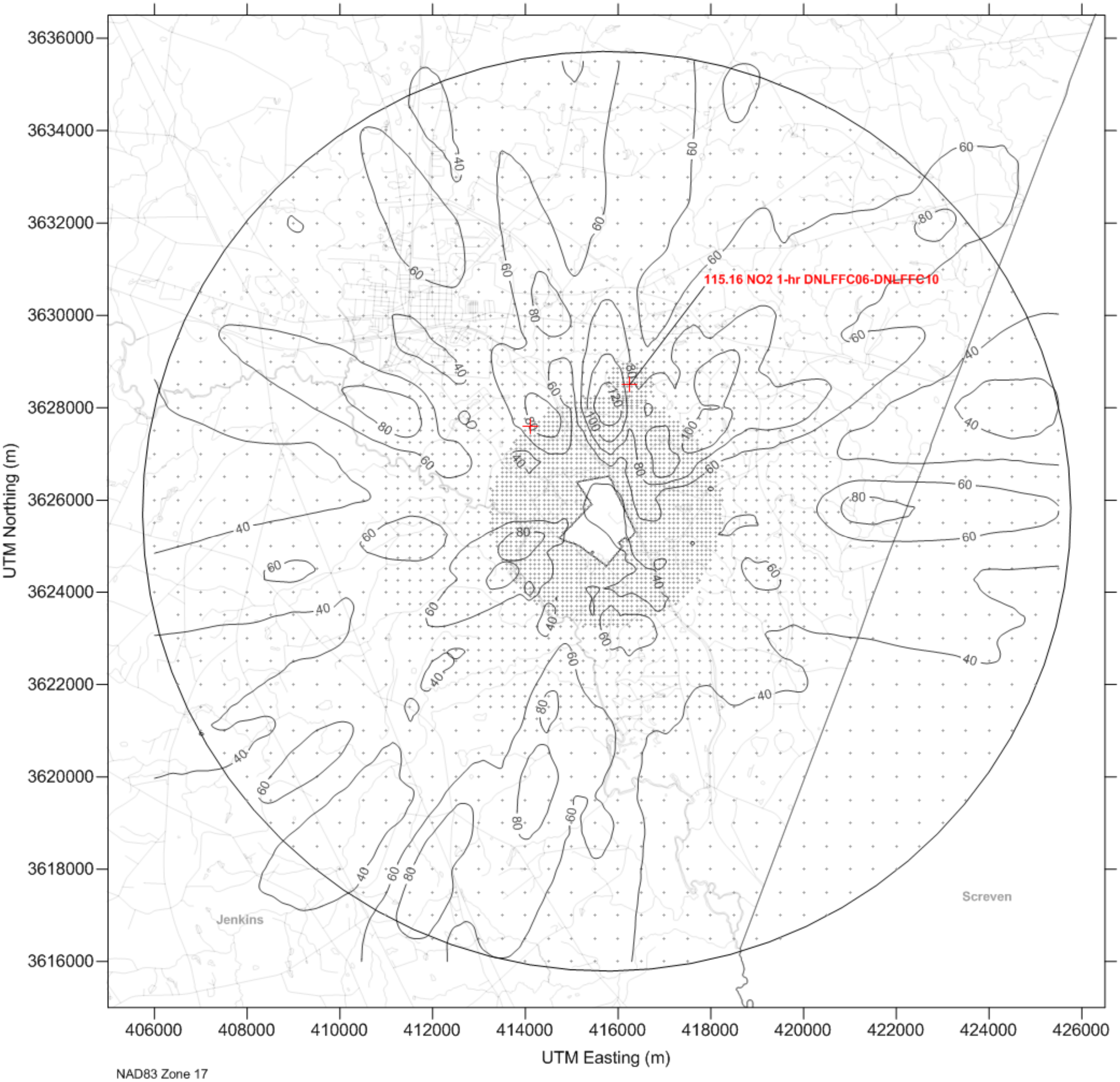

Figure 2.2.3-2: Maximum Significant Impacts for 1-Hour NO_2 and Contour Plot

2.2.4 PM_{10}

Table 2.2.4-1 summarizes the results of the preliminary impact assessment for PM_{10}. The results show that a full impact analysis for PM_{10} is required since a significant impact was predicted for the 24-hour and annual averaging periods.

Table 2.2.4-1: Class II Significance Results for PM_{10} and Surface Characteristics Sensitivity

Pollutant	Avg. Period	SIL (μg/m³)	Year	Maximum Significant Impact: UTM NAD83 East (m)	Maximum Significant Impact: UTM NAD83 North (m)	Maximum Significant Impact: Conc. (μg/m³)	Furthest Significant Receptor: UTM NAD83 East (m)	Furthest Significant Receptor: UTM NAD83 North (m)	Furthest Significant Receptor: Conc. (μg/m³)	Furthest Significant Receptor: Distance (km)
Augusta Daniel Field Surface Characteristics										
PM_{10}	24-hr	5	2006	415,049.80	3,625,513.40	22.62	418,050.00	3,626,350.00	5.04	2.4
			2007	415,176.70	3,625,645.70	22.58	**418,150.00**[1]	**3,628,200.00**[1]	**5.25**[1]	**3.4**[1]
			2008	**415,049.80**	**3,625,513.40**	**26.63**	417,950.00[1]	3,627,550.00[1]	5.05[1]	2.8[1]
			2009	415,240.20	3,625,711.90	24.06	418,150.00[1]	3,627,700.00[1]	5.26[1]	3.1[1]
			2010	414,986.30	3,625,447.20	20.40	417,950.00[1]	3,628,000.00[1]	5.10[1]	3.1[1]
PM_{10}	Annual	1	2006	416,127.80	3,625,819.70	2.87	416,900.00	3,626,300.00	1.02	1.3
			2007	416,168.30	3,625,735.50	2.62	414,800.00	3,625,000.00	1.04	1.2
			2008	416,168.30	3,625,735.50	2.79	417,000.00	3,625,000.00	1.01	1.3
			2009	416,208.80	3,625,651.30	2.63	414,600.00	3,625,200.00	1.03	1.3
			2010	416,168.30	3,625,735.50	3.25	417,100.00	3,625,400.00	1.04	1.4
CARBO Ceramics Millen Facility Project Site Surface Characteristics										
PM_{10}	24-hr	5	2006	415,049.80	3,625,513.40	20.75	417,850.00	3,626,350.00	5.10	2.2
			2007	415,176.70	3,625,645.70	22.88	417,900.00	3,626,800.00	5.01	2.4
			2008	415,113.20	3,625,579.50	25.16	418,350.00[1]	3,626,150.00[1]	5.06[1]	2.6[1]
			2009	415,240.20	3,625,711.90	21.78	417,800.00	3,626,600.00	5.02	2.2
			2010	416,300.00	3,625,700.00	19.51	417,900.00	3,626,700.00	5.23	2.3
PM_{10}	Annual	1	2006	416,127.80	3,625,819.70	3.17	416,900.00	3,626,300.00	1.02	1.3
			2007	416,127.80	3,625,819.70	2.87	416,800.00	3,626,300.00	1.04	1.2
			2008	416,168.30	3,625,735.50	3.05	416,900.00	3,625,400.00	1.06	1.2
			2009	416,168.30	3,625,735.50	2.81	416,700.00	3,626,500.00	1.01	1.2
			2010	**416,168.30**	**3,625,735.50**	**3.45**	**417,100.00**	**3,625,400.00**	**1.03**	**1.4**

[1] The furthest receptor at which a significant impact was predicted was resolved to 100 meter spacing using a circular grid with a radius of 500 meters (80 receptors each) centered on the receptor being resolved

For significance modeling, AERMOD runs were conducted using the regulatory default model option as well as the non-default control ("FLAT" and "ELEV") and source options (use of "FLAT" in place of source elevation) to specify use of flat, level terrain for fugitive emissions below the level of surrounding terrain; elevations for all volume sources representing fugitive particulate matter emissions from truck traffic on paved roads are below the level of most terrain immediately adjacent to and surrounding the Millen facility. As discussed in implementation guidance, AERMOD may tend to underestimate the air quality impact of low-level, non-buoyant sources (i.e., volume sources) in up-sloping terrain when compared to flat terrain results. The maximum significant impacts were not found to be sensitive to this modeling technique – Table 2.2.4-1 reflects the results for both approaches. However, certain receptors in elevated terrain did show greater highest first-high concentrations. For example, the difference in the maximum significant impact predicted for the 24-hour averaging period using the airport site meteorological data set was 0.0009 $\mu g/m^3$ whereas the maximum difference in significant impact for any receptor for the same year and averaging period was 0.21 $\mu g/m^3$ (416,400 m east, 3,626,200 m north, 71.93 m elevation; the highest volume source elevation is nearly 10 meters below this level at the facility entrance off State Route 17). Therefore, although the design concentrations do not appear to be sensitive to flat terrain treatment for volume sources, the non-default approach was used for all subsequent particulate matter air quality analyses, beginning with $PM_{2.5}$ significance modeling, since certain receptors in elevated terrain displayed greater highest first-high concentrations.

As shown in Figure 2.2.4-1, the maximum significant impact for each averaging period occurred within the 100 meter spaced portion of the receptor grid within 2.5 km of the project site. Looking at the results for each meteorological data set, the NWS measurement and project location surface characteristics continue to provide more conservative results for the 24-hour and annual averaging periods, respectively. Additionally, based on a comparison of the maximum significant impacts to the 24-hour and annual PM_{10} increment, it would also be appropriate to use the surface characteristics of the NWS measurement location to assess the annual PM_{10} increment since the short-term averaging period will result in the most stringent emission limitations; the maximum significant impact for the 24-hour PM_{10} SIL is 89% of the increment while the maximum significant impact for the annual PM_{10} SIL is only 20% of the increment. However, since annual average estimates of PM_{10} were more conservative using the surface characteristics of the project location, this meteorological data set was used for the annual $PM_{2.5}$ preliminary impact assessment to ensure that the SIA is established as the largest for both averaging periods. Additionally, it was important for CARBO to confirm that the annual averaging period and project location meteorological data set would not result in more stringent emission limitations for $PM_{2.5}$ since the annual background value for $PM_{2.5}$ provided by GA EPD is a larger percentage of the NAAQS.

In total, four receptors within the 250 meter spaced portion of the receptor grid were resolved to 100 meter spacing to identify the furthest receptor at which a significant impact was predicted for all averaging periods. After resolving these receptors, the largest PM_{10} SIA for the 24-hour and annual averaging periods was determined to be 3.4 km.

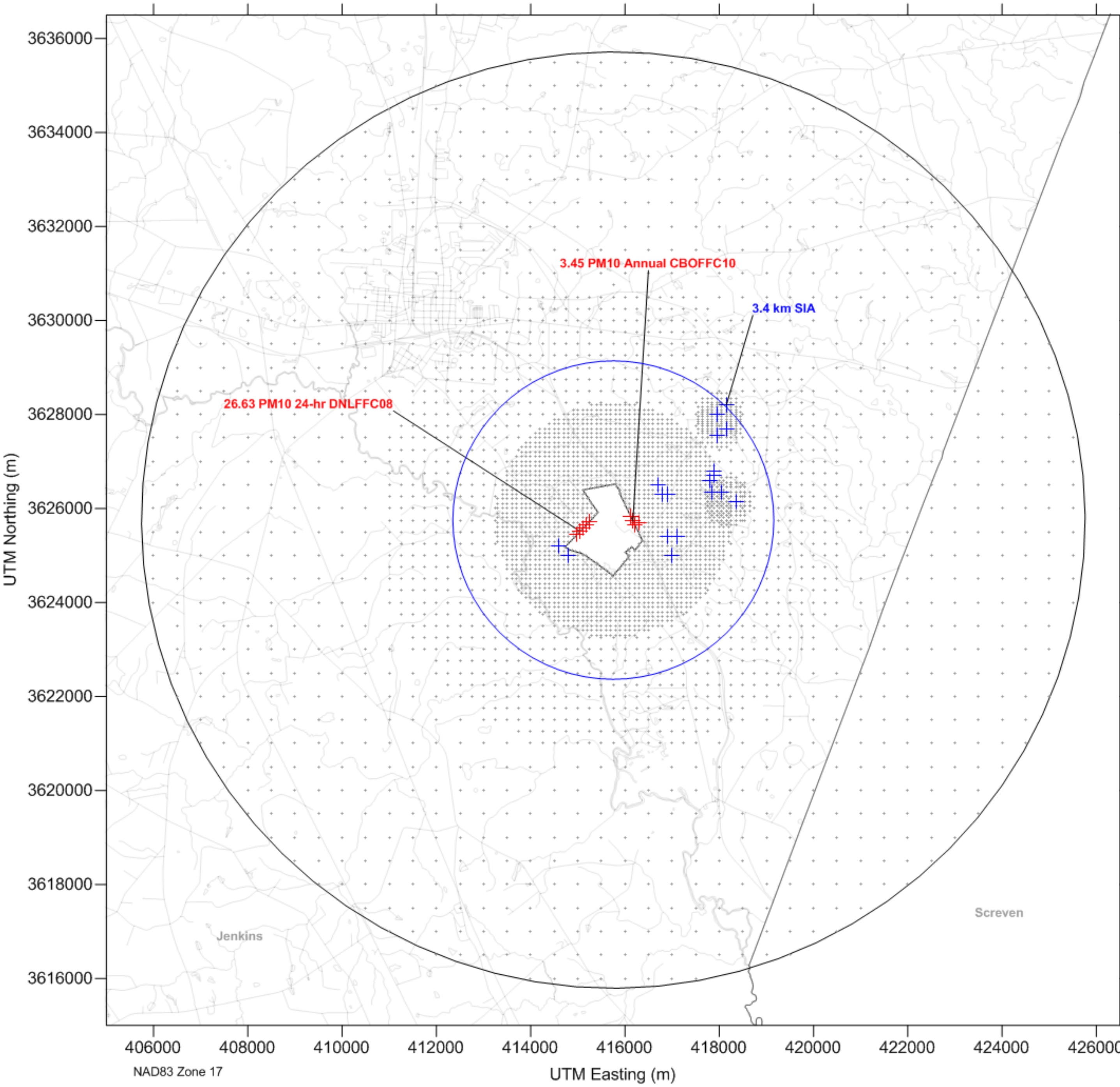

Figure 2.2.4-1: Maximum Significant Impacts for 24-Hour and Annual PM_{10} and Determination of Significant Impact Area

2.2.5 $PM_{2.5}$

Table 2.2.5-1 summarizes the results of the preliminary impact assessment for $PM_{2.5}$. As discussed earlier, only the statistical form of the $PM_{2.5}$ SIL's based on the NAAQS was used to assess the SIA since the increments were not evaluated. However, the highest first-high concentrations were also determined without multiyear averaging for comparison to the 24-hour *de minimis* monitoring concentration. The results show that a full impact analysis for the $PM_{2.5}$ NAAQS is required since a significant impact was predicted for the 24-hour and annual averaging periods.

Table 2.2.5-1: Class II Significance Results for $PM_{2.5}$ and Surface Characteristics Sensitivity

Pollutant	Avg. Period	SIL (µg/m³)	Year	Maximum Significant Impact UTM NAD83 East (m)	Maximum Significant Impact UTM NAD83 North (m)	Maximum Significant Impact Conc. (µg/m³)	Furthest Significant Receptor UTM NAD83 East (m)	Furthest Significant Receptor UTM NAD83 North (m)	Furthest Significant Receptor Conc. (µg/m³)	Distance (km)
Augusta Daniel Field Surface Characteristics										
$PM_{2.5}$	24-hr	1.2	5YR	415,113.20	3,625,579.50	9.76	419,150.00[1]	3,628,550.00[1]	1.20[1]	4.4[1]
$PM_{2.5}$	24-hr	N/A[2]	2006	415,049.80	3,625,513.40	10.14	N/A	N/A	N/A	N/A
			2007	415,176.70	3,625,645.70	10.34	N/A	N/A	N/A	N/A
			2008	415,049.80	3,625,513.40	11.97	N/A	N/A	N/A	N/A
			2009	415,240.20	3,625,711.90	11.19	N/A	N/A	N/A	N/A
			2010	414,986.30	3,625,447.20	9.22	N/A	N/A	N/A	N/A
$PM_{2.5}$	24-hr	Annual	2006	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CARBO Ceramics Millen Facility Project Site Surface Characteristics										
$PM_{2.5}$	24-hr	1.2	5YR	N/A	N/A	N/A	N/A	N/A	N/A	N/A
$PM_{2.5}$	Annual	0.3	5YR	416,168.30	3,625,735.50	1.50	417,500.00	3,625,200.00	0.31	1.8

[1] The furthest receptor at which a significant impact was predicted was resolved to 100 meter spacing using a circular grid with a radius of 500 meters (80 receptors) centered on the receptor being resolved (416,250.00 m east, 3,628,500.00 m north)

[2] Highest first-high concentrations used for comparison to the 24-hour *de minimis* monitoring concentration

Based on the results of the preliminary impact assessment for PM_{10}, significance modeling for $PM_{2.5}$ consisted separate model runs for the 24-hour and annual averaging period using the meteorological data set that resulted in more conservative impacts for PM_{10}. Additionally, since certain receptors in elevated terrain displayed sensitivity to the manner in which air quality impacts from fugitive emissions were treated, the non-default option to assume flat terrain for volume sources was used to ensure the maximum significant impacts at all receptors were determined.

In this case, it is less clear if use of the airport location meteorological data set for both averaging periods will result in the most stringent emission limitations since the annual background concentration for $PM_{2.5}$ amounts to a larger portion of the NAAQS. However, based on the maximum significant impacts for the 24-hour averaging period, the annual design concentration will not require application of a different level of best available control technology (BACT) than proposed. Therefore, it would also be appropriate to use the surface characteristics of the NWS measurement location to assess the annual $PM_{2.5}$ NAAQS.

As shown in Figure 2.2.5-1, the maximum significant impact for each averaging period occurred within the 100 meter spaced portion of the receptor grid within 2.5 km of the project site. Only one receptor within the 250 meter spaced portion of the receptor grid were resolved to 100 meter spacing to identify the furthest receptor at which a significant impact was predicted for all averaging periods. After resolving this receptor, the largest $PM_{2.5}$ SIA for the 24-hour and annual averaging periods was determined to be 4.4 km.

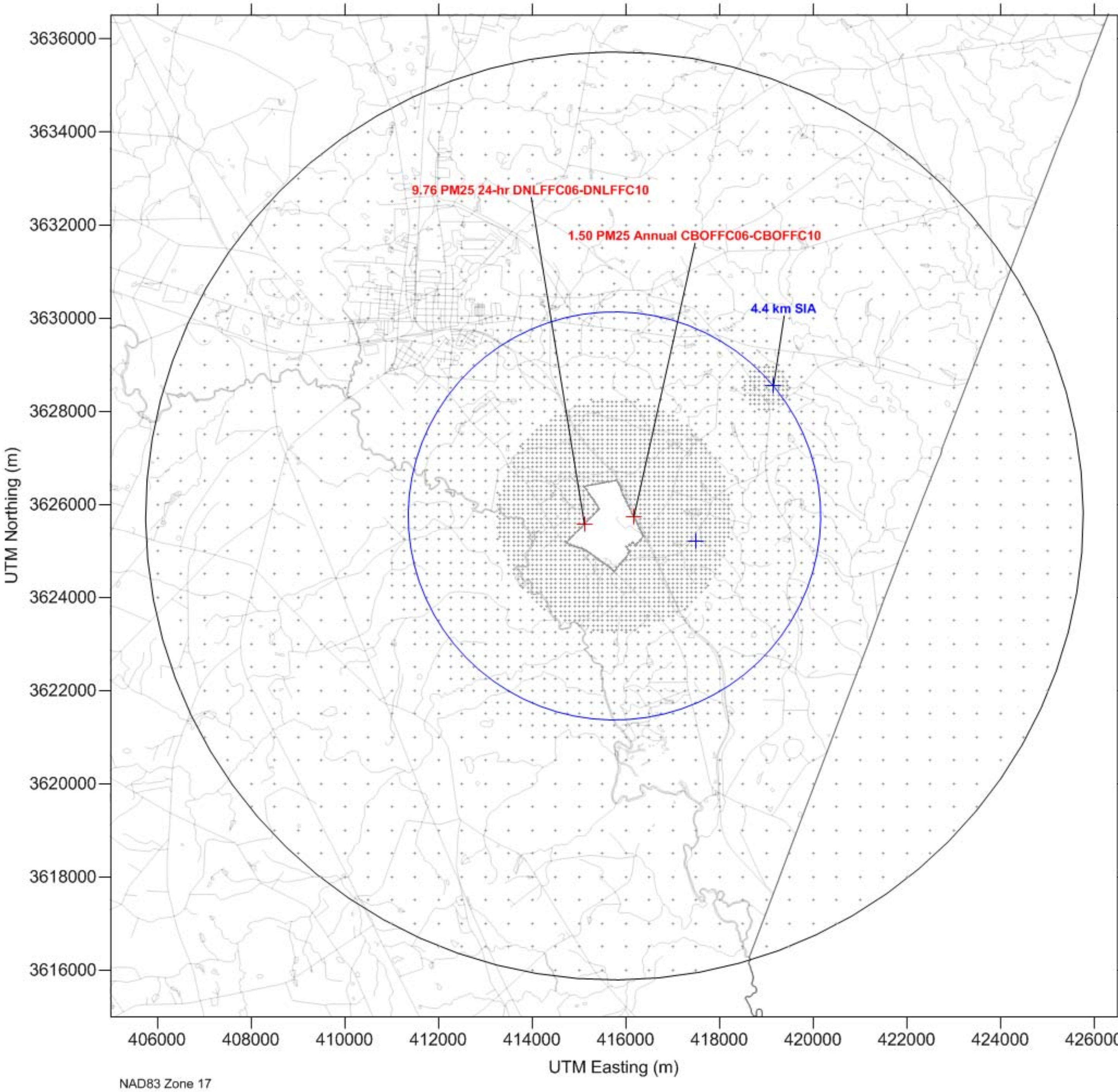

Figure 2.2.5-1: Maximum Significant Impacts for $PM_{2.5}$ and Determination of Significant Impact Area

2.3 Ambient Monitoring Requirements

Since in the preliminary impact assessment emissions of PM_{10}, $PM_{2.5}$, NO_2, and SO_2 for the Millen facility were predicted to have a significant impact, ambient monitoring data was collected to determine the existing air quality in the area the project would affect for the NAAQS air quality analysis. In lieu of conducting preconstruction ambient monitoring for this purpose, the PSD rules allow the permitting authority to exempt a PSD applicant from such requirements on a pollutant specific basis if the maximum ambient impact or existing air quality in the area are shown to be *de minimis*.
Table 2.3-1 summarizes the maximum significant impacts for each pollutant from the preliminary impact analysis in comparison to the *de minimis* monitoring concentrations.

Table 2.3-1: Comparison of Maximum Ambient Impacts to Significant Monitoring Concentrations

Pollut-ant	Avg. Period	SMC ($\mu g/m^3$)	2006 ($\mu g/m^3$)	2007 ($\mu g/m^3$)	2008 ($\mu g/m^3$)	2009 ($\mu g/m^3$)	2010 ($\mu g/m^3$)
PM_{10}	24-hr	10	**22.62(A)**	**22.88(P)**	**26.63(A)**	**24.06(A)**	**20.40(A)**
$PM_{2.5}$	24-hr	4	**10.14(A)**	**10.34(A)**	**11.97(A)**	**11.19(A)**	**9.22(A)**
NO_2	Annual	14	7.72(P)	7.39(P)	7.17(P)	6.33(P)	8.30(P)
SO_2	24-hr	13	**15.5(P)**	**16.13(A)**	**16.99(A)**	**18.15(A)**	**15.76(P)**
CO	8-hr	575	116.23(A)	111.07 (P)	116.39(A)	111.66(A)	111.45(A)

(A) Airport site surface characteristics (Augusta Daniel Field)
(P) Project site surface characteristics

As shown in the above table, the maximum significant impacts for NO_2 and CO are *de minimis*. Therefore, preconstruction monitoring for these pollutants was not required. However, emissions of PM_{10}, $PM_{2.5}$ and SO_2 did exceed the 24-hour significant monitoring concentrations for each pollutant. Instead of conducting a site-specific program for the collection of continuous air quality data, GA EPD waived preconstruction monitoring requirements for these pollutants since the agency operates an extensive monitoring network throughout the state which provides quality assured data that is contemporaneous, representative and suitable for use in PSD review. For PM_{10}, air quality data are already available to from a statewide study of rural monitoring locations. In the Class II modeling protocol submitted to the agency on July 19, 2011, CARBO proposed to use continuous monitoring data from the existing Augusta Bungalow Road (#132450091) and Macon SE monitoring sites (#130210012) for $PM_{2.5}$ and SO_2, respectively, as these sites would be representative, and likely conservative, for the area impacted by the Millen facility given the sparse distribution of stationary sources through the modeling domain.[5] In the July 27, 2011 Class II modeling protocol approval letter, in

[5] Excluding the 1-hour averaging period for NO_2 and SO_2, there are no permitted stationary sources located with the significant impact area for any pollutant. The stationary source closest to the project location is the Southern Natural

addition to providing background air quality concentrations for NO_2, CO, and PM_{10}, GA EPD also provided background concentrations for the $PM_{2.5}$ and SO_2 NAAQS air quality analysis based on continuous data from these monitoring sites. Table 2.3-2 summarizes the air quality data collected to establish the existing level of air quality in the area impacted by the Millen facility. All background values are based on the most recent three-year or five-year period, as applicable.

Table 2.3-2: Ambient Background Concentrations

Pollutant	Monitor Location	Averaging Period	Background ($\mu g/m^3$)	Comments
NO_2	Yorkville (#132230003)	1-hr [1]	33.24 [1]	3-year average of the 98th-percentile annual distribution of 1-hour daily maximum concentrations (35.75, 30.10, and 33.86 $\mu g/m^3$) [1]
		Annual	5.2	5-year average of annual average concentrations
SO_2	Macon SE (#130210012)	1-hr [1]	67.18 [1]	3-year average of the 99th-percentile annual distribution of 1-hour daily maximum concentrations (68.06, 73.29, and 60.20 $\mu g/m^3$) [1]
		3-hr	51.48	3-year average of highest 2nd-high 3-hour block average concentrations
		24-hr	16.75	3-year average of highest 2nd-high 24-hour block average concentrations
		Annual	3.89	3-year average of annual average concentrations
CO	Yorkville (#132230003)	1-hr	943	5-year average of highest 2nd-high 1-hour average concentrations
		8-hr	802	5-year average of highest 2nd-high 8-hour rolling average concentrations
PM_{10}	--	24-hr	38.0	Recommended statewide background concentrations
		Annual	20.0	
$PM_{2.5}$	Bungalow Road (#132450091)	24-hr	25	3-year average of the 98th-percentile annual distribution of 24-hour average concentrations
		Annual	12.7	3-year average of annual average concentrations (based on the average of quarterly average daily values)

[1] Existing air quality for the 1-hour averaging periods for NO_2 and SO_2 are based on the "first tier" uniform background concentration; no refined by season and hour-of-day pairing was proposed or used for the air quality analysis

Although no *de minimis* monitoring concentration has been established for ozone, since the project NO_x emissions are greater than 100 tpy, an air quality analysis is required,

Gas Company – Woodcliff Gate Compressor Station (AIRS 25100029) which operates a compressor driven by a single natural gas-fired combustion turbine to increase the pressure in the natural gas transportation pipeline to maintain downstream flow. The compressor station is located 12 km from the project site and has annualized maximum allowable hourly emissions of $PM_{2.5}$ and SO_2 less than 2 tpy. The next stationary source closest to the project location, the Screven Gin Company (AIRS 25100027), is located 23 km away.

including the collection of ambient monitoring data. As discussed in Section 2.1.1, on July 25, 2011, CARBO submitted to US EPA Region 4 and GA EPD a modeling protocol requesting approval to use the Plume Volume Molar Ratio Method (PVMRM) as part of the tiered screening approach to obtaining hourly average estimates of NO_2 for comparison to the NAAQS. Since PVMRM requires background ozone concentrations to be specified, CARBO developed a database of ozone concentrations based on the maximum of contemporaneous observations at seven monitoring sites in Georgia and one monitoring site in South Carolina. The data were collected for calendar years 2006 through 2010 and are contemporaneous with the five years of NWS meteorological data provided by the agency for the project. CARBO asserts that the development of the ozone database for PVMRM satisfies the requirement to collect ambient monitoring data for ozone since this database was an integral part of the 1-hour NO_2 NAAQS air quality analysis. Please refer to Attachment C of this volume which contains the PVMRM protocol as well as a discussion of the ozone database.

2.4 PSD Regional Source Inventories for Air Quality Analysis

Once it was determined that the construction of the proposed Millen facility would result in a significant impact for the 24-hour and annual averaging periods for PM_{10} and $PM_{2.5}$, the 1-hour and annual averaging periods for NO_2, and the 1-hour, 3-hour, 24-hour and annual averaging periods for SO_2, a baseline offsite regional source inventory for each pollutant was developed to determine the portion of the pollutant background concentration attributed to nearby sources for each NAAQS analysis as well as to determine the increase in the pollutant concentration above the baseline concentration for each PSD increment analysis. From the baseline inventory, only those stationary sources expected to cause a significant concentration gradient in the vicinity of the Millen facility were selected for the NAAQS inventory using several screening techniques. Then, the PSD increment inventory was developed for each pollutant by determining which sources in the NAAQS inventory are not accounted for in the baseline concentration.

2.4.1 Extent of Screening Areas

The screening area, or total impact area (TIA), for each pollutant was determined based on guidance provided by GA EPD in the July 27, 2011 Class II modeling protocol approval letter. In the letter, GA EPD made a distinction between pollutants covered under guidance provided in the 1990 New Source Review (NSR) Workshop Manual and those for which NAAQS have been promulgated subsequent to its publication (24-hour and annual $PM_{2.5}$ and the 1-hour NO_2 and SO_2 NAAQS). For pollutants and averaging periods addressed in the NSR Workshop Manual, the TIA was determined in the traditional manner – as the annular area extending 50 km beyond the SIA. For $PM_{2.5}$, the TIA was established using the same procedure making the baseline list of facilities included for PM_{10} identical to those included for $PM_{2.5}$. For the 1-hour NO_2 and SO_2 NAAQS, the minimum extent of the offsite inventory was determined as the SIA, or buffered SIA in the case of SO_2, with the maximum extent of the offsite inventory limited to the transport distance covered by the fastest wind speed in the meteorological data set. Although GA EPD allows for further refinement of the offsite inventories for the new 1-hour standards based on a “sectorial” approach, CARBO did not apply this method for the baseline inventory; only the fastest wind speed was used to limit the maximum extent of the inventories for these averaging periods in all wind sectors. Based on this, the following lists the extent of the TIA’s used to develop the offsite regional source inventories for each pollutant based on the SIA’s determined in the preliminary impact assessment:

- 53.4 km for PM_{10};
- 54.4 km for $PM_{2.5}$;
- 56.5 km for annual NO_2;
- 50.0 km for 1-hour NO_2;
- 54.0 km for 3-hour, 24-hour, and annual SO_2; and
- 41.0 km for 1-hour SO_2 (29.0 km buffer)

The transport distance covered by the fastest 1-hour average wind speed that was used to limit the extent of the 1-hour NO_2 and SO_2 inventories occurred during hour 13 on Julian Day 79, March 19, 2008 (40.6 km based on 11.28 m/s). This speed is based on the average of valid 1-minute ASOS winds determined by AERMINUTE and reflects the truncated wind speed adjustment of 0.26 m/s applied by AERMET to all ASOS based winds (i.e., winds measured after the ASOS commissioning date for Augusta Daniel Field). Since the buffered SIA for 1-hour SO_2 was 29 km, the TIA for this averaging period may be limited to 41 km. Additionally, since the SIA for the 1-hour NO_2 NAAQS is larger than the limiting distance, the 1-hour NO_2 TIA could not be limited using this procedure and remained unchanged at 50 km.

With the largest screening area for a pollutant being 56.5 km (annual NO_2), a baseline inventory of all stationary sources within 60 km of the project site was developed using additional buffer to add an element of conservatism to the air quality analysis. The list of sources included in the baseline inventory is provided in Table 1 of Attachment G of this volume.

2.4.2 Inventory of Stationary Sources

The area circumscribed by a 60 km radius circle about the proposed project site includes 18 counties in Georgia and South Carolina. These counties are Bulloch, Burke, Candler, Effingham, Emanuel, Evans, Jefferson, Jenkins, Johnson, Richmond, Screven, Tattnall, Toombs, Treutlen, and Washington counties in Georgia and Aiken, Allendale, Barnwell, and Hampton counties in South Carolina. In order to identify stationary sources in Georgia for the baseline inventory, GA EPD's list of stationary sources, available online at the PSD resources section of the Stationary Source Permitting Program (SSPP) website, was used. For each facility, the PSD resources source list includes the Air Information Retrieval System (AIRS) identification number, name, street address, city, zip code, geographic coordinates, county, operating status[6], Title V source classification[7], start up and shut down dates, plant description and the facility's major source status with respect to major NSR and HAP. Stationary sources were identified by mapping the geographic coordinates of all AIRS numbers within each county and excluding those not within 60 km of the project site. All sources listed as permanently closed or shut down were also removed from the baseline inventory.[8] After compiling the list of AIRS numbers identified, air quality permits, Title V permit applications and major NSR permit applications available online and permitting files available in hardcopy format at

[6] Operational status includes the codes "O" for operating, "X" for permanently closed or shut down, "T" for temporary and "P" for planned.
[7] Title V source classification includes the codes "A" for major source, "B" for true minor, "SM" for synthetic minor, and "PR" for permit-by-rule.
[8] Since GA EPD does not guarantee the accuracy or completeness of the information provided in the PSD resources source list, sources listed as permanently closed or shut down were initially included in the baseline inventory. However, after review of the hardcopy permitting files for facilities in several counties, CARBO is confident that the source list is accurate in this respect. However, CARBO did find several instances of sources being listed as operating but later confirmed to no longer exist or be permanently shut down. These sources are identified and remain listed in the baseline inventory but were not included in the air quality analysis in any manner (e.g., were not evaluated for increment expansion).

the GA EPD Air Protection Branch (APB) office in Atlanta, Georgia were reviewed to validate the information available in the PSD resources source lists as well as to determine the model emission and source input data for the air quality analyses. GA EPD's major PSD increment consuming sources spreadsheet, last revised August 2004, was also reviewed to support the inventory. In total, 90 sources in Georgia were evaluated for the baseline inventory. Of these sources, eight listed as operating were confirmed to no longer exist or be permanently shut down and permitting files could not be found in electronic or hardcopy format for seven sources. Additionally, one source was determined to be temporary and one existing source had applied for an initial air quality permit that was ultimately denied. For sources listed in the PSD resources source list as "wood furniture manufacturing", "automotive painting and refinishing", and "auto collision and repair", the only records contained in the permitting files were either permit-by-rule applications for coating and gluing operations or initial notifications for the paint stripping and miscellaneous surface coating operations area source MACT (40 CFR 63 Subpart HHHHHH) and did not have any quantifiable emissions for PM_{10}, $PM_{2.5}$, NO_x or SO_2.

For sources in South Carolina, CARBO obtained the NAAQS and PSD increment inventory spreadsheets for Aiken, Allendale, Barnwell, and Hampton counties from Mr. John Glass with the South Carolina Department of Health and Environmental Control (SCDEHC).[9] For each county, the spreadsheets include company name, air quality permit number, source identification, construction and modification dates, maximum allowable and increment affecting emission rates for PM_{10}, NO_x and SO_2, UTM coordinates, source parameters, and comments useful for modeling. Similar to the Georgia portion of the inventory, stationary sources were identified by mapping the coordinates of all sources (point, volume, and area) within each county and removing those not within 60 km of the project site. After mapping each source, the coordinates for sources located in NAD27 were modified to NAD83 to be consistent with the datum used for the air quality analysis. In total, there are only five sources within these counties included in the baseline inventory.

Figure 2.4.2-1 through Figure 2.4.2-4 show the location of each source included in the baseline inventory (i.e., all sources with AIRS numbers located within 60 km of the project site) in relation to the proposed Millen facility as well as their emission intensities of PM_{10}, $PM_{2.5}$, NO_x or SO_2, respectively. Emission intensities shown are based on the annualized maximum allowable hourly emission rates without incorporating any annual operating or emission limitations. These are the emission rates that were used as part of nearby source screening as well as for the air quality analysis, including the annual averaging period, excluding sources or emission scenarios identified as "intermittent".

[9] The spreadsheets for Aiken (Aik_0080.xls), Allendale (All_0160.xls), Barnwell (Bar_0300.xls), and Hampton (Ham_1280.xls) are provided in the attached electronic files.

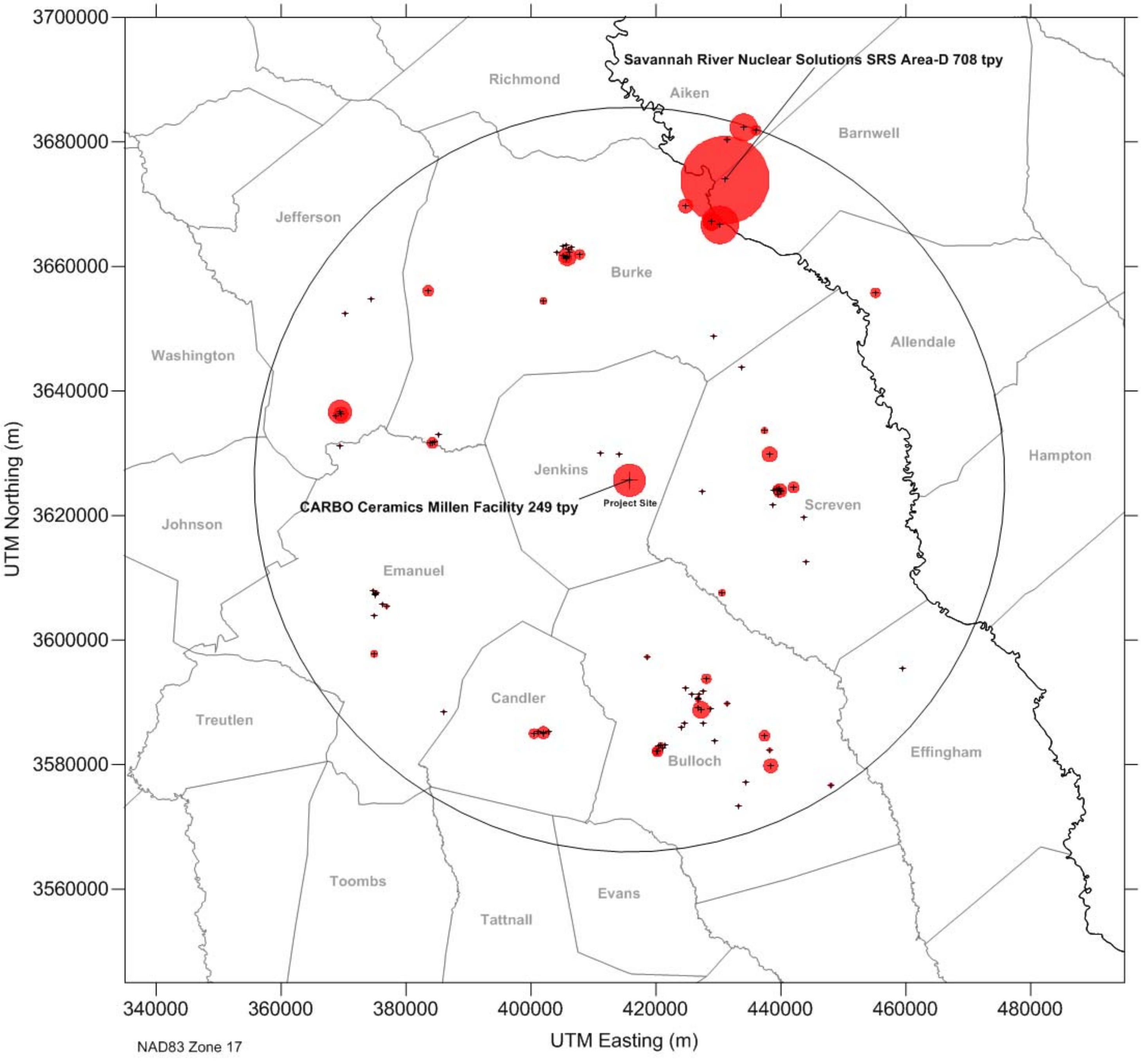

Figure 2.4.2-1: Location of Stationary Sources and PM_{10} Emission Intensity

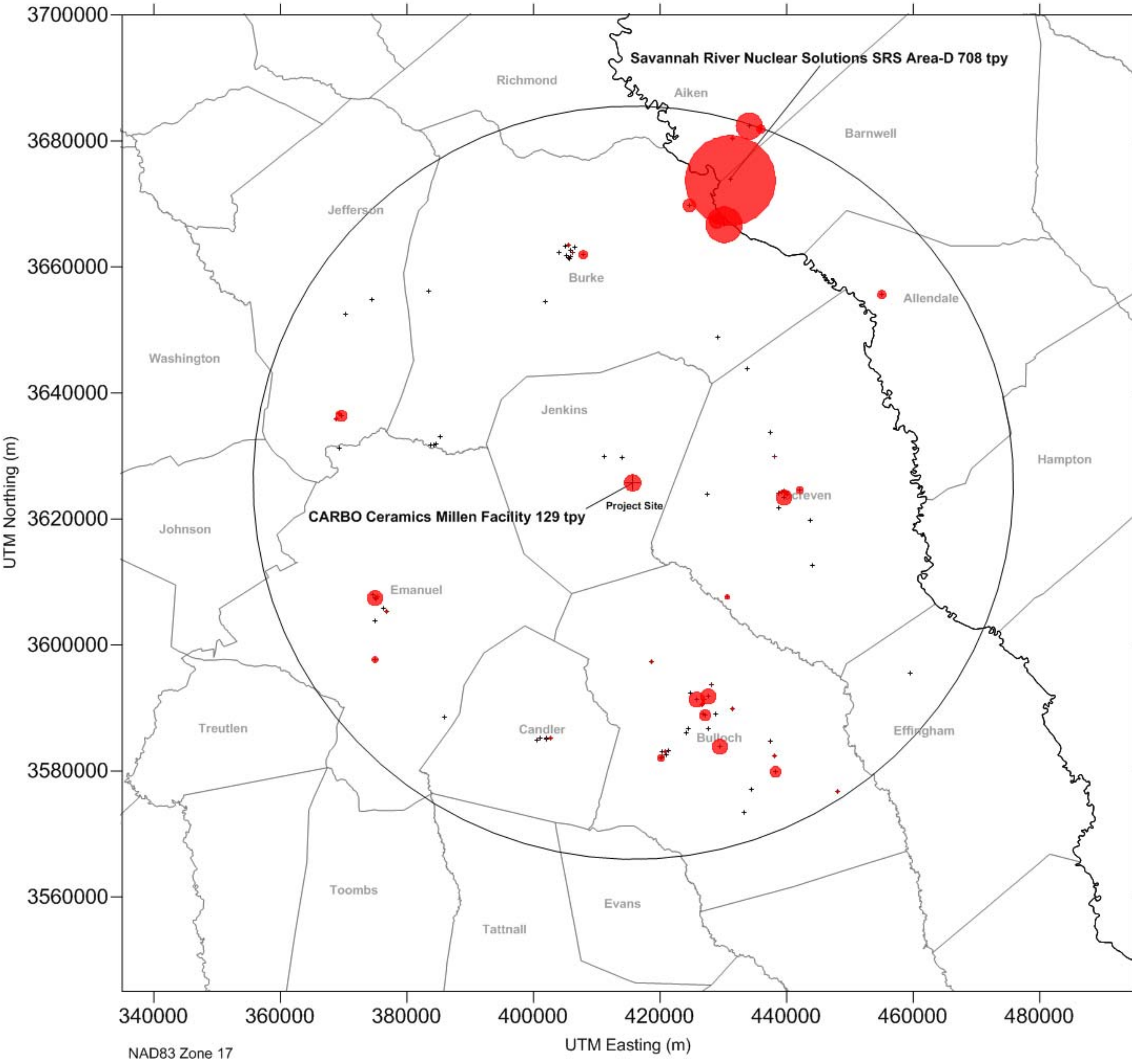

Figure 2.4.2-2: Location of Stationary Sources and $PM_{2.5}$ Emission Intensity

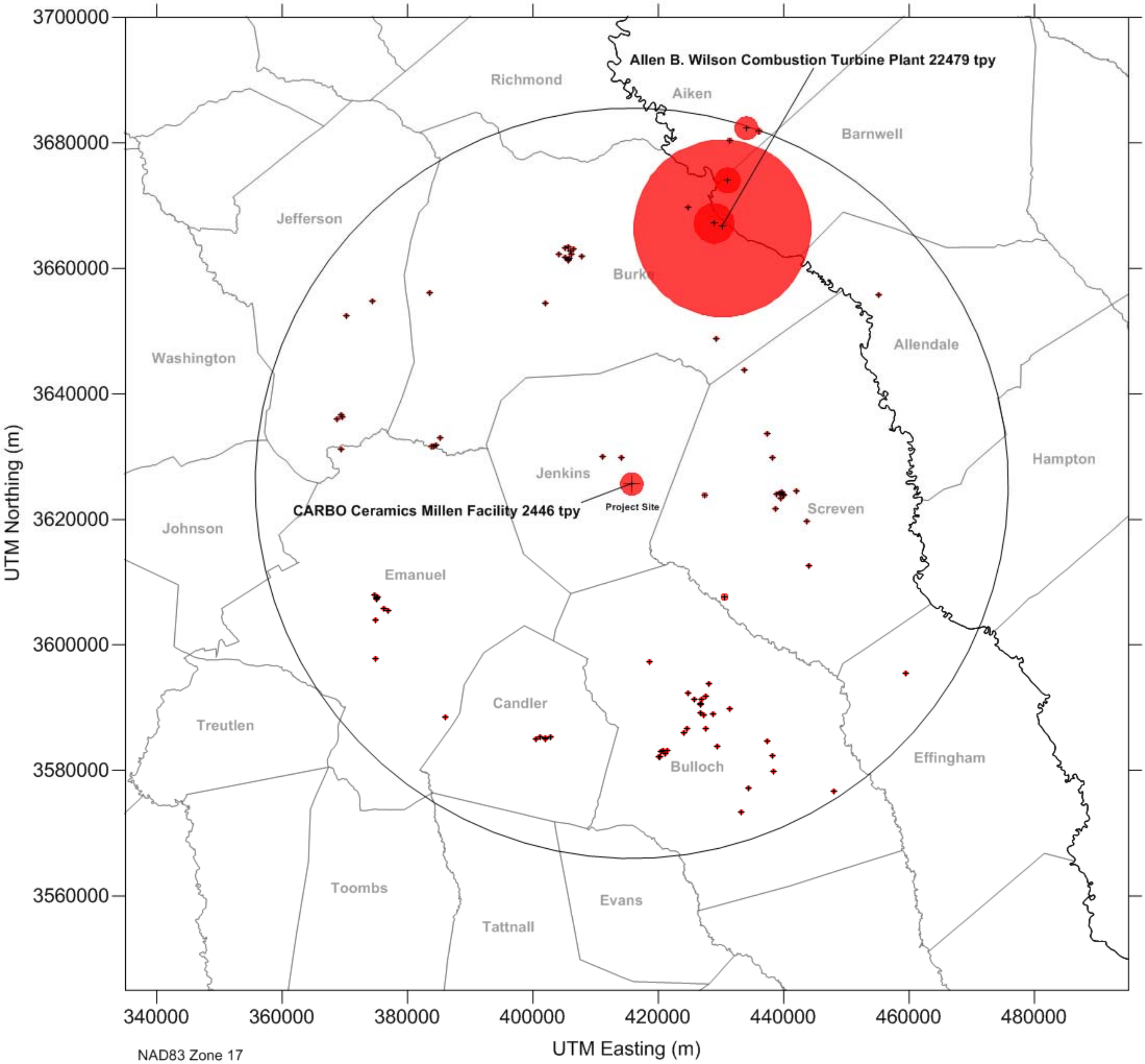

Figure 2.4.2-3: Location of Stationary Sources and NO_2 Emission Intensity

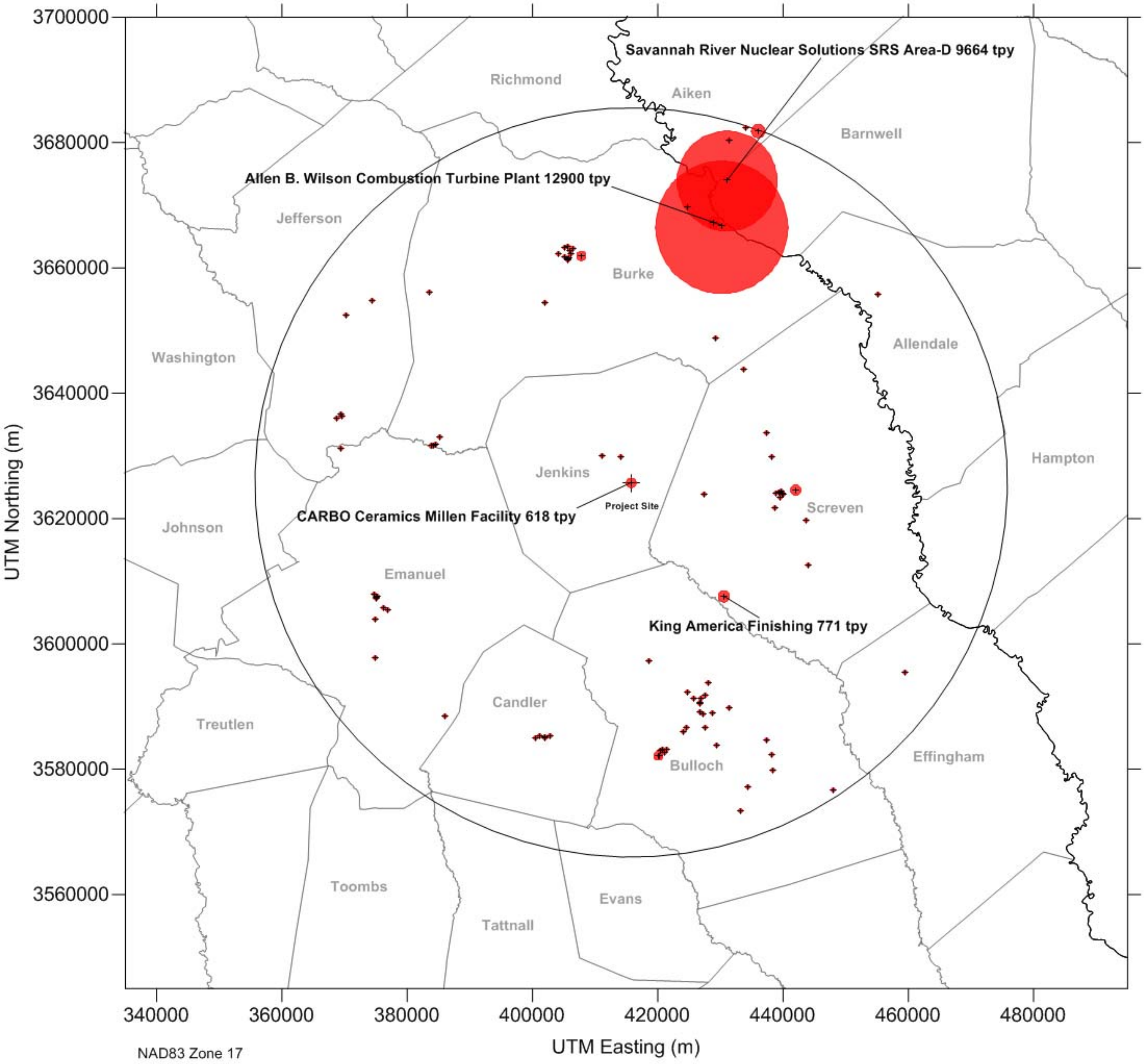

Figure 2.4.2-4: Location of Stationary Sources and SO_2 Emission Intensity

2.4.3 Identifying Nearby Sources

For the air quality analysis, the total air quality concentration compared to the NAAQS includes the background contribution from both *nearby* and *other* sources. Source referred to as "other" are those natural, minor, and distant major sources that are included in the existing air quality data established for the area impacted by Millen facility (i.e., are included in the background concentrations listed in Table 2.3-2). However, since sources typically do not operate at their maximum allowable capacity, modeling is used to establish the background contribution of certain sources determined to be "nearby". Nearby sources are those that are expected to cause a "significant concentration gradient" in the vicinity of the project. Traditionally, PSD applicants have used the Q/D (or 20D) screening method to identify nearby sources located outside of the SIA for a pollutant. The 20D screening method is based on the ratio of a facility's maximum allowable emissions in tons per year (Q) and either the source-to-source distance for short-term averaging periods or the distance from the source to the outer edge of the SIA for the annual averaging period. If a source's Q/D ratio is greater than 20, then the source can be expected to cause a significant concentration gradient in the vicinity of the project for the averaging period in question and should be explicitly modeled. However, the 20D method defines "significant concentration gradient" only in terms of the SIL's for PM_{10}, NO_2, SO_2, and CO. Since the SIL's for the 24-hour and annual $PM_{2.5}$ and the 1-hour NO_2 and SO_2 NAAQS were not established at the time the screening method was developed, 20D is not applicable to screening sources for these NAAQS inventories. Therefore, based on guidance provided by GA EPD, other screening criteria, described below, were used to identify nearby sources for $PM_{2.5}$ and the 1-hour NO_2 and SO_2 NAAQS inventories.

The baseline inventory of all stationary sources within 60 km of the Millen facility is provided as Table 1 of Attachment G to this volume. For each source, the table lists the state, county, AIRS identification number, geographic location, UTM coordinates, elevation, source classification[10], permitting status[11], the annualized maximum allowable hourly emissions (Q)[12] for PM_{10}, $PM_{2.5}$, NO_2, and SO_2, and the source-to-source distance (D). For sources within the TIA, the

[10] Since this PSD application will establish the minor source baseline dates for PM_{10} and SO_2, a source's classification is primarily used to identify emission increases at major PSD sources which occurred after the major source baseline date and affect the available increment since they are not part of the baseline concentration. Source classifications are based on a facility's Title V or major NSR status and include "general", "minor", "Title V", or "PSD". Only those sources listed as "PSD" may affect the increment for PM_{10} and SO_2. For NO_2, all emission increases from any source listed which occurred during or after 1988 are presumed to affect the annual increment.

[11] A source's permitting status includes facilities whose most recent permitting action is "active" or "pending". The permitting status also lists as "closed" the eight sources listed as operating in the PSD resources source list but confirmed to no longer exist or be permanently shut down, "no files" the seven sources for which electronic or hardcopy permitting files could not be found, "temporary" for the source determined to be temporary, and "denied" for the existing source that applied for an air quality permit that was never issued.

[12] Since the "Q" is based on the annualized maximum hourly allowable emissions, some synthetic minor sources (listed as "minor") will have emissions greater than the Title V or PSD major source thresholds. Only those listed as "Title V" or "PSD" are actually subject to the federal operating and major NSR preconstruction permitting programs.

Q/D ratio for both the short-term and long-term averaging periods is calculated.[13] A short-term or long-term Q/D ratio is listed as "N/A" if the source is within the SIA or beyond the screening area since the screening value would be irrelevant in either case. Sources located within 2 km of one another are identified as a group and their Q/D screening value was calculated using an aggregated Q for a pollutant and the minimum source-to-source distance of any facility within the 2 km grouping.[14]

As previously mentioned, the Q used for each pollutant for nearby source screening is based on the annualized maximum allowable hourly emissions for each facility. For most Georgia sources, the basis for these emission estimates is provided in Table 3 of Attachment G[15] to this volume and is consistent with the procedure specified in Table 8-2 of US EPA's *Guideline on Air Quality Models*. For each emission unit at a facility in the baseline inventory, the table lists the modeled source identification, permit source identification, source description, control device description, construction and modification dates and the design capacity[16] used to calculate emissions based on the maximum allowable or federally enforceable emission limitation for NO_x, SO_2, PM_{10}, and $PM_{2.5}$. In all cases where an air quality permit specifies an emission limitation, the emission limitation was used to determine the maximum allowable hourly emissions used for source screening and the air quality analysis. All emission limitations used are identified by permit and permit condition number for each source.[17] However, not all sources have emission limitations specified in their air quality permit or are covered by a SIP limitation. This is particularly true for minor sources, existing major PSD sources that have not undergone a major modification, and for $PM_{2.5}$. For these emission units, potential emissions were determined based on the most applicable emission factor found in resources such as AP-42 or emission estimates provided in a source's permit application. For all South Carolina sources, annualized maximum allowable hourly emissions for each facility were determined from the NAAQS and PSD increment inventory

[13] The Q/D ratio for the long-term averaging period is based on the source-to-source distance minus the SIA for each pollutant.

[14] Facilities belonging to a 2 km grouping are identified in Column E of the baseline inventory. Grouped facilities may also be identified by finding facilities with identical Q/D screening values.

[15] For certain smaller sources, such as permit-by-rule concrete batch plants, cotton gins, and other true minor sources, the Q for each pollutant is calculated or entered directly in Table 1 of Attachment G based on information found in permit applications, permit narratives, and memoranda contained in the facility's online or hardcopy permitting files and are only briefly addressed in Table 3 in anticipation of these sources being defined as *other*.

[16] Only the design capacity required to calculate the maximum allowable emission limitation for a pollutant is listed. Types of design capacities used include maximum hourly processing rate (tons per hour); maximum rated hourly heat input (million Btu per hour); maximum rate brake horsepower (bhp); maximum hourly fuel consumption, fuel type (e.g., natural gas, diesel, No. 2 fuel oil, green sawdust, etc.) and units (e.g., standard cubic feet per minute (scfh), gallons per hour (gph), pounds per hour (pph), etc.); volumetric exhaust flow rate (dry standard cubic feet per minute (dscfm; for grain loading limitations)

[17] For example, Vogtle Electric Generating facility was issued a 502(b)(10) change for the replacement of an existing fire pump engine (Application No. TV-19578; permit 4911-033-0030-V-02-4). Emissions of NO_x calculated from this engine used for source screening, and the annual NO_2 NAAQS and increment air quality assessment, are based on Condition No. 3.3.19.a which limits NO_x to no greater than 7.8 grams per brake horsepower hour based on the new source performance standard (NSPS) for compression ignition internal combustion engine (Subpart IIII). This is referenced as "V-02-4 3.3.19.a" in Table 3 of Attachment G to this volume.

spreadsheets obtained from SCDEHC, which reflect the maximum permitted rates.

For PM_{10} and $PM_{2.5}$, both the filterable and condensable fractions were addressed separately when necessary to ensure that total direct particulate matter emissions were used for source screening and as input into the model. Where an air quality permit specifies an emission limitation (e.g., Georgia Rule (d) or NSPS Subpart IIII), condensable PM was assumed to be implicitly included. Otherwise, total PM was determined using separate emission factors for filterable and condensable PM or in some cases condensable PM was assumed to not be associated with type of process in question (e.g., automobile shredding or grain shipping and receiving). For certain emission units, a single emission factor was found that represented total PM and was noted as such. For most emission units, $PM_{2.5}$ was assumed to equal PM_{10}. However, if a separate emission factor existed for $PM_{2.5}$, or if a published $PM_{2.5}/PM_{10}$ ratio applicable to the unit or source in question could be found, $PM_{2.5}$ emissions were directly calculated and the basis for the estimate is provided. Generally, the only emission units with different emission rates for PM_{10} and $PM_{2.5}$ emissions were liquid or solid fuel combustion units not associated with material handling or processing (e.g., boilers, engines, and turbines) or cotton ginning. Using this procedure, CARBO believes that both the PM_{10} and $PM_{2.5}$ emissions used for source screening and the air quality analysis adequately represent both filterable and condensable fractions.

After determining the Q/D screening value for facilities, or groups of facilities, the 20D method was applied to all pollutants and averaging periods except for the $PM_{2.5}$ and the 1-hour NO_2 and SO_2 NAAQS. After review of the original basis for 20D, GA EPD determined that the appropriate screening criterion for $PM_{2.5}$ was 2D based on the level of the $PM_{2.5}$ SIL's. Unlike 20D, 2D for $PM_{2.5}$ uses the source-to-source distance for both averaging periods. Therefore, the Q/D screening values calculated for the 24-hour and annual averaging periods for $PM_{2.5}$ are identical.

For PM_{10}, all sources in the baseline inventory have Q/D screening values less than 20. However, sources with Q/D ratios greater than 10 were selected for the PM_{10} NAAQS inventory to be conservative.[18] The PM_{10} NAAQS inventory is provided in Table 5 of Attachment G to this volume.

For $PM_{2.5}$, 30 sources in the baseline inventory have Q/D screening values greater than 2. Because the number of minor sources defined as nearby based on 2D was unexpectedly large, GA EPD allowed a more refined screening technique to be used. The 20D screening method was developed based on modeling using SCREEN2 to determine a facility's air quality impacts at various distances using maximum annual emissions emitted from a stack with poor dispersion

[18] Three sources have Q/D ratios for PM_{10} greater than 10 but less than 20: Allen B. Wilson Combustion Turbine Plant (Georgia; AIRS 03300008); Vogtle Electric Generating Plant (Georgia; AIRS 03300030); and Savannah River Nuclear Solutions Area-D (South Carolina; AIRS 030000036); Allen B. Wilson and Vogtle are part of a 2 km grouping (identified as "033-3" or the third group in Burke County (FIPS Code 033))

characteristics.[19] The SCREEN2 modeling also assumed an atmospheric stability class D, wind speed of 2.5 m/s, and calculated mixing height driven by stable (mechanical) conditions. In order to perform refined screening for sources of $PM_{2.5}$ with screening values greater than 2, CARBO used AERMOD with both sets of meteorological data to determine if each source, or group of sources, would have a significant impact for the $PM_{2.5}$ NAAQS. The refined screening used the total Q for each facility, default stack parameters consistent with the original 20D development[20], and 100 meter spaced receptors within the 4.4 km SIA determined in the preliminary impact assessment. Only those sources predicted to have a significant impact for $PM_{2.5}$ within the SIA were included in the NAAQS inventory. The results of the refined screening are provided in Table 2 Attachment G to this volume. As shown in the table, only those sources included for the PM_{10} NAAQS inventory are included for $PM_{2.5}$. The $PM_{2.5}$ NAAQS inventory is provided along with nearby sources of PM_{10} in Table 5 of Attachment G to this volume. The refined screening method allowed for sources with Q/D screening values between 1.94 and 3.84 to be excluded from the inventory. Based on the impacts of each source or source group, the equivalent screening criteria for the sources excluded from the inventory using the refined technique ranged from around 3D to 12D.

For annual NO_2, eight sources in the baseline inventory have Q/D screening values greater than 20, three of which are located just beyond the TIA in South Carolina but where included in the NAAQS inventory to be conservative.[21] The annual NO_2 NAAQS inventory is provided in Table 6 of Attachment G to this volume. NO_x emissions limitations listed are based on total NO_x ($NO + NO_2$).

For 3-hour, 24-hour, and annual SO_2, eight sources in the baseline inventory have Q/D screening values greater than 20, three of which are located just beyond the TIA in South Carolina, and two hot mix asphalt plants with Q/D screening values just between 15 and 20 were included in the NAAQS inventory.[22] The SO_2 NAAQS inventory is provided in Table 7 of Attachment G to this volume.

For the 1-hour NO_2 and SO_2 NAAQS, no Q/D screening was applied. The minimum extent of the inventory was defined as the SIA from the preliminary

[19] Stack height 10 meters; exit velocity 0.01 m/s; stack exit temperature 293 K (ambient); stack exit diameter 1 m

[20] The stack exit temperature for refined $PM_{2.5}$ screening was modified to 0 K to allow AERMOD to use the dry bulb temperature for each hour of meteorological data for exhaust conditions at ambient temperature.

[21] Allen B. Wilson Combustion Turbine Plant (Georgia; AIRS 03300008); Vogtle Electric Generating Plant (Georgia; AIRS 03300030); King America Finishing (Georgia; AIRS 21500008); South Natural Gas Company – Woodcliff Gate Compressor Station (Georgia; AIRS 25100029); Savannah River Nuclear Solution (South Carolina; AIRS 00800041); Three Rivers Landfill (South Carolina; AIRS 00800112); Ameresco Federal Solutions (South Carolina; AIRS 00800144); and Savannah River Nuclear Solutions Area-D (South Carolina; AIRS 030000036). Allen B. Wilson and Vogtle are part of a Burke County 2 km group and SRS, Three River Landfill and Ameresco are part of an Aiken County 2 km group.

[22] Reeves Construction Company (Georgia; AIRS 03100011); Allen B. Wilson Combustion Turbine Plant (Georgia; AIRS 03300008); Vogtle Electric Generating Plant (Georgia; AIRS 03300030); Reeves Construction Company (Georgia; AIRS 03300037); Koyo Bearings USA (Georgia; AIRS 25100004); King America Finishing (Georgia; AIRS 21500008); Savannah River Nuclear Solution (South Carolina; AIRS 00800041); Three Rivers Landfill (South Carolina; AIRS 00800112); Ameresco Federal Solutions (South Carolina; AIRS 00800144); and Savannah River Nuclear Solutions Area-D (South Carolina; AIRS 030000036). Allen B. Wilson and Vogtle are part of a Burke County 2 km group and SRS, Three River Landfill and Ameresco are part of an Aiken County 2 km group.

impact assessment and the maximum extent of the inventory was limited to the transport distance covered by the fastest wind speed in the meteorological data set (without using the more refined "sectorial" approach allowed by GA EPD). This limited the 1-hour NO_2 NAAQS inventory to 50 km and the 1-hour SO_2 NAAQS inventory to 41 km. However, significant sources of NO_x and SO_2 located just beyond these distances were included in order to ensure that the air quality analysis remained conservative. In total, 30 sources were included for 1-hour NO_2 and 19 sources were included for 1-hour SO_2. The NAAQS inventories for each are provided in Tables 4a and 4b of Attachment G to this volume. Table 4a contains the point source inventory and Table 4b contains the volume source inventory. Volume sources in the inventories include six direct-fired lumber drying kilns. NO_x emissions limitations listed are based on total NO_x ($NO + NO_2$) and all NO_2/NO_x ratios used for the PVMRM assessment are specified in these tables. Generally, all sources used the default in-stack NO_2/NO_x ratio of 0.50. The only sources not using the default in-stack NO_2/NO_x ratio are the project sources (direct-fired rotary kilns, spray dryers, and boilers) and combustion turbines. Please refer to Attachment C of this volume which contains the PVMRM protocol and the substantiation of the unit specific in-stack ratios.

The basis for all point and volume source parameters used to estimate the contribution of nearby sources to background concentrations is provided in Tables 8 and 9, respectively, of Attachment G of this volume. Generally, all source parameters are based on information determined from the facility's permitting files and come from permit applications, previous screen modeling assessments for toxics (SCREEN3), previous refined modeling assessment for PSD sources, stack tests, and the national emission inventory (NEI) database.

2.4.3.1 Temporary Emissions Sources

Under the PSD rules, sources of temporary emissions, typically occurring during the construction of a facility, may be excluded from the air quality analysis if the emissions would not impact a Class I area or impact an area where an increment is known to be violated. *Please refer to the exemption contained 40 CFR 52.21(i)(3)*. For this reason, Shaw Group (AIRS 03300039) was excluded from the baseline inventory. Shaw Group operates heavy construction equipment, including backup and support diesel-fired generators, portable lighting, fuel storage facilities, mobile concrete crushers, and concrete batch plants to support construction of Units 3 and 4 at the Vogtle Electric Generating Facility. Since the facility is a synthetic minor source and the closest Class I areas are 200 km away from the construction site, the temporary emissions will not impact any Class I area. Additionally, the full impact analysis performed for the Vogtle Units 3 and 4 PSD application provides evidence that no increments are known to be violated in the area impacted by the Shaw Group. Please refer to the air quality impacts analysis provided in Section 7 of Vogtle's PSD application for Units 3 and 4.[23]

2.4.3.2 Intermittent Sources and Emission Scenarios

US EPA recommends that compliance demonstrations for the 1-hour NO_2 and SO_2 NAAQS be based on emission units and emission scenarios that can logically be assumed to operate continuously or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. Source and emission scenarios not meeting these criteria are termed "intermittent" and may be excluded from the 1-hour NAAQS air quality analysis. For the 1-hour NO_2 and SO_2 NAAQS, the following emission units and emission scenarios were determined to be "intermittent" and excluded from the air quality analysis:

- emergency and backup diesel-fired generators at the Vogtle Electric Generating Facility (AIRS 03300030)[24];
- the No. 2 distillate fuel oil firing scenario for boilers B1 and B2 at East Georgia Regional Medical Center (AIRS 03100052)[25]; and
- the No. 5 residual fuel oil firing scenario for boilers B1 and B2 at Koyo Bearings USA, LLC (AIRS 25100004)[26]

2.4.4 Increment Consumption and Expansion

[23] Please refer to Application No. 18986 dated May 22, 2009 for permit amendment 4911-033-0030-V-02-3, effective April 9, 2010

[24] Although the diesel-fired generators at Vogtle do not currently have any operational restrictions specified in Title V permit, the low level of maximum actual emissions listed in the facility's online Title V application indicate that the engines are intermittent (i.e., do not operate relatively continuous or frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations). Additionally, GA EPD is allowing this exclusion since there is an action pending to incorporate operational restrictions on the engines in a future permit amendment.

[25] Please refer to Application No. 11635 dated August 18, 1999 for permit 8062-031-0052-B-01-0, effective August 14, 2000. Notes provided by the applicant in the Section III-A form for boilers and fuel burning equipment indicate that "*the main fuel for the boilers (B1 and B2) is natural gas and No. 2 fuel oil will only be used under emergency conditions.*" If the boilers were simply listed as gas/oil fired without this statement, the oil-fired scenario would not have been determined to be intermittent.

[26] Please refer to the November 13, 1996 memorandum from Heather Manley and Laura Taylor to Kirk Drucker regarding Application No. 7113 dated January 2, 1995. Boilers B1 and B2 can burn either natural gas or fuel oil but "*the only time the boilers use No. 5 fuel oil is when they are cut off from their supply of natural gas*." Since curtailment periods do not occur frequently, the oil-fired scenario was determined to be intermittent. It is also worth noting that the boilers, when originally installed in 1974, were permitted as 700 hp boilers with a maximum rated heat input of 29 mmBtu/hr. At around the time Georgia's Title V permitting program received interim approval from EPA, the facility (Torrington) submitted a synthetic minor application to limit SO_2 from the boilers to less than the major source threshold by restricting their combined hours of operation to less than 2,318 hours. After transferring ownership to Timken in 2003 and then to Koyo Bearings in 2009, the same operational limit of 2,318 hours applies to both boilers but are now referred to as being one-third the size (200 hp) which would imply the operational limitation should have been modified. Since it is unclear why this occurred, the NAAQS inventories reflect the original, larger boiler installation.

Once the NAAQS inventories were developed for the 24-hour and annual averaging periods for PM_{10}, the annual averaging period for NO_2, and the 3-hour, 24-hour, and annual averaging periods for SO_2, increment inventories were developed by comparing each emission unit's construction or modification date to the major source or minor source baseline date, as applicable. When a source was listed as constructed prior to an applicable baseline date but was later modified after such date, the maximum allowable emissions for the modified unit, in lieu of the actual emission increase, was assumed to consume increment. Since this PSD application establishes the minor source baseline date for PM_{10} and SO_2 and the SIA for each pollutant is completely contained within Jenkins County, the only emission increases that may affect the available increment are the Millen facility and those that occurred at PSD major sources after January 6, 1975, the major source baseline date for PM_{10} and SO_2. Since the minor source baseline date for NO_2 was set statewide in 1988, the same year of the major source baseline and trigger dates, any emission unit constructed or modified during that year and after was determined to consume increment. Emission units that affect increment consumption are identified in the NAAQS emission inventories for each pollutant provided in the tables of Attachment G to this volume. No increment expansion was used for the air quality analysis.

2.5 NAAQS Air Quality 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 US EPA judges are necessary, with an adequate margin of safety, to protect the public health." The secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The objective of a NAAQS analysis is to demonstrate through dispersion modeling that emissions from a proposed project, in conjunction with the background contribution from *nearby* and *other* sources, do not "cause or contribute" to a violation of the NAAQS at any ambient location. Table 2.5-1 lists the NAAQS for the pollutants modeled for the Millen facility.

Table 2.5-1: Primary and Secondary National Ambient Air Quality Standards

Pollutant	Averaging Period				
	1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	188 [4]	--	--	--	100 [1]
SO_2	196 [4]	1,300 [3]	--	365 [2, 6]	80 [2, 6]
PM_{10}	--	--	--	150 [1]	Revoked 12/18/2006 71 FR 61144 [5]
$PM_{2.5}$	--	--	--	35 [1]	15 [1]

[1] For PM_{10} (24-hour), $PM_{2.5}$ (24-hour and annual), and NO_2 (annual), the secondary NAAQS are the same as the primary
[2] For SO_2 (24-hour and annual), there are no secondary NAAQS
[3] For SO_2 (3-hour), there is no primary NAAQS
[4] For NO_2 (1-hour) and SO_2 (1-hour), new primary NAAQS are final and secondary NAAQS are proposed
[5] For PM_{10} (annual), the NAAQS were revoked at the time the primary and secondary NAAQS for 24-hour $PM_{2.5}$ were reduced
[6] For SO_2 (24-hour and annual), the primary NAAQS were revoked at the time the new 1-hour NAAQS was made final. However, these standards remain in effect until one year following the date of initial nonattainment designations for the 1-hour SO_2 primary standard (no later than June 2012)

In order to evaluate compliance with the NAAQS, AERMOD was used with the airport location meteorological data set to estimate the total air quality concentrations for comparison to the NAAQS. The total air quality concentration included the impacts from the project emissions, nearby sources from the regional source inventories, and the background concentrations. For each pollutant, except 1-hour SO_2 and NO_2, a refined receptor grid containing fenceline receptors spaced no further than 100 meters apart and 100 meter spaced receptors extending outward from the Millen facility in all directions to the distance of the applicable SIA was used. For the 1-hour SO_2 NAAQS, only the array of significant receptors plus "buffer" locations (i.e., all locations predicted to be above 7 $\mu g/m^3$) from the preliminary impact assessment was used. Please refer to Figure 2.2.1-2. The buffered array of significant receptors for 1-hour SO_2 does not contain any non-adjacent outlier receptor locations. For the 1-hour NO_2 NAAQS, the receptor grid that was used was identical to the initial grid used for 1-hour SO_2 significance modeling (i.e., with 500 meters spaced receptors carried all the way out to a distance of 50 km). Table 2.5-2 summarizes the results of the NAAQS air quality analysis.

Table 2.5-2: NAAQS Modeling Results

Pollutant	Avg. Period	Year	Back-Ground Conc. (μg/m³)	Total Air Quality Concentration [6] UTM NAD83 East (m)	North (m)	Conc. (μg/m³)	NAAQS Comparison NAAQS (μg/m³)	Violations Predicted	# of Violating Receptors
PM_{10}	24-hr [1]	5YR	38	415,113.20	3,625,579.50	58.35~~75~~	150	No	N/A
$PM_{2.5}$	24-hr [2]	5YR	25	415,049.80~~113.20~~	3,625,513.40~~579.50~~	34.46~~76~~	35	No	N/A
$PM_{2.5}$	Annual [2]	5YR	15	416,127.80~~168.30~~	3,625,819.70~~735.50~~	14.17~~15~~	15	No	N/A
NO_2	**1-hr [3,7]**	**5YR**	**33.24**	**3750,00.00**	**3,597,500.00**	**228.94~~84~~**	**188**	**Yes**	**3**
NO_2	Annual [8]	2006	5.2	416,300.00	3,626,000~~625,900~~.00	16.63~~53~~	100	No	N/A
		2007		416,300.00	3,626,000~~100~~.00	15.67~~55~~		No	N/A
		2008		416,300.00	3,625,900.00	15.27~~29~~		No	N/A
		2009		416,300.00	3,625,600.00	15.30		No	N/A
		2010		416,249.20	3,625,567.10	18.05~~03~~		No	N/A
SO_2	1-hr [4]	5YR	67.18	416,200.00	3,626,500.00	112.99~~67~~	196	No	N/A
SO_2	3-hr [5]	2006	54.18	419,000.00	3,627,800.00	93.07	1,300	No	N/A
		2007		418,600.00	3,627,900.00	104.74		No	N/A
		2008		418,000.00	3,627,500.00	97.53		No	N/A
		2009		414,800.00	3,625,400.00	104.78		No	N/A
		2010		418,400.00	3,628,200.00	111.32		No	N/A
SO_2	24-hr [5]	2006	16.75	415,113.20	3,625,579.50	31.56~~54~~	365	No	N/A
		2007		415,175.20	3,624,990.80	30.84		No	N/A
		2008		414,922.80	3,625,381.00	33.02~~32.85~~		No	N/A
		2009		416,500.00	3,625,600.00	31.12~~30.97~~		No	N/A
		2010		415,240.20	3,625,711.90	32.47~~29~~		No	N/A
SO_2	Annual [4]	2006	3.89	416,300.00	3,626,000~~625,900~~.00	7.39~~36~~	80	No	N/A
		2007		416,300.00	3,626,000.00	7.08~~05~~		No	N/A
		2008		416,300.00	3,625,900.00	6.95		No	N/A
		2009		416,400~~300~~.00	3,625,600~~626,100~~.00	7.05~~04~~		No	N/A
		2010		416,300.00	3,625,600.00	7.49		No	N/A

1 The PM_{10} 24-hour NAAQS is based on the highest sixth-high concentration over a five-year period
2 The $PM_{2.5}$ 24-hour and annual NAAQS are based on the five-year average of the highest first-high concentrations at each receptor
3 The 1-hour NO_2 NAAQS is based on the five-year average of the 98th-percentile (highest eighth-high) annual distribution of daily maximum 1-hour concentrations at each receptor location
4 The 1-hour SO_2 NAAQS is based on the five-year average of the 99th-percentile (highest fourth-high) annual distribution of daily maximum 1-hour concentrations at each receptor location

5 The 3-hour and 24-hour SO_2 NAAQS are based on the highest second-high concentration for each year modeled
6 The total air quality concentration represents the "NAAQS" source group in each AERMOD modeling run and includes the appropriate background concentration as defined by specifying BACKGRND as a source in the SO pathway and including the keyword "BACKGROUND" in the "NAAQS" source group
7 Design concentration determined using PVMRM
8 Design concentrations determine using Tier 1 full conversion of NO_x to NO_2

As shown in Table 2.5-2, there were no predicted violations of the NAAQS for any pollutants except the 1-hour NO_2 NAAQS. Figure 2.5-1 and show the locations of receptors with 1-hour NO_2 NAAQS violations.

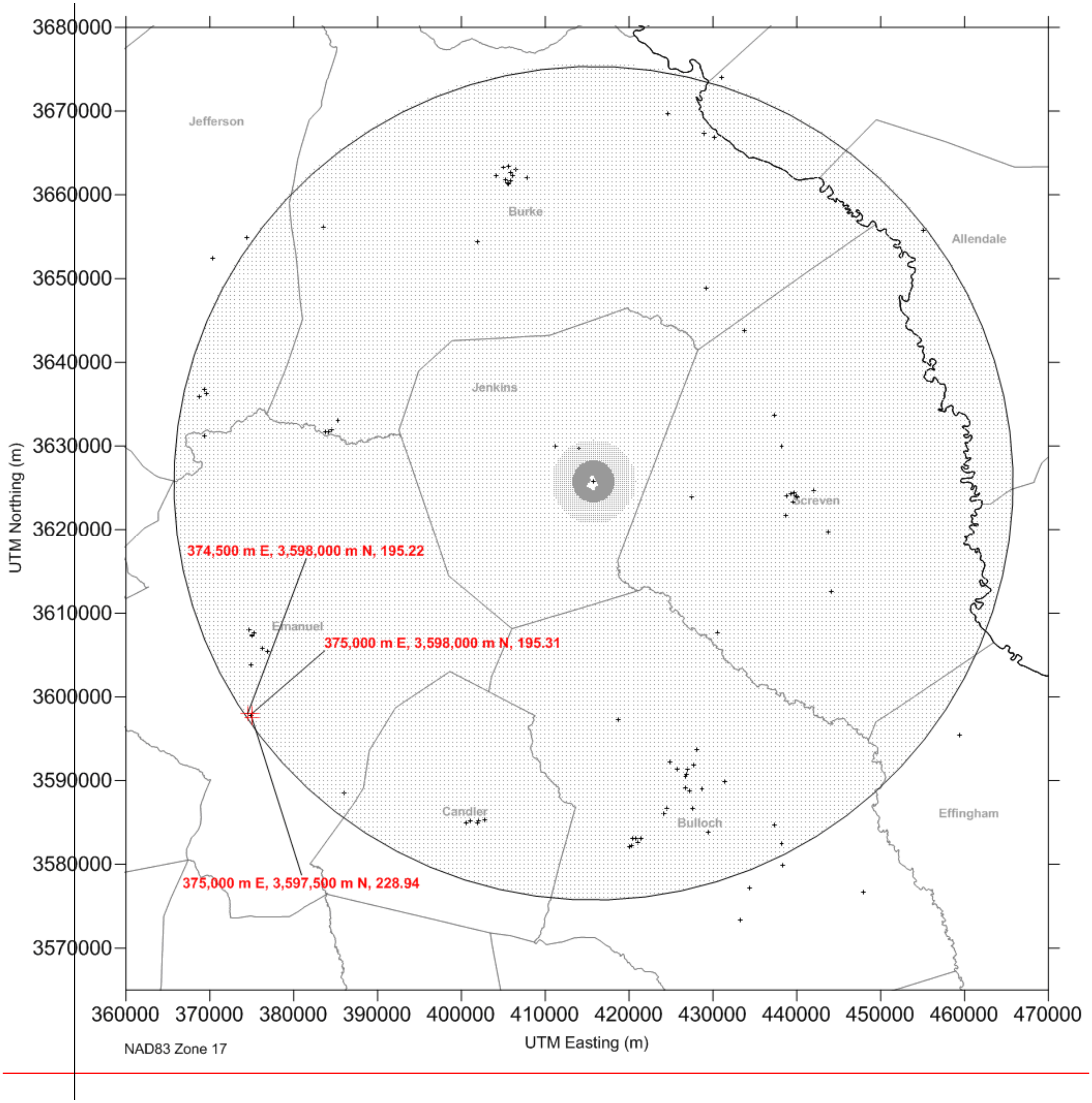

Figure 2.5-1: Location of 1-hour NO_2 NAAQS Exceedances

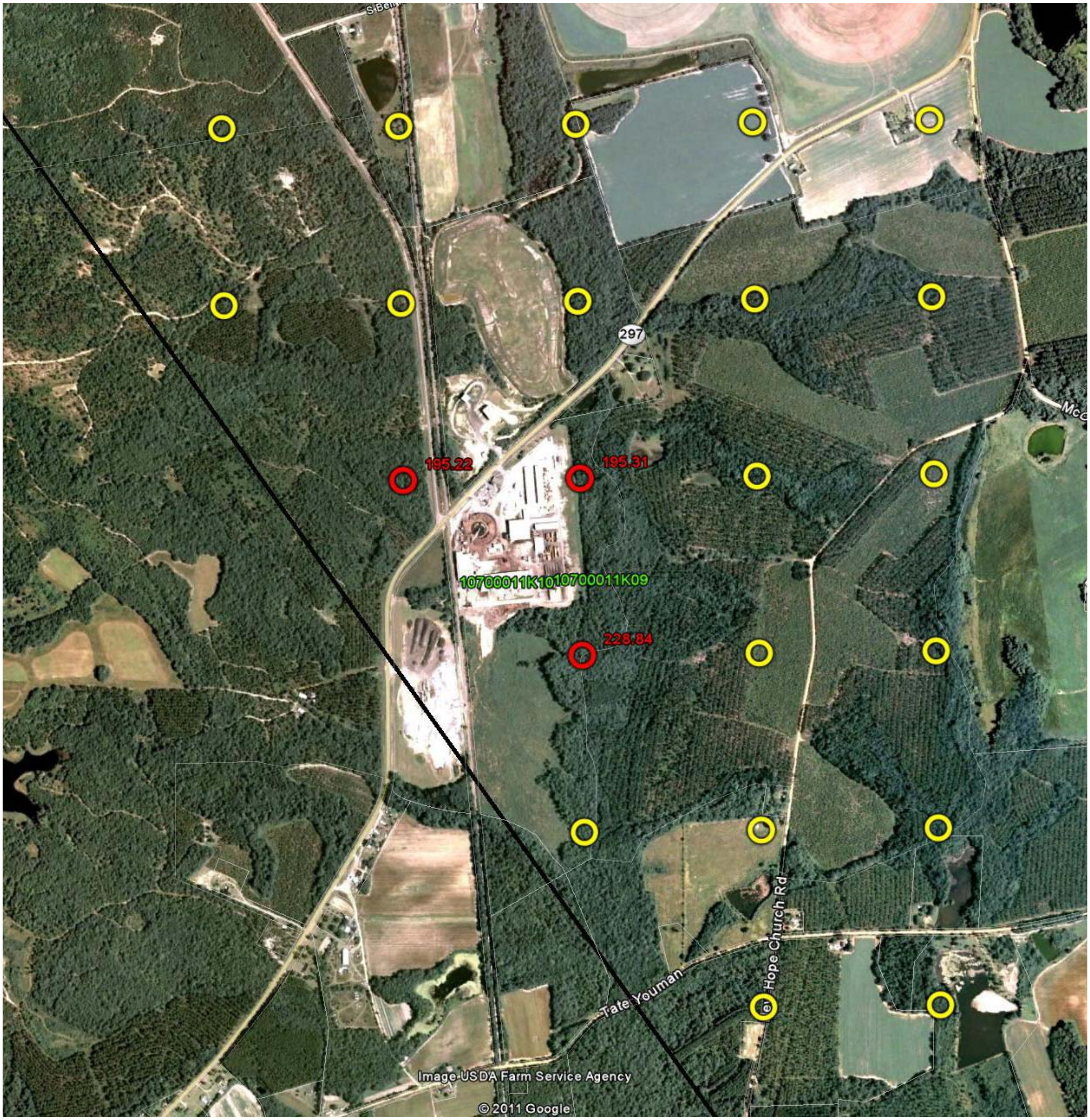

Figure 2.5-2: Aerial View of 500 m Spaced Receptors with 1-hour NO_2 NAAQS Exceedances

As shown in Figure 2.5-1 and Figure 2.5-2, there are three receptors with violations of the 1-hour NO2 NAAQS just inside the edge of the 50 km SIA. The exceedances occur in the 500 meter spaced portion of the receptor grid near the Rayonier Wood Products Swainsboro Sawmill (AIRS 10700011). Figure 2.5-2 also shows the location of Rayonier's direct-fired lumber drying kilns, Emission Unit ID Nos. DK09 and DK10 (Modeled Source ID Nos. 10700011DK09 and 10700011DK10).[27]

Since the lumber kilns are direct-fired, there is no stack associated with their continuous operation. Each kiln has four roof vents on each end which open periodically to adjust relative humidity and temperature during the drying process. Therefore, each kiln was modeled as a volume source (single, elevated, on or adjacent to a building). Based on the facility's Title V application, the vents discharge at a height of 27 feet. This height was used to determine the initial vertical dimension of the volume for each kiln. To determine the initial lateral dimension, a width of 40 feet and length of 100 feet for each kiln was estimated from aerial photography. Since the lateral dimension for a volume source should be based on square, the geometric mean of the width and length was used to model each kiln as a single volume source, as opposed to two adjacent volumes. NO_x emissions from each kiln were based on each kiln's maximum capacity, 13.1 million board feet per hour (mmbf/hr), and a NO_x emission factor of 0.135 lb/mmbf from NCASI. This is the same emission factor used to estimate future potential emissions for PSD applicability in the March 2006 PSD application.

As noted in the most recent clarifying guidance regarding application of Appendix W modeling for the 1-hour NO_2 NAAQS, PVMRM may overestimate the NO_2/NO_x ratio for low-level plumes since the algorithm does not prevent the plume from extending below ground level when the volume is calculated. Since the kilns were modeled as volume sources using PVMRM, this may be the cause for the NAAQS violations. Therefore, prior to conducting a culpability analysis, the three receptors with violations were remodeled using the ozone limiting method (OLM), as opposed to PVMRM, with the recommended OLMGROUP ALL option. The results of this analysis are summarized in Table 2.5-3.

[27] By way of background, Rayonier's initial Part 70 operating permit was amended on November 30, 2004 to allow for the construction and operation of two wood gasifier direct heated, batch-type, lumber drying kilns (DK07 and DK08), which replaced their six existing kilns. The permit amendment was not subject to PSD review and included a PSD avoidance limit for drying lumber of 118.42 million board feet (mmbf) per year. Rayonier later applied for and was issued a PSD permit (2421-107-0011–V-02-3) on July 16, 2007 authorizing the modification of lumber drying kilns DK07 and DK08 to convert them from batch to continuous, after which they were to be renamed as DK09 and DK10. This permit also authorized an increase in the allowable lumber drying to 220 mmbf/year. Since Rayonier had not begun modifying the kilns prior to the 18 month PSD deadline, the facility applied for and was granted a one-year extension. However, the facility did begin construction by the extended deadline causing the PSD permit to expire. In 2010, Rayonier submitted another application to convert their kilns in the same manner proposed in 2006. This permit (2421-107-0011-V-03-3) was issued on February 8, 2011 and serves as the basis for the modeled NO_x emissions and source parameters.

Table 2.5-3: Comparison of PVMRM and OLM for 1-hour NO_2 NAAQS Violations

Total Air Quality Concentration PVMRM			Total Air Quality Concentration OLMGROUP ALL		
UTM NAD83		Conc. ($\mu g/m^3$)	UTM NAD83		Conc. ($\mu g/m^3$)
East (m)	North (m)		East (m)	North (m)	
375,000.00	3,597,500.00	228.94~~84~~	375,000.00	3,597,500.00	220.32~~215.38~~
375,000.00	3,598,000.00	195.31	375,000.00	3,598,000.00	194.88
374,500.00	3,598,000.00	195.22	374,500.00	3,598,000.00	194.67~~20~~

As shown in the table above, when compared to using OLM, PVMRM does result in slightly higher predicted impacts for NO_2. However, since the difference in predicted impacts can not explain the NAAQS violations, further modeling was performed to determine if the Millen facility causes or contributes to these exceedances. Since the violations occur within the 500 meter spaced portion of the grid, a refined grid of 100 meter spaced receptors was created to ensure that all NAAQS violations within 50 km of the project site are found and evaluated. The receptor grid used for the culpability analysis is shown in Figure 2.5-3 and contains both ambient and non-ambient air receptors with respect to Rayonier, but are all considered ambient air receptors with respect to the Millen facility. In total, 196 receptors were used for the analysis.

After establishing the receptor grid for the culpability analysis, another AERMOD run was conducted using PVMRM and the five-year concatenated airport location meteorological data set. However, in addition to the “NAAQS” source group, two additional source groups were created: “CARBO” and “01700011”. The “CARBO” source group included all project sources with NO_x emissions and the “01700011” source group included Rayonier’s direct-fired lumber kilns. Additionally, the “RECTABLE” output option was modified to determine all five-year average daily maximum 1-hour concentrations, ranked from the highest first-high through the 366th-high as follows:

OU RECTABLE 1 1-366

Then, the “MAXDCONT” output option was used to determine the contribution of source groups “CARBO” and “01700011” paired in time and spaced to each ranked five-year average air quality impact for the “NAAQS” source group in excess of the level of the 1-hour NO_2 NAAQS as follow:

OU MAXDCONT NAAQS 8 THRESH 188

Figure 2.5-4 shows that 79 of the 196 culpability receptors have 1-hour NO_2 NAAQS violations.

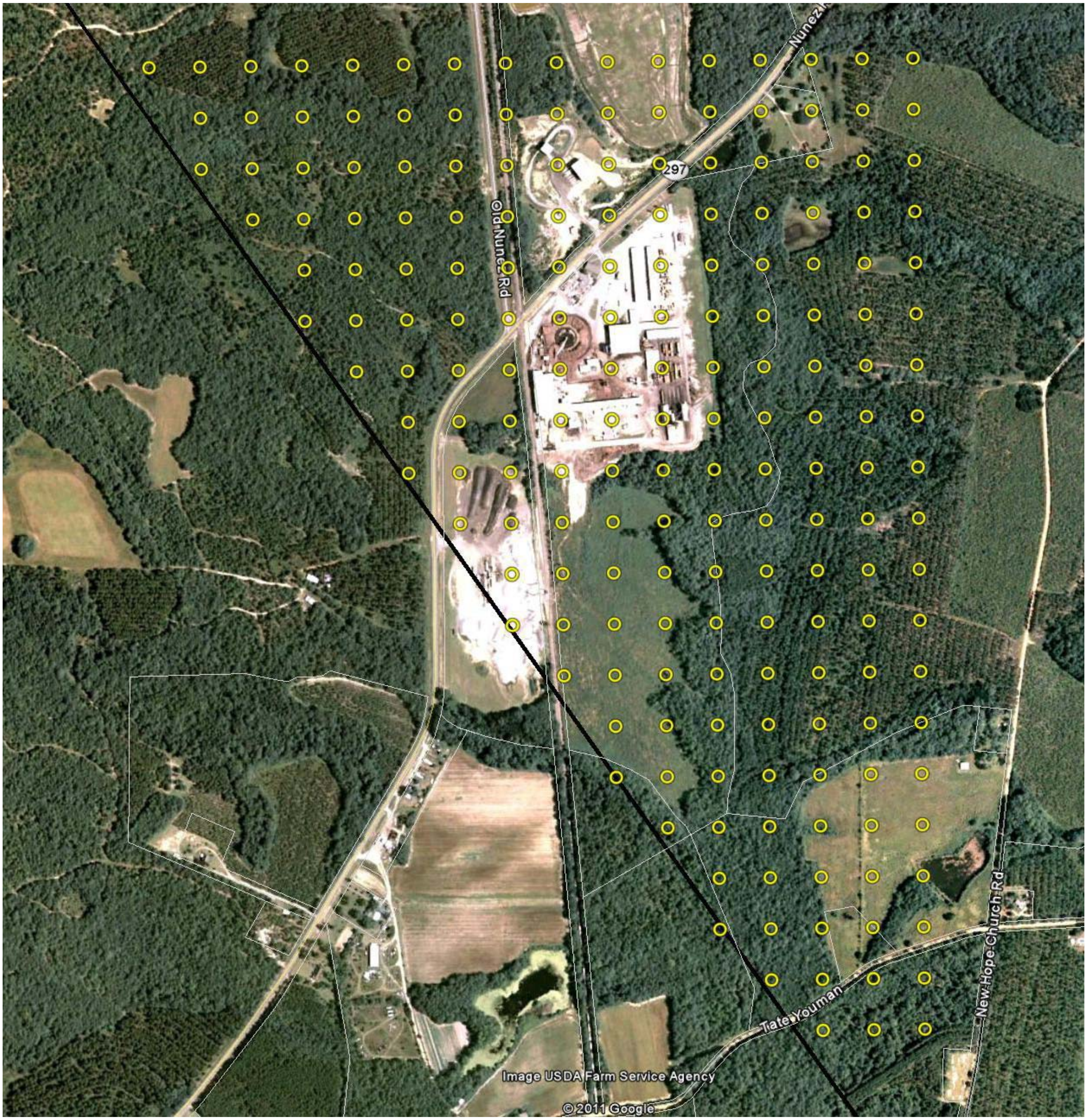

Figure 2.5-3: Aerial View of 100 meter Spaced Receptor Grid for 1-hour NO_2 NAAQS Violations Culpability

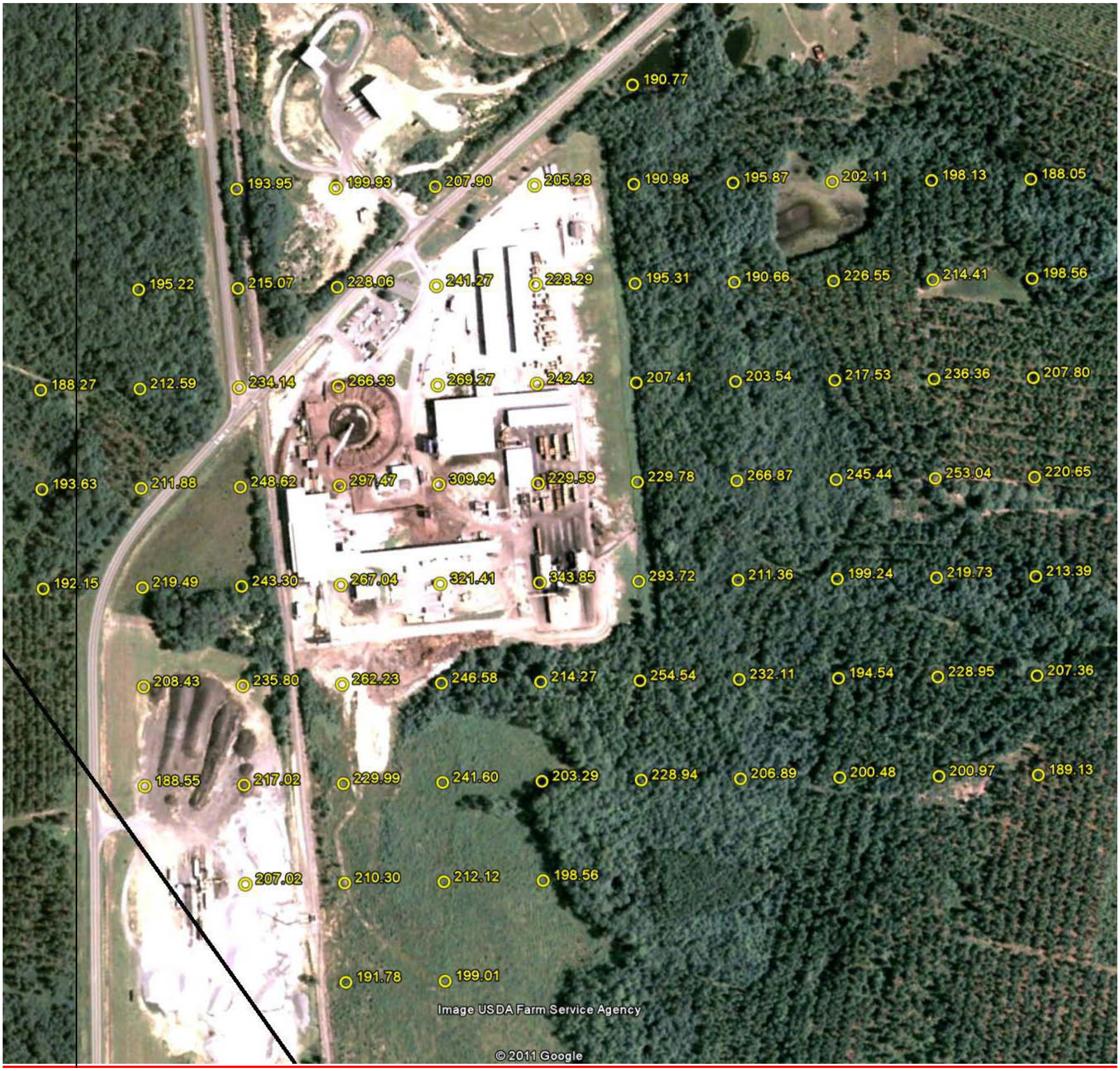

Figure 2.5-4: Aerial View of 100 m Spaced Culpability Receptors with 1-hour NO_2 NAAQS Exceedances

For the 79 receptors shown in Figure 2.5-4, 1-hour NO_2 NAAQS violations were predicted from the design concentration (98th-percentile) to the 148th ranked five-year average. However, this particular receptor (374,900.00 m east, 3,597,700.00, m north, 343.85~~334.71~~ μg/m^3) is almost directly on top lumber kiln DK10. Based on the MAXDCONT output, the maximum paired contribution of the Millen facility to any of the ranked NAAQS violations predicted at any of the culpability receptors was 2.55~~57~~ μg/m^3. Since this is less than the 1-hour NO_2 SIL, the Millen facility will not cause or contribute to any violations of the NAAQS. Table 2.5-4 lists the maximum contribution of the Millen facility to any 1-hour NO_2 NAAQS violation predicted during the culpability analysis.

Table 2.5-4: Listing of Maximum Contribution of Millen Facility to Each Culpability Receptor with 1-hour NO_2 NAAQS Violations

#	UTM NAD83		NAAQS (µg/m³)	Rank	CARBO (µg/m³)	#	UTM NAD83		NAAQS (µg/m³)	Rank	CARBO (µg/m³)
	East (m)	North (m)					East (m)	North (m)			
1	374,400	3,597,700	188.6117191.6574	9TH8TH	0.0016400184	41	374,900	3,597,900	197. 49982998	37TH	0.0099301044
2	374,400	3,597,800	193.63076306	8TH	0.0011300108	42	374,900	3,598,000	198.5273190.4719	22ND27TH	0.0060600481
3	374,400	3,597,900	188.2727	8TH	0.0010800102	43	374,900	3,598,100	192.5207191.5049	14TH	0.00191
4	374,500	3,597,500	188.55215519	8TH	0.0028100267	44	375,000	3,597,500	192.6822191.2342	23RD	0.0113901099
5	374,500	3,597,600	195.4682201.0507	11TH9TH	0.0027000232	45	375,000	3,597,600	214.28670925	30TH29TH	0.0210301928
6	374,500	3,597,700	193.14355246	15TH16TH	0.0032300304	46	375,000	3,597,700	235.0015223.767	74TH83RD	0.1081108886
7	374,500	3,597,800	195.07330732	15TH	0.0033500324	47	375,000	3,597,800	203.7130196.1311	44TH55TH	0.0278902856
8	374,500	3,597,900	188.60755169	22ND	0.002100022	48	375,000	3,597,900	195.4168188.4195	17TH23RD	0.0058700801
9	374,500	3,598,000	188.6385	13TH	0.0014000134	49	375,000	3,598,000	189.3163	11TH	0.00103
10	374,600	3,597,400	192.19191918	10TH	0.0027100261	50	375,000	3,598,100	190.9842	8TH	0.0009300091
11	374,600	3,597,500	202.23231943	12TH	1.3614332337	51	375,000	3,598,200	190.77497748	8TH	0.0009500094
12	374,600	3,597,600	196.2013207.558	19TH17TH	0.0050800447	52	375,100	3,597,500	193.3610	13TH	0.0029000284
13	374,600	3,597,700	204.1440189.2195	23RD27TH	0.00567	53	375,100	3,597,600	195.5615197.3358	21ST19TH	0.0118501252
14	374,600	3,597,800	201.5770199.6599	26TH	0.0054400487	54	375,100	3,597,700	192.4707194.7365	35TH25TH	0.0087301177
15	374,600	3,597,900	199.9476189.1466	28TH35TH	0.0041000408	55	375,100	3,597,800	194.1750209.8677	66TH58TH	0.0115301246
16	374,600	3,598,000	188.27612759	21ST	0.0028700275	56	375,100	3,597,900	192.2355833	21ST19TH	0.0033800499
17	374,600	3,598,100	188.9798191.0646	10TH9TH	0.0015700141	57	375,100	3,598,000	189.64142678	9TH	0.001090011
18	374,700	3,597,300	191.7816189.507	8TH9TH	0.0021100206	58	375,100	3,598,100	195.8689	8TH	0.0007900078
19	374,700	3,597,400	196.8744195.2526	11TH	0.0031700273	59	375,200	3,597,500	189.4090	12TH	0.0051500511
20	374,700	3,597,500	199.98825413	16TH	0.0048000504	60	375,200	3,597,600	194.5384192.7292	8TH	0.001140012
21	374,700	3,597,600	217.2219215.1367	22ND	0.7504673846	61	375,200	3,597,700	193.5613195.0494	14TH10TH	0.0036100336
22	374,700	3,597,700	205.6970192.8938	36TH40TH	0.0105901271	62	375,200	3,597,800	193.66895099	54TH	0.0055900557
23	374,700	3,597,800	189.2783	50TH	0.0089700903	63	375,200	3,597,900	213.9634214.3442	12TH11TH	0.0027800295
24	374,700	3,597,900	192.6970191.498	52ND53RD	0.0086900871	64	375,200	3,598,000	198.1231	27TH	0.0021000204
25	374,700	3,598,000	191.25792578	28TH	0.0033900328	65	375,200	3,598,100	189.4765	13TH	0.0018000175
26	374,700	3,598,100	195.9490189.9524	10TH12TH	0.002100018	66	375,300	3,597,500	195.3270	9TH	0.0024500238
27	374,800	3,597,300	199.0143	8TH	0.001800017	67	375,300	3,597,600	191.5091188.4221	31ST33RD	0.002680032
28	374,800	3,597,400	188.4637	18TH	0.00333	68	375,300	3,597,700	192.2245197.562	34TH26TH	0.0020400198
29	374,800	3,597,500	193.5987238.9922	8TH	0.0056200624	69	375,300	3,597,800	203.2558193.4685	41ST48TH	0.0037900373
30	374,800	3,597,600	192.2365190.8192	37TH	2.5562156606	70	375,300	3,597,900	198.02280227	34TH	0.0032500317
31	374,800	3,597,700	253.7584256.3819	39TH37TH	0.0203902117	71	375,300	3,598,000	203.5508193.4246	14TH20TH	0.001880014
32	374,800	3,597,800	206.39212602	87TH	0.0181902052	72	375,300	3,598,100	188.1343	14TH	0.0010500099
33	374,800	3,597,900	190.1228207.9392	56TH44TH	0.0132400599	73	375,400	3,597,500	188.12590071	8TH	0.0015900195
34	374,800	3,598,000	192.62156214	31ST	0.00494	74	375,400	3,597,600	193.28791335	14TH	0.0012200139
35	374,800	3,598,100	196.3221	12TH	0.0021900209	75	375,400	3,597,700	195.2494194.6488	19TH	0.00139
36	374,900	3,597,400	190.93092422	12TH	0.0011000117	76	375,400	3,597,800	193.62096208	22ND	0.0022300212
37	374,900	3,597,500	203.2863202.5554	8TH	0.005750052	77	375,400	3,597,900	192.00360035	15TH	0.0016100149
38	374,900	3,597,600	202.4749203.1083	14TH12TH	0.0197502174	78	375,400	3,598,000	189.7917192.5063	13TH10TH	0.0013100124
39	374,900	3,597,700	223.3586222.5964	114TH	1.2368621867	79	375,400	3,598,100	188.0494	8TH	0.0008100078
40	374,900	3,597,800	228.6830188.7167	81ST	0.0503903304						

2.6 PSD Increment Air Quality Analysis

As part of the air quality analysis, a PSD applicant must demonstrate that emissions from the proposed construction and operation of a facility will not cause or contribute to air pollution in violation of any "maximum allowable increase" over the baseline concentration in any area. The ''maximum allowable increase'' of an air pollutant that is allowed to occur above the baseline concentration is referred to as the PSD increment. By establishing the maximum allowable level of ambient pollutant concentration increase in a particular area, an increment defines ''significant deterioration'' of air quality in that area. Table 2.6-1 lists the PSD increment for pollutants modeled for the Millen facility.

Table 2.6-1: PSD Increments

Pollutant	Averaging Period				
	1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	--	--	--	--	25
SO_2	--	512	--	91	20
PM_{10}	--	--	--	30	17

In order to evaluate compliance with the PSD increments, AERMOD was used with the airport location meteorological data set to estimate the total increase in pollutant concentrations above the applicable baseline concentration. Since this PSD application establishes the minor source baseline date for PM_{10} and SO_2, the total increase in pollutant concentrations was determined as the emission increases associated with the Millen facility and all emission increases occurring at major PSD sources after the major source baseline date for PM_{10} and SO_2 (January 6, 1975). For NO_2, since the baseline concentration was established in 1988, all emission increases occurring at both major and minor sources during and after 1988 were used to evaluate the increment. No increment expansion was considered for any pollutant in the analysis. For each pollutant, a refined receptor grid containing fenceline receptors spaced no further than 100 meters apart and 100 meter spaced receptors extending outward from the Millen facility in all directions to the distance of the applicable SIA was used. Table 2.6-2 summarizes the results of the PSD increment air quality analysis.

Table 2.6-2: PSD Increment Modeling Results

Pollut-ant	Avg. Period	Year	Increase Above Baseline Concentration: UTM NAD83 East (m)	Increase Above Baseline Concentration: UTM NAD83 North (m)	Conc. (μg/m³)	PSD Increment Comparison: PSD Increment (μg/m³)	Violations Predicted	# of Violating Receptors
PM_{10}	24-hr [1]	2006	415,113.20	3,625,579.50	18.46~~85~~	30	No	N/A
		2007	416,200.00	3,626,100.00	18.31~~21~~		No	N/A
		2008	415,113.20	3,625,579.50	23.78~~24.47~~		No	N/A
		2009	415,100.00	3,625,700.00	21.51~~22.64~~		No	N/A
		2010	415,049.80	3,625,513.40	16.78~~17.30~~		No	N/A
PM_{10}	Annual	2006	416,127.80	3,625,819.70	3.03~~2.89~~	17	No	N/A
		2007	416,127.80~~168.30~~	3,625,819.70~~735.50~~	2.72~~64~~		No	N/A
		2008	416,200.00~~168.30~~	3,625,800.00~~735.50~~	2.87~~81~~		No	N/A
		2009	416,200.00~~208.80~~	3,625,800.00~~651.30~~	2.67~~66~~		No	N/A
		2010	416,168.30	3,625,735.50	3.33~~29~~		No	N/A
NO_2	Annual [2]	2006	416,300.00	3,626,000~~625,900~~.00	10.16~~07~~	25	No	N/A
		2007	416,300.00	3,626,000~~100~~.00	9.30~~20~~		No	N/A
		2008	416,300.00	3,625,900.00	9.10~~11~~		No	N/A
		2009	416,300.00	3,625,600.00	8.36~~37~~		No	N/A
		2010	416,249.20	3,625,567.10	10.76~~75~~		No	N/A
SO_2	3-hr [1]	2006	415,376.20	3,625,991.00	37.28~~15~~	512	No	N/A
		2007	416,289.70	3,625,482.90	34.25~~23~~		No	N/A
		2008	416,500.00	3,625,600.00	35.87~~85~~		No	N/A
		2009	417,600.00	3,629,100.00	45.67		No	N/A
		2010	418,400.00	3,628,200.00	52.22~~21~~		No	N/A
SO_2	24-hr [1]	2006	416,400.00	3,626,000.00	14.04~~05~~	91	No	N/A
		2007	416,300.00	3,625,600.00	13.74~~68~~		No	N/A
		2008	414,922.80	3,625,381.00	16.24~~06~~		No	N/A
		2009	416,500.00	3,625,600.00	14.34~~19~~		No	N/A
		2010	415,200.00~~176.70~~	3,625,700.00~~645.70~~	12.92~~86~~		No	N/A
SO_2	Annual	2006	416,300.00	3,626,000~~625,900~~.00	2.54~~52~~	20	No	N/A
		2007	416,300.00	3,626,~~.~~000.00	2.34~~31~~		No	N/A
		2008	416,300.00	3,625,900.00	2.24~~25~~		No	N/A
		2009	416,400~~300~~.00	3,625,600~~626,100~~.00	2.16~~15~~		No	N/A
		2010	416,300.00	3,625,600.00	2.77		No	N/A

[1] Results for the short-term PSD increment analysis for each pollutant are based on the highest second-high concentration for each year modeled (*exceedance rate of one per year at any one location*)
[2] Design concentrations determine using Tier 1 full conversion of NO_x to NO_2

As shown in Table 2.6-2, there were no predicted exceedances of the PSD increments for any pollutant. Therefore, the Millen facility will not cause or contribute to any air pollutant in violation of the maximum allowable increase over the baseline concentration in any area.

2.7 Additional Impacts Analysis

As part of preconstruction review, PSD applicants are required to conduct an analysis of the adverse impacts to visibility, soils and vegetation that would occur as a result of the project and from associated growth. The analysis need not address impacts to receptors sensitive to visibility impairment not located within the largest of the annual NO_2 or PM_{10} SIA's, soils and vegetation having no significant commercial or recreational value, or growth associated with mobile source or temporary emissions.

2.7.1 Soils and Vegetation

In order to determine if any adverse impacts to soils or vegetation would occur as a result of the project, a screening procedure was used based on guidance provided by US EPA in *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals*, December 1980. The screening guidance lists pollutants which have both direct and indirect impacts on soils and vegetation. For pollutants which are said to have direct adverse impacts, such as NO_2, SO_2, and CO, the minimum levels of pollutant concentrations in the ambient air at which adverse effects have been reported were used as screening concentrations. For this analysis, refined dispersion modeling was conducted using AERMOD to estimate the total air quality concentration to compare to the screening thresholds, including the contribution of applicable nearby sources represented in the NAAQS inventory and other sources represented by the background concentration. If the maximum model concentration exceeds the screening level, further analysis is required based on an estimation of indirect impacts via soil deposition and plant uptake. Certain pollutants, such a particulate forms of trace elements boron (B), copper (Cu), vanadium (V) and zinc (Zn), have adverse impacts via indirectly pathways only. In order to perform a screening assessment for these pollutants, potential project emissions were compared to significant emission rate thresholds (SER's). The respective SER for each pollutant was originally developed based on a source lifetime of 10 years. Therefore, the SER's were adjusted to reflect a 40 year lifetime for the project.

Table 2.7.1-1 provides a summary of the total air quality concentration predicted for NO_2, SO_2, and CO in comparison to the screening concentrations. For the analysis, the results of the NAAQS air quality analysis for SO_2 and annual NO_2 were used for comparison to the screening concentrations since the averaging times are consistent with the screening concentrations. For the 4-hour, 8-hour, and 1 month averaging periods for NO_2 and 1 week averaging period for CO, the results of the 1-hour NO_2 NAAQS analysis and 1-hour CO preliminary impact assessment were used as a conservative measure for comparison to the screening concentrations on these averaging periods. As shown in Table 2.7.1-1, the total air quality impacts for each pollutant and averaging period are well below the screening concentrations for adverse impacts.

Table 2.7.1-1: Comparison of Air Quality Impacts of NO_2, SO_2, and CO to the Direct Acting Pollutant Screening Concentrations

Pollutant	Avg. Period	Background Concentration [1] (µg/m³)	Total Air Quality Concentration [2] (µg/m³)	Screening Conc. [3] (µg/m³)	Above Screening Threshold
NO_2	4-hr	33.24	101.09~~93.98~~ [4]	3,760	No
	8-hr			3,760	No
	1-month			564	No
	Annual	5.2	18.05~~03~~ [5]	94	No
SO_2	1-hr	67.18	112.99~~67~~ [5]	917	No
	3-hr	54.18	111.32 [5]	786	No
	Annual	3.89	7.49 [5]	18	No
CO	1-week	943	1,050.44 [6]	1,800,000	No

[1] Background concentrations representing the contribution from *other* sources are provided in Table 2.3-2

[2] For NO_2 and SO_2, the total air quality concentration includes the contribution from *nearby* sources in the NAAQS inventory and background concentrations. For CO, only the Millen facility is included in the total air quality concentrations since the ambient impacts were *de minimis*

[3] Screening concentrations for each pollutant and averaging period are based on the most stringent provided in Table 3.1 of *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals*, December 1980

[4] Since the additional impacts assessment is only required to be carried out within the largest SIA for deterministic NAAQS, the total air quality concentration from the 1-hour NO_2 NAAQS air quality analysis used as a conservative surrogate for the 4-hour, 8-hour and 1-month averaging periods is the greatest impact occurring within 6.5 km of the Millen facility (415,400~~416,900~~ m east, 3,624,800~~629,300~~ m north)

[5] Maximum impacts for each averaging period from the NAAQS air quality analysis presented in Table 2.5-2

[6] Maximum impact for the 1-hour averring period from the preliminary impact assessment presented in Table 2.2.2-1 plus the background concentration

Table 2.7.1-2 provides a comparison of total project emissions for Cu, V, and Zn to the adjusted SER's; there is no data or applicable emission factor available to CARBO at this time to estimate emissions of boron from any of the project sources. Since the original SER for each pollutant was based on a 10-year source life, the SER's were adjusted downward by a factor of 4 to account for an estimated 40-year source life for the Millen facility. As shown in Table 2.7.1-2, total project emissions are below the adjusted SER's for indirect acting pollutants.

Table 2.7.1-2: Comparison of Potential Project Emissions of Cu, V, and Zn to the Significant Emission Rate Tresholds

Pollutant	Project Emissions [1] (tpy)	SER [2] (tpy)	Adjusted SER [3] (tpy)	Above Threshold
Copper (Cu)	0.024	0.21	0.053	No
Vanadium (V)	0.065	0.33	0.083	No
Zinc (Zn)	0.816	63	15.75	No

[1] Based on facility-wide maximum hourly natural gas consumption of 642,353 scfh (8 spray dryers, 4 direct-fired rotary kilns, and 4 boilers totaling 655 mmBtu/hr) and emission factors published in AP-42 Table 1.4-4 for copper (8.5 x 10^{-4} lb/10^6 scf), vanadium (2.3 x 10^{-3} lb/10^6 scf) and zinc (2.9 x 10^{-2} lb/10^6 scf)

[2] SER's for each pollutant are based on the most stringent for soils or plants provided in Table 5.7 of *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals*, December 1980

[3] SER's are adjusted downward by a factor of 4 to account for the fact that the published SER's are only based on a 10-year source life

2.7.2 Visibility Impairment

The Class II visibility impairment screening analysis evaluates the visual plume impacts at potentially sensitive receptors within the largest of the annual NO_2 or PM_{10} SIA. Potentially sensitive receptors include state parks, historic sites and airports. The receptor nearest to the project site is Magnolia Springs State Park, which is located 13 km from the project site, 8 km north of Millen. Since there are no receptors with potential sensitivity to visibility impairment within either the annual NO_2 (6.5 km) or PM_{10} (3.4 km) SIA's, no screening assessment was required to be performed.

2.7.3 Growth

The impacts of growth associated with a PSD project are referred to as secondary emissions. Secondary emissions are not emitted directly by the proposed project, but are indirectly associated with the construction and/or operation the facility. The growth analysis, if warranted, 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 that growth. Associated growth includes new residential and commercial/industrial growth resulting from the new facility but excludes temporary and mobile source emissions.

Secondary emissions associated with construction of the facility will be temporary and are not required to be evaluated. With respect to residential growth, the number of new permanent jobs created by the project is expected to be between 40 and 50. To the extent possible, these jobs will be filled from the local labor pool. However, if this expectation can not be accommodated, there is a supply of existing vacant housing in Jenkins and surrounding counties sufficient to serve those who will move to the area. According to the 2005-2009 American Community Survey (ACS), there are thousands of vacant housing units for sale and for rent within reasonable commuting distances from Bulloch, Burke, Candler, Emanuel, Jenkins and Screven counties. Other than the Millen facility, no industrial growth is anticipated to be associated with the project as the supply of kaolin and other materials for the manufacture of proppant will come from existing mines and suppliers both inside and outside of central Georgia. Accordingly, for the purposes of an additional impacts assessment, negligible new growth is anticipated as a result of the proposed facility.

3.0 CLASS I AQRV AND PSD INCREMENT ANALYSIS

When potential emissions from a proposed major stationary source "may affect" a Class I Area, the PSD rules require an applicant to demonstrate that the source will have no adverse impact on any air quality related value (AQRV). AQRV's are those attributes of a Class I Area that deterioration of air quality may diminish the area's national significance, impair the structure or functioning of an ecosystem, or impair the quality of the visitor experience and include visibility impairment and deposition of sulfur and nitrogen. A source is determined to have no adverse impact on visibility impairment if the 98th-percentile (highest eighth-high) change in light extinction, when compared to natural background conditions, is less than 5% based. For Class I areas in the eastern United States, total deposition of sulfur or nitrogen is compared to a Deposition Analysis Threshold (DAT) of 0.01 kilograms/hectare/year (kg/ha/yr) to determine if an adverse impact is predicted.

Generally, the term "may affect" includes any PSD major facility proposing to locate within 100 km of a Class I area and certain large sources beyond 100 km. In the revised *Federal Land Managers' Air Quality Related Values Work Group Phase I Report* (FLAG 2010), the U.S. Forest Service (USFS), National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS) have officially adopted screening criteria to determine if an assessment of AQRV's will be necessary for large PSD sources proposing to locate at distances greater than 50 km from a Class I area. The screening criteria (Q/D) is similar to that used for US EPA's Best Available Retrofit Technology (BART) guidelines for the Regional Haze Rule and is based on ratio of the sum of potential emissions of NO_x, SO_2, and all forms of particulate matter (including sulfuric acid mist (H_2SO_4)) and the distance between the proposed source and a Class I area. The FLM's will consider a source with a Q/D ratio of less than 10 to have negligible impacts with respect to the ARQV's.

Based on the level of BACT proposed, the Millen facility has a Q/D screening value greater than 10 for four Class I areas within 300 km of the project location: Cape Romain (SC), Okefenokee (GA), Wolf Island (GA), and Shining Rock (NC). Based on this, the FLM's for these Class I areas were contacted on July 25, 2011 to determine if they may be concerned about adverse impacts to AQRV's that would result from the proposed facility. Both FWS and USFS requested that an AQRV analysis be performed. Since evaluating visibility impairment involves modeling of NO_x, SO_2, and particulate matter, the facility's air quality impacts with respect to the Class I SIL's for NO_x, SO_2, and PM_{10} were also evaluated. In order to conduct the AQRV and Class I increment significance analysis, a modeling protocol was submitted on August 1, 2011 to FWS, USFS, GA EPD and US EPA for review and comment on the proposed modeling techniques. A copy of the modeling protocol is provided in Attachment E of this volume. Copies of all correspondence with the FLM's, GA EPD and US EPA are provided in Attachment F of this volume.

3.1 Modeling Methodology

The Class I area AQRV and PSD increment significance analysis was conducted in accordance with the modeling protocol, submitted on August 1, 2011. Since all Class I areas are located beyond 50 km from the project site, CALPUFF, the preferred regulatory model for long range transport (LRT), was used. Unlike AERMOD, CALPUFF is a non-steady-state Lagrangian puff dispersion modeling system capable of characterizing transport, chemical transformation, dispersion and deposition. The most recent EPA-approved version of CALPUFF, Version 5.8 Level 070623 (with CALPOST Version 5.6394 Level 070622), was used. However, for visibility impairment, the version of the CALPOST post-processor used was CALPOST Version 6.292 Level 110406 which allows for the use of Method 8 Mode 5 to conform to FLAG 2010 guidelines.

Because of this model selection, model options were chosen based on the recommendations contained in the *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*, December 1998 (IWAQM II). These model options are appropriate for both the AQRV's and Class I increments and were chosen, and tested, to conform to the regulatory default model (MREG = 1) and used Pasquill-Gifford dispersion coefficients (MDISP = 3). The CALPUFF input file used for the Class I air quality analysis is provided with the modeling protocol included in Attachment E of this volume. The meteorological dataset that was used was the CALMET 5.8 dataset developed for VISTAS sub-regional domain 4. This domain has been configured to include each Class I area under review with at least a 50 km buffer zone in each direction to ensure that concentrations were not underestimated by loosing "puffs" off the grid. The data was obtained from GA EPD and has been preprocessed on a 4-km grid scale using 2001 through 2003 MM5 data as the initial guess field with NWS observations to provide local surface refinement.

In order to evaluate both the visibility impairment and deposition AQRV's, chemical transformations involving five species, SO_2, SO_4, NO_x, HNO_3, and NO_3, were performed. CALPUFF is capable of simulating these chemical transformations using pseudo-first-order chemical reaction mechanisms. For the AQRV assessment, the MESOPUFF II chemical transformation scheme (MCHEM = 1), which is part of the regulatory default model, was used. MESOPUFF II uses ambient concentrations of ozone as a surrogate for hydroxyl radical (OH) concentrations for daytime sulfate and nitrate chemistry. The ozone data that were used contain hourly measurements of ozone from all non-urban monitors within and just outside the metrological domain and were obtained from GA EPD. The default ozone value of 80 ppb (BCK03) will used for the background ozone concentration for instances when hourly data is missing. Additionally, ambient ammonia concentrations are used for nitric acid and nitrate partitioning. A spatially constant, domain average value of 0.5 ppb was used for this purpose, consistent with IWAQM II and BART guidelines for the VISTAS region.

Unlike modeling conducted for the Class I PM_{10} increment, visibility impairment required speciation of total direct PM_{10} emissions into fractions representing coarse (PMC) and fine particulate matter (PMF), organic condensables (POC or SOA), and elemental carbon (EC). Also, sulfuric acid mist (H_2SO_4) is condensable PM which was modeled as directly emitted sulfur (SO_4). For visibility impairment, PM was speciated according to the profiles contained in the modeling protocol. PM_{10} was speciated into different size fractions of particulate matter based on the total PM_{10} and $PM_{2.5}$ BACT emission limitations and the facility-wide H_2SO_4 PSD avoidance limitation that are proposed as part of this PSD application. Please refer to Volumes I and II. For emission units not associated with condensable PM, such as storage silos, railcar loading and other material handling equipment, PM is apportioned to size fractions of coarse (PCM) and fine (PMF) particulate based on the ratios of $PM_{10-2.5}$ and $PM_{2.5}$ to total PM_{10} BACT. The particulate was then split evenly into coarse size fractions PM_{10-6} (PMC800) and $PM_{6-2.5}$ (PMC425) for $PM_{10-2.5}$ and the submicron size fractions $PM_{1-0.625}$ (PMF081) and $PM_{0.625-0.5}$ (PMF056) for $PM_{2.5}$. Although the spray dryers and boilers may be associated with some non-zero fraction of filterable PM, the same procedure was used to apportion PM except that all PM is assumed to be organic condensable (POC) which will provide for a conservative estimate of visibility impairment based on the light extinction coefficient for SOA. Finally, the same approach used for the spray dryers and boilers was used for the kilns except that the total portion of PM_{10} speciated to POC excludes the portion of H_2SO_4 modeled directly as SO_4.

3.2 Class I Air Quality Analysis Results

Table 3.2-1, Table 3.2-2, Table 3.2-3, and Table 3.2-4 summarize the Millen facility's impacts with respect to the AQRV's and Class I PSD increments for Cape Romain, Okefenokee, Wolf Island, and Shining Rock, respectively. Based on the results, the Millen facility, as proposed, will have no adverse impact on visibility or deposition in any Class I area and will not be significant for any Class I SIL. It should be noted that the Millen facility demonstrates no adverse impact to visibility based on the highest 24-hour change in light extinction at all Class I receptors.

Table 3.2-1: Results of Class I AQRV and PSD Increment Air Quality Analyses – Cape Romain (FWS)

Parameter	Averaging Period	2001	2002	2003	Threshold
Class I Area Significant Impact Levels for SO_2, PM_{10}, and NO_2					
SO_2 Class I SIL	3-hr ($\mu g/m^3$)	0.0981	0.1732	0.1391	1.00
	24-hr ($\mu g/m^3$)	0.0297	0.0254	0.0450	0.20
	annual ($\mu g/m^3$)	0.0022	0.0019	0.0018	0.08
PM_{10} Class I SIL	24-hr ($\mu g/m^3$)	0.0223	0.0176	0.0327	0.3
	annual ($\mu g/m^3$)	0.0013	0.0013	0.0011	0.2
NO_2 Class I SIL	annual ($\mu g/m^3$)	0.0035	0.0034	0.0031	0.10
Class I Area Sulfur and Nitrogen Deposition AQRV					
N	annual (kg/ha/yr)	0.0027	0.0024	0.0019	0.01
S	Annual (kg/ha/yr)	0.0024	0.0023	0.0016	0.01
Visibility Impairment AQRV					
Δb_{ext} Method 8 M5	24-hr (%)	1.8	1.48	1.54	Highest
Δb_{ext} Method 8 M5	24-hr (%)	0.66	0.74	0.69	5% (98th Percentile)
Number of Days Exceeding 5%		0	0	0	7

Table 3.2-2: Results of Class I AQRV and PSD Increment Air Quality Analyses – Okefenokee (FWS)

Parameter	Averaging Period	2001	2002	2003	Threshold
Class I Area Significant Impact Levels for SO_2, PM_{10}, and NO_2					
SO_2 Class I SIL	3-hr ($\mu g/m^3$)	0.1359	0.1456	0.1443	1.00
	24-hr ($\mu g/m^3$)	0.0394	0.0479	0.0458	0.20
	annual ($\mu g/m^3$)	0.0009	0.0011	0.0010	0.08
PM_{10} Class I SIL	24-hr ($\mu g/m^3$)	0.0221	0.0267	0.0235	0.3
	annual ($\mu g/m^3$)	0.0007	0.0008	0.0006	0.2
NO_2 Class I SIL	annual ($\mu g/m^3$)	0.0016	0.0020	0.0024	0.10
Class I Area Sulfur and Nitrogen Deposition AQRV					
N	annual (kg/ha/yr)	0.0010	0.0017	0.0012	0.01
S	Annual (kg/ha/yr)	0.0007	0.0011	0.0007	0.01
Visibility Impairment AQRV					
Δb_{ext} Method 8 M5	24-hr (%)	3.19	3.26	2.83	Highest
Δb_{ext} Method 8 M5	24-hr (%)	0.65	0.62	0.83	5% (98th Percentile)
Number of Days Exceeding 5%		0	0	0	7

Table 3.2-3: Results of Class I AQRV and PSD Increment Air Quality Analyses – Wolf Island (FWS)

Parameter	Averaging Period	2001	2002	2003	Threshold
Class I Area Significant Impact Levels for SO_2, PM_{10}, and NO_2					
SO_2 Class I SIL	3-hr (μg/m^3)	0.1362	0.1501	0.1466	1.00
	24-hr (μg/m^3)	0.0542	0.0446	0.0521	0.20
	annual (μg/m^3)	0.0015	0.0018	0.0014	0.08
PM_{10} Class I SIL	24-hr (μg/m^3)	0.0311	0.0243	0.0237	0.3
	annual (μg/m^3)	0.0009	0.0011	0.0009	0.2
NO_2 Class I SIL	annual (μg/m^3)	0.0032	0.0040	0.0031	0.10
Class I Area Sulfur and Nitrogen Deposition AQRV					
N	annual (kg/ha/yr)	0.0014	0.0016	0.0011	0.01
S	Annual (kg/ha/yr)	0.0013	0.0013	0.0009	0.01
Visibility Impairment AQRV					
Δb_{ext} Method 8 M5	24-hr (%)	2.61	2.39	2.09	Highest
Δb_{ext} Method 8 M5	24-hr (%)	0.76	0.85	0.92	5% (98th Percentile)
Number of Days Exceeding 5%		0	0	0	7

Table 3.2-4: Results of Class I AQRV and PSD Increment Air Quality Analyses – Shining Rock (USFS)

Parameter	Averaging Period	2001	2002	2003	Threshold
Class I Area Significant Impact Levels for SO_2, PM_{10}, and NO_2					
SO_2 Class I SIL	3-hr (μg/m^3)	0.0184	0.0245	0.0387	1.00
	24-hr (μg/m^3)	0.0047	0.0042	0.0088	0.20
	annual (μg/m^3)	0.0002	0.0002	0.0003	0.08
PM_{10} Class I SIL	24-hr (μg/m^3)	0.0037	0.0044	0.0058	0.3
	annual (μg/m^3)	0.0002	0.0002	0.0002	0.2
NO_2 Class I SIL	annual (μg/m^3)	0.0003	0.0002	0.0003	0.10
Class I Area Sulfur and Nitrogen Deposition AQRV					
N	annual (kg/ha/yr)	0.0010	0.0011	0.0018	0.01
S	Annual (kg/ha/yr)	0.0007	0.0008	0.0012	0.01
Visibility Impairment AQRV					
Δb_{ext} Method 8 M5	24-hr (%)	0.37	0.34	0.53	Highest
Δb_{ext} Method 8 M5	24-hr (%)	0.27	0.19	0.32	5% (98th Percentile)
Number of Days Exceeding 5%		0	0	0	7

4.0 TOXIC IMPACT ASSESSMENT

GA EPD regulates emissions of toxic air pollutants (TAP) through a state-only program governed by the provisions of Georgia Rule 391-1-1-.02(2)(a)3.(ii). This rule gives GA EPD the authority to require emission limitations when necessary to safeguard the public heath, safety, and welfare of Georgia's citizens. Generally, a TAP may be any substance that may have an adverse effect on public heath, excluding any substance that is covered by a state or federal ambient air quality standard. When conducting reviews of air quality permit applications for new or modified sources of TAP, GA EPD uses the procedures contained in the agency's *Guideline for Ambient Pollutant Impacts of Toxic Air Emissions*, revised June 21, 1998.

Pollutants without a state or federal ambient air quality standard (i.e., non-criteria pollutants) that are emitted from the proposed facility include ammonia, methanol, hydrogen fluoride (HF), hydrogen chloride (HCl), and speciated organics from fuel combustion. Prior to proppant formation in the spray dryers, a solution of aqueous ammonia is used to adjust the pH of the kaolin slurry. An additive containing methanol as an impurity is also added prior to proppant formation in order to control the mechanical properties of the slurry. At the high temperatures encountered in the direct-fired rotary kilns, naturally occurring fluorides and chlorides in kaolin are released to the atmosphere as HF and HCl. Speciated organic compounds, the largest of which is hexane, are emitted from combustion of fuel in all fuel burning and fuel combustion equipment.

Each of these non-criteria pollutants is classified as a TAP under GA EPD's guidelines. Generally, any non-criteria pollutant is considered a TAP in Georgia if the pollutant has one or more of the following toxicity-based values:

- US EPA *Integrated Risk Information System* (IRIS) inhalation reference concentration (RfC) or risk based air concentration (RBAC);
- Occupational Safely and Health Administration (OSHA) time-weighted average or "ceiling" permissible exposure limit (PEL) in 29 CFR 1910.1000;
- American Conference of Governmental Industrial Hygienist (ACGIH) time-weighted average, short-term exposure, or "ceiling" threshold limit value (TLV); and
- National Institute of Occupational Safety and Health Standards (NIOSH) time-weighted average, short-term exposure, or "ceiling" recommended exposure limit (REL)

Any of the aforementioned references may be directly used to determine if a pollutant has a toxicity-based threshold value. As an alternative, the most recent material safety data sheet (MSDS) for a pollutant may also be used to determine pollutant toxicity since it is required to be published in Section 8, Exposure Controls/Personnel Protection, of an MSDS. Once a pollutant's toxicity values have been determined, short-term (15-min and 24-hour) and long-term (annual) acceptable ambient concentrations (AAC's) are derived based on the exposure period on which the toxicity values are based and whether or not the pollutant is a known carcinogen. Then, dispersion modeling is conducted to compare the maximum ground level concentration (MGLC), or highest first-high concentration, to the applicable AAC.

4.1 Acceptable Ambient Concentrations

Since a single pollutant may have toxicity data published in all of the references listed above, the AAC for each TAP is derived based on a priority schedule (in the order in which the references are listed). For pollutants with an RfC or RBAC, a chronic AAC (annual averaging period) is determined. If a pollutant has both an RfC and RBAC, the AAC is based on the more stringent of the two. The RfC provides an estimate of daily inhalation exposure that is likely to be without an appreciable risk of deleterious effects during a 70 year lifetime. The RBAC is an approximation of cancer-causing potential per concentration of air inhaled. For pollutants with an RfC, the AAC is set equal to the RfC. An AAC is obtained from an RBAC by dividing the unit risk by a factor based on the weight-of-evidence classification, e.g., 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).

If both an RfC and RBAC are not available in IRIS, a 24-hour AAC is derived from a time-weighted average OSHA PEL, ACHIG TLV, or NIOSH REL. These exposure limits were developed in terms of the typical duration of occupational exposure (i.e., 8-hours per day, five-days a week or a 40-hour work week). 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 based on 168 hours per week for continuous operation. Second, the adjusted TWA is divided by a safety factor to account for carcinogenicity in humans: 100 for pollutants that are not known human carcinogens, 300 for pollutants that are known human carcinogens. Additionally, if a TAP has an RfC or RBAC based AAC, then a 24-hour AAC is not required.

If a pollutant also has a short-term exposure or ceiling limit, a 15-minute AAC is derived. These values have been established for pollutants that are acute sensory irritants and are adjusted by a safety factor of 10. No exposure adjustment factor is applied to short-term exposure or ceiling limit values. A 15-minute AAC, if applicable, must be met in addition to an annual average or 24-hour average AAC. Table 4.1-1 summarizes the AAC's derived for each TAP. It should be noted that the annual AAC for HF is not based on an IRIS RfC or RBAC but a chronic REL published by the California Air Resources Board, which was developed in the same manner.[28] GA EPD has previously accepted this toxicity value as an acceptable alternate since the US EPA Office of Air Quality Planning and Standards (OAQPS) uses the CARB-derived value when conducting risk assessments for HAP.[29]

[28] *Derivation of Toxicity Criteria*, Section 6.1, Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, California Air Resources Board, Office of Environmental Health Hazard Assessment, August 2003.
[29] http://www.epa.gov/ttn/atw/toxsource/table1.pdf

Table 4.1-1: Summary of Acceptable Ambient Concentrations for Toxic Air Pollutants

TAP	Averaging Period		
	15-min ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Hexane (C_6H_{14})	--	--	700 (IRIS RfC)
Methanol (CH_3OH)	32,760 (ACGIH 250 ppm STEL)	625 (OSHA 200 ppm TWA)	--
Ammonia (NH_3)	2,440 (ACGIH 35 ppm STEL)	--	100 (IRIS RfC)
Hydrogen Fluoride (HF)	165 (ACGIH 2 ppm STEL)	--	14 [1] (CARB Chronic REL)
Hydrogen Chloride (HCl)	745 (OSHA 5 ppm Ceiling)	--	20 (IRIS RfC)

[1] US EPA has not established an RfC or RBAC for HF, however, the California Air Resources Board (CARB) suggests a 14 $\mu g/m^3$ chronic inhalation reference exposure level (REL) which US EPA has adopted; GA EPD has previously accepted this alternate toxicity data as the AAC for the annual time averaging period

4.2 Modeling Methodology

The procedures in GA EPD's toxics guideline, as modified by instructions from GA EPD in the July 27, 2011 Class II modeling protocol approval letter, were used to conduct the toxic impact assessment for emissions of TAP from the Millen facility. In the Class II modeling protocol, CARBO proposed to use ISC3 with rural dispersion coefficients, regulatory default model options, and five-years of meteorological data measured at the Augusta Regional Airport (Bush Field) surface station (20 ft anemometer height) and Athens Bens Epps Airport upper air station for calendar years 1974 through 1978 for the toxic impact assessment. However, since there is terrain immediately surrounding the Millen facility within elevations in excess of the release height of the shortest stack, AERMOD 11103 was used to determine the MGLC for each TAP.[30] Because of this model selection, downwash was incorporated into the analysis. Consistent with the proposal for ISC3, the urban modeling option in AERMOD was not used. Additionally, the five years of meteorological data used for the NAAQS and Class II PSD increment air quality analysis were used for the TIA. Based on guidance from GA EPD, a concatenated five-year meteorological data set was used to assess the 15-min, 24-hour, and annual AAC.[31] In this way, only a single model run was required for each TAP.

[30] The natural gas-fired boilers (BLR1, BLR2, BLR3 and BLR4) are the shortest stacks from which TAP (hexane) are released to the atmosphere. The height of release above mean sea level for each boiler is 244 feet (29 feet above the grade elevation of the plant processing area). The highest terrain elevation within 2,500 meters of the facility, the extent of 100 m spaced receptors used for the TIA, is over 280 feet (414,700 meters east, 3,625,500 meters north). The release height for all other stacks emitting TAP (spray dryers and direct-fired rotary kilns) are above this terrain elevation. However, since AERMOD was used for hexane because of the stack height of the boilers, AERMOD was used to estimate the MGLC for all TAP to provide consistency in model selection for the analysis.

[31] For TAP with an annual AAC based on an RfC (or CARB chronic REL) or RBAC, PERIOD is used, in lieu of ANNUAL, when specifying the pollutant averaging period in the control options pathway.

4.3 Determination of Toxic Air Pollutant Impact

In order to determine the MGLC for each TAP, AERMOD was used to estimate the highest first-high air quality impacts from each TAP within the 100 meter spaced portion of the receptor grid used for the preliminary impact assessment (i.e., out to a distance of 2.5 km). Potential emissions of each TAP modeled and source parameters are summarized in Section 1.1.3.1 above. Please refer to Attachment B of Volume I for detailed emission calculations. For TAP with an AAC based on a 15-minute short-term exposure or ceiling limit, the 1-hour MGLC was multiplied by a conversion factor of 1.32 per GA EPD's toxic guideline. Table 4.3-1 summarizes the results of the toxic impact assessment. The results show that the maximum ambient impact all TAP are well below their respective AAC's. Therefore, the Millen facility, as proposed, will be in compliance with Georgia's state-only toxics program with additional margin on top of the safety factors built into the derivation of the AAC's.

Table 4.3-1: Toxic Impact Assessment Modeling Results

TAP	Avg. Period	ACC	Maximum Ground Level Concentration				Percent of AAC	AAC Exceeded
			UTM NAD83		Conc. ($\mu g/m^3$)	Date		
			East (m)	North (m)				
Hexane	Annual	700	415,430.60	3,625,910.40	0.04	PERIOD	<0.01%	No
Methanol	15-min	32,760	415,100.00	3,625,700.00	24.64	10070220	0.08%	No
	24-hr	625	415,049.80	3,625,513.40	9.18	08121424	1.47%	No
Ammonia	15-min	2,440	415,100.00	3,625,700.00	299.65	10070220	12.28%	No
	Annual	100	415,176.70	3,625,645.70	10.87	PERIOD	10.87%	No
HF	15-min	165	416,700.00	3,626,800.00	19.81	10062607	12.01%	No
	Annual	14	416,300.00	3,625,900.00	0.49	PERIOD	3.50%	No
HCl	15-min	745	416,700.00	3,626,800.00	4.53	10062607	0.61%	No
	Annual	20	416,300.00	3,625,900.00	0.11	PERIOD	0.55%	No

5.0 ELECTRONIC FILES

The DVD included in Attachment H to this Volume contains the electronic files associated with all air quality analyses described in this application. For reference, Table 5-1 describes the location of the electronic files within the various folders contained on the DVD.

Table 5-1: Location of Electronic Files

Main Folder	Subfolder	Subfolder(s)	Subfolder(s)	Subfolder(s)	Files
Electronic Files	--	--	--	--	South Carolina PSD inventory spreadsheets for Aiken (Aik_0080.xls), Allendale (All_0160.xls), Barnwell (Bar_0300.xls), and Hampton (Ham_1280.xls)
Electronic Files	--	--	--	--	Excel workbook for Q/D screening, refined $PM_{2.5}$ screening, NAAQS and PSD increment inventories (i.e. Attachment G) "CARBO Millen PSD Q over d Screening and Inventories.xls"
Electronic Files	--	--	--	--	Excel workbook for project source emission rates and stack parameters "Emissions and Stack Parameters.xls"
Electronic Files	--	--	--	--	Excel workbook for project source fugitive emissions calculations "Paved Road Fugitive Dust Road Calculations.xls"
Electronic Files	AERMAP 11103	--	--	--	Excel workbook contains all receptor grids for each air quality analysis, including 100 m resolution grids "Project Receptors.xls"
Electronic Files	AERMAP 11103	Receptor Grids	--	--	AERMAP files for full significance grid • Fenceline receptors spaced no further than 100 meters apart; • 100 meter spaced receptors out to 2.5 km; • 250 meter spaced receptors out to 5 km; and • 500 meter spaced receptors out to 50 km
Electronic Files	AERMAP 11103	NO2 ANN SO2 3HR 24HR SIA RESOLVE	--	--	AERMAP files to resolve annual NO_2 and 3-hr, 24-hour and annual SO_2 SIA's to 100 m spacing
Electronic Files	AERMAP 11103	PM10 24HR SIA RESOLVE	--	--	AERMAP files to resolve 24-hour PM_{10} SIA to 100 m spacing
Electronic Files	AERMAP 11103	PM25 24HR SIA RESOLVE	--	--	AERMAP files to resolve 24-hour $PM_{2.5}$ SIA to 100 m spacing

Main Folder	Subfolder	Subfolder(s)	Subfolder(s)	Subfolder(s)	Files
Electronic Files	AERMAP 11103	NO2 1HR SIG MAX RESOLVE	--	--	AERMAP files to resolve maximum 1-hour NO_2 significant impact to 100 m spacing
Electronic Files	AERMAP 11103	100m 6.5km for Full Impact	--	--	AERMAP files for 100 m spaced receptors out to distance of furthest SIA (6.5 km annual NO_2). 100 m spaced receptor grids for PM_{10} (3.4 km), SO_2 (4.0 km) and $PM_{2.5}$ (4.4 km) were extracted from this receptor set
Electronic Files	AERMAP 11103	NO2 1HR NAAQS RESOLVE	--	--	AERMAP files for 1-hour NO_2 NAAQS culpability analysis
Electronic Files	AERMET 11059	--	--	--	Excel workbook used to determine fastest wind speed to limit 1-hour NO_2 and SO_2 NAAQS screening areas "Fastest Wind Speed.xls"
Electronic Files	AERMET 11059	AIRPORT	DanielFld	--	Preprocessed AERMET surface and profile files provided by GA EPD for August Daniel Field surface characteristics
Electronic Files	AERMET 11059	PROJECT	CARBOj	--	Preprocessed AERMET surface and profile files provided by GA EPD for project site surface characteristics
Electronic Files	AERMOD 11103	INCREMENTS	NO2 ANN AIRPORT PM10 24HR ANN AIRPORT SO2 3HR 24HR ANN AIRPORT	--	All AERMOD input and output files for PSD increment analysis

Main Folder	Subfolder	Subfolder(s)	Subfolder(s)	Subfolder(s)	Files
Electronic Files	AERMOD 11103	NAAQS	NO2 1HR AIRPORT NO2 ANN AIRPORT PM10 24HR AIRPORT PM25 24HR AIRPORT PM25 ANN AIRPORT SO2 1HR AIRPORT SO2 3HR AIRPORT SO2 24HR AIRPORT SO2 ANN AIRPORT	--	All AERMOD input and output files for NAAQS analysis
Electronic Files	AERMOD 11103	PRELIM IMPACT	AIRPORT	CO 1HR 8HR NO2 1HR PM10 24HR ANN PM25 24HR NAAQS FORM PM25 24HR SMC SO2 1HR SO2 3HR 24HR ANN	All AERMOD input and output files for preliminary impact assessments using airport surface characteristics

Main Folder	Subfolder	Subfolder(s)	Subfolder(s)	Subfolder(s)	Files
Electronic Files	AERMOD 11103	PRELIM IMPACT	PROJECT	CO 1HR 8HR NO2 1HR NO2 1ANN PM10 24HR ANN PM25 ANN NAAQS FORM SO2 1HR SO2 3HR 24HR ANN	All AERMOD input and output files for preliminary impact assessments using project surface characteristics PM10 24HR ANN subfolders contains separate folders for regulator default and non-default (FLAT ELEV) modeling runs
Electronic Files	AERMOD 11103	PM25 24HR ANN NAAQS INVENORY SCREENING	AIRPORT PROJECT	--	All AERMOD input and output files for refined PM2.5 screening (Table 2 Attachment G) using both set of meteorological data
Electronic Files	AERMOD 11103	TOXICS	--	--	All AERMOD input and output files for toxic impact assessment
Electronic Files	AERSURFA CE	CARBO NLCD92	--	--	Excel workbook for surface characteristics comparison of airport and project sites "Surface Characteristics Comparison.xls"
Electronic Files	AERSURFA CE	CARBO NLCD92	AVG WET DRY	--	All AERSURFACE input and output files for all surface moisture conditions for project site Also contains "19161062.tif" and "19161062.zip" which are the NLCD92 data obtained from the USGS seamless server
Electronic Files	AERSURFA CE	KDNL NLCD92	--	--	AERSURFACE files for all surface moisture conditions provided by GA EPD for the airport site location
Electronic Files	BPIPPRM 04274	--	--	--	BPIPPRM input and output files
Electronic Files	CALPUFF	2001 2002 2003	--	--	Each folder contains the CALPUFF and POSTUTIL input files to generate files of concentrations and deposition to process through CALPOST

Main Folder	Subfolder	Subfolder(s)	Subfolder(s)	Subfolder(s)	Files
Electronic Files	CALPUFF	2001 2002 2003	METHOD8 N Deposition S Deposition PM10 NO2 SO2	--	CALPOST input and output files for AQRV's and Class I PSD increments for all Class I areas evaluated
Electronic Files	NED	NED_69308043	--	--	1 arc-sec NED data used to process elevations in AERMAP "NED_69308043.tif"
Electronic Files	O3	--	--	--	Ozone database used with PVMRM for 1-hour NO_2 NAAQS "5YR 2006-2010 OZONEFIL.v2.csv"

Volume III, Attachment A –

Class II Dispersion Modeling Protocol

SMITH ALDRIDGE, INC.
Environmental Consultants

July 19, 2011

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

RE: Proposed Dispersion Modeling Protocol
Class II PSD Air Quality and Additional Impacts Analyses
CARBO Ceramics, Inc. Greenfield Millen, Jenkins County, Georgia Facility

Dear Mr. Courtney,

On behalf of our client, CARBO Ceramics, Inc. ("CARBO"), please find the enclosed proposed dispersion modeling protocol for a planned greenfield proppant manufacturing facility in Millen, Jenkins County, Georgia. The facility will be a major stationary source with respect to PSD review and the enclosed protocol proposes the methods and procedures to be followed in conducting the source impact, air quality and additional impact analyses for areas designated as Class II for the purposes of PSD. The protocol addresses actions taken by the United States Environmental Protection Agency (US EPA) to strengthen the primary NAAQS for NO_2 and SO_2 to include new 1-hour standards, to add PSD increments, significant impact levels, and significant monitoring concentrations for $PM_{2.5}$, to end the use of PM_{10} as surrogate for $PM_{2.5}$ and to account for condensable particulate matter in PSD permit emission limitations. Additionally, this protocol addresses the processing of meteorological model input data to be contemporaneous with 1-hour monitored concentrations of ozone proposed to be used with alternative modeling techniques for estimating ambient impacts of NO_2. A separate modeling protocol requesting approval to use alternative modeling techniques for NO_2 is being submitted to US EPA concurrent with this protocol. If you have any questions, please do not hesitate to contact me by phone at (404) 255-0928 x117 or by e-mail at jbandzul@smithaldridge.com. We look forward to your review and comment.

Sincerely,

Jon Bandzul, Principal
Smith Aldridge, Inc.

enc: Proposed Dispersion Modeling Protocol w/Electronic Files

cc: Jason Goodwin – CARBO Ceramics, Inc.
Craig Smith – Smith Aldridge, Inc.

MAILING ADDRESS: P.O. BOX 420485 • ATLANTA, GEORGIA 30342
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CARBO Ceramics

Millen Proppant Manufacturing Plant

(Jenkins County)

Proposed Air Dispersion Modeling Protocol

for

Class II Area PSD Air Quality and Additional Impact Analyses

July 2011

Prepared by:

SMITH ALDRIDGE, INC.

Environmental Consultants

Atlanta, Georgia

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1.0 INTRODUCTION

CARBO Ceramics, Inc. ("CARBO") manufactures ceramic pellets, or proppants, from nonmetallic minerals for use primarily in the oil and natural gas production industries. CARBO is proposing to construct a new processing plant, approximately 6 km southeast of Millen, Georgia at the intersection of GA State Route 17 and Clayton Road, in Jenkins County. The proposed plant will be a four-line, wet processing facility, similar to its Toomsboro plant in Wilkinson County, Georgia, where ceramic proppants are manufactured from kaolin clay from a slurry which is pelletized in spray dryers and later calcined in direct-fired rotary kilns. In addition to slurry preparation, spray drying and calcining, the processing lines each consist of associated materials handling and storage, screening, and shipping operations.

The construction of the proposed new processing facility will be a subject to PSD preconstruction review since the facility will be a major stationary source and potential emissions of NO_x, SO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and CO_2e are greater than the significant emission rate thresholds for each pollutant. As part of PSD review, CARBO will be required to conduct an ambient air quality analysis to demonstrate that potential emissions from the proposed major stationary source, and all applicable emissions increases and decreases from other existing and proposed new sources, will not cause or contribute to a violation of any applicable national ambient air quality standard (NAAQS) or PSD increment effective at the time of permit issuance. CARBO will also be required to conduct an assessment of ambient air quality in the area that the proposed source would affect and an additional impact analysis to assess the impairment to visibility, soils, and vegetation that would occur as a result of the modification.

The Georgia Environmental Protection Division (GA EPD) Data and Modeling Unit (DMU) recommends in its modeling guidance that, prior to significant modeling effort, a modeling protocol be submitted by the applicant for review and comment by the agency on the proposed modeling techniques (GA EPD 2006). CARBO is submitting this modeling protocol in accordance with this recommendation. This protocol is the "Class II protocol" and proposes the methods and procedures to be followed in conducting the source impact, air quality and additional impact analyses for areas designated as Class II for the purposes of PSD review and addresses actions taken by the United States Environmental Protection Agency (US EPA) to strengthen the primary NAAQS for NO_2 and SO_2 to include new 1-hour standards, to add PSD increments, significant impact levels, and significant monitoring concentrations for $PM_{2.5}$, to end the use of PM_{10} as surrogate for $PM_{2.5}$ and to account for condensable particulate matter in PSD permit emission limitations. Additionally, this protocol addresses the processing of meteorological model input data to be contemporaneous with 1-hour monitored concentrations of ozone (O_3) proposed to be used with alternative modeling techniques for estimating ambient impacts of NO_2. The ozone database and contemporaneous meteorology are proposed to be used with the Plume Volume Molar Ratio Method (PVMRM) which may be used, on a case-by-case basis, to limit NO_2 formation based on the amount of ozone available within the volume of a single or merged plumes.

With regard to areas designated as Class I, this protocol identifies the Class I areas that the proposed modification may affect. A "Class I protocol" will be submitted to GA EPD and the appropriate Federal Land Managers shortly after the date of this protocol to address the methods and procedures to be followed in conducting additional PSD review for protection of the Class I increments and air quality related values.

2.0 PROJECT DESCRIPTION

The proposed new facility will essentially be identical to the existing Toomsboro facility in terms of process nature, production capacity, and process configurations. Generally, ceramic proppants are made by grinding or dispersing ore into a fine powder, combining the powder into small pellets and firing the pellets in a rotary kiln. Similar to the Toomsboro site, this will be accomplished using a "wet" process which begins with processing kaolin. The kaolin is formed into slurry with the addition of water, dispersants and pH-adjusting reagent to control pellet formation and the mechanical properties of the slurry. After the slurry is formed, it is pelletized in spray dryers where methanol, ammonia and excess water from the slurry are driven off. The pellets are then fired, or "sintered", in direct-fired rotary kilns to remove combined (chemically bound) water. The fired pellets are then conveyed from the kiln product systems to storage silos ready for shipment via railcars. A profile view of the proppant product flow (from left-to-right) in a typical proppant manufacturing line is shown in Figure 2.1.

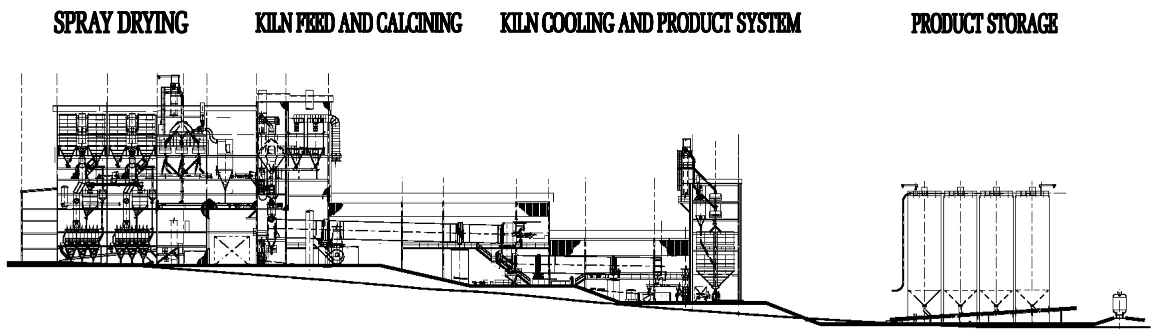


Figure 2-1 Profile View of Typical CARBO Ceramics Proppant Manufacturing Process

Air pollution control equipment associated with the proposed new facility will largely be determined by the BACT and case-by-case MACT proposals in the PSD permit application, which will reflect the most recent control technology determinations demonstrated in practice (considering other factors beyond the scope of the Class II protocol) and may differ from those of the existing Toomsboro facility.

2.1 Project, County, and Regional Location

The PSD program applies to new and modified major stationary sources proposing to located in areas meeting the NAAQS ("attainment" areas) and in areas for which there is insufficient data to designate an area as attainment or nonattainment ("unclassifiable" areas). The proposed project site is located in the eastern-central part of Georgia in Jenkins County which is currently designated as attainment or unclassifiable for all NAAQS. Table 2.1-1 lists the geographic coordinates of the facility and Figure 2.1-1 shows the project location.

Table 2.1-1 Geographic and NAD83 UTM Coordinates for Proposed Project Site

UTM Zone	UTM East (m) (NAD83)	UTM North (m) (NAD83)	Latitude	Longitude
17	415,753	3,625,754	32° 45' 59"N	81° 53' 58"W

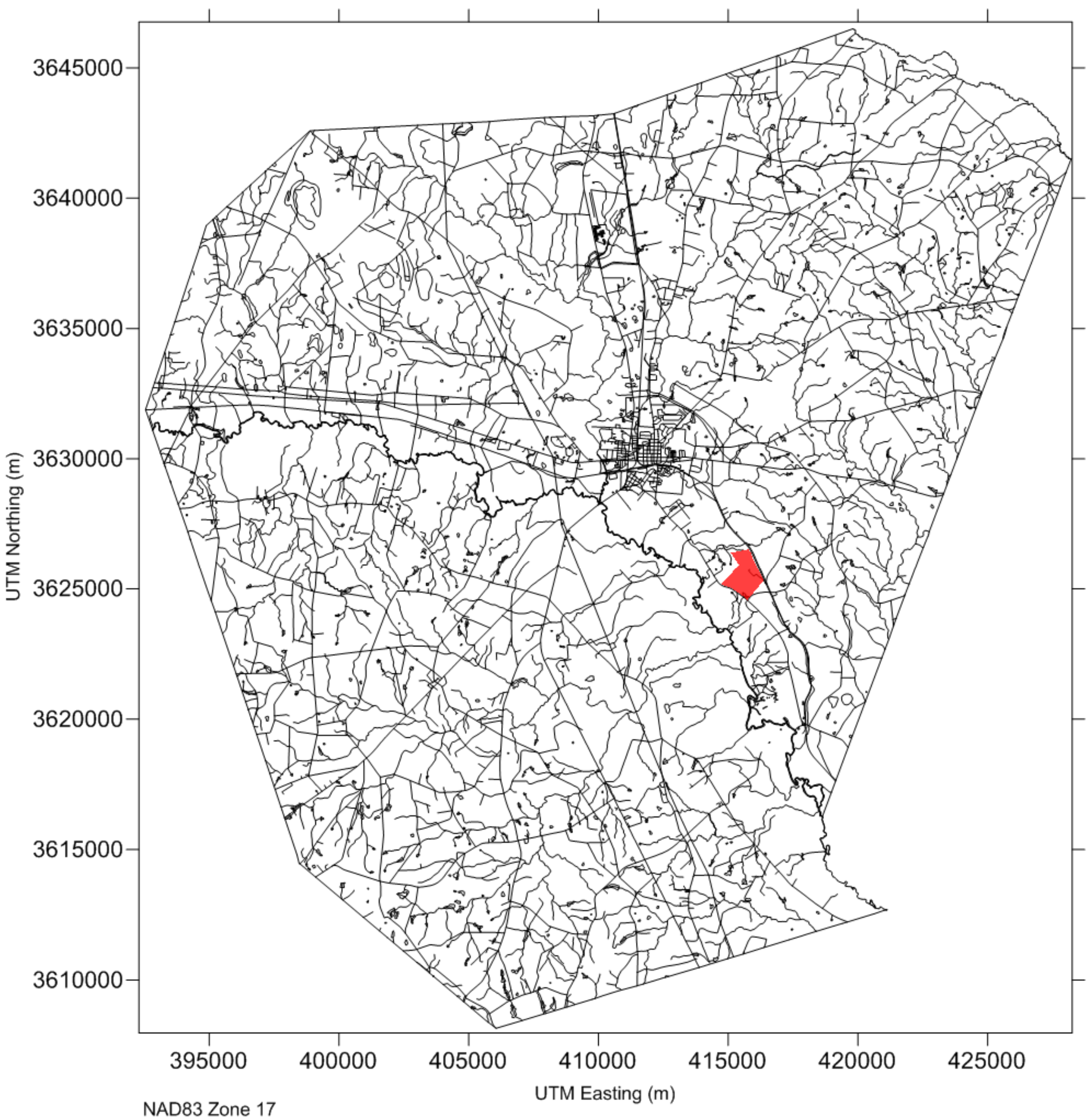


Figure 2.1-1 Proposed Project Location; Millen, Jenkins County, Georgia

Jenkins is located in the Vidalia Upland District of the Upper Coastal Plain. The county is situated in the Ogeechee river basin and is bounded by Bulloch County to the south, Emanuel County to the west, Burke County to the north and by the Screven County to the east. Elevations within 50 km of the county range from 25 feet (8 m) above mean sea level (MSL) along the Savannah River to 400 feet (122 m) in southwest Burke. Elevations within the proposed project site range from 165 feet (50 m) along the property boundary alongside GA S.R. 17 to 280 feet (85 m) along the northwest property boundary.

All counties adjoining Jenkins and within 50 km of the project site are also designated as attainment or unclassifiable for all NAAQS. The boundary of the nearest nonattainment area, Bibb County, is located approximately 150 km due west of the project site (through Twiggs) approximately 3 km north of Dry Branch. Bibb and portions of Monroe County were designated nonattainment for the 1997 annual $PM_{2.5}$ NAAQS on April 5, 2005. Previously, portions of Bibb and Monroe were designated nonattainment for the 1997 8-hour O_3 NAAQS on April 30, 2004, but were redesignated to attainment on October 19, 2007 forming the Macon ozone maintenance area. However, on March 12, 2009, GA EPD recommended designating Bibb and portions of Monroe nonattainment for the 2008 revised 8-hour O_3 NAAQS.

As mentioned in the introduction and discussed in further detail in Section 4.1.2 of this protocol, PSD review includes an assessment of visibility impairment that would occur as a result of the modification. For Class II areas, this assessment is performed for certain state and national parks, and historic sites and local, regional and international airports located within a project's significant impact area for visibility affecting pollutants such as NO_x and PM. Sections 2.1.1 and 2.1.2 list and provide relevant information for such areas that may be included in the Class II visibility impairment analysis. The same is provided for Class I areas located with 300 km of CARBO in Section 2.1.3.

2.1.1 State and National Parks

Georgia is home to 63 state and 13 national parks, monuments, and historic sites, two of which are located within approximately 50 km of the project site: the Magnolia Springs and Georgia L. Smith State Parks. Magnolia Springs is located 8 km north of Millen in Jenkins County and covers 1,070 acres, including the 28-acre Magnolia Springs Lake. Georgia L. Smith is located 20 km east of Swainsboro in Emanuel County and is best known for the refurbished Parrish Mill and Pond, a combination gristmill, saw mill, covered bridge and dam built in 1880. Table 2.1.1-1 provides summary of the proximity of the proposed project site to these state parks.

Table 2.1.1-1 Proximity of Project Site to State and National Parks

State/National Site	County	Distance (km)	Heading (from north)
Magnolia Springs	Jenkins	13.3	330°
Georgia L. Smith	Emanuel	31.8	220°

2.1.2 Local, Regional, International Airports

There are six airports located within approximately 50 km of the project site: Burke County Airport (BXG) in Burke County (3 miles S of Waynesboro), Emanuel County Airport (SBO) in Emanuel County (2 miles NW of Swainsboro), Metter Municipal Airport (MHP) in Candler County (2 miles S of Metter), Millen Airport (2J5) in Jenkins County (5 miles N of Millen near Magnolia Springs), Plantation Airpark (JYL) in Screven County (7 miles S of Sylvania), and Statesboro-Bulloch County Airport (TBR) in Bulloch County (3 miles NE of Statesboro). Table 2.1.2-1 provides summary of the proximity of the proposed project site to these airports.

Table 2.1.2-1 Proximity to Local, Regional, International Airports

Airport	County	Distance (km)	Heading (from north)
Burke County Airport (BXG)	Burke	32.1	343°
Emanuel County Airport (SBO)	Emanuel	47.5	249°
Metter Municipal Airport (MHP)	Candler	46.6	200°
Millen Airport (2J5)	Jenkins	15.3	336°
Plantation Airpark (JYL)	Screven	31.4	116°
Statesboro-Bulloch County Airport (TBR)	Bulloch	34.3	153°

2.1.3 Federal Mandatory Class I Areas

Federal mandatory Class I areas are those areas of special national or regional scenic, recreational, natural or historic value where the need to prevent deterioration of air quality is the greatest. These Class I areas include our nation's pristine national parks and wilderness areas and are managed by officials of the Forest Service (FS), Fish & Wildlife Service (FWS), and National Park Service (NPS) through the United States Departments of Interior and Agriculture. There are four Class I areas located within 300 km of the proposed project site: the Shining Rock wilderness area (FS) and the Cape Romain, Okefenokee and Wolf Island national wildlife refuges (FWS). Table 2.1.3-1 provides summary of the proximity of the proposed project site to these Class I areas.

Table 2.1.3-1 Proximity to Federal Mandatory Class I Areas

Class I Area	FLM	State	Distance (km)	Heading (from north)
Cape Romain	FWS	SC	210.2	86°
Shining Rock	FS	NC	296.7	344°
Okefenokee	FWS	GA	191.9	191°
Wolf Island	FWS	GA	164.1	161°

2.2 Project Emissions

2.2.1 Potential Emissions of the New Major Stationary Source

The construction of the proposed new facility will trigger PSD review for emissions of NO_x, SO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and CO_2e. Table 2.2.1-1 below summarizes potential emissions of criteria, other regulated new source review (NSR) pollutants including greenhouse gases (GHG's), largest single and combined hazardous air pollutants (HAP) and select toxic air pollutants (TAP) of the modification. Until such time that the BACT, case-by-case MACT control technology determinations, and air quality analyses are carried out, CARBO is estimating potential emissions of the facility based on emission limitations for similar process equipment contained in the December 2009 PSD permit and other calculations relied upon in the PSD application (number 18293 dated August 19, 2008 and revised on February 9, 2009 and on August 14, 2009) for the Toomsboro facility.

Table 2.2.1-1 Potential Emissions of Criteria, Other Regulated NSR, Toxic and Hazardous Air Pollutants of Proposed Modification

Criteria Air Pollutants							
NO_x	SO_2	CO	VOC*	PM**	PM_{10}**	$PM_{2.5}$**	Pb
(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
2,446	618	1,046	67	249	249	76	<0.6
Other Regulated NSR, Toxic and Hazardous Air Pollutants							
F	H_2SO_4	Hexane (C_6H_{14})	Ammonia (NH_3)	Methanol (CH_3OH)	HCl	HF	All HAP
(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
<3	<7	5	1,350	40	35	152	232
Greenhouse Gases (GHG)							
CO_2		N_2O	CH_4	CO_2e			
(tpy)		(tpy)	(tpy)	(tpy)			
395,376		28	8	404,308			

* Includes emissions of methanol

** Since the facility does not belong to one of the 28 source categories listed in 40 CFR 52.21(b)(1)(iii), an estimate of fugitive particulate matter emissions are not included for the purposes of PSD applicability.

On October 20, 2010, US EPA amended the PSD regulations to add increments, significant impact levels, and significant monitoring concentrations for $PM_{2.5}$, thus making it possible for states to implement NSR requirements for $PM_{2.5}$ without using PM_{10} as a surrogate (US EPA 2010f). Additionally, beginning January 1, 2011, the condensable portion of PM must be accounted for in enforceable emission limitations in PSD permits. In this regard, all emission rates modeled for PM_{10} and $PM_{2.5}$ are total PM (i.e., filterable plus condensable).

2.2.2 Class I Area Screening

When emissions from a new major stationary source may affect a Class I area, PSD review requires an applicant to demonstrate that the source would have no adverse impact on any air quality related value (AQRV). AQRV's are those attributes of a Class I area where deterioration of air quality may diminish the area's national significance, impair the structure or functioning of an ecosystem, or impair the quality of the visitor experience. The meaning of the term "may affect" is interpreted by US EPA policy to mean new or modified major sources which propose to locate within 100 km of a Class I area. However, if a large project located beyond 100 km from a Class I area is of such a size that the reviewing agency or Federal Land Manager (FLM) is concerned about the project's potential impacts, the applicant may be asked to perform a Class I area increment or AQRV analysis (US EPA 1990).

For those sources with a Q/D screening value greater than 10, where "Q" is the sum of NO_x, SO_2, all forms of PM, including sulfuric acid mist (H_2SO_4), and "D" is the distance from the source to each Class I Area, a Class I area increment and AQRV analysis is required (NPS 2010). Table 2.2.2-1 lists the estimated Q/D screening values for the proposed new processing lines for each Class I area within 300 km.

Table 2.2.2-1 Class I Area Q/D Screening Values

Class I Area	Distance, D (km)	Q/D*	Agency	Agency Contact
National Wildlife Refuges				
Cape Romain	210.2	15.76	United States Department of Interior Fish & Wildlife Service (FWS)	Catherine Collins U.S. Fish and Wildlife Service Air Quality Branch 7333 W. Jefferson Avenue Suite 375 Lakewood, CO 80235-2034 (303) 914-3807 Catherine_Collins@fws.gov
Okefenokee	191.9	17.26		
Wolf Island	164.1	20.19		
Wilderness Areas				
Shining Rock	296.7	11.17	United States Department of Agriculture Forest Service (FS)	Bill Jackson Air Resource Specialist USDA Forest Service 160A Zillicoa Street Asheville, NC 28801 (828) 257-4815 bjackson02@fs.fed.us

* Q = NO_x + SO_2 + all forms of PM = 3,313 tpy

The proposed project site is located well beyond 100 km from the nearest Class I Area (164.1 km to Wolf Island) but has an estimated Q/D screening value greater than 10 for each Class I area within 300 km. Based on this, the FLM's for the Class I areas listed may be concerned about potential emissions from the proposed facility based on the previous BACT determinations. In this regard, notification will be provided to the FLM's and a Class I modeling protocol will be prepared to delineate proposed procedures that will be used to determine whether potential emissions from the facility will cause or contribute to a violation of any Class I area PSD increment or adversely affect any applicable AQRV. The notification and protocol will be prepared and submitted shortly after the date of this Class II protocol.

3.0 AIR QUALITY ANALYSIS FOR NAAQS AND PSD INCREMENTS

As part of the PSD application, CARBO will conduct an air quality analysis to determine the ambient impacts associated with the construction and operation of the facility. The main purpose of the analyses will be to demonstrate that potential emissions from the project, and all applicable emissions increases and decreases from other existing and proposed new sources, will not cause or contribute to a violation of any applicable NAAQS or PSD increment. As of the date of this protocol, NAAQS exist for NO_2, SO_2, CO, PM_{10}, $PM_{2.5}$, and Pb and PSD increments exist for NO_2, SO_2, PM_{10}, and $PM_{2.5}$. The procedures used to conduct the air quality analysis will generally conform to those described by US EPA in their PSD and nonattainment NSR permitting guidance (US EPA 1990).

CARBO will use a two-tiered approach to dispersion modeling for the NAAQS and PSD increment analysis. Initially, only potential emissions, including quantifiable fugitive emissions, for each pollutant with a NAAQS and subject to PSD review will be modeled to determine if a significant impact is predicted to occur. If no significant impact is predicted for a pollutant for all time averaging periods, the impacts will be considered *de minimis* and no further refined modeling will be conducted. However, if a significant ambient impact is predicted to occur for a pollutant, a full impact NAAQS and PSD increment analysis will be conducted for each applicable time averaging period considering emissions increases and decreases from existing and proposed new sources, residential, commercial, and industrial growth associated with the project, and background pollutant concentrations.

3.1.1 Preliminary Impact Analysis

In the first step of the air quality analysis, CARBO will determine if a significant impact is predicted to occur by comparing results from initial dispersion modeling for each pollutant to the applicable significant impact levels (SIL's) for each averaging period. SIL's are used in the PSD program as a screening tool to identify the level at which a project's emission increase may be considered *de minimis*, i.e., will not "cause or contribute" to a violation of a NAAQS or PSD increment. SIL's are also used to define the geographical extent of the significant impact area (SIA) within which the full impact NAAQS and PSD increment air quality analysis must be carried out. US EPA has established SIL's for the annual time averaging period for NO_2, the 3-hour, 24-hour and annual time averaging periods for SO_2, the 1-hour and 8-hour time averaging periods for CO and the 24-hour and annual time averaging periods for PM_{10} and $PM_{2.5}$. Additionally, US EPA has issued guidance on the use of interim SIL's for the 1-hour NO_2 and SO_2 NAAQS until a SIL for each is promulgated through rulemaking (US EPA 2010c, 2010e). For both the 1-hour NO_2 and SO_2 NAAQS, EPA recommends using a SIL with a value of 4% of the NAAQS – 4 ppb for NO_2 and 3 ppb for SO_2. Table 3.3.3-1 summarizes the SIL's that will be used in the preliminary impact analysis.

Table 3.1.1-1 Significant Impact Levels (SIL's)

POLLUTANT	AVERAGING PERIOD				
	1-hour (μg/m³)	3-hour (μg/m³)	8-hour (μg/m³)	24-hour (μg/m³)	Annual (μg/m³)
NO_2	8*	--	--	--	1
SO_2	8*	25	--	5	1
CO	2,000	--	500	--	--
PM_{10}	--	--	--	5	1
$PM_{2.5}$	--	--	--	1.2	0.3
O_3†	--	--	--	--	--

* Based on 4% of the NAAQS for the same averaging period at EPA standard conditions of 25 °C and 760 mm Hg (1 atm.) and rounded to the nearest whole number

† No SIL has been established for ozone (O_3) and an ambient impact analysis is required for a significant net emission increase of NO_x or VOC greater than 100 tons per year

Excluding the 1-hour time averaging period for NO_2 and SO_2, the highest modeled pollutant concentration for each averaging period will be compared to the SIL's listed in Table 3.1.1.-1 to determine if a significant impact is predicted to occur. For the 1-hour time averaging period for NO_2 and SO_2, EPA recommends using the average of the highest concentrations predicted at each receptor and comparing the highest five-year average to the interim SIL.

For $PM_{2.5}$, a situation exists where the form of the SIL for the NAAQS and increment will likely be dissimilar. On March 23, 2010, US EPA issued guidance on using a SIL based on the statistical form of the 24-hour and annual NAAQS. However, US EPA promulgated increments for $PM_{2.5}$ allowing for an exceedance rate of one per year for the short-term averaging period (i.e., the highest value of the second-highest modeled concentrations for the 24-hour time averaging period) consistent with the existing PSD regulations. In their final action on the $PM_{2.5}$ SIL's, US EPA states that they intend to provide guidance on interpreting the SIL's for use with the increments. CARBO believes that US EPA will likely interpret the SIL's for the $PM_{2.5}$ increments consistent with the form of the SIL's for all other existing PSD increments. Therefore, for the purposes of determining the extent of the SIA, CARBO will use the highest modeled $PM_{2.5}$ concentration for each averaging period for comparison to the SIL's, in lieu of using the form of the SIL's suggested for the $PM_{2.5}$ NAAQS. However, as discussed in Section 3.1.7, if modeled violations of the $PM_{2.5}$ NAAQS are predicted to occur, CARBO will use SIL's which take into account the statistical form of the NAAQS when resolving violations of the 24-hour and annual $PM_{2.5}$ standards.

If a significant impact for a pollutant is predicted to occur, the SIA will be determined as the circular area with a radius extending from the proposed project site to the most distant receptor at which a significant impact is predicted or 50 km, whichever is less. For all pollutants, except NO_2 and SO_2, the SIA will be the largest area determined considering each averaging period and all years modeled. Based on previous guidance from GA EPD, the SIA's used for the 1-hour NO_2 and SO_2 NAAQS air quality analyses will be specific to the 1-hour time averaging period. In other words, the SIA used for the 3-hour, 24-hour, and annual averaging periods for SO_2 will be different from the SIA used for the 1-hour averaging period. The same will be true of the 1-hour and annual averaging periods for NO_2. As discussed in Section 3.1.3, this is because the GA EPD no longer allows the Q/D (or 20D) screening methodology for the new 1-hour NAAQS standards.

3.1.2 Ambient Monitoring Exemption Analysis

The air quality analysis must assess the existing ambient air quality in the area that the proposed project would affect. For each criteria pollutant subject to PSD review, ambient monitoring data may be required to be collected as part of the air quality analysis. However, GA EPD has discretionary authority to exempt CARBO from this data requirement considering a comparison of the project's ambient impact to significant monitoring concentrations (SMC's) or if existing ambient monitoring data for a pollutant is judged to be available and contemporaneous, complete, quality assured, and representative of the project area. As discussed in Section 3.1.5, CARBO believes that such data exists and has proposed background pollutant concentrations to be used in the NAAQS analysis.

Regardless, CARBO will compare the highest pollutant concentrations predicted for criteria pollutants in the preliminary impact analysis to the SMC's specified in Table 3.1.2-1 for each applicable averaging period. If the project's predicted impacts exceed the SMC for a pollutant, CARBO will contact GA EPD to confirm that the proposed air quality monitoring data for that pollutant will satisfy PSD ambient monitoring requirements if preconstruction monitoring requirements have not yet been waived.

Table 3.1.2-1 Significant Monitoring Concentrations (SMC's)

POLLUTANT	AVERAGING PERIOD				
	1-hour (μg/m³)	3-hour (μg/m³)	8-hour (μg/m³)	24-hour (μg/m³)	Annual (μg/m³)
NO_2	--	--	--	--	14
SO_2	--	--	--	13	--
CO	--	--	575	--	--
PM_{10}	--	--	--	--	10
$PM_{2.5}$	--	--	--	4	--

3.1.3 Regional PSD Inventory Development

CARBO will develop regional source emission inventories for each pollutant requiring a full impact NAAQS and PSD increment analysis. The process will generally consist of (1) determining the SIA to be used for each pollutant and averaging period (2) using the SIA and meteorological data to determine the screening area for a pollutant, (3) identifying the counties within the SIA and screening areas, (4) identifying the existing and proposed new sources within the SIA and screening areas, (5) performing a screening procedure to determine which stationary sources must be explicitly modeled and which can be considered to be included in ambient background concentrations and excluded, (6) determining model and emission input data, (7) ensuring the emission input data is appropriate for each averaging period and (8) determining which sources affect increment consumption or expansion.

The screening area, or total impact area (TIA), for each pollutant will be the SIA plus a distance of 50 km, except for the 1-hour time averaging period for NO_2 and SO_2. For the 1-hour NO_2 and SO_2 NAAQS, an initial screening area will be determined as the SIA plus a distance of 50 km, but may be decreased to the distance covered by the fastest wind speed in the meteorological dataset used for the NAAQS and PSD increment air quality analyses as per previous guidance from GA EPD. Based on CARBO's review of the meteorological dataset (discussed in Section 6.3.3), the fastest wind speed over the five year period was 14.16 m/s, which occurred on March 5, 2005 at hour 16 and includes the 0.26 m/s truncated wind speed adjustment applied to ASOS based winds in AERMET. This would limit the size of the screening areas for the 1-hour NO_2 and SO_2 NAAQS to 51 km. For the other pollutants and averaging periods, CARBO expects the TIA's to be in the range of 55 to 60 km. Therefore, the inventory of sources used for the NAAQS and PSD increment air quality analyses will be derived from Bulloch, Burke, Candler, Effingham, Emanuel, Jefferson, Jenkins, and Screven counties in Georgia and Aiken, Allendale, and Barnwell counties in South Carolina. The 60 km area also covers portions of Evans, Johnson, Richmond, Tattnall, Toombs, Treutlen and Washington counties in Georgia and Hampton County in South Carolina however there are no sources located within 60 km of the project site in these counties.

Within the TIA for all NAAQS and PSD increments, excluding the 1-hour NO_2 and SO_2 NAAQS, CARBO proposes to identify stationary sources to be included in the NAAQS inventory using the Q/D (or 20D) method. The 20D method is designed to exclude stationary sources located within the TIA; stationary sources within the SIA will not be excluded using this method. A stationary source within the TIA will be excluded from the air quality analysis if it is located beyond the SIA and the ratio of Q/D is less than 20, where Q is the maximum emission rate in tons per year (tpy) of the source and D is either the distance from the stationary source to the SIA for the annual averaging period or is the distance from the stationary source to the project site for short-term averaging periods. Prior to performing 20D screening, an aggregate Q for a pollutant will be determined for stationary sources located within the vicinity of each other (within 2 km). CARBO does not intend to exclude any sources from the 1-hour NO_2 and SO_2 NAAQS air quality analyses unless they are determined to be temporary, intermittent, or are of such a size and type (such as automotive painting and refinishing, concrete batch plants, cotton gins, etc.) sources) that they can reasonably be assumed to be included in the ambient background concentration.

CARBO will make a good faith effort to include in the NAAQS inventory source's for which permit applications are submitted as of 30 days prior to the anticipated date the PSD application will be filed. Once sources have been identified, online and hardcopy major and minor source permit and application files, information provided by the agency such as the PSD increment consuming sources database available online (PSDINVEN_1.xls), and the national emission inventory (NEI) database will be searched to determine source and emission model input data. NAAQS inventories and electronic modeling files from previous PSD applications will be used to the extent that they are available and include sources and emissions applicable to the air quality analysis. For sources in South Carolina, CARBO has obtained the PSD inventory spreadsheets for each county covered by the projected screening areas and will use this data as provided by the SCDEHC. In certain circumstances, it may be difficult to determine model input data (e.g., stack parameters) for some emission units since not all stationary sources are required to submit air modeling information in their permit applications or participate in the annual emission inventory. In such cases where these sources can not be screened from the inventory, CARBO will utilize model input data known for a similar emission unit or determine "average" model input data for the source based on the emission unit's standard classification code (SCC) using the NEI database and document the occurrence in the PSD application.

Emission rates used as model input will be based upon the maximum allowable emission limit or federally enforceable permit limit and the source design capacity, consistent with US EPA requirements for source emission input data for NAAQS compliance in PSD modeling demonstrations (US EPA 2005). However, if a source's permitted or SIP emission limit for a particular source or source category is greater than the source's maximum physical capacity to emit, or in the absence of such limits, emission input data will be based on the source's potential emissions determined using GA EPD guidance considering its design specifications, allowable and available fuels and process materials.

Once the NAAQS source inventory has been developed for each pollutant, sources will be initially screened for inclusion in the PSD increment inventory by comparing the sources' construction dates to the statutory major source baseline dates (January 6, 1975 for PM and SO_2, February 8, 1988 for NO_2 and October 20, 2010 for $PM_{2.5}$) or the established minor source baseline date, as applicable. Since CARBO anticipates filing a PSD application prior to the trigger date for $PM_{2.5}$ (October 20, 2011), no minor source baseline date for $PM_{2.5}$ will be established in Jenkins or surrounding counties. Based on information available to CARBO, the minor source baseline dates for NO_2, SO_2, and PM_{10} have not been established for Jenkins County. Additionally, CARBO does not anticipate that the construction of the facility will have a significant impact for the annual averaging period at locations outside of Jenkins County, except for possibly NO_2 in Screven County. According to information available from GA EPD, the minor source baseline date for NO_2 for Screven has not been established. Because of this, it is likely that only emissions changes at PSD major sources occurring as a result of construction after the major source baseline dates will be included in the increment inventories, if not already screened from the NAAQS inventories using the 20D procedure.

3.1.3.1 Estimating $PM_{2.5}$ Emission Rates for Existing and Proposed New Sources

In modeling submitted with previous PSD applications, it was typical for applicants to use PM_{10} as a surrogate for meeting $PM_{2.5}$ major NSR requirements. However, as of May 16, 2011, the PM_{10} surrogate policy may no longer be used and direct $PM_{2.5}$ emissions must be explicitly modeled.

This presents significant challenges since modeling of $PM_{2.5}$ has not been a routine requirement to date. Most, if not all sources in the inventory will likely not have maximum allowable emission rates for $PM_{2.5}$ specified in construction and operating permits. In such cases, emission rates will have to be based on the source's maximum physical capacity to emit, i.e., "potential-to-emit". However, direct PM emissions consist of both the filterable fraction, which already exists in particle form, and the condensable fraction, which exist in gaseous form under exhaust stream conditions but condenses in the ambient air. Emission factors for $PM_{2.5}$, if available, are largely representative of filterable particulate matter, many of which are in the form of fractions of PM or PM_{10} based on uncontrolled particle size distributions for sources, and do not include the condensable portion of PM. Emission factors that do include, or separately estimate, condensable PM are only widely available for most stationary combustion sources (e.g.

fossil fuel-fired boilers, combustion turbines, internal combustion engines (ICE), etc.).

Notwithstanding that direct $PM_{2.5}$ emissions from most sources are not well characterized, emission rates for sources in the NAAQS and increment inventories must be developed to explicitly meet the requirement to conduct an ambient air quality impact analysis under the PSD program. Based on an initial review of sources likely to be included in the $PM_{2.5}$ inventories, CARBO does not anticipate having other than stationary combustion sources in the final, screened inventories. For these sources, the potential maximum hourly emission rate for direct PM or PM_{10} will be determined and then multiplied by a fraction for $PM_{2.5}$, derived for the source category, using PM profiles in the California Emission Inventory Data and Reporting System (CEIDARS) developed by the California Air Resources Board (CARB) (SCAQMD 2006).

3.1.3.2 Intermittent Emissions

For the 1-hour NO_2 and SO_2 NAAQS inventories, US EPA recommends that only sources and emissions scenarios that "can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations" be included in compliance demonstrations (US EPA 2011). Sources and emission scenarios that do not meet these criteria, such as emergency/backup generators and certain startup/shutdown operations, are determined to be "intermittent" and not modeled for the new 1-hour standards. CARBO believes that this definition also includes sources whose maximum actual emissions are or will be significantly lower than potential emissions. For example, for existing or proposed new gas/oil fired boilers, if information in the source's permit or permit application files indicates that oil is combusted only during periods of natural gas curtailment, the oil-fired scenario will not be included in the 1-hour NO_2 and SO_2 NAAQS inventory since natural gas curtailment periods do not frequently occur – for most sources in Georgia, the last period of curtailment occurred during Hurricane Katrina. However, the oil-fired scenario will be included in all other air quality analyses. In developing the inventory, CARBO will identify those sources and emission scenarios determined to be intermittent and the basis for the determination.

3.1.4 NAAQS Analysis

The NAAQS, summarized in Table 3.1.4-1, are the maximum pollutant concentrations that define the level of air quality which US EPA has judged to be requisite for the protection of public health with an adequate margin for safety.

Table 3.1.4-1 National Ambient Air Quality Standards (NAAQS)

POLLUTANT	AVERAGING PERIOD				
	1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	188*	--	--	--	100
SO_2	196*	1,300 Secondary	--	365†	80†
CO	40,000	--	10,000	--	--
PM_{10}	--	--	--	150	Revoked Dec 18, 2006 71 FR 61144
$PM_{2.5}$	--	--	--	35	15
O_3	--	--	147 (75 ppb)	--	--

* At EPA standard conditions of 25 °C and 760 mm Hg (1 atm.)

† Although the 24-hour and annual NAAQS were revoked at the time the 1-hour standard was made final, these standards remain in effect until one year following the effective date of initial nonattainment designations for the 1-hour SO_2 standard (no later than June 2012)

The following describes the design concentrations that will be determined to demonstrate compliance with the NAAQS for the five years of NWS meteorological model input data proposed to be used:

<u>3-hour SO_2, 24-hour SO_2, 1-hour CO and 8-hour CO NAAQS</u>

For the 3-hour and 24-hour time averaging periods for SO_2 and the 1-hour and 8-hour time averaging periods for CO, the highest of the second-highest modeled concentrations plus the applicable ambient background concentration will be used to determine compliance with the NAAQS.

<u>Annual NO_2 NAAQS</u>

For the annual time averaging period for NO_2, the highest of the annual average modeled concentrations plus the applicable ambient background concentration will be used to determine compliance with the NAAQS.

<u>24-hour and PM_{10} NAAQS</u>

For the 24-hour time averaging period for PM_{10}, the highest sixth-high 24-hour modeled concentration for the five-year period modeled plus the applicable ambient background concentration will be used to determine compliance with the NAAQS.

24-hour and Annual $PM_{2.5}$ NAAQS

Since existing preferred regulatory dispersion models used for the PSD program can not account for secondary $PM_{2.5}$ impacts resulting from precursor emissions, a screening level analysis will be used for the $PM_{2.5}$ NAAQS modeling demonstration. For the 24-hour and annual time averaging periods for $PM_{2.5}$, the highest five-year averages of the 24-hour and annual average modeled concentrations plus the applicable ambient background concentration will be used to determine compliance with the NAAQS. The average of the highest first-high concentrations is used in lieu of the 98th-percentile (highest eighth-high) for the 24-hour averaging period.

1-hour SO_2 NAAQS

For the 1-hour time averaging period for SO_2, the highest five-year average of the 99th-percentile (highest fourth-high) annual distribution of 1-hour daily maximum concentrations at each receptor plus the applicable ambient background concentration will be used to determine compliance with the NAAQS.

1-hour NO_2 NAAQS

For the 1-hour time averaging period for NO_2, the highest five-year average of the 98th-percentile (highest eighth-high) annual distribution of 1-hour daily maximum concentrations at each receptor plus the applicable ambient background concentration will be used to determine compliance with the NAAQS.

8-hour O_3 NAAQS

Currently, no preferred regulatory model exists to conduct refined single or multiple source modeling for ozone. However, since the modification results in a significant net emission increase of NO_x greater than 100 tpy, the ambient impacts of ozone must be addressed. Please refer to Section 3.1.8 for CARBO's approach to conducting an ozone impact analysis for the modification.

3.1.5 Background Pollutant Concentrations

Ambient background concentrations are an essential part in estimating the total air quality concentration to be considered in determining source impacts and represent the portion of pollutant concentrations attributable to other natural, minor, and distant major sources not explicitly modeled. For all PSD modeling demonstrations, background concentrations are required to be added to a source's modeled impacts to determine the design concentration for comparison to the NAAQS. Generally, air quality data collected in the vicinity of the source should be used to determine the appropriate background concentrations for the averaging times of concern. However, if no monitors are located in the vicinity of the source, a regional site – one that located away from the area of interest but is impacted by similar natural and distant sources – may be selected (US EPA 2005).

For more than three decades, the Georgia Environmental Protection Division (GA EPD) has monitored air quality in the state of Georgia through the Ambient Monitoring Program (AMP) of the Air Protection Branch (APB). The AMP provides information on the measured concentrations of both criteria and non-criteria pollutants from data collected in a network of 60 monitoring locations in 36 counties and includes State and Local Air Monitoring Stations (SLAMS) and Photochemical Assessment Monitoring Stations (PAMS). Generally, monitoring locations are sited to determine the highest concentrations expected to occur, to measure typical concentrations in densely populated areas, to determine the impact of significant sources or categories of sources on air quality or to determine general background concentration levels. The data collected are then used to provide timely information on air quality to the public, to determine compliance with air quality standards and develop emission control strategies (GA EPD 2010).

CARBO has performed a review of monitoring stations measuring ambient concentrations of NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$ throughout the state of Georgia and has selected monitoring sites believed to be representative of or conservative for the background conditions for the project area. A total of three monitoring sites were selected to develop representative estimates for background air quality. Table 2.1.1-1 provides summary of the proposed background concentrations which are based on the average of the design values for each pollutant and time averaging period for the most recent three-year period, 2008 through 2010, from data obtained from US EPA's AQS database.

Table 3.1.5-1 Proposed Background Air Quality Concentrations for NAAQS Air Quality Analysis

Pollutant	Monitor Location	Averaging Period	Proposed Background (μg/m³)	Comments
NO_2	Yorkville (#132230003)	1-hour	33.24	3-year average of the 98th-percentile annual distribution of 1-hour daily maximum concentrations (19, 16, 18 ppb)*
		Annual	10.18	3-year average of annual average concentrations*
SO_2	Macon SE (#130210012)	1-hour	67.12	3-year average of the 99th-percentile annual distribution of 1-hour daily maximum concentrations (26, 28, 23 ppb) **
		3-hour	49.12	3-year average of highest 2nd-high 3-hour block average concentrations***
		24-hour	16.75	3-year average of highest 2nd-high 24-hour block average concentrations***
		Annual	4.36	3-year average of annual average concentrations***
CO	Yorkville (#132230003)	1-hour	N/A	Proposed construction will be less than significant impact levels for CO
		8-hour	N/A	
PM_{10}	--	24-hour	38.0	Recommended statewide background concentrations
		Annual	20.0	
$PM_{2.5}$	Bungalow Rd. (#132450091)	24-hour	25	3-year average of the 98th-percentile annual distribution of 24-hour average concentrations**
		Annual	12.7	3-year average of annual average concentrations (based on the average of quarterly average daily values)**

* Documented in AQS annual summary query report, "13-223-0003 YORKVILLE NO2 2008-2010.xls", provided in the electronic files ("\BACKGROUNDS\") enclosed as Attachment A

** Documented in AQS design value report, "aqsprodAIO890602.pdf", provided in the electronic files ("\BACKGROUNDS\") enclosed as Attachment A

*** Documented in AQS annual summary query report, "13-021-0012 MACON SE SO2 2008-2010.xls", provided in the electronic files ("\BACKGROUNDS\") enclosed as Attachment A

For NO_2, Yorkville (#132230003), the Type 1 PAMS for the Atlanta Metropolitan Statistical Area (MSA), was selected was as a representative regional site. The monitor serves as a rural upwind background monitor and is sited in Paulding County. GA EPD has previously indicated that data from this monitor is preferred for background concentrations for PSD air quality analyses for NO_2. The monitor is located within approximately 50 km of four of six of Georgia's largest coal-fired power plants not expected to be explicitly modeled (Bowen, Hammond, Wansley and Yates) and located downwind of other significant combustion sources in Georgia and Alabama such as Alabama's Gaston, Gorgas and Miller electric generating facilities and the Sewell Creek combustion turbine facility in Polk County.

For SO_2, GA Forestry Commission (#130210012), or the Macon SE SLAMS, was selected as a representative regional monitor. There are eight SO_2 monitors located throughout the state of Georgia which are located generally in the vicinity of Atlanta, Brunswick, Columbus, Macon, Rome and Savannah. The Savannah monitoring sites, East President Street (#130510021) and Lathrop (#130511002), are closest to the project site at a distance of 108 km. However, neither of these monitors is considered representative of the project location because they are sited in a coastal environment, along the Savannah River at its discharge to the Atlantic Ocean, with differing meteorology and significant marine traffic. The Macon SE SLAMS, located in Bibb County, is the next closest to the project area at a distance of 154 km and the only SO_2 monitor within the same physiographic region and airshed.

For $PM_{2.5}$, Bungalow Road (#132450091) was selected as the representative monitor in the project vicinity. The Bungalow Road monitoring site is located in Augusta and is closest to the project location at a distance of 75 km. Being within a suburban area of the Augusta-Richmond MSA, data from this monitoring site will provide a conservative estimate of background air quality for $PM_{2.5}$ in the modeling domain.

For PM_{10}, GA EPD recommends statewide background concentrations based on a previous study of monitors located in rural areas. CARBO is proposing to use these background concentrations so no monitor was selected for PM_{10}.

3.1.6 PSD Increment Analysis

The Class II area PSD increments, summarized in Table 3.1.6-1, are the maximum allowable increases of ambient pollutant concentrations that are allowed to occur above baseline concentrations in a particular area. As such, an increment defines ‘‘significant deterioration’’.

Table 3.1.6-1 Class II PSD Increments

POLLUTANT	AVERAGING PERIOD				
	1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	--	--	--	--	25
SO_2	--	512	--	91	20
CO	--	--	--	--	--
PM_{10}	--	--	--	30	17
$PM_{2.5}$	--	--	--	9	4

The following describes the design concentrations that will be determined to demonstrate compliance with the PSD increments for the five years of NWS meteorological model input data proposed to be used:

PSD Increments for NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$
For all time averaging periods other than the annual, the highest of the second-highest modeled concentrations will be used to determine compliance with the Class II increments. For the annual time averaging period, the highest of the annual average modeled concentrations will be used to determine compliance with the Class II increments.

3.1.7 NAAQS or PSD Increment Exceedance Resolution

Now that the NSR transition period for $PM_{2.5}$ may soon end and after US EPA strengthened the primary NAAQS for NO_2 and SO_2, the potential for existing modeled violations of the NAAQS and increments to occur is greater than before. If dispersion modeling does predict violations of the NAAQS and/or increments, CARBO may choose to demonstrate that the construction and operation of the proposed facility will not cause or contribute to the modeled violations in a "spatial and temporal sense", consistent with US EPA policy (US EPA 1988). This analysis is straightforward for most pollutants and time averaging periods but the statistical form of the 1-hour NO_2 and SO_2 NAAQS and 24-hour $PM_{2.5}$ NAAQS makes spatial and temporal resolution more challenging. However, the most recent version of US EPA's preferred regulatory model for NSR and PSD air quality analyses, AERMOD (v11103), contains an output option (MAXDCONT) that can be used to determine a source's contribution to the predicted air quality impacts of a target source group, which will be used to resolve modeled violations of these standards, as required.

As previously mentioned, CARBO expects US EPA to interpret the form of the SIL for the $PM_{2.5}$ increment differently from that of the NAAQS. Therefore, spatial and temporal resolution of modeled increment or NAAQS violations will differ accordingly.

3.1.8 Ozone Impact Analysis

As previously stated, no preferred regulatory model exists to conduct refined modeling to estimate the air quality impact of single or multiple sources on the ozone NAAQS for the purposes of PSD review. Most often, state agencies evaluate the relationship between precursor emissions and ozone formation in the context of state implementation plan (SIP) attainment demonstrations for the ozone NAAQS or regional haze. For some sources, the Scheffe VOC/NO_x point source screening tables may serve as a useful screening tool for estimating a source's incremental impact for ozone. However, this screening tool was developed specifically for the 1-hour O_3 standard and is applicable only to those sources with VOC/NO_x emission ratios greater than 1 that propose to located in VOC-limited environments. CARBO's VOC/NO_x emission ratio is far less than 1. Thus, use of the Scheffe point source screening tables would be of limited value to estimate the project's ozone impacts. In this regard, CARBO will provide in the PSD application a qualitative assessment of the project's ozone impacts framed by a discussion expected intrastate and regional precursor emission reductions that will be achieved as a result of existing and proposed new SIP revisions and federal rules in the context of the proposed increase in precursor emissions of the modification.

4.0 ADDITIONAL IMPACT ANALYSES

Emissions of criteria and other pollutants have a variety of effects on public welfare. As part of the PSD application, CARBO will conduct an additional impact analysis to review these effects in an assessment of impairment to visibility, soils, and vegetation that would occur as a result of the proposed construction and any associated residential, commercial, and industrial growth. Visibility may be adversely affected by pollutants such as NO_x and PM by scattering or absorption of light in amounts sufficient to cause a plume to be visible when observed against its viewing background. Gaseous pollutants and metals, when emitted in certain amounts, may also have adverse impacts on sensitive vegetation species either directly through exposure to concentrations in the ambient air or indirectly through deposition on soils.

4.1.1 Soils and Vegetation

Both direct and indirect adverse impacts to vegetation will be assessed using a screening procedure described by US EPA to estimate the impacts of sources of air pollution on plants, soils, and animals (US EPA 1980). This analysis will also use a two-tiered approach. Initially, the annual level of potential emissions for direct and indirect acting pollutants will be compared to significant emission rate thresholds for each applicable time averaging period. For pollutants emitted in amounts exceeding the thresholds, refined modeling will be conducted, considering emissions from other existing and proposed new sources and background pollutant concentrations, to compare the predicted ambient pollutant impacts to the screening concentrations. Additional analysis will be performed for each pollutant with an ambient impact above the screen concentration, taking into account inventories of soil and vegetation types within the impact area, the sensitivity of the species to the pollutant emitted, and whether the species is of significant commercial or recreational value.

4.1.2 Class II Visibility

As previously discussed in Section 2.1, an assessment of visibility impairment will be performed for state and national parks, monuments and historic sites and local, regional and international airports located within the project's significant impact area for NO_x and PM – for NO_x, CARBO is planning to use the annual averaging period for NO_x to determine the SIA applicable to the Class II visibility analyis. These Class II areas are listed in Tables 2.1.1-1 and 2.1.2-1. In order to perform the assessment, a screening procedure developed by US EPA will be used determine the potential visible plume impacts (US EPA 1992). This analysis, too, uses a two-tiered approach consisting of an initial screening procedure (Level I) using worst-case meteorological parameters and, if necessary, a more refined procedure (Level

II), considering, among other factors, plume transport time and cumulative frequency distributions for dispersion conditions and associated winds speeds and atmospheric stability to determine meteorological conditions representative of the periods during which the winds are in the direction of the Class II area. The primary variables affecting plume visibility are the (1) quantity of emissions, (2) types of emissions, (3) relative location of source and observer, and (4) the background visual range. For Georgia, and much of the southeast, the background visual range is 25 km for Class II areas.

Both the Level I and Level II screening procedures are used to determine the contrast of a plume against a viewing background and plume perceptibility. The analysis is generally considered satisfactory if plume contrast and perceptibility are less than critical values of 0.05 and 2.0, respectively.

5.0 TOXIC IMPACT ANALYSES

As part of the PSD application, CARBO will conduct a toxics impact assessment (TIA) for emissions of toxic air pollutants (TAP) emitted from the proposed new facility. The TIA will use GA EPD's procedures governing permitting review of TAP emissions contained in the agency's revised guideline on ambient impact assessments for TAP (GA EPD 1998). GA EPD regulates emissions of TAP through a state-only program under the provisions of Georgia Rule 391-3-1-.02(2)(a)3.(ii). Generally, a TAP is any substance that may have an adverse effect on public health, excluding any substance that is covered by a state or federal ambient air quality standard. Since GA EPD does not specify *de minimis* emission rates for TAP emissions, dispersion modeling is performed to demonstrate that the ambient impacts of TAP are less than the acceptable ambient concentration (AAC) values.

5.1.1 Acceptable Ambient Concentrations

A number of TAP are emitted during the manufacture of proppants from kaolin and include speciated organic compounds, primarily hexane, from the combustion of natural gas, methanol and ammonia during spray drying of the kaolin slurry and HF and HCl from sintering the pellets in the direct-fired rotary kilns. Table 5.1.1-1 summarizes the ACC level and basis for each of these TAP.

Table 5.1.1-1 Acceptable Ambient Concentrations for Toxic Air Pollutants

TAP	AVERAGING PERIOD		
	15-min ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Hexane (C_6H_{14})	--	--	700 (IRIS RfC)
Methanol (CH_3OH)	32,760 (ACGIH 250 ppm STEL)	625 (OSHA 200 ppm TWA)	--
Ammonia (NH_3)	2,440 (ACGIH 35 ppm STEL)	--	100 (IRIS RfC)
Hydrogen Fluoride (HF)	165 (ACGIH 2 ppm STEL)	--	14* (CARB Chronic REL)
Hydrogen Chloride (HCl)	745 (OSHA 5 ppm Ceiling)	--	20 (IRIS RfC)

* US EPA has not established an RfC or RBAC for HF, however, the California Air Resources Board (CARB) suggests a 14 $\mu g/m^3$ chronic inhalation reference exposure level (REL) which US EPA has adopted; GA EPD has previously accepted this alternate toxicity data as the AAC for the annual time averaging period

For the 24-hour and annual time averaging periods, the highest modeled TAP concentrations, or maximum ground level concentration (MGLC), will be compared to the AAC's. For the 15-min averaging period, the highest 1-hour MGLC will be multiplied by a factor of 1.32 and then compared to the AAC's.

6.0 AIR DISPERSION MODELING METHODOLOGY

Dispersion modeling for the PSD application will be conducted in accordance with the recommendations contained in GA EPD's modeling guidance for SIP-approved federal and state-only programs, US EPA's guideline on air quality models (40 CFR Part 51 Appendix W or "US EPA's guideline") and as proposed and agreed upon in this protocol. US EPA's guideline addresses the regulatory application of refined air quality dispersion models in assessing ambient impacts of criteria pollutants and contains the preferred modeling techniques recommended by US EPA for the new source review (NSR) and PSD programs.

Subsequent to this protocol, CARBO will submit to US EPA Region 4 and GA EPD a proposed modeling protocol to request approval to use the Plume Volume Molar Ratio Method (PVMRM) as part of a tiered screening approach for estimating air quality impacts of NO_2 ("the PVMRM protocol"). In the PVMRM protocol, CARBO will propose to use a database of monitored 1-hour ozone concentrations for calendar years 2005 through 2009 with PVMRM. Below in Section 6.3, CARBO addresses the processing of meteorological model input data to be contemporaneous with the proposed ozone database.

6.1 Model Selection and Model Options

6.1.1 Air Quality Analyses for the SIL's, SMC's, NAAQS, PSD Increments and Soils and Vegetation Impairment

US EPA's guideline was revised in 2005 to replace the Industrial Source Complex (ISC3) model with the American Meteorological Society (AMS)/EPA model (AERMOD) as the preferred regulatory model. AERMOD is a steady-state plume dispersion model that is considered to be the best state-of-the-art practice of Gaussian dispersion. The AERMOD model incorporates parameterized dispersion in both stable and convective conditions using planetary boundary layer (PBL) characteristics developed from directly observed meteorological data and surface characteristics preprocessed in AERMET and AERSURFACE, respectively. To reduce the number of calm, variable, and missing winds typically encountered in standard archives of observed meteorological data, AERMINUTE is used to calculate hourly average wind speed and direction to supplement the data processed in AERMET, increasing completeness of the meteorological dataset used with AERMOD. A terrain preprocessor, AERMAP, is used to process a variety of United States Geological Survey (USGS) gridded terrain datasets to determine receptor-specific terrain-influence heights and source and receptor elevations for input into AERMOD. The terrain-influence height at each receptor is used by AERMOD to incorporate the dividing streamline height concept to better characterize plume behavior in elevated terrain. AERMOD also incorporates the plume rise model enhancements (PRIME) downwash algorithm which has been evaluated and found to perform better than the ISC3 downwash algorithm using a variety of data sets.

For these reasons, the most recent version of AERMOD (v11103) and its preprocessors AERMET (v11059), AERMINUTE (11059), AERMAP (v11103), and AERSURFACE (v08009) will be used to estimate the ambient impacts for all PSD air quality analyses, excluding any Class II area visibility impairment modeling that may be required as part of the additional impact analysis. Because of this model selection, additional guidance on the recommend use of AERMOD for certain concerns, such as surface characteristics and elevation processing, will be in accordance with the most recent revision of implementation guidance for AERMOD (US EPA 2010). Except as otherwise specified and approved, AERMOD will be executed using the regulatory default model option, i.e., the parameter "DFAULT" will be specified in the MODELOPT record in the control pathway.

For the NO_2 NAAQS and PSD increment, CARBO will propose in a protocol to US EPA Region 4 and GA EPD to use PVMRM, which simulates the first-order reaction of nitric oxide (NO) with O_3 to determine the NO_2/NO_x conversion rate during plume expansion. PVMRM is available as a non-regulatory default model option within AERMOD and it application makes AERMOD no longer a preferred guideline model. In such cases, use of this technique must be approved as an alternate model by US EPA Region 4 on a case-by-case basis under Section 3.2.2 of US EPA's guideline. Generally, the Air Quality Modeling Group (AQMG) at US EPA's Office of Air Quality Planning and Standards (OAQPS) recommends accepting the use of PVMRM provided that a reasonable demonstration can be made regarding the appropriateness of the in-stack NO_2/NO_x ratios and background ozone database proposed to be used (US EPA 2011). The PVMRM protocol will describe the methods and procedures to be followed when using AERMOD with this non-regulatory default model option.

6.1.2 Class II Area Visibility Impairment Analysis

The Level I and Level II visibility impairment assessment for Class II areas will be performed using VISCREEN. VISCREEN calculates the potential impact of a plume containing NO_x and PM for specific transport and dispersion conditions. Should a Level III analysis be required, CARBO will submit a separate protocol addressing the application of PLUVUE-II, if required.

6.1.3 Toxic Impact Analysis

The most recent version of the ISC3 model (v02035) will be used to estimate the maximum ground level concentration (MGLC) for each TAP considered to compare to the pollutant's ambient impacts to the AAC's consistent with GA EPD's most recent air dispersion modeling guidance for state-only programs (GA EPD 2006). ISC3 will be executed using the regulatory default model option, i.e., the parameter "DFAULT" will be specified in the MODELOPT record in the control pathway.

6.2 Dispersion Coefficients

The selection of either rural or urban dispersion coefficients is an important component in characterizing the environment in which pollutants disperse and should follow one of the two procedures specified in the US EPA's guideline. These include a land use classification procedure using the Auer meteorological land use typing scheme or a population based procedure. Of the two methods, the land use procedure is considered to be sufficient for most applications.

6.2.1 Land Cover and Land Use

As specified in Section 7.2.3.c of US EPA's guideline, the land use within the total area circumscribed by a 3 km radius circle (28.3 km^2) about the proposed project site was visually inspected for classification using the Auer meteorological land use typing scheme (Auer 1978). If land use types I1 (Heavy Industrial), I2 (Light Industrial), C1 (Commercial), R2 (Residential; Small Lot Single Family & Duplex), and R3 (Residential; Multi-Family) account for 50% or more of the circumscribed area, urban dispersion coefficients should be used. Otherwise, rural dispersion coefficients are appropriate. Figure 6.2.1-1 presents an aerial image of the 28.3 km^2 area surrounding the proposed project site in comparison to the 1992 digitized USGS National Land Cover Dataset (NLCD92).

Aerial Image USGS NLCD 92

Figure 6.2.1-1 USGS NLCD92 Land Use Surrounding the CARBO Ceramics Project Site – 3km Radius

Without quantification, visual inspection of the NLCD92 data in Figure 6.2.1-1 shows that well over 50% of the circumscribed area surrounding the proposed project site is of the deciduous (41) and evergreen (42) forest, pasture/hay (81), row crops (82), and woody wetland (91) land use types. Since none of these USGS NLCD92 land use types can be classified as Auer land use types I1, 12, C1, R2, or R3, over 50% of the area may therefore be classified as rural. Therefore, the urban modeling option in AERMOD will not be used and rural dispersion coefficients will be selected for ISC3.

6.3 Meteorological Data

Because the dispersion modeling for the PSD source and additional impact analyses and toxic impact analysis will use two refined models – AERMOD which is the preferred regulatory model for NSR programs and ISC3 which is used specifically for certain state-only programs – two sets of meteorological model input data are proposed. For the toxics review, CARBO is proposing to use ISC3 with five years of National Weather Service (NWS) data measured at the Augusta Regional Airport (Bush Field) surface station (20 ft anemometer height) and Athens Bens Epps Airport upper air station for calendar years 1974 through 1978. For all other PSD air quality analyses, CARBO is proposing to use AERMOD with five years of NWS data measured for calendar years 2005 through 2009 so that the meteorological model input data may be contemporaneous with the ozone database proposed for PVMRM.

AERMOD requires meteorological data preprocessed in AERMET to estimate the air quality impact of pollutants discharged to the atmosphere from stationary sources. AERMET is used to process surface characteristics, including surface roughness legth, Bowen ratio, and albedo, in conjunction with several standardized formats of hourly meteorological surface observations and upper air soundings to develop the hourly boundary layer parameter estimates and multiple-level observations required by AERMOD. In this section, meteorological station selection, surface characteristics processing and comparison, meteorological data processing, and representativeness of the meteorological data are discussed.

6.3.1 Meteorological Station Selection

In its guideline, US EPA recommends that site-specific meteorological data be used for the air quality modeling analyses if one or more years of quality assured data are available. In the absence of site-specific data, five years of representative meteorological data from a nearby NWS station can be used. The NWS data used as input into the dispersion model should be selected based on spatial and climatological representativeness considering the proximity of the meteorological monitoring site to the modeling domain, the complexity of the terrain, the exposure of the meteorological monitoring site the period of time during which data are collected.

Since at least one year of site specific meteorological data is not available for the project, CARBO inventoried and performed a review of NWS Automated Surface Observing System (ASOS) stations in Georgia and radiosonde observation (RAOBS) sites in the southeast United States using National Climactic Data Center (NCDC) and National Oceanographic and Atmospheric Administration Earth System Research Laboratory (NOAA/ESRL) databases to determine which monitoring sites would be most characteristic project vicinity. The review of surface stations was limited to ASOS stations since 1-min winds archived in the DSI-6405 format are readily available for use in AERMINUTE. Table 6.3.1-1 summarizes the WBAN identifier and call sign, names, geographic locations, base elevations and distances to the surface and upper air stations nearest to the project site.

Table 6.3.1-1 Inventory of GA NWS ASOS and Southeast U.S. NOAA/ESRL RAOBS Stations

WBAN#	Name	LAT LONG (decimal degrees)	Elevation	Distance (to project site)
NWS ASOS Surface Stations (Georgia)				
03813	Macon, GA Regional Airport (MCN)	32.689N, 83.653W	108 m (354 ft)	164 km
03820	Augusta, GA Regional Airport (AGS)	33.370N, 81.965W	45 m (148 ft)	67 km
03822	Savannah, GA Municipal Airport (SAV)	32.119N, 81.202W	16 m (52 ft)	97 km
13837	Augusta, GA Daniel Field (DNL)	33.467N, 82.039W	129 m (423 ft)	79 km
13870	Alma, GA Bacon Co. Airport (AMG)	31.536N, 82.507W	58 m (188 ft)	148 km
NOAA/ERSL RAOBS Upper Air Stations (Southeast United States)				
13880	Charleston, SC International Airport (CHS)	32.899N, 80.041W	12 m (39 ft)	174 km
13889	Jacksonville, FL International Airport (JAX)	30.494N, 81.693W	8 m (26 ft)	252 km
53819	Peachtree City, GA Falcon Field (FFC)	33.355N, 84.567W	243 m (798 ft)	257 km
53823	Shelby County, AL Birmingham (BMX)	33.172N, 86.770W	178 m (584 ft)	456 km
93805	Tallahassee, FL Regional Airport (TLH)	30.393N, 84.353W	17 m (55 ft)	351 km

In terms of proximity, the Augusta (Bush Field) Regional Airport (AGS), Augusta Daniel Field (DNL), and Savannah Municipal Airport (SAV) ASOS stations are nearest to the project site. However, DNL is sited in an urban setting and such meteorological observations may not be representative of the modeling domain. SAV was also determined to not be representative of the modeling domain since it is sited in a coastal setting and meteorological observations may be affected by local land-sea breeze circulations typically associated with such locations. And although the nearest NWS ASOS station, AGS, would likely be spatially and climatologically representative of the project site, surface observations from this monitoring site were found to suffer severely from a high incidence of calm, variable, and missing winds, even after merging 1-min ASOS winds.

Both MCN and AMG are located at similar distances from the project site. There are also no apparent significant terrain features between either of the surface stations and the project site. However, MCN is located at about the same latitude as the project site whereas AGS is located much farther to the south towards Florida. Thus, the project site likely shares more of the same climactic influences with MCN. Additionally, five consecutive years of NWS ASOS data for MCN is available from a previously proposed PSD project in Georgia. Therefore, MCN was selected as the representative surface station to develop five years of meteorology for model input for the project.

GA EPD has previously recommended upper air soundings from the Peachtree City Falcon Field (FFC) Weather Service Forecast Office (WSFO) for use with hourly meteorological observations from the MCN NWS ASOS station. Therefore, CARBO is proposing to use five years of NWS data measured at the MCN NWS ASOS and FFC WSFO upper air stations for calendar years 2005 through 2009. The surface station data was obtained from the National Climactic Data Center (NCDC) in the integrated surface hourly data (ISHD) file format and is provided in the electronic files enclosed as Attachment A ("\ISHD\KMCN"). The upper air data was obtained from the NOAA/ESRL radiosonde database in the forecast systems laboratory (FSL) file format and is also provided in the electronic files enclosed as Attachment A ("\FSL\FFC").

6.3.2 Surface Characteristics

AERMET uses surface characteristics, in conjunction with meteorological observations, to characterize the boundary layer parameters used by AERMOD. The surface characteristics required for processing include surface roughness length, Bowen ratio, and albedo. The surface roughness length is related to the height of obstacles in the direction of the wind flow and is important in determining mechanical turbulence during stable conditions. The Bowen ratio and albedo are both used to estimate convective turbulence during unstable conditions and are measures of daytime surface moisture and the fraction of solar radiation reflected by the surface, respectively.

AERSURFACE was created to develop realistic values for surface characteristics for AERMET processing and uses digitized 30-m resolution USGS NCLD92 data to determine land cover specific values for surface roughness, Bowen ratio, and albedo. For each USGS NLCD92 land use type, surface characteristic values are linked to five seasonal categories which are specified for each month of the year. The default seasonal categories and month assignments in AERSURFACE include (1) "midsummer with lush vegetation" for June, July, and August, (2) "autumn with unharvested cropland" for September, October, and November, (3) "late autumn after frost and harvest, or winter with no snow" for December, January, and February, (4) "winter with continuous snow on ground" also for December, January, and February and (5) "transitional spring with partial green coverage or short annuals" for March, April, and May. AERSURFACE also links surface characteristics values based on whether or not the site is an airport, is in an arid region, and whether or not the surface moisture for the site being processed is "average", "wet", or "dry" when compared to climactic normals. US EPA has made the following recommendations for processing digitized land cover data for surface characteristic values (US EPA 2010):

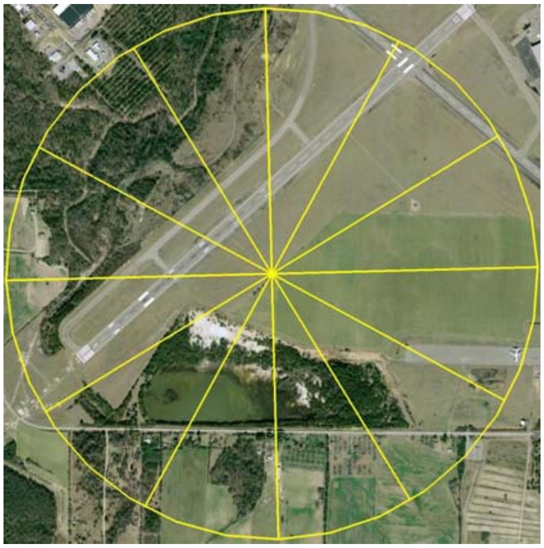
Surface Roughness
Surface roughness length should be based on an inverse distance weighted geometric mean for a default upwind distance of 1 km relative to the site and may be varied by sector to account for variations in land cover. However, the sector widths should be no smaller than 30 degrees.

Bowen Ratio
The Bowen ratio should be based on a simple unweighted geometric mean within the domain defined by a 10 km by 10 km region centered on the site.

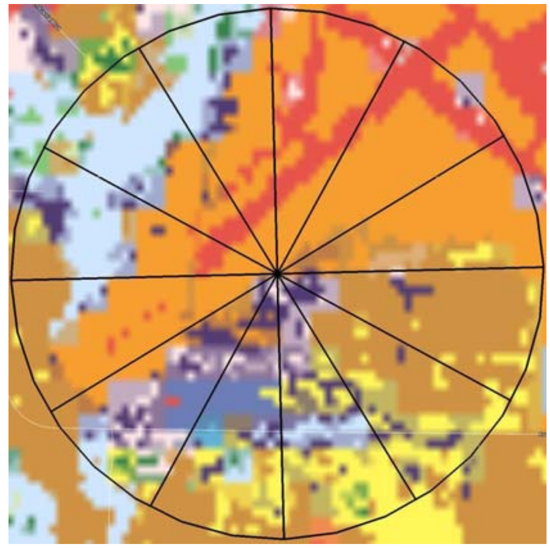
Albedo
The albedo should be based on a simple unweighted arithmetic mean within the domain defined by a 10 km by 10 km region centered on the site.

Generally, the surface characteristics input into AERMET should be based on the land cover in the vicinity of the NWS surface station. However, these surface characteristics may not result in the construction of a boundary layer representative of the environment in the vicinity of the project site. Because of this, the surface characteristics for the land cover surrounding the NWS surface station and project site should be determined and compared.

USGS NCLD92 data for the area surrounding both the MCN NWS surface station and CARBO were obtained from the USGS National Map Seamless Server, available online at http://seamless.usgs.gov/, and are provided in the in the electronic files ("\AERSURFACE\KMCN NLCD92\" and "\AERSURFACE\CARBO NLCD92\") enclosed as Attachment A. Figures 6.3.2-1 and 6.3.2-2 illustrate the digitized land cover data contained within an area circumscribed by a 1 km radius circle, divided into 12 30-degree sectors, about the MCN NWS ASOS station and project site, respectively.

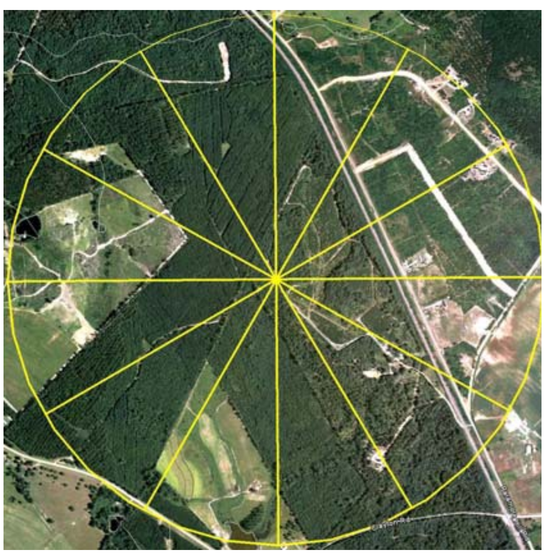


Aerial Image

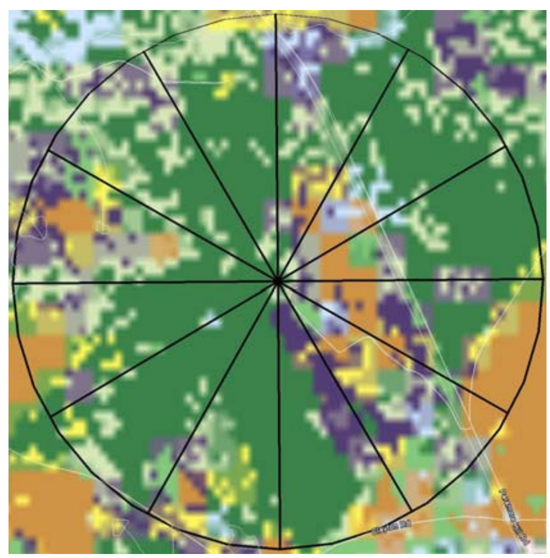


USGS NLCD 92

Figure 6.3.2-1 USGS NLCD92 Land Use Surrounding the Macon NWS Surface Station – 1km Radius (12 30-degree sectors)



Aerial Image



USGS NLCD 92

Figure 6.3.2-2 USGS NLCD92 Land Use Surrounding the CARBO Ceramics Project Site – 1km Radius (12 30-degree sectors)

In order to compare surface characteristics between the two sites, AERSURFACE was used to determine the seasonal parameter values using the unmodified NLCD92 data. In AERSURFACE, the latitude and longitude for the MCN NWS surface station (32.689N, 83.653W) and project site (32.766N, 81.899W) were specified and NAD83 was input as the datum for the NLCD92 data. Then, each set of digitized land cover data representing the surface station (airport) and project site (not an airport) was processed as a "non-arid region" with no "continuous snow cover for most of the winter" for each of the "average", "wet", and "dry" surface moisture conditions using the default seasonal category and month assignments. Surface characteristic values were determined for each season and for each of 12 30-degree sectors. Table 6.3.2-1 presents the seasonal parameter values determined by AERSUFACE.

Table 6.3.2-1 Seasonal Albedo, Bowen, and Surface Roughness Length Values for Macon NWS Surface Station and Project Site

SECTOR	MACON NWS SURFACE STATION				CARBO MILLEN PROJECT SITE			
	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
Albedo								
0-360	0.16	0.16	0.16	0.16	0.15	0.14	0.16	0.16
Bowen (Average Surface Moisture Condition)								
0-360	0.64	0.38	0.40	0.58	0.64	0.41	0.34	0.58
Bowen (Dry Surface Moisture Condition)								
0-360	1.14	0.82	0.80	1.14	1.07	0.84	0.65	1.07
Bowen (Wet Surface Moisture Condition)								
0-360	0.30	0.22	0.24	0.30	0.27	0.22	0.20	0.27
Surface Roughness Length								
0-30	0.015	0.031	0.037	0.031	0.487	0.551	0.775	0.775
30-60	0.014	0.021	0.029	0.023	0.397	0.473	0.773	0.773
60-90	0.024	0.020	0.048	0.041	0.377	0.438	0.750	0.750
90-120	0.031	0.035	0.172	0.169	0.116	0.147	0.378	0.378
120-150	0.049	0.044	0.196	0.196	0.121	0.160	0.396	0.396
150-180	0.036	0.063	0.160	0.158	0.548	0.586	0.682	0.682
180-210	0.035	0.043	0.079	0.078	0.601	0.662	0.892	0.892
210-240	0.016	0.045	0.082	0.076	1.149	1.205	1.260	1.260
240-270	0.046	0.023	0.042	0.034	0.651	0.716	0.963	0.963
270-300	0.067	0.064	0.126	0.115	0.446	0.534	0.765	0.765
300-330	0.040	0.089	0.127	0.114	1.028	1.104	1.201	1.201
330-360	0.015	0.053	0.067	0.057	1.119	1.186	1.257	1.257

The AERSURFACE files for the "average", "wet", and "dry" surface moisture conditions for both the surface station and project site are provided in the electronic files ("\AERSURFACE\KMCN NLCD92\" and

"\AERSURFACE\CARBO NLCD92\") enclosed in Attachment A. In order to compare the surface characteristics of the two sites, both the absolute difference and relative percent difference between the seasonal values were calculated and are presented in Table 6.3.2-2.

Table 6.3.2-2 Absolute and Relative Percent Difference of Seasonal Surface Characteristic Values for Macon NWS ASOS Station and Project Site

SECTOR	ABSOLUTE DIFFERNCE				RELATIVE PERCENT DIFFERNCE			
	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
Albedo								
0-360	0.01	0.02	0.00	0.00	6%	13%	0%	0%
Bowen (Average Surface Moisture Condition)								
0-360	0.00	0.03	0.06	0.00	0%	8%	16%	0%
Bowen (Dry Surface Moisture Condition)								
0-360	0.07	0.02	0.15	0.07	6%	2%	21%	6%
Bowen (Wet Surface Moisture Condition)								
0-360	0.03	0.00	0.04	0.03	11%	0%	18%	11%
Surface Roughness Length								
0-30	0.472	0.520	0.738	0.744	188%	179%	182%	185%
30-60	0.383	0.452	0.744	0.750	186%	183%	186%	188%
60-90	0.353	0.418	0.702	0.709	176%	183%	176%	179%
90-120	0.085	0.112	0.206	0.209	116%	123%	75%	76%
120-150	0.072	0.116	0.200	0.200	85%	114%	68%	68%
150-180	0.512	0.523	0.522	0.524	175%	161%	124%	125%
180-210	0.566	0.619	0.813	0.814	178%	176%	167%	168%
210-240	1.133	1.160	1.178	1.184	195%	186%	176%	177%
240-270	0.605	0.693	0.921	0.929	174%	188%	183%	186%
270-300	0.379	0.470	0.639	0.650	148%	157%	143%	148%
300-330	0.988	1.015	1.074	1.087	185%	170%	162%	165%
330-360	1.104	1.133	1.190	1.200	195%	183%	180%	183%

As shown in Table 6.3.2-2, there is no significant difference between the average seasonal albedo and Bowen ratio values between the two sites. There is, however, a large difference, in both absolute and relative terms, between the seasonal surface roughness length values between the two sites for each of the 12 30-degree sectors. It is typical for the 1 km upwind domain of a NWS surface station located at an airport to have a much lower surface roughness length when compared to industrial sites because of Federal Aviation Administration (FAA) restrictions on the height of nearby obstacles in navigable airspace. In such cases, a site-specific sensitivity analysis should be conducted to determine the degree to which predicted air quality impacts are influenced by differences in surface characteristics. This sensitivity analysis is discussed further in Section 6.3.6.

6.3.3 AERMET Processing

AERMET is the meteorological data preprocessor used to characterize the surface fluxes of heat and momentum, scaling and stability parameters, boundary layer height, and the surface characteristics, winds and temperature used by AERMOD. In order to develop the surface and upper air profile data files required by AERMOD, AERMET processing is conducted in three stages. In Stage 1, NWS surface and upper air observations are extracted from the NCDC ISHD and NOAA/ESRL FSL data files and processed through various quality assessment checks. In Stage 2, the extracted observations are merged together along with 1-min ASOS winds processed in AERMINUTE and stored in a single file. Finally, in Stage 3 the merged meteorological data is combined with the surface characteristic values determined by AERSURFACE to estimate the boundary layer parameters used by AERMOD. Stage 3 AERMET processing also applies an adjustment to all ASOS-based wind speeds in order to compensate for the bias introduced due to wind speeds being truncated, rather than rounded, to whole knots in the archived data files.

Each year of paired surface and upper air profile data files were processed in AERMET for both sets of seasonal surface characteristics considering the surface moisture condition for each year relative to climatological normals. All input, message, and report data files created by AERMET during Stage 1, 2, and 3 processing for each year of meteorology are provided in the electronic files ("\AERMET 11059\CARBO\" and "\AERMET 11059\KMCN\") enclosed in Attachment A. In performing the processing, the five-year meteorological dataset using the project site surface characteristics was processed first. Then, since the surface observations, 1-min ASOS winds and upper air soundings for both datasets are identical, the merge file created in initial Stage 2 processing was used to process the five-year meteorological dataset with the MCN NWS ASOS surface characteristics in Stage 3 (i.e., the meteorology developed for the airport surface characteristics only required Stage 3 processing using the merged filed from the project site dataset). In order to process the observational data and surface characteristics through the various stages of AERMET, an identifier, latitude, longitude, elevation and factor to convert the time of each record to local standard time (LST) must be specified for the surface station and upper air station. AERMET no longer requires specifying the project site latitude, longitude, time conversion factor, and elevation using the LOCATION keyword on the Stage 3 METPREP pathway. Table 6.3.3-1 provides a summary of the identifying information used in AERMET processing.

Table 6.3.3-1 MCN NWS ASOS Surface and FFC Upper Air Station Identifying Information for AERMET Processing

Site	Identifier	LAT LONG (decimal degrees)	Elevation	Time Conversion
MCN NWS ASOS Station	3813	32.689N, 83.653W	108 m (354 ft)	5* (EST)
Peachtree City Falcon Field WSFO Upper Air Station	53819	33.355N, 84.567W	243 m (798 ft)	5* (EST)

* The time specified for each record in both the NCDC ISHD and NOAA/ESRL FSL surface and upper air data files are specified in Greenwich Mean Time (GMT)

6.3.3.1 1-min ASOS Winds Processing in AERMINUTE

Prior to Stage 1 processing in AERMET, AERMINUTE was used to develop for each year of meteorological data a file (HOURFILE) containing hourly averaged winds formatted for input and merging with the surface and upper air observations in Stage 2 AERMET processing. The 1-min ASOS winds in the DSI-6405 file format, input files and output files for each year of AERMINUTE processing are contained in the electronic files ("\AERMINUTE 11059\") enclosed in Attachment A. In order to ensure that AERMINUTE handles wind speeds less than 2 knots in the appropriate manner, the date by which a sonic anemometer was installed at the MCN NWS ASOS station, July 24, 2007, was specified using the Ice Free Winds Group (IFWGROUP) keyword in each AERMINUTE.INP input file.

6.3.3.2 Stage 1 Extracting NWS Data and Quality Assessment

As previously stated, Stage 1 AERMET processing comprises of the extraction and retrieval of data and an assessment of the quality of that data. Quality assessment (QA) is performed on all the data types by AERMET. The QA process identifies occurrences of missing data, values that are outside a range of threshold upper and lower bound values, and inconsistencies between selected variables within an observation period. Default values are defined for the upper and lower bounds and for missing values. When AERMET detects anomalous data, a message is written to a file informing the user of the violation.

In order to increase the number of temperature observations accepted by AERMET in Stage 1 processing, the threshold upper bound for the dry bulb temperature variable (TMPD) was modified to 40°C (104°F) from 35°C (95°F). After completing Stage 1 processing, the surface and upper air output files, SFQAOUT.DSK and UAQAOUT.DSK, were processed with the 1-min ASOS winds HOURFILE from AERMINUTE through Stage 2.

6.3.3.3 Stage 2 Merging Surface and Upper Air Data

In Stage 2, the surface observations and upper air soundings extracted in Stage 1 and 1-min ASOS winds calculated by AERMINUTE for each 24-hour period are merged together and stored in a single file for use in Stage 3. The single, merged file is then combined with the surface characteristic values determined by AERSURFACE to estimate the boundary layer parameters used by AERMOD.

6.3.3.4 Stage 3 Creating AERMOD Boundary Layer Parameters

In the final stage of AERMET processing, the merged data file is combined with the seasonal surface characteristic values for each of 12 30-degree sectors to produce the two meteorological model input data files for AERMOD – the surface (*.SFC) file and upper air profile (*.PFL) file. The surface data file contains boundary layer scaling parameters, such as surface friction velocity, mixing height, and Monin-Obukhov length, and reference-height winds and temperature. The upper air profile data file contains one or more levels of winds, temperature and the standard deviation of the fluctuating components of the wind.

In selecting whether to process the seasonal surface characteristics determined by AERSURFACE for the "average", "wet", or "dry" surface moisture condition, the annual precipitation as measured at the MCN NWS ASOS station for each year of data being processed was compared to the 30-year (1971-2000) climatological record. US EPA recommends selecting "wet" conditions if precipitation is in the upper 30th-percentile, "dry" conditions if precipitation is in the lower 30th-percentile, and "average" conditions if precipitation is in the middle 40th-percentile (US EPA 2008). Table 6.3.3.4-1 summarizes the upper, lower, and middle percentile precipitations measured at the MCN NWS surface station for the 1971-2000 period in comparison to the annual precipitation for each year of data being processed (NOAA 2004). The annual amount of precipitation for each year was determined from data provided by the Peachtree City NWS WSFO, available online at http://www.srh.noaa.gov/ffc/?n=rainfall_scorecard.

Table 6.3.3.4-1 Upper, Lower, and Middle Percentile Annual Precipitation (in.) for Macon NWS Surface Station, 1971-2000

Time Period	Lower 30th-Percentile ("dry")	Middle 40th-Percentile ("average")	Upper 30th-Percentile ("wet")
1971-2000	< 41.34"	41.34" – 48.18"	> 48.18"
2005	--	47.43	--
2006	34.62	--	--
2007	39.71	--	--
2008	--	48.14	--
2009	--	--	61.54

Based on the precipitation data presented in Table 6.3.3.4-1, "dry" was selected in processing calendar years 2006 and 2007, "average" was selected in processing calendar years 2005 and 2008, and "wet" was selected in processing calendar year 2009. The surface (*.SFC) and upper air profile (*.PFL) data files created by AERMET are also provided in the electronic files ("\AERMET\MCN NWS" and "\AERMET\CARBO") enclosed in Attachment A.

6.3.4 Meteorological Dataset Completeness

Regulatory analyses for NAAQS and PSD increments involve the sequential application of AERMOD, or another preferred regulatory model, to every hour in the period of analysis. As such, these analyses require meteorological records for each hour in the analysis period. In order to be acceptable for use in regulatory modeling applications, the meteorological data base must be 90% percent complete. Due to implementation of the METAR coding used to report surface observations at NWS ASOS stations during the mid-1990's, a high incidence of calm, variable, and missing wind conditions have been reported in the archived data files. Currently, AERMOD cannot simulate dispersion for calm or missing wind conditions – the model will calculate a zero for the concentration predicted. Because of this, the surface file used for the dispersion modeling analyses may not meet the 90% completeness requirement, even after merging 1-min ASOS winds. Therefore, each year of meteorology processed in AERMET was evaluated for completeness to determine its acceptability for NAAQS and PSD increment analysis.

In order to determine the completeness of the five year meteorological database, the variables wind direction, wind speed, temperature, stability (heat flux, boundary layer height, and Monin-Obukhov length), and joint wind direction, wind speed, and stability were evaluated for completeness on a quarterly basis (US EPA 2000). For a given hour, wind speed was considered missing if “999” was reported in the surface file or if a “0” was reported in the surface file and “999” was reported for the same hour in the AERMINUTE 1-min ASOS winds HOURFILE. The same approach was used for wind direction. This method ensures that valid calm hours determined by AERMINUTE are not counted as missing. Temperature was considered missing if “999” was reported in the surface file. For stability, this variable was determined to be missing if the hour was not calm or variable and (1) heat flux was missing, (2) heat flux was positive and the convective boundary layer height or Monin-Obukhov length was missing, or if (3) heat flux was negative and the stable boundary layer height or Monin-Obukhov length was missing. These stability parameters may be missing due to missing temperature, cloud cover or morning soundings. Tables 6.3.4-1 through 6.3.4-5 summarize the completeness of each year of meteorology using this procedure on a quarterly basis. The number of valid calm, invalid calm, and variable wind conditions are also reported each year.

Table 6.3.4-1 Calendar Year 2005 Meteorological Dataset Completeness

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
WSPD (Wind speed)	96.99%	96.16%	96.02%	96.94%	96.58%
WDIR (Wind direction)	96.71%	95.69%	95.09%	96.67%	96.10%
TMPD (Temperature)	100.00%	100.00%	100.00%	99.95%	99.99%
Stability	97.87%	99.31%	99.40%	99.07%	98.93%
Joint (WSPD, WDIR, Stability)	94.58%	95.00%	94.49%	95.74%	95.02%
Number of valid calms		533			
Number of invalid calms		300			
Number of variable winds		42			

Table 6.3.4-2 Calendar Year 2006 Meteorological Dataset Completeness

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
WSPD (Wind speed)	90.05%	98.38%	98.52%	98.89%	96.51%
WDIR (Wind direction)	<u>**89.35%**</u>	97.45%	97.87%	98.89%	95.95%
TMPD (Temperature)	98.24%	98.70%	99.44%	98.52%	98.74%
Stability	98.06%	97.78%	97.18%	96.44%	97.40%
Joint (WSPD, WDIR, Stability)	<u>**87.41%**</u>	95.23%	95.05%	95.32%	93.34%
Number of valid calms	584				
Number of invalid calms	295				
Number of variable winds	49				

Table 6.3.4-3 Calendar Year 2007 Meteorological Dataset Completeness

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
WSPD (Wind speed)	98.38%	97.96%	98.33%	97.92%	98.17%
WDIR (Wind direction)	98.19%	97.41%	98.10%	97.73%	97.89%
TMPD (Temperature)	98.38%	98.80%	96.53%	97.50%	97.83%
Stability	98.56%	97.36%	95.88%	96.76%	97.18%
Joint (WSPD, WDIR, Stability)	96.76%	94.77%	93.98%	94.49%	95.07%
Number of valid calms	293				
Number of invalid calms	114				
Number of variable winds	25				

Table 6.3.4-4 Calendar Year 2008 Meteorological Dataset Completeness

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
WSPD (Wind speed)	97.99%	97.07%	97.07%	96.11%	97.07%
WDIR (Wind direction)	97.85%	96.93%	96.66%	96.11%	96.90%
TMPD (Temperature)	97.39%	98.49%	97.62%	100.00%	98.38%
Stability	96.75%	97.12%	96.61%	100.00%	97.63%
Joint (WSPD, WDIR, Stability)	94.60%	94.05%	93.27%	96.11%	94.54%
Number of valid calms	0				
Number of invalid calms	212				
Number of variable winds	15				

Table 6.3.4-5 Calendar Year 2009 Meteorological Dataset Completeness

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
WSPD (Wind speed)	96.20%	98.84%	96.02%	96.90%	97.03%
WDIR (Wind direction)	95.56%	98.75%	95.79%	96.76%	96.76%
TMPD (Temperature)	99.26%	99.12%	97.04%	99.03%	98.63%
Stability	99.12%	98.84%	97.41%	98.80%	98.56%
Joint (WSPD, WDIR, Stability)	94.68%	97.59%	93.19%	95.56%	95.32%
Number of valid calms	0				
Number of invalid calms	212				
Number of variable winds	24				

As shown in the above tables, all meteorological variables evaluated were determined to meet the quarterly 90% completeness requirement, except for wind direction and joint wind direction, wind speed, and stability in the first quarter of 2006. In order to obtain the 90% goal, calendar year 2006 was reprocessed using data from the MCN NWS ASOS station as "onsite" data with surface data from the Warner Robins Air Force Base (WMO #722175; WBAN #13860; Call Sign KWRB, or "WRB") used "backup" as suggested by GA EPD for a previously proposed PSD project. Meteorological variables are not considered missing if they are obtained from a "backup" monitor and may be used to meet the completeness requirement.

6.3.5 Processing ASOS Station as "Onsite" with NWS Data as "Backup"

In order to process the MCN NWS ASOS station as "onsite" data, the meteorological variables wind speed, wind direction, temperature, station pressure and total sky cover were extracted from the 2006 surface file data and compiled into a FORTRAN free format file for Stage 1 AERMET processing. The data were extracted from the surface file, as opposed to the raw or abbreviated ISHD data, to be sure that the onsite data used are the exact same data that AERMET extracted from the raw surface file using the 30 minute window preceding the end of each hour – the raw surface data contain a variable number of observations per hour and AERMET requires a fixed number for processing onsite data. Additionally, since onsite data are given are higher priority than 1-min ASOS winds and NWS data in AERMET, using the raw ISHD surface data as onsite data will not allow AERMET to substitute 1-min ASOS winds unless the data are coded as missing and will not apply the truncated wind speed adjustment for ASOS based wind measurements during Stage 3 processing. For these reasons, the 2006 surface file, which already contains the merged and adjusted ASOS winds, was used to create the free formatted onsite data file for processing.

Using data from the surface file, a multilevel onsite data file was constructed – one level for dry bulb temperature (variable TT01) at the 2 m reference measurement height and a second level for wind speed (WS02), wind direction (WD02), station pressure (PRES), and total sky cover (TSKC) at the 10 m reference measurement height. Temperature was specified in units of Celsius with threshold lower and upper bounds of -30°C and 40°C, respectively, with missing data coded as "99". Wind speed was specified in units of meters per second with threshold lower and upper bounds of 0 m/s and 50 m/s, respectively, with missing data coded as "999". Wind direction was specified in units of degrees with threshold lower and upper bounds of 0° and 360°, respectively, with missing data coded as "999". Station pressure was specified in units of 10*mbar and total sky cover was specified on the range of 0 to 10 tenths. Specification of the variables in this manner is consistent with the nomenclature and quality assurance indicators for onsite data in Tables B-3a and B-3b of the AERMET user manual. A threshold wind speed of 0.2 m/s was also specified, which is the minimum allowable wind speed used by AERMET to estimate the boundary layer parameters. Otherwise, the hour is treated as calm.

In order to process WRB as the "backup" for the MCN "onsite" data through the various stages of AERMET, an identifier, latitude, longitude, elevation and factor to convert the time of each record to local standard time (LST) must be specified for the surface station and upper air station. Table 6.3.5-1 provides a summary of the identifying information used in AERMET processing.

Table 6.3.5-1 WRB NWS Surface Station Identifying Information for AERMET Processing

Site	Identifier	LAT LONG (decimal degrees)	Elevation	Time Conversion
Warner Robins Air Force Base	99999[**]	32.633N, 83.600W	90 m (295 ft)	5[*] (EST)

* The time specified for each record in both the NCDC ISHD and NOAA/ESRL FSL surface and upper air data files are specified in Greenwich Mean Time (GMT)

* Previously WBAN 13860; WMO number is 722175

For Stage 1 processing, the threshold upper bound for the dry bulb temperature variable (TMPD) for WRB was also modified to 40°C (104°F) from 35°C (95°F) to increase the number of temperature observations accepted by AERMET. Using WRB as backup also required specifying secondary site surface characteristics in the Stage 3 input file. NLCD92 data for WRB were processed through AERSURFACE for the dry surface moisture condition using the same options as MCN except that the latitude and longitude specified with the identifying information listed in the table above were used. The surface roughness of WRB is applied to estimate boundary layer parameters when AERMET substitutes WRB wind data for calm or missing onsite data. Currently, albedo and Bowen from the primary set of surface characteristics, MCN, are used in all cases. For the meteorological data representing the surface characteristics of the project site, the seasonal values of albedo, Bowen, and surface roughness for the project site were used for both the primary and secondary values.

In performing the processing, the 2006 dataset for the airport sites was processed first with the merge file created in Stage 2 processing used to process the dataset for project site. All input, message, and report data files created by AERMET during Stage 1, 2, and 3 processing, the ISHD and AERSURFACE files, and free format MCN onsite data file are contained in the onsite processing folders ("\2006 ONSITE\) provided in the electronic files ("\AERMET 11059\CARBO\" and "\AERMET 11059\KMCN\") enclosed in Attachment A. When comparing the initial surface files to the surface files reprocessed with WRB, the files are essentially identical except for those hours where wind speed, wind direction, temperature, and/or cloud cover were used as backup for data missing from the MCN onsite file. The primary differences between the two files are the precipitation codes, precipitation amounts and relative humidity, which are not important for the modeling analyses since they are only relevant when using AERMOD's deposition algorithms. Table 6.3.5-2 summarizes the completeness of year 2006 after using WRB as backup for MCN.

Table 6.3.5-2 Calendar Year 2006 Meteorological Dataset Completeness using WRB as "Backup" for MCN NWS ASOS "Onsite"

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
WSPD (Wind speed)	96.67%	99.07%	99.54%	98.98%	98.58%
WDIR (Wind direction)	94.17%	98.66%	99.44%	98.98%	97.84%
TMPD (Temperature)	99.40%	99.26%	99.91%	99.63%	99.55%
Stability	99.31%	98.84%	98.80%	98.75%	98.94%
Joint (WSPD, WDIR, Stability)	93.47%	97.50%	98.24%	97.73%	96.78%
Number of valid calms		350			
Number of invalid calms		123			
Number of variable winds		65			

As shown in the above table, after reprocessing MCN as onsite with WRB as a "backup", the variables wind direction and joint wind direction, wind speed, and stability in the first quarter of 2006 meet the 90% completeness requirement for regulatory dispersion modeling applications.

6.3.6 Determination of Data Representativeness

As previously discussed, the values for surface characteristics input into AERMET should be based on the land cover in the vicinity of the NWS surface station and be representative of the modeling domain. This is to help ensure that boundary layer parameters used by AERMOD adequately characterize atmospheric dispersion of the source area. If the representativeness of a meteorological dataset is uncertain based on the results of the surface characteristics comparison, a site-specific sensitivity analysis should be conducted to determine the degree to which predicted pollutant concentrations are influenced by differences in surface parameters.

Since the absolute and relative percent difference in seasonal surface roughness length values between the airport and project sites were large, CARBO will apply AERMOD using both five-year meteorological datasets in the preliminary impact analysis to determine the importance of this difference in surface characteristics relative to changes in the predicted pollutant concentrations for each averaging period of interest. The meteorological dataset that results in more conservative air quality impacts for a given pollutant and averaging period will be used to determine the design concentrations for the NAAQS and PSD increments.

6.4 Good Engineering Practice Stack Height and Building Downwash

As specified in Section 6.2.2 and the Guideline, credit for emissions reductions achieved by using a stack with a height in excess of what is considered to be Good Engineering Practice (GEP) is prohibited. GEP stack height, as measured from the base elevation of a stack, is defined in 40 CFR 51.100(ii) and the US EPA technical support document for the stack height regulations as the greater of 213 feet (65 meters) or the stack height determined based on the dimensions of nearby structures ("refined formal height") or EPA approved fluid model studies (US EPA 1985).

US EPA has created software applications to determine the GEP stack height based on the refined formula and the appropriate building downwash dimensions for input into both ISC3 and AERMOD. However, GA EPD does not require applicants to consider downwash when determining the MGLC for TAP using ISC3. The most recent version (v04274) of the Building Profile Input Program for the PRIME (BPIPPRM) software application will be used to determine the GEP height and wind direction-specific downwash dimensions and the dominant downwash structures for each stack for use in the AERMOD input control files. All data generated by BPIPPRM in processing stack heights and building and tank dimensions for the existing and proposed new processing lines are provided in the electronic files ("\BPIPPRM") enclosed as Attachment A.

6.5 Coordinate System

For the air quality analyses, the location of all source, building corner and receptors locations will be specified in the Universal Transverse Mercator (UTM) coordinate system in the North American Datum of 1983 (NAD83).

6.6 Receptors

Receptors are locations where ambient air concentrations are calculated by the dispersion model. Generally, the receptor grid must be of sufficient size and density to ensure that the dispersion pattern can be adequately characterized and the maximum ambient impact for the averaging period(s) of interest has been determined. Additionally, receptor grids may be of refined (100-meter spacing) or coarse (greater than 100-meter spacing) grid densities. For the PSD air quality analyses, the final extent of the receptor grid(s) used for each pollutant will be determined based on results obtained from the preliminary impact analysis. At a minimum, 100-meter spaced receptors will be placed along the facility property boundary with a refined Cartesian receptor grid extending outward in all directions to a distance of 5 km. If necessary, this refined Cartesian receptor grid will be supplemented by coarse Cartesian grids of 250-meter spaced receptors out to a distance of 10-km and 1,000 meter spaced receptors out to a distance of 50 km. If design concentrations or violations of the NAAQS or PSD increment are predicted at receptors in the coarse grids, the air quality impact will be resolved to the nearest 100 meters. The receptor that represents the endpoint for the radius of the SIA for each pollutant will also be resolved to 100 meters.

6.7 Elevation Processing

The most recent version of AERMAP (v11103) supports processing terrain elevations extracted from the USGS National Elevation Dataset (NED) in the GeoTIFF format. The NED elevation data are currently available for the conterminous United States, Hawaii, Puerto Rico, and the Virgin Islands at a horizontal resolution of one arc-second (approximately 30-meters) and at a resolution of two arc-seconds for Alaska. Higher resolution, 1/3 arc-second (approximately 10-meters) data are available for most areas outside of Alaska. US EPA has encouraged users of AERMOD to transition from the Digital Elevation Model (DEM) files to the NED as soon as practical since the DEM data will not be updated in the future and the NED are being actively supported and quality assured by the USGS. Additionally, problems that should be avoided by using the NED data but have been reported with the DEM data include incorrect geo-referencing information for entire DEM files and elevations that reflect the tops of buildings and trees. The NED data represent the ground elevation, which is a more appropriate input for determining receptor elevations and hill height scales for use in AERMOD. For these reasons, receptor-specific terrain-influence heights and source and receptor elevations will be determined by processing NED data in AERMAP for input into AERMOD. The same elevations will also be used for input into ISC3 for the toxic impact assessment.

USGS NED data files at 1 arc-second resolution were obtained from the USGS National Map Seamless Server, available online at http://seamless.usgs.gov/, and are provided in the in the electronic files ("\NED") enclosed as Attachment A. The extent of the NED data obtained is shown in Figure 6.7-1.

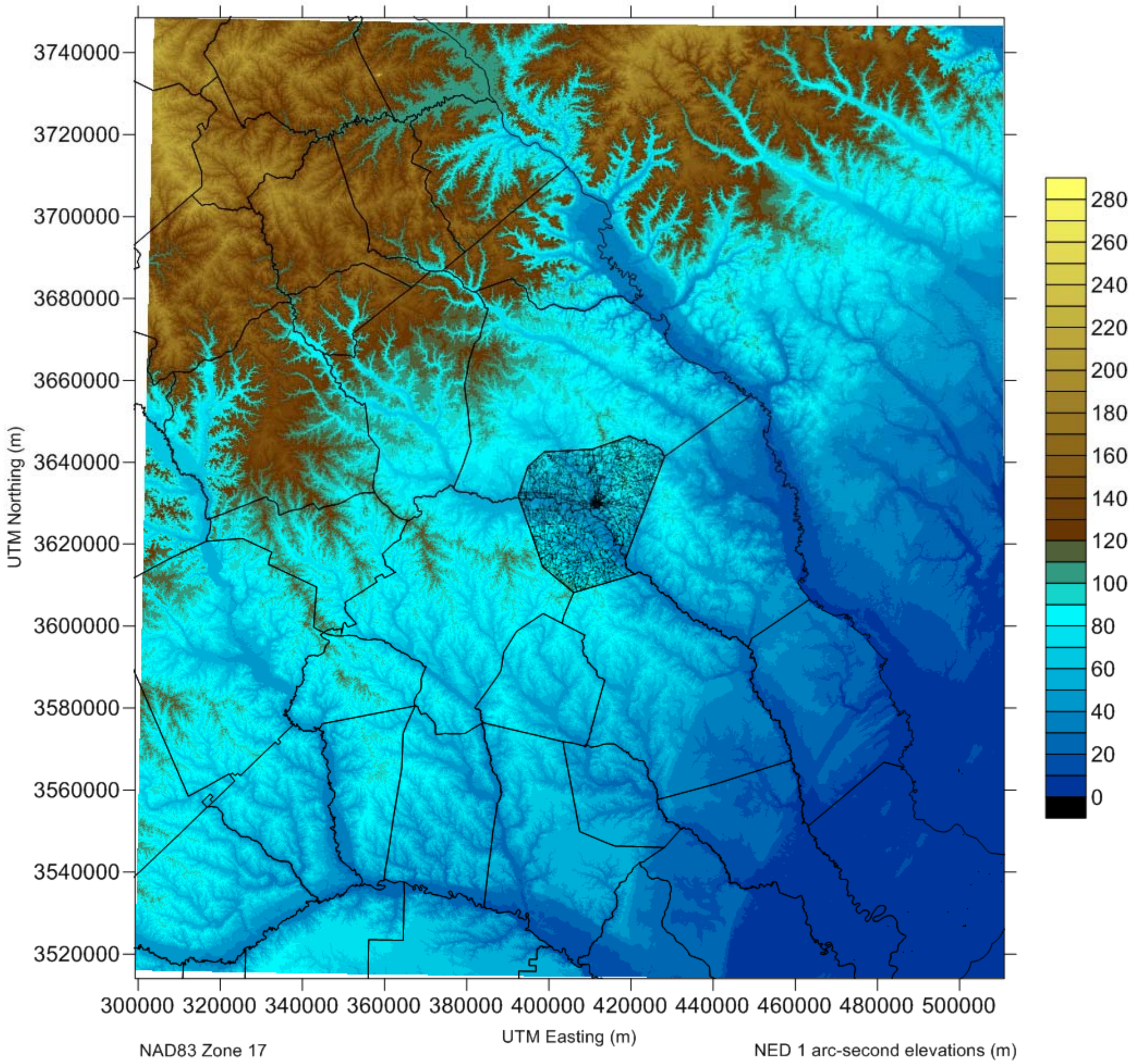


Figure 6.7-1 Extent of National Elevation Data Set Domain

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Volume III, Attachment B –

Agency Correspondence Relating to the Class II Dispersion Modeling Protocol

Georgia Department of Natural Resources

Environmental Protection Division • Air Protection Branch
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404/363-7000 • Fax: 404/363-7100
Mark Williams, Commissioner
F. Allen Barnes, Director

July 27, 2011

Mr. John Bandzul Forwarded to: Jbandzul@SmithAldridge.com
Smith Aldridge, Inc.
P.O. Box 420485
Atlanta, GA 30342

Subject: **Review of PSD Air Dispersion Modeling Protocol**
CARBO-Greenfield Site, Millen, Jenkins Co., Georgia

Dear Mr. Bandzul:

We have reviewed the air quality dispersion modeling protocol dated July 19, 2011, which addresses the proposed modeled conformance of CARBO Ceramics, Inc. (CARBO) kaolin processing facility in Jenkins 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. Since the protocol was received, we have received copies of your FLM communications with the US Fish & Wildlife Service and the US Forest Service, confirming an interest in Air Quality Related Value Assessments in the former. We understand you have not heard confirmation of such a requirement for the Shining Rock Wilderness Area. We look forward to receipt of your Class I area Modeling Protocol. We anticipate that it will include the Shining Rock Class I area, if required. Please continue to copy GA EPD on any FLM communications.

   As discussed on the April 5, 2011 conference call, EPA/EPD retain purview over Class I Increment consumption, so both agencies should get a copy of any project correspondence you may have with any FLM. In addition, if the project is not required to assess Air Quality Related Values at any Class I area (such as Shining Rock), you may wish to contact EPD for Class I Significance screening procedures involving AERMOD. If such screening modeling indicates the project will exceed applicable Significance levels at Shining Rock, such screening modeling must be repeated using CALPUFF, which should be addressed in the Class I Area Modeling Protocol that you are preparing. GA EPD does not expect your project to consume, or model any Class I PM2.5 Increment or Significance. For issues with Class I AQRV assessment, refer to the FLAG-2010 AQRV Work Group Phase I Report, or consult the applicable FLM. For issues with Class I Increment, refer to the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, 1998, or consult the GA EPD modeling unit.

2. Class II Meteorological Data: Based on the preliminary meteorological representation results you shared with us on 7/26/11, we believe you should conduct any further Class II impacts modeling with the Daniel Field/Peachtree City 2006-2010 data set based on the surface characteristics of the Daniel Field National Weather Service (NWS) station. GA EPD processed hourly meteorological observations collected at Daniel Field using the recently promulgated, final versions of AERMINUTE and AERMET (both versions 11059), incorporating the once daily upper air observations of the Peachtree City NWS station. The data were processed using AERSURFACE (version 08009) outputs for the wet, dry, and average moisture conditions, by season and 30^{o} sector in accordance with the AERMOD Implementation Guidance (3/19/08). Two sets of meteorological data were compiled, one for the surface characteristics of the NWS site, and one for the characteristics of the CARBO project site.

While the AERSURFACE outputs were similar for values of albedo and Bowen ratio, and generally similar for surface roughness, the ratio of surface roughness values by sector consistently indicated a pair of sectors to have ratios in excess of 10. For this reason, the EPA Region 4 modeling-based method of demonstrating representation was invoked.

You have conducted significance modeling with both sets of meteorological data for SO2, NO2 (using PVMRM), PM10, PM2.5, and CO. The results showed higher maximum short-term impacts for each pollutant were predicted using the NWS-characteristics data set. The results also indicated slightly higher maximum annual average impacts for each pollutant were predicted using the site characteristics. During our meeting of 7/26/11, we decided that:

a. The short-term impacts are usually the basis for model-derived permit limits.
b. The surface characteristics of the NWS set are those which actually influenced the data collected.

For these reasons, GA EPD authorized you to complete the air quality assessment using the meteorological data set compiled with the NWS station surface characteristics.

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. GA EPD believes extent of the offsite inventory should be based on the significant impact distance plus 50km, as indicated in the Draft 1990 NSR Workshop Manual. For pollutants and averaging periods addressed in that guidance, the offsite inventory may be reduced using the 20D screening technique. For PM2.5, all facilities in the post-20D PM10 offsite inventory should be inventoried for emissions of PM2.5. Examination of the original basis for the 20D screening technique suggests that application of the method to PM2.5 screening is acceptable (based on approximation of the PM2.5 SILs and the tabulated impacts), if:
    a. the technique is changed to 2D,
    b. D is defined consistently as the distance (in km) from the source to the offsite facility, and
    c. PM2.5 annual (tpy) emission rates are used.

   EPA has indicated (1-hr NO2 guidance memo dated 3/1/11) that the minimum extent of the modeled offsite inventory is defined by the Array of Significant Receptors (ASRs). GA EPD accepts the ASR for this purpose. If the ASR is not refined to 100m resolution, then GA EPD accepts the ASR for this purpose if it is buffered by the addition of receptor locations (not to exceed 500m resolution) at which concentrations of 7 $\mu g/m^3$, or above, have been predicted during significance modeling. Refined modeling for the 1-hr standards must be conducted to the ASR locations, or the ASR+buffer locations, as applicable.

   The maximum extent of 1-hr pollutant offsite inventories is determined by identifying the fastest wind speed in the project meteorological data set, and converting that speed to the appropriate transport distance:

   Wind speed (m/s) * 3600 s/hr * 1km/1000m) = transport distance per hour

   GA EPD allows refinement of this maximum inventory extent using a 16-sector wind rose, as follows:
    a. Use Lakes Environmental's WRPLOT freeware (or equivalent) to develop a wind rose based on the entire project meteorological data set.
    b. Using wind speeds in meters-per-second, identify the sectors with undefined (designated ">") wind speed for the maximum wind speed class.
        i. Adjust the minimum wind speed for this fastest class until the fastest wind speed is resolved.
        ii. Repeat for all sectors with maximum wind speeds designated as ">".
    c. Use the class upper bound speed for sectors with designated class wind speeds.

d. Convert the fastest wind speed, or wind speed class upper bound to the appropriate transport distance for each sector.
e. Eliminate all sources beyond this maximum transport distance from the project in each sector.
f. This transport distance screening technique cannot be applied to sources lying within the ASR, or ASR+buffer, as applicable.

Significance modeling may predict concentrations in excess of the 1-hr SILs or 7 $\mu g/m^3$ at selected receptors which are not adjacent to the main ASR, or ASR+buffer, respectively. Such outlier locations are assumed to be continuous with the main ASR or ASR+buffer for purposes of refined model receptor locations, and defining the minimum extent of the offsite inventory. However, outlying receptors with concentrations in excess of the SILs or 7 $\mu g/m^3$ may be excluded from refined modeling if they lie farther from the source than the fastest 1-hr transport distance in their wind sector.

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 used for air toxics, with receptors assigned terrain elevations, use the Macon/Waycross meteorological data set downloadable from the georgiaair.org website for ISCST3 modeling. 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 advises that the same pollutants modeled with the last CARBO PSD/112(g) permit are the specific air toxics to be assessed. The Permitting Program will also review and, if acceptable, approve your on- and off-site emissions inventories, including PM2.5 and SO2 emissions. On page 14 of the protocol, you indicate you may not be able to locate sufficient information to model selected sources, and wish to use "average" data for missing emission data. We would prefer that you identify the missing information and allow EPD the opportunity to provide the information to you or confirm that it is missing and approve your specific missing data handling technique.

5. Actual 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 guidance. Other, more recent standards (post-2007, ie., 1-hr NO2, 1-hr SO2, and PM2.5) should be evaluated considering the guidance memos listed on page 63 of the updated AERMOD User's Guide. We have provided a discussion of methods we believe to be allowable based on the latter guidance in paragraph 3 of this protocol approval letter. 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. You will shortly receive a letter from the EPA Region 4 Dispersion Modeling contact in which he, as I understand it, will provide approval of your use of the Beta-(and non-Default) PVMRM algorithm, contingent on certain conditions being met.

   The largest Significant Impact Distance (SID) for each pollutant, regardless of time-averaging period, plus 50 km, will establish the size of any model screening area to be inventoried for offsite sources of that pollutant (PM2.5, PM10, SO_2, or NO_2) for cumulative modeling. The "20D", or for PM2.5, the "2D" 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", except for PM2.5. No source located within the pollutant-specific largest Significant Impact Areas (SIAs) may be screened from the cumulative inventory. As discussed in paragraph 3, above, 1-hr NO2 and SO2 inventories will be developed based on other criteria, so the pollutant-specific largest SIA for these pollutants refers only to pre-2008 time-averaging periods. When applying the 20D or 2D screening methods, the pollutant-specific emissions of facilities within 2 km of each other outside the SIA should be added prior to applying the screening test.

6. PM2.5 Modeling: EPD expects CARBO to conduct refined PM2.5 modeling for NAAQS (only). At this time, EPD is not aware of PM2.5 modeling techniques acceptable to EPA other than those outlined in the Stephen Page guidance memo of 3/23/10. We understand you propose to add a 50km screening annulus to your maximum PM2.5 SID in order to develop an offsite PM2.5 inventory. Offsite sources may be screened from refined modeling using the "2D" technique, though no sources may be screened which are located within the SIA

7. Increment Issues: The Jenkins Co. Air Quality Control Region minor source baseline date for annual NO2 is 5/5/88, and was set statewide on that date. 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), based on the submittal of the application in advance of the earliest possible PM2.5 trigger date. When deemed a complete application, this CARBO project's emissions will set the minor source baseline dates for PM and SO2 in Jenkins Co., and , with annual NO2 project emissions, consume such Increment.

8. Ambient Concentrations: The project background 1- and 8-hr background ambient concentrations of CO are 943 and 802 $\mu g/m^3$, respectively. The annual NO_2 background ambient concentration is 5.2 $\mu g/m^3$. The 1-hr NO_2 background ambient concentration (2008-2010) is 33.24 $\mu g/m^3$, based on the March 1, 2011 EPA memo requiring the 98^{th} %-ile of the daily maximum 1-hr concentration over a 3-yr period to be used for this purpose. The 24-hr annual average of the daily 98^{th} percentile concentrations of PM2.5 at Bungalow Rd, Augusta ('08-'10) is 25.0 $\mu g/m^3$, the annual average PM2.5 concentration at Bungalow Rd, Augusta ('08-'10) is 12.7 $\mu g/m^3$. The:

   1-hr SO_2 ambient concentration (Macon SE, 2008-2010) is 67.2 $\mu g/m^3$. The
   3-hr SO_2 ambient background (same monitor and period) is 51.48 $\mu g/m^3$, the
   24-hr SO_2 ambient background (same monitor and period) is 16.75 $\mu g/m^3$, 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 on request.

9. 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 elevations using AERMAP, if appropriate. For all criteria pollutant modeling, please use AERMOD (version 11103).

10. Model Receptors: For the pre-2008 air quality standards and PM2.5, the extent of the receptors modeled should be at least that which was agreed upon during the 7/25/11 pre-PSD meeting. All design

concentrations should ultimately 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 1-hr air quality standards, see the discussion detailed in paragraph 3 as regards receptor placement.

11. Additional Impacts:
    a. All additional impacts studies will be limited to no more than the largest significant impact distance from the project site based on pre-2008 (excluding PM2.5) standards. Additional impacts studies do not include National Monuments, or National Parks, unless specifically requested by a Federal Land Manager.
    b. On the basis of Tables 2.1.1-1 and 2.1.2-1, six airports, and two state parks, or less depending on the largest 24-hr PM10 or annual NO2 SIA, should be assessed for visible plume impacts using the VISCREEN model, User's Guide, and Tutorial.
    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, or more recent literature. Note that EPA has proposed modifications of the secondary SO2 and NO2 standards 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 growth associated with the project as indicated on pages D.3-D.4 of EPA's Draft 1990 New Source Review Workshop Manual.

Please contact me at 404-363-7095, or 706-334-2533, 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.

Sincerely,

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

Attachments: Generally Applicable Class II Area Modeling References

Generally Applicable Class II Area 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 (EPA-454/B-03-001, September 2004) (version 04300)

2009, ADDENDUM, USER'S GUIDE FOR THE AMS/EPA REGULATORY MODEL - AERMOD (EPA-454/B-03-001, September 2004), October 2009 (version 09292)

2011, ADDENDUM, USER'S GUIDE FOR THE AMS/EPA REGULATORY MODEL - AERMOD (EPA-454/B-03-001, September 2004), March 2011 (version 11059)

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

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

2009, ADDENDUM, February, 2009, to USER'S GUIDE FOR THE AERMOD TERRAIN PREPROCESSOR (AERMAP version 09040), 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).

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. Vol. a includes 02035 instructions.

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.

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).

Volume III, Attachment C –

Tier 3 NO_2 (PVMRM) Modeling Protocol

SMITH ALDRIDGE, INC.
Environmental Consultants

July 25, 2011

Stanley Krivo
US EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street SW
Atlanta, Georgia 30303-8960

RE: Proposed Dispersion Modeling Protocol
Alternative Modeling Techniques using Tier 3 Screening Methods for NO_2
CARBO Ceramics, Inc. Greenfield Millen, Jenkins County, Georgia Facility

Dear Mr. Krivo,

On behalf of our client, CARBO Ceramics, Inc. ("CARBO"), please find the enclosed dispersion modeling protocol requesting approval to use PVMRM as an alternate model under Section 3.2.2 of US EPA's Guideline on Air Quality Models for a planned greenfield proppant manufacturing facility in Millen, Jenkins County, Georgia. Based on our review, we believe that the enclosed protocol satisfies the conditions to use PVMRM as part of the tiered screening methodology for obtaining hourly average estimates of NO_2 for comparison to the NAAQS for the PSD air quality analysis required for the project. If you have any questions, please do not hesitate to contact me by phone at (404) 255-0928 x117 or by e-mail at jbandzul@smithaldridge.com. We look forward to your review and comment.

Sincerely,

Jon Bandzul, Principal
Smith Aldridge, Inc.

enc: Proposed Dispersion Modeling Protocol w/Electronic Files

cc: Jason Goodwin – CARBO Ceramics, Inc.
Craig Smith – Smith Aldridge, Inc.
Pete Courtney – GA EPD

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CARBO Ceramics

Millen Proppant Manufacturing Plant

(Jenkins County)

Proposed Air Dispersion Modeling Protocol

for

Alternative Modeling Techniques using Tier 3 Screening Methods for the NO_2 NAAQS

July 2011

Prepared by:

SMITH ALDRIDGE, INC.

Environmental Consultants

Atlanta, Georgia

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1.0 INTRODUCTION

CARBO Ceramics, Inc. ("CARBO") manufactures proppants from nonmetallic minerals for use primarily in the oil and natural gas production industries. CARBO is proposing to construct a new processing plant, approximately 6 km southeast of Millen, Georgia at the intersection of GA State Route 17 and Clayton Road, in Jenkins County. The proposed plant will be a four-line, wet processing facility, similar to its Toomsboro plant in Wilkinson County, Georgia, where proppants are manufactured from kaolin clay from a slurry which is pelletized in spray dryers and later calcined in direct-fired rotary kilns. In addition to slurry preparation, spray drying and calcining, the processing lines each consist of associated materials handling and storage, screening, and shipping operations.

The construction of the proposed new processing facility will be a subject to PSD preconstruction review since the facility will be a major stationary source with potential emissions of NO_x, SO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and CO_2e greater than the significant emission rate thresholds for each pollutant. As part of PSD review, CARBO will be required to conduct an ambient air quality analysis to demonstrate that potential emissions from the proposed construction, and all applicable emissions increases and decreases from other existing and proposed new sources, will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment effective at the time of permit issuance.

In this protocol, CARBO is requesting GA EPD and US EPA Region 4 approve the use of the Plume Volume Molar Ratio Method (PVMRM) as part of the tiered screening approach to obtaining hourly average estimates of NO_2 for comparison to the new 1-hour NAAQS standard. This modeling technique is not being proposed for the annual averaging period. PVMRM is available as a non-regulatory default model option within AERMOD and its application makes AERMOD no longer the preferred regulatory model. In such cases, use of this technique as an alternative model may be approved on a case-by-case basis under Section 3.2.2 of US EPA's guideline on air quality models (40 CFR Part 51 Appendix W or "US EPA's guideline"). In cases where the preferred model is less appropriate for a particular situation, or if there is no preferred model, an alternate model may be used provided that the model has received scientific peer review, is applicable to the particular application on a theoretical basis, the databases necessary to perform the analysis are adequate and available, performance evaluations have shown that the alternate is not biased towards underestimates and a protocol on the methods and procedures to be followed has been established. CARBO is submitting this protocol for consideration to satisfy the above conditions and justify the use of the PVMRM. Generally, the Air Quality Modeling Group (AQMG) at US EPA's Office of Air Quality Planning and Standards (OAQPS) recommends accepting the use of PVMRM provided that a reasonable demonstration can be made regarding the appropriateness of the in-stack NO_2/NO_x ratios and background ozone database proposed to be used (US EPA 2011).

With regard to in-stack NO_2/NO_x ratios, CARBO obtained 180 minutes of NO and NO_2 measurements from the exhaust stack of a similar operating kiln, spray dryer, and boiler at CARBO's Toomsboro facility during the second week of July 2011 – the emission units associated with the construction of the proposed Millen facility will be substantially similar, if not identical, to the units on which stack sampling was conducted. From this data, CARBO determined in-stack NO_2/NO_x ratios for the project sources as 0.01 for kilns, 0.06 for spray dryers and 0.12 for boilers – the NO_2/NO_x ratios were determined as the average of three 60-min periods of data (i.e., 3-run averages). For all other nearby sources in the PSD inventory, except combustion turbines, CARBO is proposing to use the default NO_2/NO_x ratio of 0.50 in the absence of source-specific information. For combustion turbines, CARBO is proposing to use an in-stack ratio of 0.20, which is substantiated by documentation submitted along with this protocol.

With regard to the background ozone concentrations, CARBO has developed a database using the maximum of contemporaneous 1-hour observations of ozone measured at seven monitors surrounding the modeling domain with one monitor used as secondary source for periods of missing data not within Georgia's statutory ozone monitoring season, March through October. Combining the observations in this manner will ensure that the background ozone concentrations used with PVMRM are representative and conservative for both the project site and averaging period so that the controlling NO_2 concentrations will not be underestimated.

2.0 ALTERNATIVE MODELING TECHNIQUES FOR NO_2

On April 12, 2010, a new 1-hour NO_2 NAAQS of 100 ppb (188 $\mu g/m^3$) became effective. For the purposes of NSR and PSD dispersion modeling demonstrations, the design concentration for the hourly NO_2 NAAQS is the five-year average of the 98th-percentile annual distribution of 1-hour daily maximum concentrations at each receptor location. In other words, for each receptor, the maximum 1-hour NO_2 concentration is determined for each calendar day and then the highest 8th-high of these concentrations is obtained for each year and averaged across the modeled five-year period.

Nitrogen oxides (NO_x) exist in various forms in the atmosphere and are primarily emitted in combustion processes from the oxidation of fuel-bound nitrogen and molecular nitrogen in combustion air with the most common constituent being nitric oxide (NO). NO_2 is formed to a much lesser degree in-stack through thermal conversion. Upon entering the atmosphere, NO is oxidized rapidly to NO_2 in the presence of ozone or in a photochemically reactive environment. The resulting NO_2 may also undergo cyclic decomposition back to NO in the presence of sunlight through photolysis resulting in the production of free oxygen which combines with molecular oxygen to form ozone. Additionally, NO_2 may undergo subsequent reactions with hydroxyl radicals (OH) to form nitric acid (HNO_3), which could contribute to acidic rain and deposition, or as a parallel competing reaction path may also subsequently react in the presence of ammonia (NH_3) to form visibility impairing nitrates. This all makes modeling for the NO_2 NAAQS difficult considering the complexity of the atmospheric chemistry and meteorology affecting its formation. For these reasons, US EPA recommends in Section 5.2.4 of the Guideline a three-tiered screening approach to obtaining annual average estimates of NO_2 for comparison to the NAAQS and PSD increment. Recent memoranda issued by US EPA's OAQPS regarding this screening approach confirm its applicability to the new hourly standard (US EPA 2010b, US EPA 2011).

In the tiered screening approach, full conversion of NO_x to NO_2 is assumed as the first tier. If the concentration assuming full conversion exceeds the NAAQS and/or PSD increment, the Ambient Ratio Method (ARM) is applied in the second tier. In the ARM, the NO_x concentration used in the first tier is simply multiplied by a factor of 0.80 as a conservative default ambient ratio for the 1-hour standard (US EPA 2011). In the third tier, a more detailed screening method such as the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM) may be considered. Both the OLM and PVMRM attempt to avoid overestimates made using the full conversion and ARM methods by taking into account the oxidizing potential of the atmosphere while still retaining the desired screening level approach for NO_2.

2.1 Description of Tier 3 Detailed Screening Models

The OLM uses a simplified approach to the reaction chemistry by assuming that NO and ozone react in proportion to their ground level concentrations. In the OLM, the estimated maximum NO_x concentration is separated into two components: the portion formed due to in-stack thermal conversion and directly emitted as NO_2 with the remaining portion available in the atmosphere as NO for oxidation with ozone. The portion of NO available is then is compared to the background O_3 concentration to determine the limiting factor in NO_2 formation. If the portion of NO available is greater than the background ozone concentration, the conversion of NO to NO_2 is limited to the background ozone concentration (i.e., is ozone limited). Otherwise, full conversion is assumed.

Studies have shown, however, that NO_2 formation occurs in proportion to the number of moles of NO and ozone entrained in the plume rather than in proportion to their atmospheric concentrations (Hanranhan 1999). The PVMRM follows the same chemical reaction theory as the OLM but determines the NO_2/NO_x conversion rate by calculating the number of NO_x moles emitted in the plume and the number of O_3 moles contained within the plume volume between the source and receptor. As the plume moves downwind from the source, the amount of ozone available within the plume for reaction increases as the plume expands. This continues until equilibrium is reached within the plume and the plume becomes limited by the amount of ozone entrained in the plume.

CARBO is proposing to use PVMRM as part of a tiered screening approach to obtaining hourly average estimates of NO_2 for comparison to the NAAQS since this method provides a more realistic prediction of the NO_2/NO_x conversion rate in an expanding plume. Since the application of PVMRM makes AERMOD no longer the preferred regulatory model, CARBO is providing the following under Section 3.2.2 of the Guideline to justify its use in the absence of a preferred model.

2.1.1 Scientific Peer Review

In 1991, the American Meteorological Society (AMS) and US EPA initiated a joint effort to develop an improved air quality model for regulatory applications. At that time, the AMS/EPA Regulatory Model Improvement Committee (AERMIC) was formed to upgrade current regulatory models which had been in existence for nearly two decades. Instead, AERMIC chose to focus on developing a new model, AERMOD which, along with its meteorological and terrain data preprocessors AERMET and AERMAP, was submitted to OAQPS for consideration as a preferred regulatory model. As part of this process, the scientific merit of AERMOD was extensively documented through internal and external peer review, model evaluation and public comment (US EPA 2002). Furthermore, the reaction chemistry of PVMRM itself has also received scientific peer review in several performance evaluation and sensitivity studies discussed below and has been found to perform within the range considered acceptable for refined models. And since AERMOD is the preferred Guideline model for a wide range of applications, CARBO believes that the requirement for scientific peer review has been satisfied.

2.1.2 Applicability of PVMRM

Atmospheric concentrations of NO_2 are nearly always the result of oxidation of NO in the presence of ozone. The process of ozone removal by NO is referred to as the ozone titration mechanism. PVMRM simulates this first-order reaction in an expanding plume based on a photostationary state (PSS) approximation of NO, NO_2, and ozone in order to better estimate ambient concentrations of NO_2. PVMRM is therefore applicable on a theoretical basis to determining design concentrations of NO_2 for PSD air quality analysis. However, applicability of PVMRM depends, in part, on the chemical environment into which the plumes are emitted.

Although ozone titration is the primary mechanism of atmospheric NO_2 formation, PVMRM neglects the role of peroxy radicals in the conversion of NO to NO_2. This process ultimately results in the production of ozone through subsequent photolysis of NO_2. Peroxy radicals can be formed through the photolysis of volatile organic compounds (VOC) and subsequent combination of hydrogen with oxygen or through reactions of VOC with the hydroxyl radical (OH). In both cases, NO_2 may be the product of subsequent secondary atmospheric reactions. The reactions will continue cyclically until NO_2 finds a "sink" to remove it from the cycle, such as nitric acid (HNO_3) or peroxyacyl nitrate (PAN), or when radicals react with each other to form stable products. Since the formation of NO_2 through reactions of NO with peroxy radicals are essentially limited by the presence of VOC in the atmosphere, PVMRM is most applicable to chemical environments in which ozone is the dominant oxidant for NO. In other words, PVMRM is most applicable to low-VOC environments.

According to the most recent information available from US EPA's AirData website (http://www.epa.gov/air/data/index.html), Jenkins County is in the bottom 20th-percentile in the state for countywide point, nonpoint, and mobile source emissions of VOC, ranking 144th out of 159 counties. In 2002, total emissions of VOC from on-road vehicles, nonroad equipment, solvent use, waste disposal, industrial processes, residential wood combustion, and fossil fuel combustion and other miscellaneous sources were 847 tons, or approximately 0.1% of statewide VOC emissions (638,000 tons). VOC emissions from Jenkins and all bordering counties (Bulloch, Burke, Emanuel, and Screven) comprised less than 2% of the statewide total for the same year. Also, there are no municipal solid waste (MSW) landfills in Jenkins County, which can be a significant source of VOC. Additionally, there are no Title V or PSD major sources for VOC in Jenkins County. The closest stationary source that exceeds the PSD major source threshold for VOC is the King America Finishing textile finishing facility, located 25 km southeast of the proposed project site in Screven County. However, information provided in the facility's most recent Title V permit renewal application indicates that five-year average actual VOC emissions were only 55 tons.

Since the environment of Jenkins County is not subject to high loading of VOC and the most significant stationary sources of VOC are located outside the county, significant NO_x point sources, such as CARBO's proposed facility, will cause the atmosphere to experience a significant net removal of ozone through titration. Thus, CARBO believes that the atmospheric environment of Jenkins County is well suited for PVMRM.

2.1.3 Performance Evaluations for Bias

Despite some theoretical limitations associated with the first-order approximation, in practice the performance of PVMRM in predicting NO_2/NO_x conversion rates for the annual averaging period has been shown to be unbiased under a variety of conditions based on criteria comparable to that used for other dispersion models considered to be refined. The databases used to evaluate the ability of PVMRM to make predictions of ambient concentrations of NO_2 have included ambient NO_2/NO_x ratios measured by aircraft downwind of large power plants to evaluate the performance of photochemical reaction models and long-term field studies used to develop site specific ARM ratios for sources with multiple stacks. In all cases studies, PVMRM was found to consistently predict values close to those observed and also performed very well in comparison to the more complex models. When the NO_2/NO_x ratios predicted by PVMRM were paired in space and time with those ratios observed closest to the maximum ground level concentrations, the average ratio of all cases was within a factor or two, a commonly used benchmark in judging the performance of refined dispersion models. In fact, most of the predicted and observed pairings were within a factor of 1.5 (MACTEC 2005). Additionally, no anomalous behavior was noted when PVMRM was subjected to sensitivity testing over a range of buoyancy and momentum fluxes from single and multiple source models. PVMRM was found to perform as expected with the NO_2/NO_x conversion rate primarily controlled by the volume of the plume (MACTEC 2004).

The original evaluations of PVMRM have recently been updated to reflect the new AERMOD modeling system and to assess its performance for the 1-hour averaging period (US EPA 2011). Results from these evaluations continue to demonstrate good performance of PVMRM when ranked hourly pairings and robust highest concentrations of modeled and monitored concentrations are compared.

2.1.4 Background Concentration Data

Ambient background concentrations are an essential part in estimating the total air quality concentration to be considered in determining source impacts and their role takes on even greater importance in the context of the new 1-hour NO_2 standard. For all PSD modeling demonstrations, background concentrations are required to be added to a source's modeled impacts to determine the design concentration for comparison to the NAAQS (US EPA 2005). However, since PVMRM relies on ozone as the primary conversion mechanism for NO_x emissions, ambient background concentrations also play a critical role in estimating a source's modeled impacts for NO_2 (US EPA 2008a).

PVMRM requires ambient background concentrations of ozone to be specified to account for the oxidation of NO to NO_2 in the atmosphere. Given the averaging time and form of the NO_2 NAAQS and the importance of seasonal and diurnal patterns of ozone and meteorological conditions typically associated with peak hourly concentrations, CARBO believes that any PSD modeling demonstration for the NO_2 NAAQS must involve the use of monitored hourly ambient background concentrations of ozone and contemporaneous meteorology. CARBO has therefore completed a review of monitoring stations measuring ambient concentrations of ozone in the vicinity of the project and has developed an ozone database believed to be representative and conservative of background conditions for the project area and is contemporaneous with the five-year period for which GA EPD has provided meteorological data for the PSD air quality analysis. A total of eight monitoring sites from Georgia and South Carolina were selected to develop five years of hourly background concentrations for ozone.

For more than three decades, the Georgia Environmental Protection Division (GA EPD) has monitored air quality in the state of Georgia through the Ambient Monitoring Program (AMP) of the Air Protection Branch (APB). The AMP provides information on the measured concentrations of both criteria and non-criteria pollutants from data collected in a network of 60 monitoring locations, including 23 ozone monitors, in 36 counties and includes State and Local Air Monitoring Stations (SLAMS) and Photochemical Assessment Monitoring Stations (PAMS). Additionally, the South Carolina Department of Health and Environmental Control (SCDEHC) has operated a network of air quality monitors in the state since 1959 and conducts monitoring for ozone at 19 sites. Generally, monitoring locations are sited to determine the highest concentrations expected to occur, to measure typical concentrations in densely populated areas, to determine the impact of significant sources or categories of sources on air quality or to determine general background concentration levels. The data collected are then used to provide timely information on air quality to the public, to determine compliance with air quality standards and develop emission control strategies.

In addition to monitoring conducted at the state level, US EPA's Clean Air Markets Division (CAMD), with sponsorship from the National Park Service (NPS), operates 86 monitoring stations across the nation as part of the Clean Air Status and Trends Network (CASTNET). At each CASTNET monitoring site, CAMD continuously measures ambient concentrations of ozone and performs weekly sampling of select gaseous and particulate pollutants involved in acidic deposition in or near rural areas and sensitive ecosystems. Originally, CASTNET was formed to assess trends in acidic deposition due to emission reductions achieved through implementation of trading programs such as the Acid Rain Program (ARP). CASTNET has since become the nation's primary monitoring network for acidic deposition with its measurements also being used to track changes associated with climate change and to develop and evaluate numerical models created for regulatory assessment and understand atmospheric processes (US EPA 2007).

For ozone, the seven ozone monitoring sites nearest to the project location – six monitoring sites in Georgia and one in South Carolina – were selected as the primary sources of measured hourly background concentrations. US EPA's CAMD operates a single CASTNET monitoring station in Georgia which measures hourly background concentrations of ozone year-round. Since Georgia's ozone monitoring season consists only of the March through

October months, the CASTNET monitor was used as a secondary source of data for substitution during periods of missing data not within the ozone monitoring season. Data for each monitoring site was obtained from US EPA's Air Quality System (AQS) and CASTNET database. A summary of each dataset is presented below with a description of the monitors used and the methods used to substitute for periods of missing data.

2.1.4.1 Ozone

Since PVMRM is based on a first-order approximation of the oxidizing potential of the atmosphere, representativeness of background ozone concentrations in the modeling domain is of critical importance. To ensure that the background ozone data is spatially representative and conservative for the PSD air quality analysis, seven ozone monitoring sites surrounding the modeling domain were used to develop a database consisting of the maximum contemporaneous 1-hour observation measured for each site. These sites include Macon SE (#130210012) and Macon West (#130210013) in Bibb County, Georgia; E. President Street (#130510021) in Chatham County, Georgia; Riverside Park (#130730001) and Bungalow Road (#132450091) in Richmond County, Georgia; Leslie (#132611001) in Sumter County, Georgia; and Aston (#450290002) in Colleton County, South Carolina. Details of these monitoring stations, including the Pike County, Georgia CASTNET station, are described below in Table 2.1.4.1-1 below. Figure 2.1.4.1-1 shows the location of each monitoring site relative to the modeling domain.

Table 2.1.4.1-1 Project Ozone Database Monitoring Sites

AQS ID	County/ MSA	Direction From Site	Site Type	Monitoring Scale	Monitoring Season
130210012 Macon SE GA Forestry	Bibb/ Macon	W	SLAMS	Neighborhood/ Population Exposure	March-October
130210013 Macon West Lake Tobesofkee	Bibb/ Macon	W	SLAMS	Neighborhood/ Population Exposure	March-October
130510021 Savannah E. President St.	Chatham/ Savannah	SE	SLAMS	Neighborhood/ Population Exposure	March-October
130730001 Riverside Park	Columbia/ Augusta	N	SLAMS	Neighborhood/ Population Exposure	March-October
132450091 Bungalow Road	Richmond/ Augusta	N	SLAMS	Neighborhood/ Population Exposure	March-October
132558001 Bledsoe Farm (CASTNET)	Spalding/ Atlanta	W/NW	CASTNET	Regional/ Rural Background	Year-Round
132611001 Leslie Union High	Sumter/ None	SW	SLAMS	Neighborhood/ Background	March-October
450290002 Ashton (SC)	Colleton/ None	E/NE	SPM	Urban	Year-Round (effective 3/15/2005)

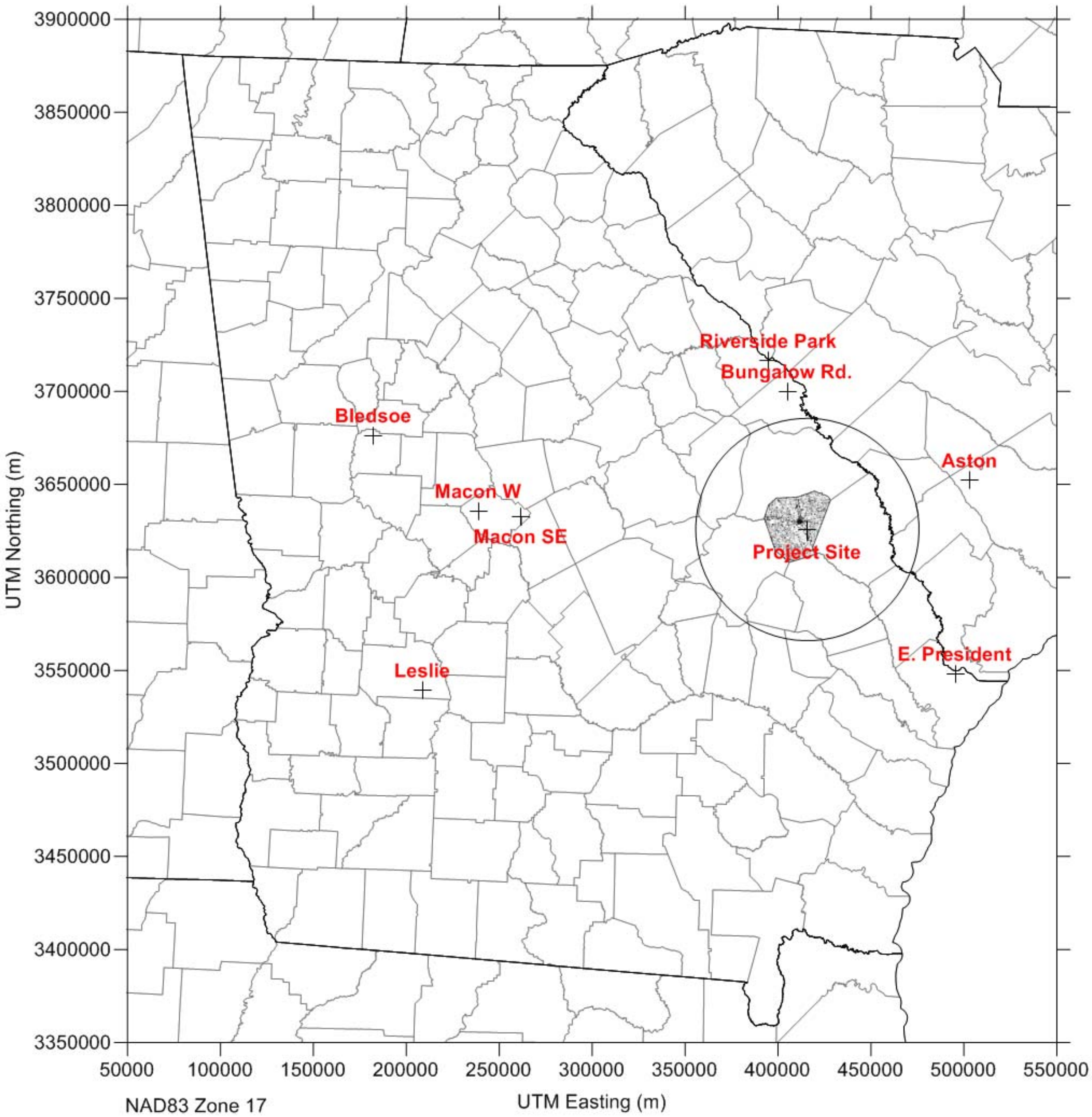

Figure 2.1.4.1-1 Project Ozone Database Monitoring Site Locations Relative to 50-km Modeling Domain

As previously mentioned, in order to ensure that the background ozone concentrations used with PVMRM are representative and conservative for both the project site and averaging period so that the controlling NO_2 concentrations will not be underestimated, the maximum of contemporaneous 1-hour observations of ozone measured at the seven state operated monitors surrounding the modeling domain were used to develop the primary ozone database. Table 2.1.4.1-2 summarizes the completeness of this combined ozone dataset, prior to data substitution, and also the Bledsoe CASTNET dataset.

Table 2.1.4.1-2 Combined Ozone Database and CASTNET Completeness Summary

	2006	2007	2008	2009	2010
Combined GA and SC Ozone Monitoring Site Data (EPA AQS)					
Ozone Season Hours (March through October)	5,880	5,880	5,880	5,880	5,880
Data Availability	5,880	5,880	5,879	5,880	5,880
Percent Data Availability	100%	100%	99%	100%	100%
Non-Ozone Season Hours (January, February, November, & December)	2,880	2,880	2,904	2,880	2,880
Data Availability	2,856	2,859	2,859	2,626	2,589
Percent Data Availability	99%	99%	99%	91%	90%
Bledsoe CASTNET Data					
Ozone Season Hours (March through October)	5,880	5,880	5,880	5,880	5,880
Data Availability	5,778	5,811	5,758	5,790	5,317
Percent Data Availability	98%	98%	98%	98%	90%
Non-Ozone Season Hours (January, February, November, & December)	2,880	2,880	2,904	2,880	2,880
Data Availability	2,604	2,837	2,876	2,849	2,582
Percent Data Availability	90%	99%	99%	99%	90%

The combined set of ozone observations provides extensive and robust data for Georgia's statutory March through October ozone monitoring. Only a single hour (March 9, 2008 hour 23) required data substitution. As the data gap was only one hour in duration, the average of the ozone observations before and after the missing data period was used for substitution. For the months of January, February, November and December, data availability was not as complete since only Ashton, the South Carolina ozone monitor, operates during Georgia's non-ozone monitoring season months.

Because the Bledsoe CASTNET monitoring site is located just south of the Atlanta 8-hour ozone nonattainment area, ozone observations from the monitor should provide conservative measured values for substitution. However, in order to determine the suitability of using the CASTNET data for periods of missing data outside of the ozone monitoring season, each hour where contemporaneous ozone observations were recorded for both the CASTNET site and combined database where compared. Out of 28,457 paired observations, the CASTNET monitoring site was found to have a higher recorded valued for ozone than the combined data for 11,177 hours. This indicates that, on average, the CASTNET data is more conservative than the combined dataset 41% of time. Given that the combined database contains the maximum of contemporaneous ozone observations at seven monitors, CARBO believes that the Bledsoe observations show sufficient evidence of conservative bias and that direct substitution of CASTNET data for missing and non-ozone monitoring season hours is appropriate. However, in order to ensure that the values in the non-ozone season monitoring months remain conservative and representative of the modeling domain, the maximum value of the CASTNET monitor and Aston was used for hours in the months of January, February, November and December where contemporaneous measurements were recorded at both sites. For these months, ozone observations at Ashton were more conservative that Bledsoe 36% of the time – 4,726 hours out of 13,198 paired observations.

Data substitution for periods of missing data in the combined dataset not within in the ozone monitoring season was performed as follows:

Missing Data Periods Longer than Four Hours
For periods of missing data longer than four hours, the maximum of contemporaneous monitored 1-hour ozone concentrations measured at the Aston and Bledsoe monitors was substituted for each missing hour.

Missing Data Periods of Four Hours or Less
For periods of missing data of four hours or less, an averaging technique was used to maintain the form of the diurnal profile characteristic of ozone while biasing data substitution to concentrations higher than would be determined through linear interpolation. Starting with the first missing hour, the arithmetic average of the monitored 1-hour ozone concentrations before and after the missing data period was substituted. For the second missing hour (if any), the arithmetic average of the 1-hour ozone concentrations before and after the missing data period was also substituted but in this case the 1-hour ozone concentration before the missing data period was the first hour for which data substitution was performed. This data substitution process was repeated for up to four consecutive missing hours.

All Other Missing Data Periods
The remaining missing data periods consisted of those greater than four hours where contemporaneous Aston and CASTNET data was also missing. For these periods of missing data, the 1-hour monthly

maximum concentration for each hour of day was substituted from the combined dataset for each missing hour.

Table 2.1.4.1-3 provides a summary of statistics for the five year dataset after performing the above described data substitution.

Table 2.1.4.1-3 Maximum, Average, and Median Annual Values and 1-hour Annual Maximum Values for Ozone Dataset (ppb)

	2006	2007	2008	2009	2010
Maximum	138	107	103	89	104
Average	36	39	38	34	37
Median	37	37	35	34	35
Hour 01	62	65	61	65	61
Hour 02	59	60	58	60	62
Hour 03	69	61	59	58	58
Hour 04	60	60	58	56	55
Hour 05	53	58	56	53	52
Hour 06	53	56	56	50	50
Hour 07	52	53	56	48	49
Hour 08	54	54	54	49	50
Hour 09	69	57	57	59	53
Hour 10	77	76	65	61	82
Hour 11	86	94	80	79	90
Hour 12	93	103	83	79	104
Hour 13	138	96	89	82	104
Hour 14	116	99	98	86	100
Hour 15	102	106	96	88	91
Hour 16	101	107	103	86	91
Hour 17	99	106	100	89	86
Hour 18	101	104	100	86	85
Hour 19	98	97	95	81	77
Hour 20	93	91	84	74	80
Hour 21	85	86	76	64	72
Hour 22	75	74	71	66	74
Hour 23	66	72	67	66	62
Hour 24	66	67	65	68	60

The final data set showing the data substitutions made is also provided in the electronic files ("\O3\") enclosed as Attachment A ("CombinedO3wDataSubstitution.xls"). Columns A through M contain the AQS time series and data set and column N contains the CASTNET data set. Columns P through U include the procedures described above to perform each step of data substitution, such as selection of the maximum value for a given hour of data, with the final selected value in column U. Each column that contains a function that performs the substitution procedures is labeled, as appropriate. Columns X through BC are used to calculate summary statistics for the combined data set, presented in Table 2.1.4.1-3. Finally, columns BP through BT are used to generate the comma-delimited data series for use as the ozone file in AERMOD.

2.1.4.2 Nitrogen Dioxide

CARBO is not proposing any contemporaneous pairing of modeled and monitored concentrations for NO_2 to determine compliance with the 1-hour NAAQS standard. Instead, CARBO will use a "first tier" uniform monitored background concentration based on a monitored design value – the average of the 98th-percentile annual distribution of daily 1-hour maximum concentrations – from a representative monitor for the most recent three year period. GA EPD has previously indicated that data from the Yorkville Type 1 PAMS (#132230003) in Paulding County is the preferred monitoring site for determining background concentrations for PSD air quality analyses for NO_2. The monitor is located within approximately 50 km of four of six of Georgia's largest coal-fired power plants not expected to be explicitly modeled (Bowen, Hammond, Wansley and Yates) and located downwind of other significant combustion sources in Georgia and Alabama such as Alabama's Gaston, Gorgas and Miller electric generating facilities and the Sewell Creek combustion turbine facility in Polk County. Based on GA EPD's review of AQS data for this site, the monitored design value for this monitor is 35.75 $\mu g/m^3$ for the most recent three-year period (2008 – 2010).

2.1.5 In-stack NO_2/NO_x Ratios

PVMRM requires a NO_2/NO_x ratio to be specified for each source or group of sources to account for the fraction of NO_2 formed in-stack due to thermal conversion. Currently, limited information exists nation-wide for measured in-stack NO_2/NO_x ratios for stationary sources. Therefore, for all sources in the 1-hour NO_2 NAAQS PSD inventory, except CARBO's NO_x sources and seven combustion turbines, the default 0.50 NO_2/NO_x ratio will be used (US

EPA 2011). For the project sources, unit-specific NO_2/NO_x ratio will be used based on recent in-stack measurements taken on similar operating units. For combustion turbines, an NO_2/NO_x ratio was determined based on review of data available in literature and from GA EPD's industrial source monitoring program.

2.1.5.1 Project Sources

Sources of NO_x associated with the construction of the Millen facility include spray dryers (or fluidizers), direct-fired rotary kilns, and boilers. An emergency diesel-fired generator (EDG) will also constructed with each processing line, but these units will be excluded as "intermittent" since their operation is not frequent enough to contribute significantly to the annual distribution of 1-hour daily maximum concentrations. The EDG's are used solely in the event of an emergency to prevent catastrophic mechanical failure of the direct-fired kilns by maintaining power to the kiln drive (for rotary motion), process cooling and product recycle systems. No other systems, including the kiln burners, are in operation at the plant during such events. Therefore, no NO_2/NO_x ratio was determined for EDG's.

During the second week of July 2011, CARBO obtained 180 minutes of NO and NO_2 measurements from the exhaust stack of a similar operating kiln, spray dryer, and boiler at CARBO's Toomsboro facility – the units associated with the construction of the proposed Millen facility will be substantially similar, if not identical, to the units on which stack sampling was conductedy. From this data, CARBO determined in-stack NO_2/NO_x ratios for the project sources as 0.01 for kilns, 0.06 for spray dryers and 0.12 for boilers – the NO_2/NO_x ratios were determined as the average of three 60-min periods of data (i.e., 3-run averages). Table 2.1.5.1-1 summarizes the measurement data used to determine the in-stack NO_2/NO_x ratios for each unit. The raw measurement data taken from the stack of each unit is provided in the electronic files ("\In-Stack Ratios\CARBO\") enclosed as Attachment A.

Table 2.1.5.1-1 In-Stack NO_2/NO_x Ratios for Project Sources (Spray Dryers, Direct-Fired Rotary Kilns, and Boilers)

Date	Time	NO_2 (ppm)	NO (ppm)	In-stack NO_2/NO_x
Spray Dryers				
7/11/2011	10:22-11:22	0.35	7.47	--
7/11/2011	11:22-12:22	0.56	7.32	--
7/11/2011	12:22-01:22	0.57	7.54	--
	3-run average	0.49	7.44	0.06
Direct-fired Rotary Kilns				
7/12/2011	21:47-22:47	0.21	155.92	--
7/12/2011	22:47-23:47	0.50	198.04	--
7/12/2011	23:47-00:47	0.22	180.76	--
	3-run average	0.31	178.24	0.002 (0.01)*
Boilers				
7/13/2011	01:26-02:26	0.13	3.33	--
7/13/2011	02:26-03:26	0.39	2.75	--
7/13/2011	03:26-04:26	0.56	2.05	--
	3-run average	0.36	2.71	0.12

* The measured in-stack NO_2/NO_x for the direct-fired rotary kiln was 0.002; in order to be conservative, CARBO is rounding the value to 0.01 for the PVMRM assessment (the highest instantaneous NO_2/NO_x ratio over the 180 minute period was 0.006)

2.1.5.2 Combustion Turbines

In an environmental assessment of combustion modification techniques for stationary gas turbines, the relationship between NO and NO_x emissions from combustion turbines was described under varying compressor inlet temperatures. Under most conditions, NO was found to account for 90% of total NO_x emissions, on average, with a lower limit of 80% (US EPA 1981). While in some regards the data supporting this conclusion could be considered out of date since it was collected in the 1970s, six of the seven combustion turbines that will be included in the 1-hour NO_2 NAAQS PSD inventory are vintage 1970's units. Therefore, the data is reasonably representative of the particular turbines in question. As such, an NO_2/NO_x ratio of 0.20 will be used for these units.

Additionally, an NO_2/NO_x ratio of 0.20 is also substantiated for newer units based on data obtained from GA EPD's industrial source monitoring program for combustion turbines. On August 19, 2010, Walton County Power, LLC submitted to GA EPD measured in-stack NO, NO_2 and NO_x data obtained during continuous emission monitoring systems (CEMS) relative accuracy test audits (RATA) – a RATA is required to consist of at least nine 21 minute runs (WPC 2010). The CEMS audits were performed on combustion turbines at two facilities, constructed in 2001 and 2003, and the data for both confirm that an in-stack NO_2/NO_x ratio of 0.20 is appropriate for newer combustion turbines as well; all NO_2/NO_x ratios measured during the RATA were equal to or less than 0.20.

Both the 1981 US EPA environmental assessment of combustion turbine and the Walton County Power NO_x RATA summaries are provided in the electronic files ("\In-Stack Ratios\Combustion Turbines\") enclosed as Attachment A. Please refer to Section 4.2.3, Fuel Potential for NO_x Production, of the 1981 reference for information regarding the relationship between NO and NO_x emissions (specifically the discussion on page 4-21 and Figure 4-10 on page 4-22.

2.1.5.3 All Other Stationary Sources

For all source types other than those described above, the default 0.50 NO_2/NO_x ratio will be used. US EPA's guidance indicates that this value is an upper bound based on available in-stack data and is adequately conservative in most cases (US EPA 2011).

2.1.6 NO_2/NO_x Equilibrium Ratio

PVMRM determines the NO_2/NO_x conversion rate in an expanding plume which is limited by how quickly the plume entrains O_3 from the surrounding ambient air. In other words, the fraction of NO_2 in the plume increases as the plume disperses downwind of the source. This increase will continue until equilibrium is reached within the plume and PVMRM method requires this equilibrium ratio to be specified.

CARBO is proposing to use an equilibrium ratio of 0.90. This ratio is consistent with that used in the initial and updated performance evaluations and sensitivity analysis discussed in earlier sections.

2.1.7 Protocol of Methods

The following protocol of methods establishes the procedures to be followed in applying PVMRM for the ambient air quality analysis for NO_2 in a PSD application for the construction the Millen facility. The protocol of methods is specific to NO_2 and PVMRM. All other matters typically addressed in a protocol, such as selection of dispersion coefficients, surface characteristics, evaluations of good engineering practice (GEP) stack height and building downwash, and receptor elevation and terrain influence height preprocessing, are addressed in a separate Class II modeling protocol to GA EPD.

2.1.7.1 AERMOD Control Options for PVMRM

The following will be specified in the AERMOD control options (CO) pathway to indicate that PVMRM (MODELOPT) will be used for the 1-hour averaging period (AVERTIME) for NO_2 (POLLUTID). The file path and name for the hourly ozone file (OZONEFIL) in units of parts per billion and default in-stack NO_2/NO_x (NO2STACK) and equilibrium ratios (NO2EQUIL) will also be specified. An in-stack NO_2/NO_x ratio for the project sources and combustion turbines will be specified separately for each source in the source options (SO) pathway which will override the default ratio.

```
CO MODELOPT PVMRM
CO AVERTIME 1
CO POLLUTID NO2
CO OZONEFIL "5YR 2006-2010 OZONEFIL.csv" PPB
CO NO2STACK 0.50
CO NO2EQUIL 0.90
```

2.1.7.2 AERMOD Source Options for PVMRM

The following will be specified in the SO pathway to indicate the NO_2/NO_x ratio (NO2/NOX) that will be used for each source (SOURCE ID).

```
SO NO2RATIO [SOURCE ID] [NO2/NOX]
```

2.1.7.3 Hourly Ozone File

Background O_3 concentrations will be input into AERMOD using a separate data file, specified in the CO pathway, for each year modeled in a FORTRAN free format with commas separating the required data fields. For year YY, month MM, day DD, hour HH, and O_3 background $[O_3]$, the data will be specified in the following format for each hour.

YY,MM,DD,HH,[O_3]

2.1.7.4 Determining the Significant Impact Area

In the first step of the air quality analysis for NO_2, CARBO will determine if a significant ambient impact is predicted to occur by comparing results from initial dispersion modeling to the applicable significant impact level (SIL) for each averaging period. The SIL's are used in the PSD program as a screening tool to identify the level at which a project's emission increase may be considered de minimis, i.e., will not cause or contribute to a violation of a NAAQS or PSD increment. SIL's are also used to define the geographical extent of the significant impact area (SIA) within which the full impact NAAQS and PSD increment air quality analysis must be carried out.

US EPA has issued guidance on the use of 4 ppb, or 4% of the NAAQS, as an interim SIL for the 1-hour averaging period until such time that a SIL is promulgated through rulemaking (US EPA 2010c). For the 1-hour averaging period, the five-year average of the highest 1-hour concentrations for each year modeled at each receptor will be compared to the SIL to determine if a significant impact is predicted to occur. The SIA will be determined as the circular area with a radius extending from CARBO to the lesser of the most distant receptor at which a significant impact is predicted or 50 km.

2.1.7.5 Determining the Design Concentrations

For the 1-hour time averaging period for NO_2, the highest five-year average of the 98th-percentile (highest eighth-high) annual distribution of 1-hour daily maximum concentrations at each receptor plus the first-tier ambient background concentration will be used to determine compliance with the NAAQS. The most recent version of US EPA's preferred regulatory model, AERMOD (v11103), can now support the statistical form of the new 1-hour NAAQS and SIL.

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Volume III, Attachment D –

Agency Correspondence Relating to the Tier 3 NO_2 (PVMRM) Modeling Protocol

Volume III, Attachment E –

Class I AQRV and PSD Increment Modeling Protocol

SMITH ALDRIDGE, INC.
Environmental Consultants

August 1, 2011

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Bill Jackson
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Federal Land Managers,

On behalf of our client, CARBO Ceramics, Inc. ("CARBO"), please find the enclosed Class I AQRV dispersion modeling protocol for your review and comment. CARBO is proposing to construct a PSD major facility in Millen, Jenkins County, Georgia. After application of BACT, potential emissions NO_x, SO_2, and all forms of particulate matter may affect air quality related values in the Class I areas under your purview. Specifically, you have requested AQRV's to be evaluated at Cape Romain, Okefenokee, Wolf Island and Shining Rock. In this regard, the enclosed modeling protocol contains the procedures that we propose to use to evaluate visibility impairment and deposition of sulfur and nitrogen in your areas. Since the closest Class I area that will be assessed is further than 50 km from the project site, CALPUFF will be used. The procedures contained in the protocol conform to guidance in the Interagency Workgroup of Air Quality Modeling (IWAQM) Phase 2 Summary Report and the revised Federal Land Managers' Air Quality Related Values Work Group Phase I report (FLAG 2010).

Additionally, GA EPD has requested we evaluate the project for significance with respect to the Class I increments. Therefore, the protocol also addresses how CALPUFF will be used to evaluate the Class I significant impact levels and is being forwarded to GA EPD and US EPA Region 4.

If you have any questions or require any further information, please do not hesitate to contact me by e-mail at jbandzul@smithaldridge.com or by phone at 404-255-0928 Ext. 117.

Sincerely,

Jon Bandzul, Principal
Smith Aldridge, Inc.

cc: Tim Allen, FWS
Melanie Pitrolo, USFS
Stan Krivo, US EPA Region 4
Peter Courtney, GA EPD
Jason Goodwin, CARBO Ceramics, Inc.
Craig Smith, Smith Aldridge, Inc.

enc: CARBO Ceramics Millen Facility Class I Area Impact Analysis Modeling Protocol

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CARBO Ceramics

Millen Proppant Manufacturing Plant

(Jenkins County)

Proposed Air Dispersion Modeling Protocol

for

Class I Area PSD Increments and Air Quality Related Values

August 2011

Prepared by:
SMITH ALDRIDGE, INC.
Environmental Consultants
Atlanta, Georgia

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1.0 INTRODUCTION

CARBO Ceramics, Inc. ("CARBO") manufactures ceramic pellets, or proppants, from nonmetallic minerals for use primarily in the oil and natural gas production industries. CARBO is proposing to construct a new processing plant, approximately 6 km southeast of Millen, Georgia at the intersection of GA State Route 17 and Clayton Road, in Jenkins County. The proposed plant will be a four-line, wet processing facility, similar to its Toomsboro plant in Wilkinson County, Georgia, where proppants are manufactured from kaolin clay slurry which is pelletized in spray dryers and later calcined in direct-fired rotary kilns. In addition to slurry preparation, spray drying and calcining, the processing lines each consist of associated materials handling and storage, screening, and shipping operations.

The construction of the proposed new processing facility will be a subject to PSD preconstruction review since the facility will be a major stationary source with potential emissions of NO_x, SO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and CO_2e greater than the significant emission rate thresholds for each pollutant. As part of PSD review, CARBO will be required to conduct an ambient air quality analysis to demonstrate that potential emissions from the proposed major stationary source, and all applicable emissions increases and decreases from other existing and proposed new sources, will not cause or contribute to a violation of any applicable national ambient air quality standard (NAAQS) or PSD increment effective at the time of permit issuance. Also, when potential emissions from a proposed major stationary source "may affect" a Class I Area, the PSD rules also require an applicant to demonstrate that the source will have no adverse impact on any air quality related value (AQRV). AQRV's are those attributes of a Class I Area that deterioration of air quality may diminish the area's national significance, impair the structure or functioning of an ecosystem, or impair the quality of the visitor experience and include visibility and deposition of sulfur and nitrogen.

Generally, the term "may affect" includes any PSD major facility proposing to locate within 100 km of a Class I area and certain large sources beyond 100 km. In the revised Federal Land Managers' Air Quality Related Values Work Group Phase I report (FLAG 2010), the U.S. Forest Service (USFS), National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS) have officially adopted screening criteria to determine if an assessment of AQRV's will be necessary for large PSD sources proposing to locate at distances greater than 50 km from a Class I area. The screening criteria (Q/D) is similar to that used for US EPA's Best Available Retrofit (BART) guidelines for the Regional Haze Rule and is based on ratio of the sum of potential emissions of NO_x, SO_2, and all forms of particulate matter (including sulfuric acid mist (H_2SO_4)) and the distance between the proposed source and a Class I area. The FLM's will consider a source with a Q/D ratio of less than 10 to have negligible impacts with respect to the ARQV's.

The Millen facility will have a Q/D screening value greater than 10 for four Class I areas within 300 km of the project location: Cape Romain (SC), Okefenokee (GA), Wolf Island (GA), and Shining Rock (NC). Based on this, the FLM's for these Class I areas – FWS for Cape Romain, Okefenokee and Wolf Island and USFS for Shining Rock – were contacted on July 25, 2011 to determine if they may be concerned about adverse impacts to AQRV's that would result from the proposed facility. FWS indicated that an AQRV analysis should be performed on the basis of the Q/D screening ratios for each wildlife refuge. USFS also indicated that an AQRV analysis would be required for Shining Rock (since FWS had requested the analysis) but that a Class I modeling applicability determination form should be submitted so that the FLM could make the appropriate judgment. The determination form was submitted to USFS on July 25, 2011 and the FLM confirmed that an analysis would be required in July 27, 2011. In this regard, this modeling protocol is being submitted for review and comment on the proposed modeling techniques for the AQRV analysis. Since the visibility impairment analysis involves modeling of NO_x, SO_2, and speciated particulate matter, this protocol also includes the proposed methods and procedures for evaluating the facility's air quality impacts with respect to the Class I significant impact levels (SIL's) for NO_x, SO_2, and PM_{10}. Therefore, this document is also being submitted to the Georgia Environmental Protection Division (GA EPD) Air Protection Branch (APB) for review and comment. At this time GA EPD is not requiring PSD sources to evaluate significant impacts for $PM_{2.5}$.

2.0 PROJECT DESCRIPTION

Generally, ceramic proppants are made by grinding or dispersing ore into a fine powder, combining the powder into small pellets and firing the pellets in a rotary kiln. This will be accomplished using a "wet" process which begins with processing kaolin clay. The kaolin is formed into slurry with the addition of water, dispersants and pH-adjusting reagent to control pellet formation and the mechanical properties of the slurry. After the slurry is formed, it is pelletized in spray dryers and then fired, or "sintered", in direct-fired rotary kilns to remove combined (chemically bound) water. The fired pellets are then conveyed from the kiln product systems to storage silos ready for shipment via railcars. A profile view of the proppant product flow (from left-to-right) in a typical proppant manufacturing line is shown in Figure 2.1.

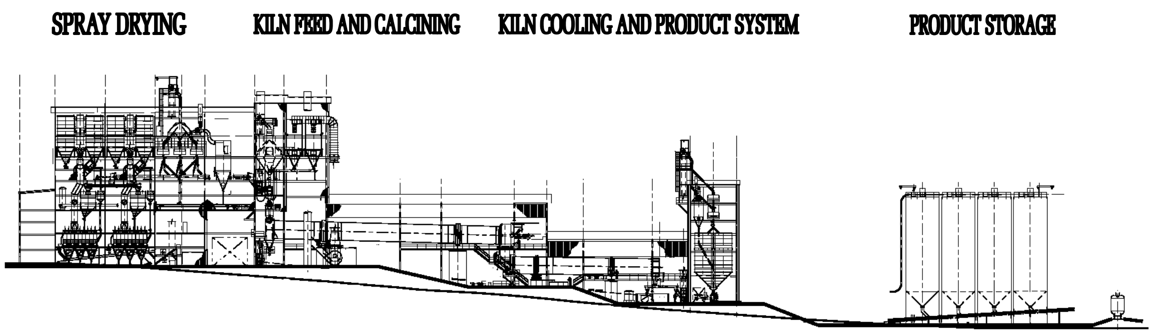

Figure 2-1 Profile View of Typical CARBO Ceramics Proppant Manufacturing Process

Emissions units and source parameters associated with the construction of the Millen facility are enclosed as Table 1 of Attachment A. Potential emissions of NO_x, SO_2, PM_{10} and $PM_{2.5}$ are provided in Table 2 of Attachment A and are based on the level of best available control technology (BACT) that is planned to be proposed for each emission unit as part of a PSD application for the facility. As for sulfuric acid mist, CARBO will propose to avoid PSD review by limiting facility-wide potential emissions of H_2SO_4 to less than 7 tons per year. Therefore, emissions of H_2SO_4 are split evenly among the direct-fired rotary kilns and proposed to be modeled directly as SO_4. Since sulfuric acid mist is considered to be a component of condensable particulate matter (CPM) and CPM must now be accounted for in emission limitations in PSD permits, the PM speciation for the direct-fired rotary kilns reflects the fact the a portion of total PM is being modeled as SO_4. Please refer to Section 4.6 and Table 2 in Attachment A for details as to how PM is speciated for each emission unit for the visibility impairment analysis.

2.1 Project, County, and Regional Location

The proposed Millen facility will be located in the eastern-central part of Georgia in Jenkins County. Figure 2.1-1 shows the project location and Table 2.1-1 lists the geographic coordinates of the facility.

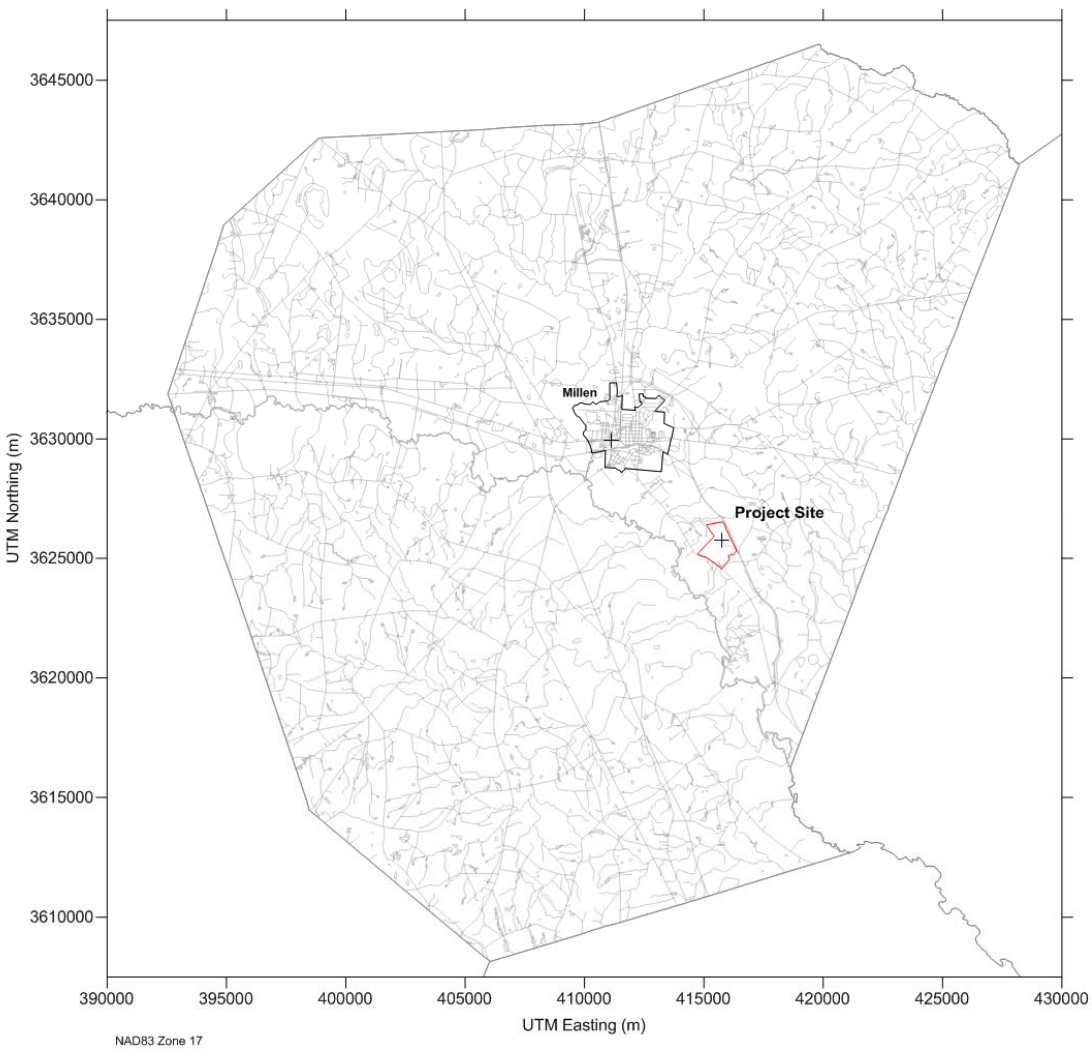

Figure 2.1-1 Proposed Project Location; Millen, Jenkins County, Georgia

Table 2-1 Geographic and NAD83 UTM Coordinates for Proposed Project Site

UTM Zone	UTM East (m) (NAD83)	UTM North (m) (NAD83)	Latitude	Longitude
17	415,753	3,625,754	32° 45' 59"N	81° 53' 58"W

2.1.1 Federal Mandatory Class I Areas

Federal mandatory Class I areas are those areas of special national or regional scenic, recreational, natural or historic value where the need to prevent deterioration of air quality is the greatest. These Class I areas include our nation's pristine national parks and wilderness areas and are managed by officials of the Forest Service (FS), Fish & Wildlife Service (FWS), and National Park Service (NPS) through the United States Departments of Interior and Agriculture. There are four Class I areas located within 300 km of the proposed project site: the Shining Rock wilderness area (FS) and the Cape Romain, Okefenokee and Wolf Island national wildlife refuges (FWS). Figure 2.1.1-1 shows the location of the proposed project in relation to these Class I areas and Table 2.1.1-1 provides summary of the facility's proximity to each area.

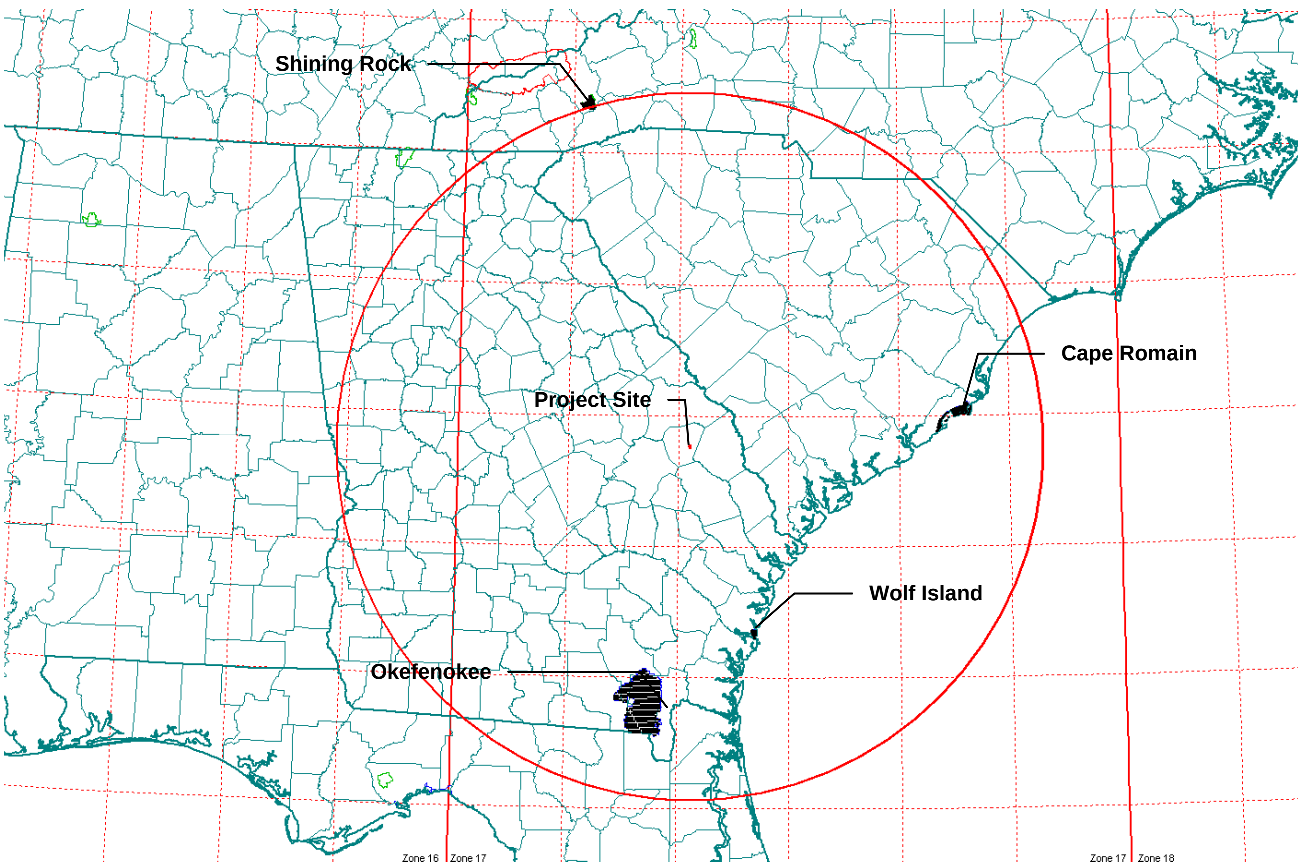

Figure 2.1.1-1 Class I Areas within 300 km of Proposed Project Site (Latitude 32° 45' 59"N, Longitude 81° 53' 58"W)

Table 2-2 Proximity to Federal Mandatory Class I Areas

Class I Area	FLM	State	Distance (km)	Heading (from north)
Cape Romain	FS	SC	210.2	86°
Shining Rock	FS	NC	296.7	344°
Okefenokee	FWS	GA	191.9	191°
Wolf Island	FWS	GA	164.1	161°

2.2 Project Emissions

2.2.1 Potential Emissions of the New Major Stationary Source

The construction of the proposed new facility will trigger PSD review for emissions of NO_x, SO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and CO_2e. Table 2 in Attachment A summarizes the level of best available control technology (BACT) that will be proposed for pollutants relevant to the AQRV analysis and Class I increments on a unit-level basis.

2.2.2 Class I Area Screening

When emissions from a new major stationary source may affect a Class I area, PSD review requires an applicant to demonstrate that the source would have no adverse impact on any AQRV. For those sources with a Q/D screening value greater than 10, where "Q" is the sum of NO_x, SO_2, all forms of PM, including sulfuric acid mist (H_2SO_4), and "D" is the distance from the source to each Class I Area, a Class I area AQRV analysis is required (FLAG 2010). And, when an AQRV analysis is required by an FLM, GA EPD requires PSD applicants to assess a project's air quality impacts with respect to the Class I increments using the same refined model that is used for the AQRV analysis, if applicable. Table 2.2.2-1 lists the estimated Q/D screening values for the proposed new processing lines for each Class I area within 300 km.

Table 2-3 Class I Area Q/D Screening Values

Class I Area	Distance, D (km)	Q/D*	Agency	Agency Contacts
National Wildlife Refuges				
Cape Romain	210.2	15.76	United States Department of Interior	Catherine Collins (303) 914-3807 Catherine_Collins@fws.gov
Okefenokee	191.9	17.26	Fish & Wildlife Service (FWS)	Tim Allen (303) 914-3802 Tim_Allen@fws.gov
Wolf Island	164.1	20.19		U.S. Fish and Wildlife Service Air Quality Branch 7333 W. Jefferson Avenue Suite 375 Lakewood, CO 80235-2034
Wilderness Areas				
Shining Rock	296.7	11.17	United States Department of Agriculture	Bill Jackson (828) 257-4815 bjackson02@fs.fed.us
			Forest Service (FS)	Melanie Pitrolo (828) 257-4213 mpitrolo@fs.fed.us
				USDA Forest Service 160A Zillicoa Street Asheville, NC 28801

* Q = NO_x + SO_2 + all forms of PM = 3,312 tpy; reflects H_2SO_4 as a component of condensable PM

The proposed project site is located well beyond 100 km from the nearest Class I Area (164.1 km to Wolf Island) but has an estimated Q/D screening value greater than 10 for each Class I area within 300 km. Based on this, the FLM's for these Class I areas have requested that an AQRV analysis be performed and modeling protocol be submitted.

3.0 ASSESSING CLASS I PSD INCREMENTS AND AQRV'S

3.1 Class I PSD Increments

Since NO_x, SO_2, and PM_{10} are subject to PSD review, CARBO will perform an air quality analysis for each pollutant to determine if the facility's potential emissions would result in a significant impact for each Class I aa within 300 km. On July 23, 1996, the US EPA proposed significant impact levels for the NO_x, SO_2, and PM_{10} Class I increments that would exclude proposed sources with *de minimis* ambient impacts from the requirement to conduct comprehensive Class I increment analyses and enable the permitting authority to determine that the emissions from such source would not cause or contribute to a violation of the increment in a Class I area (61 FR 38292). The significant impact levels (SIL's) for NO_x, SO_2, and PM_{10} proposed to be used for the Class I analysis were determined by taking four percent (4%) of the Class I increment for each pollutant and averaging period, consistent with EPA's approach in the original 1996 proposal. Additionally, on October 20, 2010, US EPA amended the PSD regulations to add Class I PSD increments and SIL's for $PM_{2.5}$ (75 FR 64864). The Class I SIL's for $PM_{2.5}$ are based on multiplying the PM_{10} Class I SIL's by the ratio of the $PM_{2.5}$ NAAQS to the PM_{10} NAAQS for each averaging period. However, at this time GA EPD is not requiring PSD sources to evaluate significant impacts for $PM_{2.5}$. Table 3.1-2 summarizes the Class I increments and SIL's for each pollutant and averaging period.

Table 3.1-1 Class I PSD Increments and Significant Impact Levels (SIL's)

POLLUTANT		AVERAGING PERIOD				
		1-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	Increment	--	--	--	--	2.5
	SIL	--	--	--	--	0.1
SO_2	Increment	--	25	--	5	2
	SIL	--	1	--	0.2	0.1
PM_{10}	Increment	--	--	--	8	4
	SIL	--	--	--	0.3	0.2
$PM_{2.5}$	Increment	--	--	--	2	1
	SIL	--	--	--	0.07	0.06

A cumulative increment consumption analysis should be performed only for those pollutants and averaging periods for which the maximum ambient impact of the facility's emissions are greater that the applicable SIL. This is equivalent to the approach used for Class II areas. Please refer to 43 FR 26398, published June 19, 1978.

3.2 Visibility Impairment

Visibility can be characterized in terms of light extinction, b_{ext}, which is the attenuation of light per unit distance due to light scattering and absorption by gases and particles in the atmosphere. The change in light extinction is affected by various chemical species and the Rayleigh scattering phenomenon and can be calculated using the IMPROVE methodology as shown by the following;

$$b_{ext} = 2.2 f_s(RH)\underbrace{\left[(NH_4)_2(SO_4)\right]}_{\text{Small Sulfates}} + 4.8 f_l(RH)\underbrace{\left[(NH_4)_2(SO_4)\right]}_{\text{Large Sulfates}} +$$

$$2.4 f_s(RH)\underbrace{\left[NH_4NO_3\right]}_{\text{Small Nitrates}} + 5.1 f_l(RH)\underbrace{\left[NH_4NO_3\right]}_{\text{Large Nitrates}} +$$

$$2.8\underbrace{[OC]}_{\substack{\text{Small}\\ \text{Organics}}} + 6.1\underbrace{[OC]}_{\substack{\text{Large}\\ \text{Organics}}} + \underbrace{[Soil]}_{\substack{\text{Filterable}\\ \text{Fine PM}\\ PM_{2.5}}} + \underbrace{0.6[PMC]}_{\substack{\text{Filterable}\\ \text{Coarse PM}\\ PM_{10-2.5}}} + \underbrace{10[EC]}_{\substack{\text{Filterable}\\ \text{Elemental}\\ \text{Carbon}}} + 1.7 f_{ss}(RH)\underbrace{[S]}_{\substack{\text{Sea}\\ \text{Salt}}} + \underbrace{b_{ray}}_{\substack{\text{Rayleigh}\\ \text{Scattering}}} + \frac{1}{3}\underbrace{[NO_2]}_{\text{ppb}}$$

where concentrations, in square brackets, are in micrograms per cubic meter ($\mu g/m^3$) and b_{ext} is in units of inverse megameters (Mm^{-1}). The IMPROVE formula incorporates different light extinction coefficients and separate humidity growth functions for large and small hygroscopic species (sulfate and nitrates), different extinction coefficients for large and small organic particulate matter, the contribution of concentrations of fine hygroscopic sea salt, site-specific Rayleigh scattering, and the light absorption by NO_2.

In order to evaluate visibility impairment, the change in light extinction is compared to the annual average natural visibility conditions for a Class I area. If the 98th-percentile change in light extinction from natural conditions at any Class I receptor is less than 5%, the construction of the Millen facility will be deemed to have a presumptive no adverse impact on visibility impairment. Table 3.2-1 lists the annual average natural background conditions that will be used for each Class I area from FLAG 2010.

Table 3.2-2 Annual Average Natural Background Conditions (Table 6 FLAG 2010)

Class I Area	$(NH_4)_2SO_4$ BKSO4	NH_4NO_3 BKNO3	Organics BKOC	Elemental Carbon BKEC	Soils BKSOIL	Coarse BKPMC	Sea Salt BKSALT	Rayleigh Mm^{-1} BEXTRAY
Cape Romain	0.23	0.10	1.80	0.02	0.45	3.00	0.20	12
Okefenokee	0.23	0.10	1.80	0.02	0.50	3.00	0.08	11
Wolf Island	0.23	0.10	1.80	0.02	0.50	3.00	0.08	11
Shining Rock	0.23	0.10	1.76	0.02	0.50	1.76	0.02	10

Since small and large sulfate and nitrate and fine sea salt particles are hygroscopic, an adjustment factor is applied when determining the extinction coefficient for these species. With FLAG 2010, monthly average relative humidity adjustment factors for these particles are applied to natural conditions as well as modeled species in order to minimize the effects short-term weather events and geographically localized meteorological phenomena. Tables 3.2-2 through 3.2-4 list the monthly average humidity growth factors for large and small sulfates and nitrates and fine sea salt particles that will be used for each Class I area.

Table 3.2-3 Monthly Average Large Sulfate and Nitrate Relative Humidity Adjustment Factors (Table 7 FLAG 2010)

Class I Area	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Cape Romain	2.66	2.47	2.42	2.32	2.56	2.8	2.82	3.04	3.03	2.86	2.65	2.7
Okefenokee	2.94	2.73	2.73	2.65	2.74	3.11	3.00	3.17	3.16	3.05	2.96	3.03
Wolf Island	2.86	2.67	2.61	2.54	2.63	2.96	2.94	3.13	3.12	2.99	2.88	2.95
Shining Rock	2.78	2.56	2.48	2.33	2.72	2.98	3.02	3.17	3.18	2.91	2.68	2.79

Table 3.2-4 Monthly Average Small Sulfate and Nitrate Relative Humidity Adjustment Factors (Table 8 FLAG 2010)

Class I Area	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Cape Romain	3.66	3.33	3.24	3.07	3.46	3.88	3.91	4.31	4.30	4.00	3.62	3.73
Okefenokee	4.16	3.79	3.80	3.65	3.79	4.46	4.24	4.55	4.55	4.35	4.18	4.33
Wolf Island	4.02	3.68	3.58	3.45	3.59	4.17	4.13	4.47	4.46	4.23	4.05	4.18
Shining Rock	3.89	3.51	3.37	3.11	3.77	4.22	4.29	4.58	4.60	4.12	3.69	3.88

Table 3.2-5 Monthly Average Fine Sea Salt Relative Humidity Adjustment Factors (Table 9 FLAG 2010)

Class I Area	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Cape Romain	3.74	3.44	3.37	3.23	3.62	3.99	4.04	4.32	4.29	4.03	3.74	3.81
Okefenokee	4.13	3.83	3.82	3.69	3.85	4.38	4.28	4.51	4.48	4.31	4.18	4.27
Wolf Island	4.03	3.74	3.66	3.55	3.72	4.20	4.20	4.46	4.42	4.22	4.08	4.15
Shining Rock	3.90	3.55	3.43	3.21	3.82	4.22	4.28	4.48	4.48	4.06	3.76	3.92

3.3 Acidic Deposition

The primary gases involved in sulfur and nitrogen deposition are SO_2, SO_4, NO and NO_2 (NO_x), HNO_3 and NO_3. An analysis will be performed to determine total annual wet and dry deposition fluxes of sulfur and nitrogen from the proposed facility within each Class I Area. The total sulfur and nitrogen deposition shall be compared to the deposition analysis threshold (DAT). For Class I Areas in the eastern United States, the DAT for each area is 0.01 kilograms/hectare/year (kg/ha/yr). If the modeled sulfur or nitrogen deposition exceeds the DAT, the FLM will make a project specific determination as to whether the increase in deposition constitutes an adverse impact.

4.0 MODELING METHODOLOGY

4.1 Model and Post-Processor Selection

CALPUFF has been adopted by the U.S. EPA as a "Guideline" model for source-receptor distances greater than 50 km (i.e. long range transport, or "LRT"), and for use on a case-by-case basis in complex flow situations for near-field applications. CALPUFF is also recommended by FLAG and IWAQM for Class I Area LRT increment and AQRV assessments. In its final BART guidance, EPA recommended CALPUFF as "the best modeling application available for predicting a single source's contribution to visibility impairment. As a result of these recommendations, the CALPUFF modeling and post-processing systems will be used for the AQRV and Class I increment analysis. The most recent EPA-approved version of CALPUFF, Version 5.8 Level 070623 (with CALPOST Version 5.6394 Level 070622), will be used. However, the version of the CALPOST post-processor used for visibility impairment will be CALPOST Version 6.292 Level 110406 to allow for the use of visibility Method 8 Mode 5 to conform to FLAG 2010 guidelines.

4.2 Modeling Domain, Terrain, and Meteorological Dataset

The meteorological dataset that will be used for the AQRV and Class I increment analysis is the CALMET 5.8 dataset developed for VISTAS sub-regional domain 4. Initial discussions with Tim Allen at FWS confirm that this CALMET data set is still appropriate to use for PSD applicants. The data was obtained from GA EPD and has been preprocessed on a 4-km grid scale using 2001 through 2003 MM5 data as the initial guess field with NWS observations to provide local surface refinement. The grid uses the Lambert Conic Conformal (LCC) projection with an origin of 40° N latitude and 97° W longitude with matching parallel latitudes of 33° N and 45° N.

4.3 Computational Domain and Receptors

The computational domain for the Class I area analysis will use the full meteorological domain. This domain has been configured to include each Class I area under review with at least a 50 km buffer zone in each direction to ensure that concentrations will not be underestimated by loosing "puffs" off the grid. The discrete receptors for each Class I Area will be those receptor locations and elevations provided by the National Park Service (NPS) Air Resources Division (ARD) available online at the NPS website.

It should be noted that CALPOST contains a receptor screening method (NDRECP) that allows subsets of discrete receptors modeled in CALPUFF to be selected for processing in a given CALPOST run. Using this method, a single CALPUFF input file will be used to generate the species concentrations and wet and dry deposition fluxes for all Class I receptors. For the four Class I areas included as part of this protocol, there are 804 total receptors listed in Subgroup 17b of the CALPUFF.INP, file enclosed in Attachment B, in the following order:

- Cape Romain: 1 – 164;
- Okefenokee: 165 – 665;
- Wolf Island: 665 – 694; and
- Shining Rock: 695-804

CALPOST will then be used to process subsets of discrete receptors for each AQRV and Class I increment using NDRECP. As an example, receptors for Wolf Island will be processed by specifying the following:

NDRECP = 664*0, 30*1

This allows CALPOST to skip the first 664 receptors (for Cape Romain and Okefenokee) and process the next 30 receptors, which represent Wolf Island.

4.4 Background Ozone and Ammonia Concentrations

The CALPUFF model is capable of simulating linear chemical transformation effects by using pseudo-first-order chemical reaction mechanisms for the conversions of SO_2 to SO_4, and NO_x, which consists of nitrogen oxide (NO) and nitrogen dioxide (NO_2), to nitrate (NO_3) and nitric acid (HNO_3). For the analysis, chemical transformations involving five species (SO_2, SO_4, NO_x, HNO_3, and NO_3) will be modeled using the MESOPUFF II chemical transformation scheme, which is part of the regulatory default model options selection. Ambient concentrations of ozone and ammonia concentrations as represented in the model affect the MESOPUFF II chemical transformation simulation.

4.4.1 Ozone Concentrations

Ambient ozone concentrations are used in the MESOPUFF II chemical transformation scheme as a surrogate for OH radicals throughout the daylight hours during SO_2 and NO_x oxidation. Hourly measurements of ozone from all non-urban monitors within and just outside the computational grid will be used as input to CALPUFF. Standard ozone data files containing this data were obtained from GA EPD. The default value of 80 ppb (BCK03) will used for the background ozone concentration for instances when hourly data is missing.

4.4.2 Ammonia Concentrations

FLAG 2010 recommends using the IWAQM Phase II spatially constant domain average ammonia background values (BCKNH3) of 10 ppb for "grasslands", 0.5 ppb for "forest", and 1.0 ppb for "arid lands". The VISTAS RPO recommends using an ammonia background value of 0.5 ppb for the purposes of BART determinations. Since most areas of the modeling domain are predominantly forested, the ammonia background will be set to 0.5 ppb the analysis.

4.5 Model Options Selection

CALPUFF model options will be specified in accordance with the recommendations contained in Appendix B of the IWAQM Phase II summary report. These recommended modeling options are appropriate for both Class I increment and AQRV analyses. The CALPUFF input options will be tested to conform to the regulatory default model (MREG = 1) using the MESOPUFF II chemical transformation scheme (MCHEM = 1) and Pasqiull-Gifford dispersion coefficients (MDISP = 3).

The CALPUFF input file will be setup to generate the species concentration (CONC.DAT), wet deposition (WFLX.DAT) and dry deposition (DFLX.DAT) data files required for POSTUTIL and CALPOST processing to determine the impact of the proposed facility on each Class I increment and AQRV. The CALPUFF input file (CALPUFF.INP) showing model options selection is provided in Attachment B for FLM confirmation; the enclosed CALPUFF.INP excludes meteorological and ozone data pathways.

4.6 Particulate Matter Speciation

For the visibility impairment analysis, particulate matter will be speciated according to the profile developed for each emission unit provided in Table 2 of Attachment A. Generally, PM_{10} is speciated into different size fractions of particulate matter based on the total PM_{10} and $PM_{2.5}$ BACT emission limitations and the facility-wide H_2SO_4 PSD avoidance limitation that will be proposed as part of the PSD application for the Millen facility. For emission units not associated with condensable PM, such as storage silos, railcar loading and other material handling equipment, PM is apportioned to size fractions of coarse (PCM) and fine (PMF) particulate based on the ratios of $PM_{10\text{-}2.5}$ and $PM_{2.5}$ to total PM_{10} BACT. The particulate is then split evenly into coarse size fractions $PM_{10\text{-}6}$ (PMC800) and $PM_{6\text{-}2.5}$ (PMC425) for $PM_{10\text{-}2.5}$ and the submicron size fractions $PM_{1\text{-}0.625}$ (PMF081) and $PM_{0.625\text{-}0.5}$ (PMF056) for $PM_{2.5}$. Although the spray dryers and boilers may be associated with some non-zero fraction of filterable PM, the same procedure was used to apportion PM except that all PM is assumed to be organic condensable (POC) which will provide for a conservative estimate of visibility impairment from these units based on the light extinction coefficient for SOA. Finally, the same approach used for the spray dryers and boilers was used for the kilns except that the total portion of PM_{10} speciated to POC excludes the sulfuric acid mist PSD avoidance limitation since H_2SO_4 is a component of PM. So, 7 tons per year (0.40 lb/hr per kiln) will be modeled directly as SO_4 while the remaining PM (BACT minus SO_4) is speciated to submicron size fractions for POC.

4.7 Good Engineering Practice Stack Height and Building Downwash

As specified 40 CFR Part 51 Appendix W, credit for emissions reductions from stack heights in excess of good engineering practice (GEP) is prohibited. GEP stack height, as measured from the base elevation of a stack, is defined in 40 CFR §51,100(ii) and the US EPA Technical Support Document for Stack Height Regulations (EPA-450/4-80-023R) as the greater of 213 feet (65 meters), or the stack height determined based on the dimensions of nearby structures ("Equation 1 Height") or EPA approved fluid model studies. As shown in Table 1 of Attachment A, only the kiln stacks are greater than 213 feet (245). Therefore, the actual stack height for all other emission units may be used for the analysis. In order to determine if the actual height of the kilns stacks may be used, the Building Profile Input Program (BPIP), a software application designed to incorporate the concepts and procedures expressed in EPA-450/4-80-023R, was used to determine the GEP stack height based on EPA's refined formula. Using BPIP, the GEP stack height for the kilns was determined to be 344 feet. Therefore, the actual height of the kiln stacks will be used for the analysis. The input, output, and summary files for BPIP are provided in the electronic files enclosed as Attachment C. Also, a Google Earth .kml file is provided which shows the locations of the stacks relative to the buildings associated with the proposed facility to facilitate review of the BPIP files.

4.8 POSTUTIL Post-Processing

4.8.1 Class I PSD Increments

No post processing in POSTUTIL will be required prior to using CALPOST for the NO_2, SO_2 and PM_{10} Class I increments. These species are directly modeled in CALPUFF and stored in the concentration file (CONC.DAT).

4.8.2 Visibility Impairment

POSTUTIL will be used to generate a file for CALPOST (VISIBILITY.DAT) from the CALPUFF concentration files. Species SO_2, SO_4, NO_x, HNO_3, and NO_3 will be passed directly through to the new file. However, species for coarse particulate matter (PMC), fine particulate matter (SOIL), and secondary organic aerosols (SOA) will be computed from the modeled species of particulate matter using the following in Subgroup 2c;

```
! CSPECCMP  =   PMC !
!   PMC800  =   1.0 !
```

```
!   PMC425  =   1.0 !
! END !

! CSPECCMP  =  SOIL !
!   PMF081  =   1.0 !
!   PMF056  =   1.0 !
! END !

! CSPECCMP  =   SOA !
!   POC800  =   1.0 !
!   POC425  =   1.0 !
!   POC081  =   1.0 !
!   POC056  =   1.0 !
! END !
```

4.8.3 Deposition

POSTUTIL will be used to generate a total flux file (TFLX.DAT) file from the wet flux (WFLX.DAT) and dry flux (DFLX.DAT) CALPUFF files. This will be accomplished by processing the input species and computing nitrogen, N, and sulfur, S. N and S will be computed from the modeled species using the following in Subgroup 2c;

```
! CSPECCMP = N !
! SO2 = 0.0 !
! SO4 = 0.291667 !
! NOx = 0.466667 !
! HNO3 = 0.222222 !
! NO3 = 0.451613 !
! END!

! CSPECCMP = S !
! SO2 = 0.500000 !
! SO4 = 0.333333 !
! NOx = 0.0 !
! HNO3 =0.0 !
! NO3 = 0.0 !
! END!
```

Sulfur and nitrogen deposition are calculated in order to correct for the difference in molecular weight between species. The amount of N deposition from secondary formation of ammonium sulfates and nitrates is also included.

4.9 CALPOST Post-Processing

4.9.1 Class I PSD Increments

For the NO_2, SO_2 and PM_{10} Class I increments, CALPOST will be used to extract the highest first-high concentrations for each pollutant and applicable averaging period of the CALPUFF concentration file (CONC.DAT). This will be performed by setting the ASPEC parameter to the appropriate species, extracting the species from the correct layer, and setting as true (T) the appropriate averaging period.

4.9.2 Visibility Impairment

For visibility impairment, CALPOST will be used to process the VISIBILITY.DAT file created by POSTUTIL by setting the ASPEC parameter to VISIB. Consistent with FLAG 2010, MVISBK will be set to 8 with M8_MODE set to 5 and monthly relative humidity will be capped at 95%. For each Class I area, the annual average natural background conditions specified in Table 3.2-1 will be set to BKSO4, BKNO3, BKPMC, BKOC, BKSOIL, BKEC and BKSALT as applicable. The extinction due to site specific Rayleigh scattering specified in Table 3.2-1 will be defined in BEXTRAY. Additionally, the monthly average humidity growth factors for large and small sulfates and nitrates and fine sea salt particles specified in Tables 3.2-2, 3.2-3, and 3.2-4 will be specified as RFHSML, RFHLRG, and RFHSEA, respectively.

4.9.3 Deposition

For deposition, the total flux file (TFLX.DAT) created in POSTUTIL will be processed in CALPOST by setting ASPEC to N or S, as applicable. The total flux extracted from the flux file is in micrograms per meter squared per second ($\mu g/m^2/s$) and will be converted to kilograms/hectare/year (kg/ha/yr) for comparison to the DAT by multiplying by a factor of 315.36 as shown below.

$$\left(\frac{\text{kg}}{\text{ha}\cdot\text{year}}\right)=\left(\frac{10^{-6}\,\text{g}}{\text{m}^2\cdot\text{sec}}\right)\left(\frac{60\text{ sec}}{\text{min}}\right)\left(\frac{60\text{ min}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{year}}\right)\left(\frac{10{,}000\text{ m}^2}{\text{ha}}\right)\left(\frac{\text{kg}}{1{,}000\text{ g}}\right)=315.36\left(\frac{\mu\text{g}}{\text{m}^2\cdot\text{sec}}\right)$$

This conversion factor will be applicable for years 2001 and 2002 of the CALMET data set. There are only 8,734 hours in year 2003. Therefore, the appropriate conversion factor is 314.424.

5.0 PRESENTATION OF RESULTS

Results will be summarized for each Class I Area in tables similar to that of Table 5-1.

Table 5-1 [Class I Area] Class I SIL, S & N Deposition and Visibility Impairment Summary

Parameter	Averaging Period	2001	2002	2003	Threshold
Class I Area Significant Impact Levels for SO2, PM10, and NO2					
SO2 Class I SIL	3-hr (μg/m³)	--	--	--	1.00
	24-hr (μg/m³)	--	--	--	0.20
	annual (μg/m³)	--	--	--	0.08
PM10 Class I SIL	24-hr (μg/m³)	--	--	--	0.32
	annual (μg/m³)	--	--	--	0.16
NO2 Class I SIL	annual (μg/m³)	--	--	--	0.10
Class I Area Sulfur and Nitrogen Deposition AQRV					
N	annual (kg/ha/yr)	--	--	--	0.01
S	annual (kg/ha/yr)	--	--	--	0.01
Visibility Impairment AQRV					
Δb_{ext} Method 8 M5	24-hr (%)	--	--	--	Highest
Δb_{ext} Method 8 M5	24-hr (%)	--	--	--	5% (98th Percentile)
Number of Days Exceeding 5%		--	--	--	7

ATTACHMENT A

Source Parameters, Stack Location, BACT Limits and PM Speciation

Table 1. CARBO Ceramics Millen Facility - Stack Locations and Source Parameters

		Stack Locations and Base Elevation						Modeled Stack Parameters and Elevations				
Modeled ID No.	Emission Unit Description	Zone	Base Elevation, (ft)	UTM NAD 83 Easting, (km)	UTM NAD 83 Northing, (km)	LCC Easting, (km)	LCC Northing, (km)	Stack Height, (ft)	Base Elevation, (ft)	Stack Diameter, (in)	Exit Velocity, (fps)	Exhaust Temp., t (°F)
CARBO Ceramics Millen Facility Processing Line 1												
S001	Spray Dryer No. 1	17	215	415.76082	3625.68254	1405.83795	-684.19427	180.0	215.00	36.00	108.46	206
S002	Spray Dryer No. 2	17	215	415.76978	3625.68718	1405.84595	-684.18813	180.0	215.00	36.00	108.46	206
S003	Pellet Feed System No. 1	17	215	415.78100	3625.68988	1405.85651	-684.18352	160.0	215.00	28.00	85.75	80
S005	Kiln No. 1 Scrubber	17	215	415.79974	3625.69601	1405.87387	-684.17421	245.0	215.00	48.00	83.56	160
S006	Kiln No. 1 Product System	17	215	415.87009	3625.74918	1405.93377	-684.10947	125.0	215.00	19.00	16.93	150
S007	Product Silo No. 1-1	17	225	415.90949	3625.82589	1405.95914	-684.02684	95.5	225.00	20.00	7.64	80
S008	Product Silo No. 1-2	17	225	415.91603	3625.82936	1405.96497	-684.02228	95.5	225.00	20.00	7.64	80
S009	Product Silo No. 1-3	17	225	415.92254	3625.83280	1405.97077	-684.01775	95.5	225.00	20.00	7.64	80
S010	Product Silo No. 1-4	17	225	415.92897	3625.83619	1405.97650	-684.01329	95.5	225.00	20.00	7.64	80
S011	Railcar Loading System No. 1	17	225	415.97089	3625.86411	1406.01286	-683.97843	65.0	215.00	14.00	54.57	80
BLR1	Boiler No. 1	17	215	415.71900	3625.66695	1405.79954	-684.21693	29.0	215.00	18.00	23.58	380
CARBO Ceramics Millen Facility Processing Line 2												
S012	Spray Dryer No. 3	17	215	415.75149	3625.70004	1405.82572	-684.17860	180.0	215.00	36.00	108.46	206
S013	Spray Dryer No. 4	17	215	415.76038	3625.70489	1405.83362	-684.17227	180.0	215.00	36.00	108.46	206
S014	Pellet Feed System No. 2	17	215	415.76891	3625.71253	1405.84067	-684.16324	160.0	215.00	28.00	85.75	80
S016	Kiln No. 2 Scrubber	17	215	415.78452	3625.72449	1405.85394	-684.14871	245.0	215.00	48.00	83.56	160
S017	Kiln No. 2 Product System	17	215	415.86818	3625.75293	1405.93124	-684.10610	125.0	215.00	19.00	16.93	150
S018	Product Silo No. 2-1	17	225	415.93526	3625.83987	1405.98205	-684.00856	95.5	225.00	20.00	7.64	80
S019	Product Silo No. 2-2	17	225	415.94181	3625.84317	1405.98791	-684.00416	95.5	225.00	20.00	7.64	80
S020	Product Silo No. 2-3	17	225	415.94817	3625.84658	1405.99357	-683.99969	95.5	225.00	20.00	7.64	80
S021	Product Silo No. 2-4	17	225	415.95484	3625.85007	1405.99952	-683.99508	95.5	225.00	20.00	7.64	80
BLR2	Boiler No. 2	17	215	415.70761	3625.68873	1405.78455	-684.19739	29.0	215.00	18.00	23.58	380
CARBO Ceramics Millen Facility Processing Line 3												
S022	Spray Dryer No. 5	17	215	415.70704	3625.78298	1405.76756	-684.10437	180.0	215.00	36.00	108.46	206
S023	Spray Dryer No. 6	17	215	415.71600	3625.78762	1405.77556	-684.09823	180.0	215.00	36.00	108.46	206
S024	Pellet Feed System No. 3	17	215	415.72722	3625.79032	1405.78612	-684.09362	160.0	215.00	28.00	85.75	80
S026	Kiln No. 3 Scrubber	17	215	415.74596	3625.79645	1405.80348	-684.08431	245.0	215.00	48.00	83.56	160
S027	Kiln No. 3 Product System	17	215	415.81631	3625.84962	1405.86339	-684.01957	125.0	215.00	19.00	16.93	150
S028	Product Silo No. 3-1	17	225	415.90285	3625.83835	1405.95044	-684.01569	95.5	225.00	20.00	7.64	80
S029	Product Silo No. 3-2	17	225	415.90939	3625.84182	1405.95627	-684.01112	95.5	225.00	20.00	7.64	80
S030	Product Silo No. 3-3	17	225	415.91590	3625.84526	1405.96207	-684.00659	95.5	225.00	20.00	7.64	80
S031	Product Silo No. 3-4	17	225	415.92233	3625.84865	1405.96780	-684.00213	95.5	225.00	20.00	7.64	80
S032	Railcar Loading System No. 2	17	225	415.96425	3625.87657	1406.00416	-683.96727	65.0	225.00	14.00	54.57	80
BLR3	Boiler No. 3	17	215	415.66522	3625.76739	1405.72916	-684.12703	29.0	215.00	18.00	23.58	380
CARBO Ceramics Millen Facility Processing Line 4												
S033	Spray Dryer No. 7	17	215	415.69771	3625.80048	1405.75533	-684.08870	180.0	215.00	36.00	108.46	206
S034	Spray Dryer No. 8	17	215	415.70660	3625.80533	1405.76323	-684.08237	180.0	215.00	36.00	108.46	206
S035	Pellet Feed System No. 4	17	215	415.71513	3625.81297	1405.77029	-684.07334	160.0	215.00	28.00	85.75	80
S037	Kiln No. 4 Scrubber	17	215	415.73074	3625.82493	1405.78355	-684.05881	245.0	215.00	48.00	83.56	160
S038	Kiln No. 4 Product System	17	215	415.81440	3625.85337	1405.86085	-684.01620	125.0	215.00	19.00	16.93	150
S039	Product Silo No. 4-1	17	225	415.92862	3625.85233	1405.97335	-683.99740	95.5	225.00	20.00	7.64	80
S040	Product Silo No. 4-2	17	225	415.93517	3625.85563	1405.97921	-683.99300	95.5	225.00	20.00	7.64	80
S041	Product Silo No. 4-3	17	225	415.94153	3625.85904	1405.98487	-683.98853	95.5	225.00	20.00	7.64	80
S042	Product Silo No. 4-4	17	225	415.94820	3625.86253	1405.99082	-683.98393	95.5	225.00	20.00	7.64	80
BLR4	Boiler No. 4	17	215	415.65383	3625.78917	1405.71416	-684.10749	29.0	215.00	18.00	23.58	380

Table 2. CARBO Ceramics Millen Facility - Potential Emissions (BACT) for AQRV and Class I Significance Analysis

Modeled ID No.	Emission Unit Description	NO_x, (lb/hr) BACT	SO_2, (lb/hr) BACT	SO_4, (lb/hr) PSD Avoid.	PM, (gr/dscf) BACT	PM, (lb/hr) BACT	PM_{10}, (gr/dscf) BACT	PM_{10}, (lb/hr) BACT	$PM_{2.5}$, (gr/dscf) BACT	$PM_{2.5}$, (lb/hr) BACT	Filterable Particulate Matter	Condensable Particulate Matter	BACT PM_{10-6}	BACT $PM_{2.5-0}$	Inorganic Condensable as SO4	Inorganic Condensable as PMF	Organic Condensable as POC
CARBO Ceramics Millen Facility Processing Line 1															SO4	PMF	POC
S001	Spray Dryer No. 1	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S002	Spray Dryer No. 2	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S003	Pellet Feed System No. 1				0.0100	1.629	0.0100	1.629	0.0050	0.814	100%	0%	50%	50%	0%	0%	0%
S005	Kiln No. 1 Scrubber	121.00	34.25	0.40	0.0100	2.759	0.0100	2.759	0.0100	2.759	0%	100%	0%	100%	14%	0%	86%
S006	Kiln No. 1 Product System				0.0100	0.129	0.0100	0.129	0.0050	0.064	100%	0%	50%	50%	0%	0%	0%
S007	Product Silo No. 1-1				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S008	Product Silo No. 1-2				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S009	Product Silo No. 1-3				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S010	Product Silo No. 1-4				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S011	Railcar Loading System No. 1				0.0100	0.300	0.0100	0.300	0.0050	0.150	100%	0%	50%	50%	0%	0%	0%
BLR1	Boiler No. 1	0.14	0.01			0.075		0.075		0.075	0%	100%	0%	100%	0%	0%	100%
CARBO Ceramics Millen Facility Processing Line 2																	
S012	Spray Dryer No. 3	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S013	Spray Dryer No. 4	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S014	Pellet Feed System No. 2				0.0100	1.629	0.0100	1.629	0.0050	0.814	100%	0%	50%	50%	0%	0%	0%
S016	Kiln No. 2 Scrubber	121.00	34.25	0.40	0.0100	2.759	0.0100	2.759	0.0100	2.759	0%	100%	0%	100%	14%	0%	86%
S017	Kiln No. 2 Product System				0.0100	0.129	0.0100	0.129	0.0050	0.064	100%	0%	50%	50%	0%	0%	0%
S018	Product Silo No. 2-1				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S019	Product Silo No. 2-2				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S020	Product Silo No. 2-3				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S021	Product Silo No. 2-4				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
BLR2	Boiler No. 2	0.14	0.01			0.075		0.075		0.075	0%	100%	0%	100%	0%	0%	100%
CARBO Ceramics Millen Facility Processing Line 3																	
S022	Spray Dryer No. 5	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S023	Spray Dryer No. 6	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S024	Pellet Feed System No. 3				0.0100	1.629	0.0100	1.629	0.0050	0.814	100%	0%	50%	50%	0%	0%	0%
S026	Kiln No. 3 Scrubber	121.00	34.25	0.40	0.0100	2.759	0.0100	2.759	0.0100	2.759	0%	100%	0%	100%	14%	0%	86%
S027	Kiln No. 3 Product System				0.0100	0.129	0.0100	0.129	0.0050	0.064	100%	0%	50%	50%	0%	0%	0%
S028	Product Silo No. 3-1				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S029	Product Silo No. 3-2				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S030	Product Silo No. 3-3				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S031	Product Silo No. 3-4				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S032	Railcar Loading System No. 2				0.0100	0.300	0.0100	0.300	0.0050	0.150	100%	0%	50%	50%	0%	0%	0%
BLR3	Boiler No. 3	0.14	0.01			0.075		0.075		0.075	0%	100%	0%	100%	0%	0%	100%
CARBO Ceramics Millen Facility Processing Line 4																	
S033	Spray Dryer No. 7	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S034	Spray Dryer No. 8	8.30	0.50		0.0200	4.543	0.0200	4.543	0.0075	1.704	0%	100%	63%	38%	0%	0%	100%
S035	Pellet Feed System No. 4				0.0100	1.629	0.0100	1.629	0.0050	0.814	100%	0%	50%	50%	0%	0%	0%
S037	Kiln No. 4 Scrubber	121.00	34.25	0.40	0.0100	2.759	0.0100	2.759	0.0100	2.759	0%	100%	0%	100%	14%	0%	86%
S038	Kiln No. 4 Product System				0.0100	0.129	0.0100	0.129	0.0050	0.064	100%	0%	50%	50%	0%	0%	0%
S039	Product Silo No. 4-1				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S040	Product Silo No. 4-2				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S041	Product Silo No. 4-3				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
S042	Product Silo No. 4-4				0.0100	0.086	0.0100	0.086	0.0050	0.043	100%	0%	50%	50%	0%	0%	0%
BLR4	Boiler No. 4	0.14	0.01			0.075		0.075		0.075	0%	100%	0%	100%	0%	0%	100%

Particulate Matter Speciation of Total PM_{10} and Model Species for Visibility Impairment Analysis

Modeled ID No.	Emission Unit Description	Coarse		Soil		Organic				Particle Speciation Sum Check		Coarse		Soil		Organic				Particle Speciation PM_{10} Mass Emissions Rate Sum Check		
		PMC_{10-6} PMC800	$PMC_{6-2.5}$ PMC425	$PMF_{1-0.625}$ PMF081	$PMF_{0.625-0.5}$ PMF056	POC_{10-6} POC800	$POC_{6-2.5}$ POC425	$POC_{1-0.625}$ POC081	$POC_{0.625-0.5}$ POC056			PMC_{10-6} PMC800	$PMC_{6-2.5}$ PMC425	$PMF_{1-0.625}$ PMF081	$PMF_{0.625-0.5}$ PMF056	POC_{10-6} POC800	$POC_{6-2.5}$ POC425	$POC_{1-0.625}$ POC081	$POC_{0.625-0.5}$ POC056			
CARBO Ceramics Millen Facility Processing Line 1		PMC800	PMC425	PMF081	PMF056	POC800	POC425	POC081	POC056			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	
S001	Spray Dryer No. 1	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S002	Spray Dryer No. 2	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S003	Pellet Feed System No. 1	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.407	0.407	0.407	0.407	0.000	0.000	0.000	0.000	1.629	0.000	✓
S005	Kiln No. 1 Scrubber	0%	0%	0%	0%	0%	0%	43%	43%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	1.180	1.180	2.759	0.000	✓
S006	Kiln No. 1 Product System	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.032	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.129	0.000	✓
S007	Product Silo No. 1-1	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S008	Product Silo No. 1-2	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S009	Product Silo No. 1-3	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S010	Product Silo No. 1-4	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S011	Railcar Loading System No. 1	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.075	0.075	0.075	0.075	0.000	0.000	0.000	0.000	0.300	0.000	✓
BLR1	Boiler No. 1	0%	0%	0%	0%	0%	0%	50%	50%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.037	0.075	0.000	✓
CARBO Ceramics Millen Facility Processing Line 2																						
S012	Spray Dryer No. 3	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S013	Spray Dryer No. 4	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S014	Pellet Feed System No. 2	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.407	0.407	0.407	0.407	0.000	0.000	0.000	0.000	1.629	0.000	✓
S016	Kiln No. 2 Scrubber	0%	0%	0%	0%	0%	0%	43%	43%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	1.180	1.180	2.759	0.000	✓
S017	Kiln No. 2 Product System	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.032	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.129	0.000	✓
S018	Product Silo No. 2-1	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S019	Product Silo No. 2-2	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S020	Product Silo No. 2-3	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S021	Product Silo No. 2-4	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
BLR2	Boiler No. 2	0%	0%	0%	0%	0%	0%	50%	50%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.037	0.075	0.000	✓
CARBO Ceramics Millen Facility Processing Line 3																						
S022	Spray Dryer No. 5	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S023	Spray Dryer No. 6	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S024	Pellet Feed System No. 3	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.407	0.407	0.407	0.407	0.000	0.000	0.000	0.000	1.629	0.000	✓
S026	Kiln No. 3 Scrubber	0%	0%	0%	0%	0%	0%	43%	43%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	1.180	1.180	2.759	0.000	✓
S027	Kiln No. 3 Product System	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.032	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.129	0.000	✓
S028	Product Silo No. 3-1	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S029	Product Silo No. 3-2	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S030	Product Silo No. 3-3	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S031	Product Silo No. 3-4	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S032	Railcar Loading System No. 2	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.075	0.075	0.075	0.075	0.000	0.000	0.000	0.000	0.300	0.000	✓
BLR3	Boiler No. 3	0%	0%	0%	0%	0%	0%	50%	50%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.037	0.075	0.000	✓
CARBO Ceramics Millen Facility Processing Line 4																						
S033	Spray Dryer No. 7	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S034	Spray Dryer No. 8	0%	0%	0%	0%	31%	31%	19%	19%	100%	✓	0.000	0.000	0.000	0.000	1.420	1.420	0.852	0.852	4.543	0.000	✓
S035	Pellet Feed System No. 4	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.407	0.407	0.407	0.407	0.000	0.000	0.000	0.000	1.629	0.000	✓
S037	Kiln No. 4 Scrubber	0%	0%	0%	0%	0%	0%	43%	43%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	1.180	1.180	2.759	0.000	✓
S038	Kiln No. 4 Product System	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.032	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.129	0.000	✓
S039	Product Silo No. 4-1	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S040	Product Silo No. 4-2	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S041	Product Silo No. 4-3	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
S042	Product Silo No. 4-4	25%	25%	25%	25%	0%	0%	0%	0%	100%	✓	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.086	0.000	✓
BLR4	Boiler No. 4	0%	0%	0%	0%	0%	0%	50%	50%	100%	✓	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.037	0.075	0.000	✓

Particulate Matter Speciation

Spray Dryers 1, 2, 3, and 4 (Modeled ID Nos. S001, S002, S012, S013, S022, S023, S033, and S034)

Particulate matter is speciated based on the ratio of $PM_{10-2.5}$ and $PM_{2.5-0}$ to total PM_{10} based on best available control technology (BACT) emission limitations for PM_{10} and $PM_{2.5}$.

Although some non-zero amount of particulate matter will be coarse and fine filterable PM (PMC and PMF), all PM is apportioned to four size fractions for organic condensables as a conservative assumption for visibility impact based on the light extinction efficiency of SOA.

$PM_{10-2.5}$ is split evenly into size fractions POC_{10-6} (POC800) and $POC_{6-2.5}$ (POC425) and $PM_{2.5-0}$ is split evenly into the submicron size fractions $POC_{1-0.625}$ (POC081) and $POC_{0.625-0.5}$ (POC056)

Pellet Feed Systems 1, 2, 3, and 4 (Modeled ID Nos. S003, S014, S024, and S035), Product Systems 1, 2, 3, and 4 (Modeled ID Nos. S003, S014, S024, and S035), Product Silos (Modeled ID Nos. S007-S010, S018-S021, S028-S031, and S039-S042), and Railcar Loading Systems 1 and 2 (Modeled ID Nos. S011 and S032)

Particulate matter is speciated based on the ratio of $PM_{10-2.5}$ and $PM_{2.5-0}$ to total PM_{10} based on best available control technology (BACT) emission limitations for PM_{10} and $PM_{2.5}$.

These units are referred to as "material handling" and are associated with coarse (PMC) and fine (PMF) filterable particulate matter.

$PM_{10-2.5}$ is split evenly into size fractions PMC_{10-6} (PMC800) and $PMC_{6-2.5}$ (PMC425) and $PM_{2.5-0}$ is split evenly into the submicron size fractions $PMF_{1-0.625}$ (PMF081) and $PMF_{0.625-0.5}$ (PMF056).

Direct-fired Rotary Calciners 1, 2, 3, and 4 (Modeled S005, S016, S026, and S037)

Particulate matter is speciated based on the PSD avoidance limitation of less than 7 tons per year for H_2SO_4 and the ratio of $PM_{10-2.5}$ and $PM_{2.5-0}$ to total PM_{10} based on best available control technology (BACT) emission limitations for PM_{10} and $PM_{2.5}$.

The avoidance limitation for H_2SO_4 is split evenly among the kilns and is modeled directly as SO_4. The amount of SO_4 directly modeled is subtracted from total PM10 prior to specitation since H_2SO_4 is condensable PM and and component of PM_{10}.

All PM is apportioned to two submicron size fraction for organic condensables as a conservative assumption for visibility impact based on the light extinction efficiency of SOA; actual PM is likely inorganic PM which should be modeled (less conservatively) as PMF or SOIL.

The amount of total PM_{10} after subtracting SO_4 is 100% $PM_{2.5-0}$ and is split evenly into the submicron size fractions $POC_{1-0.625}$ (POC081) and $POC_{0.625-0.5}$ (POC056).

Natural Gas-fired Boilers 1, 2, 3, and 4 (Modeled ID Nos. BLR1-BLR4)

Particulate matter specation for the natural gas-fired boilers is based on BACT for PM_{10} and apportioned evenly into the submicron size fractions for organic condensables $POC_{1-0.625}$ (POC081) and $POC_{0.625-0.5}$ (POC056)

ATTACHMENT B

CALPUFF Input File

```
CARBO Millen Class I Increment and AQRV CALPUFF.INP
CALPUFF/CALMET 5.8 (YYYY), MREG=1, MCHEM=1, MDISP=3, BCKNH3=0.5
Cape Romain, Okefenokee, Wolf Island, Shining Rock
---------------- Run title (3 lines) ------------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

-------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    * METDAT = ..\CALMET.DAT   *
    or
ISCMET.DAT    input    * ISCDAT =             *
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
--------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =CALPUFF.LST  !
CONC.DAT      output   ! CONDAT =CONC.DAT     !
DFLX.DAT      output   ! DFDAT  =DFLX.DAT     !
WFLX.DAT      output   ! WFDAT  =WFLX.DAT     !

VISB.DAT      output   * VISDAT =VISB.DAT     *
TK2D.DAT      output   * T2DDAT =             *
RHO2D.DAT     output   * RHODAT =             *
RESTARTE.DAT  output   * RSTARTE=             *
--------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =             *
VOLEMARB.DAT  input    * VOLDAT =             *
BAEMARB.DAT   input    * ARDAT  =             *
LNEMARB.DAT   input    * LNDAT  =             *
--------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    ! OZDAT  = file path for ozone observations   !
VD.DAT        input    * VDDAT  =            *
CHEM.DAT      input    * CHEMDAT=            *
H2O2.DAT      input    * H2O2DAT=            *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   ! DEBUG = DEBUG.DAT   !
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
--------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length


Provision for multiple input files
----------------------------------

     Number of CALMET.DAT files for run (NMETDAT)
                                     Default: 1       ! NMETDAT =   12   !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                     Default: 0       ! NPTDAT =  0  !

     Number of BAEMARB.DAT files for run (NARDAT)
                                     Default: 0       ! NARDAT =  0  !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                     Default: 0       ! NVOLDAT =  0  !

!END!

-------------
```

```
Subgroup (0a)
-------------

  The following CALMET.DAT filenames are processed in sequence if NMETDAT>1

Default Name  Type          File Name
------------  ----          ---------
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Jan) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Feb) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Mar) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Apr) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (May) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Jun) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Jul) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Aug) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Sep) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Oct) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Nov) !   !END!
 none         input    ! METDAT= file path for CALMET 5.8 dataset (Dec) !   !END!


--------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   0  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

     Starting date:   Year (IBYR) -- No default       ! IBYR =  YYYY  !
     (used only if   Month (IBMO) -- No default       ! IBMO =  1  !
      METRUN = 0)      Day (IBDY) -- No default       ! IBDY =  1  !
                      Hour (IBHR) -- No default       ! IBHR =  1  !

     Note: IBHR is the time at the END of the first hour of the simulation
           (IBHR=1, the first hour of a day, runs from 00:00 to 01:00)

     Base time zone        (XBTZ) -- No default       ! XBTZ = 5  !
     The zone is the number of hours that must be
     ADDED to the time to obtain UTC (or GMT)
     Examples: PST = 8., MST = 7.
               CST = 6., EST = 5.

     Length of run (hours) (IRLG) -- No default       ! IRLG =  8760  !

     Number of chemical species (NSPEC)
                                    Default: 5       ! NSPEC =  14   !

     Number of chemical species
     to be emitted  (NSE)           Default: 3       ! NSE =  12   !

     Flag to stop run after
     SETUP phase (ITEST)            Default: 2       ! ITEST =  2   !
     (Used to allow checking
     of the model inputs, files, etc.)
           ITEST = 1 - STOPS program after SETUP phase
           ITEST = 2 - Continues with execution of program
                       after SETUP

     Restart Configuration:

        Control flag (MRESTART)      Default: 0       ! MRESTART =  0   !

           0 = Do not read or write a restart file
           1 = Read a restart file at the beginning of
               the run
           2 = Write a restart file during run
           3 = Read a restart file at beginning of run
               and write a restart file during run

        Number of periods in Restart
        output cycle (NRESPD)        Default: 0       ! NRESPD =  0   !

           0 = File written only at last period
          >0 = File updated every NRESPD periods

     Meteorological Data Format (METFM)
                                    Default: 1       ! METFM =  1   !

           METFM = 1 - CALMET binary file (CALMET.MET)
```

```
          METFM = 2 - ISC ASCII file (ISCMET.MET)
          METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
          METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                      surface parameters file (SURFACE.DAT)
          METFM = 5 - AERMET tower file (PROFILE.DAT) and
                      surface parameters file (SURFACE.DAT)

     Meteorological Profile Data Format (MPRFFM)
            (used only for METFM = 1, 2, 3)
                                 Default: 1        ! MPRFFM =  1   !

          MPRFFM = 1 - CTDM plus tower file (PROFILE.DAT)
          MPRFFM = 2 - AERMET tower file (PROFILE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                 Default: 60.0     ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                 Default: 60.0     ! PGTIME = 60. !


!END!


-------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                   Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                              Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                          Default: 0     ! MCTSG =  0   !
        0 = not modeled
        1 = modeled

     Near-field puffs modeled as
     elongated slugs? (MSLUG)              Default: 0     ! MSLUG =  0   !
        0 = no
        1 = yes (slug model used)

     Transitional plume rise modeled ?
     (MTRANS)                              Default: 1     ! MTRANS =  1   !
        0 = no  (i.e., final rise only)
        1 = yes (i.e., transitional rise computed)

     Stack tip downwash? (MTIP)            Default: 1     ! MTIP =  1  !
        0 = no  (i.e., no stack tip downwash)
        1 = yes (i.e., use stack tip downwash)

     Method used to simulate building
     downwash? (MBDW)                      Default: 1     ! MBDW =   1  !
        1 = ISC method
        2 = PRIME method

     Vertical wind shear modeled above
     stack top? (MSHEAR)                   Default: 0     ! MSHEAR =  0  !
        0 = no  (i.e., vertical wind shear not modeled)
        1 = yes (i.e., vertical wind shear modeled)

     Puff splitting allowed? (MSPLIT)      Default: 0     ! MSPLIT =  0  !
        0 = no (i.e., puffs not split)
        1 = yes (i.e., puffs are split)

     Chemical mechanism flag (MCHEM)       Default: 1     ! MCHEM =  1   !
        0 = chemical transformation not
            modeled
        1 = transformation rates computed
            internally (MESOPUFF II scheme)
        2 = user-specified transformation
            rates used
```

```
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)

Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 1, or 3)        Default: 0     ! MAQCHEM =  0   !
   0 = aqueous phase transformation
       not modeled
   1 = transformation rates adjusted
       for aqueous phase reactions

Wet removal modeled ? (MWET)          Default: 1     ! MWET =  1   !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  1   !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)


Gravitational settling (plume tilt)
modeled ? (MTILT)                     Default: 0     ! MTILT =  0   !
   0 = no
   1 = yes
   (puff center falls at the gravitational
    settling velocity for 1 particle species)

Restrictions:
    - MDRY  = 1
    - NSPEC = 1  (must be particle species as well)
    - sg    = 0  GEOMETRIC STANDARD DEVIATION in Group 8 is
                 set to zero for a single particle diameter

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  3   !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4, 5)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

[DIAGNOSTIC FEATURE]
```

```
Method used for Lagrangian timescale for Sigma-y
(used only if MDISP=1,2 or MDISP2=1,2)
(MTAULY)                              Default: 0     ! MTAULY =  0  !
   0 = Draxler default 617.284 (s)
   1 = Computed as Lag. Length / (.75 q) -- after SCIPUFF
  10 < Direct user input (s)             -- e.g., 306.9


[DIAGNOSTIC FEATURE]
Method used for Advective-Decay timescale for Turbulence
(used only if MDISP=2 or MDISP2=2)
(MTAUADV)                             Default: 0     ! MTAUADV =  0  !
   0 = No turbulence advection
   1 = Computed (OPTION NOT IMPLEMENTED)
  10 < Direct user input (s)   -- e.g., 300


Method used to compute turbulence sigma-v &
sigma-w using micrometeorological variables
(Used only if MDISP = 2 or MDISP2 = 2)
(MCTURB)                              Default: 1     ! MCTURB =  1  !
   1 = Standard CALPUFF subroutines
   2 = AERMOD subroutines

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion?
(MPARTL)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  0  !
(MPDF)
   0 = no
   1 = yes

Sub-Grid TIBL module used for shore line?
                                      Default: 0     ! MSGTIBL = 0  !
(MSGTIBL)
   0 = no
   1 = yes

Boundary conditions (concentration) modeled?
                                      Default: 0     ! MBCON = 0  !
(MBCON)
   0 = no
   1 = yes, using formatted BCON.DAT file
   2 = yes, using unformatted CONC.DAT file

Note:  MBCON > 0 requires that the last species modeled
       be 'BCON'.  Mass is placed in species BCON when
       generating boundary condition puffs so that clean
       air entering the modeling domain can be simulated
       in the same way as polluted air.  Specify zero
       emission of species BCON for all regular sources.

Individual source contributions saved?
                                      Default: 0     ! MSOURCE = 0  !
(MSOURCE)
   0 = no
   1 = yes


Analyses of fogging and icing impacts due to emissions from
arrays of mechanically-forced cooling towers can be performed
using CALPUFF in conjunction with a cooling tower emissions
processor (CTEMISS) and its associated postprocessors.  Hourly
emissions of water vapor and temperature from each cooling tower
cell are computed for the current cell configuration and ambient
conditions by CTEMISS. CALPUFF models the dispersion of these
emissions and provides cloud information in a specialized format
for further analysis. Output to FOG.DAT is provided in either
```

```
     'plume mode' or 'receptor mode' format.

     Configure for FOG Model output?
                                      Default: 0     ! MFOG =  0   !
     (MFOG)
        0 = no
        1 = yes  - report results in PLUME Mode format
        2 = yes  - report results in RECEPTOR Mode format


     Test options specified to see if
     they conform to regulatory
     values? (MREG)                   Default: 1     ! MREG =  1   !

        0 = NO checks are made
        1 = Technical options must conform to USEPA
            Long Range Transport (LRT) guidance
                       METFM    1 or 2
                       AVET     60. (min)
                       PGTIME   60. (min)
                       MGAUSS   1
                       MCTADJ   3
                       MTRANS   1
                       MTIP     1
                       MCHEM    1 or 3 (if modeling SOx, NOx)
                       MWET     1
                       MDRY     1
                       MDISP    2 or 3
                       MPDF     0 if MDISP=3
                                1 if MDISP=2
                       MROUGH   0
                       MPARTL   1
                       SYTDEP   550. (m)
                       MHFTSZ   0
                       SVMIN    0.5 (m/s)


!END!


-------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

 ! CSPEC =  SO2 !            !END!
 ! CSPEC =  SO4 !            !END!
 ! CSPEC =  NOX !            !END!
 ! CSPEC =  HNO3 !           !END!
 ! CSPEC =  NO3 !            !END!
 ! CSPEC =  PM10 !           !END!
 ! CSPEC =  PMC800 !         !END!
 ! CSPEC =  PMC425 !         !END!
 ! CSPEC =  PMF081 !         !END!
 ! CSPEC =  PMF056 !         !END!
 ! CSPEC =  POC800 !         !END!
 ! CSPEC =  POC425 !         !END!
 ! CSPEC =  POC081 !         !END!
 ! CSPEC =  POC056 !         !END!

                                                              Dry                 OUTPUT GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED                NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,                  (0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS          1=1st CGRUP,
    Characters                                       2=COMPUTED-PARTICLE     2=2nd CGRUP,
    in length)                                       3=USER-SPECIFIED)       3= etc.)

!          SO2  =           1,               1,           1,                  0   !
!          SO4  =           1,               1,           2,                  0   !
!          NOX  =           1,               1,           1,                  0   !
!          HNO3  =          1,               0,           1,                  0   !
!          NO3  =           1,               0,           2,                  0   !
!          PM10  =          1,               1,           2,                  0   !
!          PMC800  =        1,               1,           2,                  0   !
!          PMC425  =        1,               1,           2,                  0   !
!          PMF081  =        1,               1,           2,                  0   !
!          PMF056  =        1,               1,           2,                  0   !
```

```
!          POC800  =         1,              1,           2,                  0   !
!          POC425  =         1,              1,           2,                  0   !
!          POC081  =         1,              1,           2,                  0   !
!          POC056  =         1,              1,           2,                  0   !

!END!

  Note:  The last species in (3a) must be 'BCON' when using the
         boundary condition option (MBCON > 0).  Species BCON should
         typically be modeled as inert (no chem transformation or
         removal).


-------------
Subgroup (3b)
-------------
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
  CGRUP name will be used as the species name in output files.
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
  Order must be consistent with 3(a) above.



--------------------------------------------------------------------------------


INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                     Default: UTM    ! PMAP = LCC !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                    Default=0.0     ! FEAST  = 0  !
     (FNORTH)                   Default=0.0     ! FNORTH = 0  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                   No Default      ! IUTMZN =  17   !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                   Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
      (RLAT0)                    No Default      ! RLAT0 = 40N !
      (RLON0)                    No Default      ! RLON0 = 97W !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
                RLAT0 identifies latitude of tangent-point of mapping plane

     Matching parallel(s) of latitude (decimal degrees) for projection
     (Used only if PMAP= LCC or PS)
      (XLAT1)                    No Default      ! XLAT1 = 33N !
      (XLAT2)                    No Default      ! XLAT2 = 45N !

         LCC :  Projection cone slices through Earth's surface at RLAT1 and RLAT2
         PS  :  Projection plane slices through Earth at RLAT1
                (RLAT2 is not used)
```

```
     ----------
     Note:  Latitudes and longitudes should be positive, and include a
            letter N,S,E, or W indicating north or south latitude, and
            east or west longitude.  For example,
            35.9  N Latitude  =  35.9N
            118.7 E Longitude = 118.7E


     Datum-region
     ------------

     The Datum-Region for the coordinates is identified by a character
     string.  Many mapping products currently available use the model of the
     Earth known as the World Geodetic System 1984 (WGS-84).  Other local
     models may be in use, and their selection in CALMET will make its output
     consistent with local mapping products.  The list of Datum-Regions with
     official transformation parameters is provided by the National Imagery and
     Mapping Agency (NIMA).

     NIMA Datum - Regions(Examples)
     ------------------------------------------------------------------------------
     WGS-84    WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
     NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
     NAR-C     NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
     NWS-84    NWS 6370KM Radius, Sphere
     ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

     Datum-region for output coordinates
     (DATUM)                   Default: WGS-84     ! DATUM = NWS-84  !


METEOROLOGICAL Grid:

     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =  248   !
            No. Y grid cells (NY)      No default     ! NY =  257  !
         No. vertical layers (NZ)      No default     ! NZ =  10   !

           Grid spacing (DGRIDKM)      No default     ! DGRIDKM = 4 !
                                       Units: km

                Cell face heights
                    (ZFACE(nz+1))      No defaults
                                       Units: m
 !  ZFACE = 0., 20, 40, 80, 160, 320, 640, 1200, 2000, 3000, 4000 !

            Reference Coordinates
           of SOUTHWEST corner of
                 grid cell(1, 1):

        X coordinate (XORIGKM)         No default     ! XORIGKM = 718.005 !
        Y coordinate (YORIGKM)         No default     ! YORIGKM = -1214.003 !
                                      Units: km


COMPUTATIONAL Grid:

     The computational grid is identical to or a subset of the MET. grid.
     The lower left (LL) corner of the computational grid is at grid point
     (IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
     computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
     The grid spacing of the computational grid is the same as the MET. grid.

        X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
                  (1 <= IBCOMP <= NX)

        Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
                  (1 <= JBCOMP <= NY)


        X index of UR corner (IECOMP)      No default     ! IECOMP =  248   !
                  (1 <= IECOMP <= NX)

        Y index of UR corner (JECOMP)      No default     ! JECOMP =  257   !
                  (1 <= JECOMP <= NY)


SAMPLING Grid (GRIDDED RECEPTORS):
```

```
     The lower left (LL) corner of the sampling grid is at grid point
     (IBSAMP, JBSAMP) of the MET. grid.  The upper right (UR) corner of the
     sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid.
     The sampling grid must be identical to or a subset of the computational
     grid.  It may be a nested grid inside the computational grid.
     The grid spacing of the sampling grid is DGRIDKM/MESHDN.

        Logical flag indicating if gridded
        receptors are used (LSAMP)         Default: T     ! LSAMP = F !
        (T=yes, F=no)

        X index of LL corner (IBSAMP)      No default     ! IBSAMP =  1   !
         (IBCOMP <= IBSAMP <= IECOMP)

        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =  1   !
         (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP =  248   !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =  257   !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  1  !
        (MESHDN is an integer >= 1)

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                             *                          *
     FILE                       DEFAULT VALUE             VALUE THIS RUN
     ----                       -------------             --------------

   Concentrations (ICON)              1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                  1                   !  IDRY =  1   !
   Wet Fluxes (IWET)                  1                   !  IWET =  1   !
   2D Temperature (IT2D)              0                   !  IT2D =  0   !
   2D Density (IRHO)                  0                   !  IRHO =  0   !
   Relative Humidity (IVIS)           1                   !  IVIS =  1   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                           Default: T         ! LCOMPRS = T !

   *
    0 = Do not create file, 1 = create file


    QA PLOT FILE OUTPUT OPTION:

       Create a standard series of output files (e.g.
       locations of sources, receptors, grids ...)
       suitable for plotting?
       (IQAPLOT)                       Default: 1         !  IQAPLOT =  1   !
         0 = no
         1 = yes

    DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

       Mass flux across specified boundaries
       for selected species reported?
       (IMFLX)                         Default: 0         ! IMFLX =  0  !
         0 = no
         1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
                  are specified in Input Group 0)

       Mass balance for each species
       reported?
       (IMBAL)                         Default: 0         ! IMBAL =  0  !
         0 = no
         1 = yes (MASSBAL.DAT filename is
              specified in Input Group 0)
```

```
   LINE PRINTER OUTPUT OPTIONS:

      Print concentrations (ICPRT)    Default: 0         ! ICPRT =  0   !
      Print dry fluxes (IDPRT)        Default: 0         ! IDPRT =  0   !
      Print wet fluxes (IWPRT)        Default: 0         ! IWPRT =  0   !
      (0 = Do not print, 1 = Print)

      Concentration print interval
      (ICFRQ) in timesteps            Default: 1         ! ICFRQ =  1   !
      Dry flux print interval
      (IDFRQ) in timesteps            Default: 1         ! IDFRQ =  1   !
      Wet flux print interval
      (IWFRQ) in timesteps            Default: 1         ! IWFRQ =  1   !

      Units for Line Printer Output
      (IPRTU)                         Default: 1         ! IPRTU =  1   !
                      for            for
                 Concentration    Deposition
          1 =       g/m**3         g/m**2/s
          2 =      mg/m**3        mg/m**2/s
          3 =      ug/m**3        ug/m**2/s
          4 =      ng/m**3        ng/m**2/s
          5 =     Odour Units

      Messages tracking progress of run
      written to the screen ?
      (IMESG)                         Default: 2         ! IMESG =  2   !
        0 = no
        1 = yes (advection step, puff ID)
        2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


    SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                 ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------ WET FLUXES ------
-- MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?
SAVED ON DISK?
   -------       ------------------------   ------------------------   ------------------------
---------------
!          SO2 =        0,          1,          0,          1,          0,          1,
    0   !
!          SO4 =        0,          1,          0,          1,          0,          1,
    0   !
!          NOX =        0,          1,          0,          1,          0,          1,
    0   !
!          HNO3 =       0,          1,          0,          1,          0,          1,
    0   !
!          NO3 =        0,          1,          0,          1,          0,          1,
    0   !
!          PM10 =       0,          1,          0,          1,          0,          1,
    0   !
!          PMC800 =     0,          1,          0,          1,          0,          1,
    0   !
!          PMC425 =     0,          1,          0,          1,          0,          1,
    0   !
!          PMF081 =     0,          1,          0,          1,          0,          1,
    0   !
!          PMF056 =     0,          1,          0,          1,          0,          1,
    0   !
!          POC800 =     0,          1,          0,          1,          0,          1,
    0   !
!          POC425 =     0,          1,          0,          1,          0,          1,
    0   !
!          POC081 =     0,          1,          0,          1,          0,          1,
    0   !
!          POC056 =     0,          1,          0,          1,          0,          1,
    0   !

  Note:  Species BCON (for MBCON > 0) does not need to be saved on disk.


     OPTIONS FOR PRINTING DEBUG QUANTITIES (much output)

       Logical for debug output
       (LDEBUG)                                 Default: F     ! LDEBUG = F !

       First puff to track
       (IPFDEB)                                 Default: 1     ! IPFDEB =  1  !

       Number of puffs to track
       (NPFDEB)                                 Default: 1     ! NPFDEB =  1000  !
```

```
       Met. period to start output
       (NN1)                                Default: 1     ! NN1 =  1   !

       Met. period to end output
       (NN2)                                Default: 10    ! NN2 =  8760  !

!END!

-------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------

---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                      Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  2   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1. !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1. !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                      1 **
     HILL information


HILL           XC        YC       THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2   SCALE 1    SCALE 2
  AMAX1     AMAX2
 NO.          (km)      (km)      (deg.)   (m)     (m)      (m)       (m)       (m)        (m)
   (m)       (m)
----          ----      ----      ------  -----  ------    ------    ------   -------    -------
  -----     -----

---------------
Subgroup (6c)
---------------

    COMPLEX TERRAIN RECEPTOR INFORMATION

                      XRCT         YRCT        ZRCT          XHH
                      (km)         (km)         (m)
                     ------        -----      ------         ----


-------------------
1
     Description of Complex Terrain Variables:
          XC, YC  = Coordinates of center of hill
          THETAH  = Orientation of major axis of hill (clockwise from
                    North)
          ZGRID   = Height of the  0  of the grid above mean sea
                    level
          RELIEF  = Height of the crest of the hill above the grid elevation
```

```
          EXPO 1  = Hill-shape exponent for the major axis
          EXPO 2  = Hill-shape exponent for the major axis
          SCALE 1 = Horizontal length scale along the major axis
          SCALE 2 = Horizontal length scale along the minor axis
          AMAX    = Maximum allowed axis length for the major axis
          BMAX    = Maximum allowed axis length for the major axis

          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT    = Height of the ground (MSL) at the complex terrain
                    Receptor
          XHH     = Hill number associated with each complex terrain receptor
                    (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
     NOTE: DATA for each hill and CTSG receptor are treated as a separate
           input subgroup and therefore must end with an input group terminator.

-------------------------------------------------------------------------------


INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
--------------

      SPECIES     DIFFUSIVITY      ALPHA STAR      REACTIVITY    MESOPHYLL RESISTANCE     HENRY'S
LAW COEFFICIENT
       NAME        (cm**2/s)                                              (s/cm)
(dimensionless)
      -------     -----------      ----------      ----------    --------------------
-----------------------

!          SO2  =     0.1509,         1000,            8,               0,                  0.04
!
!          NOX  =     0.1656,         1,             8,              5,                  3.5 !
!          HNO3  =     0.1628,         1,             18,               0,                  8E-08
!

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 8 -- Size parameters for dry deposition of particles
--------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                   DEVIATION
                        (microns)                  (microns)
      -------      -------------------        ------------------
!          SO4  =         0.48,                      2 !
!          NO3  =         0.48,                      2 !
!          PM10  =         0.48,                      2 !
!          PMC800  =         8,                      0 !
!          PMC425  =         4.25,                      0 !
!          PMF081  =         0.8125,                      0 !
!          PMF056  =         0.5625,                      0 !
!          POC800  =         8,                      0 !
!          POC425  =         4.25,                      0 !
!          POC081  =         0.8125,                      0 !
!          POC056  =         0.5625,                      0 !

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
--------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                           Default: 30    !  RCUTR = 30.0 !
     Reference ground resistance  (s/cm)
     (RGR)                             Default: 10    !    RGR = 10.0 !
```

```
     Reference pollutant reactivity
     (REACTR)                          Default: 8     ! REACTR = 8.0 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                            Default: 9     !   NINT =  9  !

     Vegetation state in unirrigated areas
     (IVEG)                            Default: 1     !   IVEG =  1   !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 10 -- Wet Deposition Parameters
---------------

                   Scavenging Coefficient -- Units: (sec)**(-1)

      Pollutant      Liquid Precip.       Frozen Precip.
      ---------      --------------       --------------
!         SO2  =          0.00003,                   0 !
!         SO4  =           0.0001,             0.00003 !
!         NOX  =                0,                   0 !
!         HNO3  =         0.00006,                   0 !
!         NO3  =           0.0001,             0.00003 !
!         PM10  =          0.0001,             0.00003 !
!         PMC800  =        0.0001,             0.00003 !
!         PMC425  =        0.0001,             0.00003 !
!         PMF081  =        0.0001,             0.00003 !
!         PMF056  =        0.0001,             0.00003 !
!         POC800  =        0.0001,             0.00003 !
!         POC425  =        0.0001,             0.00003 !
!         POC081  =        0.0001,             0.00003 !
!         POC056  =        0.0001,             0.00003 !

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 11 -- Chemistry Parameters
---------------

     Ozone data input option (MOZ)     Default: 1            ! MOZ =     1    !
     (Used only if MCHEM = 1, 3, or 4)
        0 = use a monthly background ozone value
        1 = read hourly ozone concentrations from
            the OZONE.DAT data file

     Monthly ozone concentrations
     (Used only if MCHEM = 1, 3, or 4 and
      MOZ = 0 or MOZ = 1 and all hourly O3 data missing)
     (BCKO3) in ppb                    Default: 12*80.
 !  BCKO3 = 80, 80, 80, 80, 80, 80, 80, 80, 80, 80, 80, 80 !

     Monthly ammonia concentrations
     (Used only if MCHEM = 1, or 3)
     (BCKNH3) in ppb                   Default: 12*10.
 !  BCKNH3 = 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5 !

     Nighttime SO2 loss rate (RNITE1)
     in percent/hour                   Default: 0.2          ! RNITE1 = 0.2 !

     Nighttime NOx loss rate (RNITE2)
     in percent/hour                   Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate (RNITE3)
     in percent/hour                   Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 1            ! MH2O2 =  1   !
     (Used only if MAQCHEM = 1)
        0 = use a monthly background H2O2 value
        1 = read hourly H2O2 concentrations from
            the H2O2.DAT data file
```

```
     Monthly H2O2 concentrations
     (Used only if MQACHEM = 1 and
      MH2O2 = 0 or MH2O2 = 1 and all hourly H2O2 data missing)
     (BCKH2O2) in ppb                  Default: 12*1.
     !  BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !


 --- Data for SECONDARY ORGANIC AEROSOL (SOA) Option
     (used only if MCHEM = 4)

     The SOA module uses monthly values of:
          Fine particulate concentration in ug/m^3 (BCKPMF)
          Organic fraction of fine particulate     (OFRAC)
          VOC / NOX ratio (after reaction)         (VCNX)
     to characterize the air mass when computing
     the formation of SOA from VOC emissions.
     Typical values for several distinct air mass types are:

        Month    1    2    3    4    5    6    7    8    9   10   11   12
                Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

     Clean Continental
        BCKPMF   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.
        OFRAC  .15  .15  .20  .20  .20  .20  .20  .20  .20  .20  .20  .15
        VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

     Clean Marine (surface)
        BCKPMF  .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5
        OFRAC  .25  .25  .30  .30  .30  .30  .30  .30  .30  .30  .30  .25
        VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

     Urban - low biogenic (controls present)
        BCKPMF  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.
        OFRAC  .20  .20  .25  .25  .25  .25  .25  .25  .20  .20  .20  .20
        VCNX     4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.

     Urban - high biogenic (controls present)
        BCKPMF  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.
        OFRAC  .25  .25  .30  .30  .30  .55  .55  .55  .35  .35  .35  .25
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Regional Plume
        BCKPMF  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.
        OFRAC  .20  .20  .25  .35  .25  .40  .40  .40  .30  .30  .30  .20
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Urban - no controls present
        BCKPMF 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100.
        OFRAC  .30  .30  .35  .35  .35  .55  .55  .55  .35  .35  .35  .30
        VCNX     2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

     Default: Clean Continental
 !  BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
 !  OFRAC = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
 !  VCNX = 50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0 !


!END!


-------------------------------------------------------------------------------


INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP = 5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0      ! MHFTSZ =  0   !

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = 0.01 !

     Vertical dispersion constant for neutral/
```

```
unstable conditions (k2 in Eqn. 2.7-4)
(CONK2)                                  Default: 0.1    ! CONK2 = 0.1 !

Factor for determining Transition-point from
Schulman-Scire to Huber-Snyder Building Downwash
scheme (SS used for Hs < Hb + TBD * HL)
(TBD)                                    Default: 0.5    ! TBD = 0.5 !
   TBD < 0   ==> always use Huber-Snyder
   TBD = 1.5 ==> always use Schulman-Scire
   TBD = 0.5 ==> ISC Transition-point

Range of land use categories for which
urban dispersion is assumed
(IURB1, IURB2)                           Default: 10     ! IURB1 =  10  !
                                                  19     ! IURB2 =  19  !

Site characterization parameters for single-point Met data files ---------
(needed for METFM = 2,3,4,5)

   Land use category for modeling domain
   (ILANDUIN)                            Default: 20     ! ILANDUIN =  20  !

   Roughness length (m) for modeling domain
   (Z0IN)                                Default: 0.25   ! Z0IN = 0.25 !

   Leaf area index for modeling domain
   (XLAIIN)                              Default: 3.0    ! XLAIIN = 3.0 !

   Elevation above sea level (m)
   (ELEVIN)                              Default: 0.0    ! ELEVIN = 0.0 !

   Latitude (degrees) for met location
   (XLATIN)                              Default: -999.  ! XLATIN = -999. !

   Longitude (degrees) for met location
   (XLONIN)                              Default: -999.  ! XLONIN = -999. !

Specialized information for interpreting single-point Met data files -----

   Anemometer height (m) (Used only if METFM = 2,3)
   (ANEMHT)                              Default: 10.    ! ANEMHT = 10. !

   Form of lateral turbulance data in PROFILE.DAT file
   (Used only if METFM = 4,5 or MTURBVW = 1 or 3)
   (ISIGMAV)                             Default: 1      ! ISIGMAV =  1  !
       0 = read sigma-theta
       1 = read sigma-v

   Choice of mixing heights (Used only if METFM = 4)
   (IMIXCTDM)                            Default: 0      ! IMIXCTDM =  0  !
       0 = read PREDICTED mixing heights
       1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)
(XMXLEN)                                 Default: 1.0    ! XMXLEN = 1. !

Maximum travel distance of a puff/slug (in
grid units) during one sampling step
(XSAMLEN)                                Default: 1.0    ! XSAMLEN = 1. !

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)                                  Default: 99     ! MXNEW =  99   !

Maximum Number of sampling steps for
one puff/slug during one time step
(MXSAM)                                  Default: 99     ! MXSAM =  99   !

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)                                 Default: 2      ! NCOUNT =  2   !

Minimum sigma y for a new puff/slug (m)
(SYMIN)                                  Default: 1.0    ! SYMIN = 1.  !

Minimum sigma z for a new puff/slug (m)
(SZMIN)                                  Default: 1.0    ! SZMIN = 1.  !

Default minimum turbulence velocities sigma-v and sigma-w
for each stability class over land and over water (m/s)
(SVMIN(12) and SWMIN(12))
```

```
                  ----------  LAND  ----------       ---------  WATER  ----------
        Stab Class :  A    B    C    D    E    F        A    B    C    D    E    F
                     ---  ---  ---  ---  ---  ---      ---  ---  ---  ---  ---  ---
     Default SVMIN : .50, .50, .50, .50, .50, .50,     .37, .37, .37, .37, .37, .37
     Default SWMIN : .20, .12, .08, .06, .03, .016,    .20, .12, .08, .06, .03, .016

           ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.500,
0.500 !
           ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120, 0.080, 0.060, 0.030,
0.016 !

     Divergence criterion for dw/dz across puff
     used to initiate adjustment for horizontal
     convergence (1/s)
     Partial adjustment starts at CDIV(1), and
     full adjustment is reached at CDIV(2)
     (CDIV(2))                                  Default: 0.0,0.0  ! CDIV = 0., 0. !

     Minimum wind speed (m/s) allowed for
     non-calm conditions. Also used as minimum
     speed returned when using power-law
     extrapolation toward surface
     (WSCALM)                                   Default: 0.5    ! WSCALM = 0.5 !

     Maximum mixing height (m)
     (XMAXZI)                                   Default: 3000.  ! XMAXZI = 3000. !

     Minimum mixing height (m)
     (XMINZI)                                   Default: 50.    ! XMINZI = 50.0 !

     Default wind speed classes --
     5 upper bounds (m/s) are entered;
     the 6th class has no upper limit
     (WSCAT(5))                      Default   :
                                     ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

                              Wind Speed Class :  1     2     3     4     5
                                                 ---   ---   ---   ---   ---
 !  WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

     Default wind speed profile power-law
     exponents for stabilities 1-6
     (PLX0(6))                       Default   : ISC RURAL values
                                     ISC RURAL : .07, .07, .10, .15, .35, .55
                                     ISC URBAN : .15, .15, .20, .25, .30, .30

                               Stability Class :  A     B     C     D     E     F
                                                 ---   ---   ---   ---   ---   ---
 !  PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55 !

     Default potential temperature gradient
     for stable classes E, F (degK/m)
     (PTG0(2))                       Default: 0.020, 0.035
                                        ! PTG0 = 0.020, 0.035 !

     Default plume path coefficients for
     each stability class (used when option
     for partial plume height terrain adjustment
     is selected -- MCTADJ=3)
     (PPC(6))                  Stability Class :  A     B     C     D     E     F
                                  Default  PPC : .50,  .50,  .50,  .50,  .35,  .35
                                                 ---   ---   ---   ---   ---   ---
 !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

     Slug-to-puff transition criterion factor
     equal to sigma-y/length of slug
     (SL2PF)                              Default: 10.        ! SL2PF = 10.0 !

     Puff-splitting control variables ------------------------

       VERTICAL SPLIT
       --------------

       Number of puffs that result every time a puff
       is split - nsplit=2 means that 1 puff splits
       into 2
       (NSPLIT)                           Default:   3        ! NSPLIT =  3  !

       Time(s) of a day when split puffs are eligible to
       be split once again; this is typically set once
       per day, around sunset before nocturnal shear develops.
       24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
```

```
       0=do not re-split    1=eligible for re-split
       (IRESPLIT(24))                    Default:  Hour 17 = 1
 !  IRESPLIT = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0 !

       Split is allowed only if last hour's mixing
       height (m) exceeds a minimum value
       (ZISPLIT)                         Default: 100.       ! ZISPLIT = 100.0 !

       Split is allowed only if ratio of last hour's
       mixing ht to the maximum mixing ht experienced
       by the puff is less than a maximum value (this
       postpones a split until a nocturnal layer develops)
       (ROLDMAX)                         Default: 0.25       ! ROLDMAX = 0.25 !


       HORIZONTAL SPLIT
       ----------------

       Number of puffs that result every time a puff
       is split - nsplith=5 means that 1 puff splits
       into 5
       (NSPLITH)                         Default:   5        ! NSPLITH =  5  !

       Minimum sigma-y (Grid Cells Units) of puff
       before it may be split
       (SYSPLITH)                        Default:  1.0       ! SYSPLITH = 1.0 !

       Minimum puff elongation rate (SYSPLITH/hr) due to
       wind shear, before it may be split
       (SHSPLITH)                        Default:  2.        ! SHSPLITH = 2.0 !

       Minimum concentration (g/m^3) of each
       species in puff before it may be split
       Enter array of NSPEC values; if a single value is
       entered, it will be used for ALL species
       (CNSPLITH)                        Default:  1.0E-07   ! CNSPLITH = 1.0E-07 !

     Integration control variables ------------------------

       Fractional convergence criterion for numerical SLUG
       sampling integration
       (EPSSLUG)                         Default:   1.0e-04  ! EPSSLUG = 1.0E-04 !

       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                         Default:   1.0e-06  ! EPSAREA = 1.0E-06 !

       Trajectory step-length (m) used for numerical rise
       integration
       (DSRISE)                          Default:   1.0      ! DSRISE = 1.0 !

       Boundary Condition (BC) Puff control variables ------------------------

       Minimum height (m) to which BC puffs are mixed as they are emitted
       (MBCON=2 ONLY).  Actual height is reset to the current mixing height
       at the release point if greater than this minimum.
       (HTMINBC)                         Default:   500.     ! HTMINBC = 500.0 !

       Search radius (km) about a receptor for sampling nearest BC puff.
       BC puffs are typically emitted with a spacing of one grid cell
       length, so the search radius should be greater than DGRIDKM.
       (RSAMPBC)                         Default:   10.      ! RSAMPBC = 10.0 !
       Near-Surface depletion adjustment to concentration profile used when
       sampling BC puffs?
       (MDEPBC)                          Default:   1        ! MDEPBC =  1  !
          0 = Concentration is NOT adjusted for depletion
          1 = Adjust Concentration for depletion

!END!


-------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
--------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  42  !
```

```
     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   3  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                              a
          POINT SOURCE: CONSTANT DATA
          -----------------------------
                                                                                     b          c
  Source       X          Y        Stack    Base     Stack    Exit  Exit    Bldg.  Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash   Rates
              (km)      (km)       (m)      (m)       (m)  (m/s) (deg. K)
  ------   ---------- ---------- ------  ------   -------- ----- -------- ----- --------
 1 ! SRCNAM = S001 !
   1 ! X =    1405.8379,   -684.1943,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 1 ! SIGYZI =   0, 0 !
 1 ! ZPLTFM =   .0 !
 1 ! FMFAC =   1 !   !END!
 2 ! SRCNAM = S002 !
   2 ! X =    1405.8459,   -684.1881,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 2 ! SIGYZI =   0, 0 !
 2 ! ZPLTFM =   .0 !
 2 ! FMFAC =   1 !   !END!
 3 ! SRCNAM = S003 !
   3 ! X =    1405.8565,   -684.1835,    48.768, 65.532,       0.7112,   26.1366,  299.8267,
0.,
     0,   0,   0,   0,   0,   1.629,   0.4071,   0.4071,   0.4071,   0.4071,   0,   0,   0,   0!
 3 ! SIGYZI =   0, 0 !
 3 ! ZPLTFM =   .0 !
 3 ! FMFAC =   1 !   !END!
 4 ! SRCNAM = S005 !
   4 ! X =    1405.8739,   -684.1742,    74.676, 65.532,       1.2192,   25.46909,  344.2711,
0.,
     34.25,   0.4,   121,   0,   0,   2.759,   0,   0,   0,   0,   0,   0,   1.1798,   1.1798!
 4 ! SIGYZI =   0, 0 !
 4 ! ZPLTFM =   .0 !
 4 ! FMFAC =   1 !   !END!
 5 ! SRCNAM = S006 !
   5 ! X =    1405.9338,   -684.1095,    38.1, 65.532,       0.4826,   5.160264,  338.7155,   0.,

     0,   0,   0,   0,   0,   0.129,   0.0321,   0.0321,   0.0321,   0.0321,   0,   0,   0,   0!
 5 ! SIGYZI =   0, 0 !
 5 ! ZPLTFM =   .0 !
 5 ! FMFAC =   1 !   !END!
 6 ! SRCNAM = S007 !
   6 ! X =    1405.9591,   -684.0268,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 6 ! SIGYZI =   0, 0 !
 6 ! ZPLTFM =   .0 !
 6 ! FMFAC =   1 !   !END!
 7 ! SRCNAM = S008 !
   7 ! X =    1405.9650,   -684.0223,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
```

```
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 7 ! SIGYZI =   0, 0 !
 7 ! ZPLTFM =   .0 !
 7 ! FMFAC =   1 !   !END!
 8 ! SRCNAM = S009 !
   8 ! X =    1405.9708,   -684.0178,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 8 ! SIGYZI =   0, 0 !
 8 ! ZPLTFM =   .0 !
 8 ! FMFAC =   1 !   !END!
 9 ! SRCNAM = S010 !
   9 ! X =    1405.9765,   -684.0133,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 9 ! SIGYZI =   0, 0 !
 9 ! ZPLTFM =   .0 !
 9 ! FMFAC =   1 !   !END!
 10 ! SRCNAM = S011 !
   10 ! X =    1406.0129,   -683.9784,    19.812, 65.532,       0.4572,   10.06145,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.3,   0.075,   0.075,   0.075,   0.075,   0,   0,   0,   0!
 10 ! SIGYZI =   0, 0 !
 10 ! ZPLTFM =   .0 !
 10 ! FMFAC =   1 !   !END!
 11 ! SRCNAM = BLR1 !
   11 ! X =    1405.7995,   -684.2169,    8.8392, 65.532,       0.4572,   7.187184,  466.4933,
0.,
     0.01,   0,   0.14,   0,   0,   0.075,   0,   0,   0,   0,   0,   0,   0.0375,   0.0375!
 11 ! SIGYZI =   0, 0 !
 11 ! ZPLTFM =   .0 !
 11 ! FMFAC =   1 !   !END!
 12 ! SRCNAM = S012 !
   12 ! X =    1405.8257,   -684.1786,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 12 ! SIGYZI =   0, 0 !
 12 ! ZPLTFM =   .0 !
 12 ! FMFAC =   1 !   !END!
 13 ! SRCNAM = S013 !
   13 ! X =    1405.8336,   -684.1723,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 13 ! SIGYZI =   0, 0 !
 13 ! ZPLTFM =   .0 !
 13 ! FMFAC =   1 !   !END!
 14 ! SRCNAM = S014 !
   14 ! X =    1405.8407,   -684.1632,    48.768, 65.532,       0.7112,   26.1366,  299.8267,
0.,
     0,   0,   0,   0,   0,   1.629,   0.4071,   0.4071,   0.4071,   0.4071,   0,   0,   0,   0!
 14 ! SIGYZI =   0, 0 !
 14 ! ZPLTFM =   .0 !
 14 ! FMFAC =   1 !   !END!
 15 ! SRCNAM = S016 !
   15 ! X =    1405.8539,   -684.1487,    74.676, 65.532,       1.2192,   25.46909,  344.2711,
0.,
     34.25,   0.4,   121,   0,   0,   2.759,   0,   0,   0,   0,   0,   0,   1.1798,   1.1798!
 15 ! SIGYZI =   0, 0 !
 15 ! ZPLTFM =   .0 !
 15 ! FMFAC =   1 !   !END!
 16 ! SRCNAM = S017 !
   16 ! X =    1405.9312,   -684.1061,    38.1, 65.532,       0.4826,   5.160264,  338.7155,
0.,
     0,   0,   0,   0,   0,   0.129,   0.0321,   0.0321,   0.0321,   0.0321,   0,   0,   0,   0!
 16 ! SIGYZI =   0, 0 !
 16 ! ZPLTFM =   .0 !
 16 ! FMFAC =   1 !   !END!
 17 ! SRCNAM = S018 !
   17 ! X =    1405.9820,   -684.0086,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 17 ! SIGYZI =   0, 0 !
 17 ! ZPLTFM =   .0 !
 17 ! FMFAC =   1 !   !END!
 18 ! SRCNAM = S019 !
   18 ! X =    1405.9879,   -684.0042,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 18 ! SIGYZI =   0, 0 !
 18 ! ZPLTFM =   .0 !
```

```
 18 ! FMFAC =   1 !   !END!
 19 ! SRCNAM = S020 !
   19 ! X =    1405.9936,   -683.9997,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 19 ! SIGYZI =   0, 0 !
 19 ! ZPLTFM =   .0 !
 19 ! FMFAC =   1 !   !END!
 20 ! SRCNAM = S021 !
   20 ! X =    1405.9995,   -683.9951,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 20 ! SIGYZI =   0, 0 !
 20 ! ZPLTFM =   .0 !
 20 ! FMFAC =   1 !   !END!
 21 ! SRCNAM = BLR2 !
   21 ! X =    1405.7845,   -684.1974,    8.8392, 65.532,       0.4572,   7.187184,  466.4933,
0.,
     0.01,   0,   0.14,   0,   0,   0.075,   0,   0,   0,   0,   0,   0,   0.0375,   0.0375!
 21 ! SIGYZI =   0, 0 !
 21 ! ZPLTFM =   .0 !
 21 ! FMFAC =   1 !   !END!
 22 ! SRCNAM = S022 !
   22 ! X =    1405.7676,   -684.1044,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 22 ! SIGYZI =   0, 0 !
 22 ! ZPLTFM =   .0 !
 22 ! FMFAC =   1 !   !END!
 23 ! SRCNAM = S023 !
   23 ! X =    1405.7756,   -684.0982,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 23 ! SIGYZI =   0, 0 !
 23 ! ZPLTFM =   .0 !
 23 ! FMFAC =   1 !   !END!
 24 ! SRCNAM = S024 !
   24 ! X =    1405.7861,   -684.0936,    48.768, 65.532,       0.7112,   26.1366,  299.8267,
0.,
     0,   0,   0,   0,   0,   1.629,   0.4071,   0.4071,   0.4071,   0.4071,   0,   0,   0,   0!
 24 ! SIGYZI =   0, 0 !
 24 ! ZPLTFM =   .0 !
 24 ! FMFAC =   1 !   !END!
 25 ! SRCNAM = S026 !
   25 ! X =    1405.8035,   -684.0843,    74.676, 65.532,       1.2192,   25.46909,  344.2711,
0.,
     34.25,   0.4,   121,   0,   0,   2.759,   0,   0,   0,   0,   0,   0,   1.1798,   1.1798!
 25 ! SIGYZI =   0, 0 !
 25 ! ZPLTFM =   .0 !
 25 ! FMFAC =   1 !   !END!
 26 ! SRCNAM = S027 !
   26 ! X =    1405.8634,   -684.0196,    38.1, 65.532,       0.4826,   5.160264,  338.7155,
0.,
     0,   0,   0,   0,   0,   0.129,   0.0321,   0.0321,   0.0321,   0.0321,   0,   0,   0,   0!
 26 ! SIGYZI =   0, 0 !
 26 ! ZPLTFM =   .0 !
 26 ! FMFAC =   1 !   !END!
 27 ! SRCNAM = S028 !
   27 ! X =    1405.9504,   -684.0157,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 27 ! SIGYZI =   0, 0 !
 27 ! ZPLTFM =   .0 !
 27 ! FMFAC =   1 !   !END!
 28 ! SRCNAM = S029 !
   28 ! X =    1405.9563,   -684.0111,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 28 ! SIGYZI =   0, 0 !
 28 ! ZPLTFM =   .0 !
 28 ! FMFAC =   1 !   !END!
 29 ! SRCNAM = S030 !
   29 ! X =    1405.9621,   -684.0066,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 29 ! SIGYZI =   0, 0 !
 29 ! ZPLTFM =   .0 !
 29 ! FMFAC =   1 !   !END!
 30 ! SRCNAM = S031 !
   30 ! X =    1405.9678,   -684.0021,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
```

```
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 30 ! SIGYZI =   0, 0 !
 30 ! ZPLTFM =   .0 !
 30 ! FMFAC =   1 !   !END!
 31 ! SRCNAM = S032 !
   31 ! X =    1406.0042,   -683.9673,    19.812, 65.532,       0.4572,   10.06145,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.3,   0.075,   0.075,   0.075,   0.075,   0,   0,   0,   0!
 31 ! SIGYZI =   0, 0 !
 31 ! ZPLTFM =   .0 !
 31 ! FMFAC =   1 !   !END!
 32 ! SRCNAM = BLR3 !
   32 ! X =    1405.7292,   -684.127,    8.8392, 65.532,       0.3556,   7.187184,  466.4933,
0.,
     0.01,   0,   0.14,   0,   0,   0.075,   0,   0,   0,   0,   0,   0,   0.0375,   0.0375!
 32 ! SIGYZI =   0, 0 !
 32 ! ZPLTFM =   .0 !
 32 ! FMFAC =   1 !   !END!
 33 ! SRCNAM = S033 !
   33 ! X =    1405.7553,   -684.0887,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 33 ! SIGYZI =   0, 0 !
 33 ! ZPLTFM =   .0 !
 33 ! FMFAC =   1 !   !END!
 34 ! SRCNAM = S034 !
   34 ! X =    1405.7632,   -684.0824,    54.864, 65.532,       0.9144,   33.05861,  369.8267,
0.,
     0.5,   0,   8.3,   0,   0,   4.543,   0,   0,   0,   0,   1.4196,   1.4196,   0.8518,
0.8518!
 34 ! SIGYZI =   0, 0 !
 34 ! ZPLTFM =   .0 !
 34 ! FMFAC =   1 !   !END!
 35 ! SRCNAM = S035 !
   35 ! X =    1405.7703,   -684.0733,    48.768, 65.532,       0.7112,   26.1366,  299.8267,
0.,
     0,   0,   0,   0,   0,   1.629,   0.4071,   0.4071,   0.4071,   0.4071,   0,   0,   0,   0!
 35 ! SIGYZI =   0, 0 !
 35 ! ZPLTFM =   .0 !
 35 ! FMFAC =   1 !   !END!
 36 ! SRCNAM = S037 !
   36 ! X =    1405.7836,   -684.0588,    74.676, 65.532,       1.2192,   25.46909,  344.2711,
0.,
     34.25,   0.4,   121,   0,   0,   2.759,   0,   0,   0,   0,   0,   0,   1.1798,   1.1798!
 36 ! SIGYZI =   0, 0 !
 36 ! ZPLTFM =   .0 !
 36 ! FMFAC =   1 !   !END!
 37 ! SRCNAM = S038 !
   37 ! X =    1405.8609,   -684.0162,    38.1, 65.532,       0.4826,   5.160264,  338.7155,
0.,
     0,   0,   0,   0,   0,   0.129,   0.0321,   0.0321,   0.0321,   0.0321,   0,   0,   0,   0!
 37 ! SIGYZI =   0, 0 !
 37 ! ZPLTFM =   .0 !
 37 ! FMFAC =   1 !   !END!
 38 ! SRCNAM = S039 !
   38 ! X =    1405.9733,   -683.9974,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 38 ! SIGYZI =   0, 0 !
 38 ! ZPLTFM =   .0 !
 38 ! FMFAC =   1 !   !END!
 39 ! SRCNAM = S040 !
   39 ! X =    1405.9792,   -683.993,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 39 ! SIGYZI =   0, 0 !
 39 ! ZPLTFM =   .0 !
 39 ! FMFAC =   1 !   !END!
 40 ! SRCNAM = S041 !
   40 ! X =    1405.9849,   -683.9885,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 40 ! SIGYZI =   0, 0 !
 40 ! ZPLTFM =   .0 !
 40 ! FMFAC =   1 !   !END!
 41 ! SRCNAM = S042 !
   41 ! X =    1405.9908,   -683.9839,    29.1084, 68.58,       0.508,   2.328672,  299.8267,
0.,
     0,   0,   0,   0,   0,   0.086,   0.0214,   0.0214,   0.0214,   0.0214,   0,   0,   0,   0!
 41 ! SIGYZI =   0, 0 !
 41 ! ZPLTFM =   .0 !
 41 ! FMFAC =   1 !   !END!
```

```
 42 ! SRCNAM = BLR4 !
   42 ! X =    1405.7142,   -684.1075,    8.8392, 65.532,       0.4572,   7.187184,  466.4933,
0.,
     0.01,   0,   0.14,   0,   0,   0.075,   0,   0,   0,   0,   0,   0,   0.0375,   0.0375!
 42 ! SIGYZI =   0, 0 !
 42 ! ZPLTFM =   .0 !
 42 ! FMFAC =   1 !   !END!

--------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

     SRCNAM  is a 12-character name for a source
             (No default)
     X       is an array holding the source data listed by the column headings
             (No default)
     SIGYZI  is an array holding the initial sigma-y and sigma-z (m)
             (Default: 0.,0.)
     FMFAC   is a vertical momentum flux factor (0. or 1.0) used to represent
             the effect of rain-caps or other physical configurations that
             reduce momentum rise associated with the actual exit velocity.
             (Default: 1.0  -- full momentum used)
     ZPLTFM  is the platform height (m) for sources influenced by an isolated
             structure that has a significant open area between the surface
             and the bulk of the structure, such as an offshore oil platform.
             The Base Elevation is that of the surface (ground or ocean),
             and the Stack Height is the release height above the Base (not
             above the platform).  Building heights entered in Subgroup 13c
             must be those of the buildings on the platform, measured from
             the platform deck.  ZPLTFM is used only with MBDW=1 (ISC
             downwash method) for sources with building downwash.
             (Default: 0.0)

    b
     0. = No building downwash modeled
     1. = Downwash modeled for buildings resting on the surface
     2. = Downwash modeled for buildings raised above the surface (ZPLTFM > 0.)
     NOTE: must be entered as a REAL number (i.e., with decimal point)

    c
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IPTU
     (e.g. 1 for g/s).

---------------
Subgroup (13c)
---------------

           BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH
           -------------------------------------------------------
Source                                                                    a
 No.       Effective building height, width, length and X/Y offset (in meters)
           every 10 degrees.  LENGTH, XBADJ, and YBADJ are only needed for
           MBDW=2 (PRIME downwash option)
------     --------------------------------------------------------------------
 1    * SRCNAM  =   1 *
 1    * HEIGHT  =  50.0,   50.0,   50.0,   50.0,   50.0,   50.0,
                   50.0,   50.0,   50.0,   50.0,   50.0,   50.0,
                   50.0,   50.0,   50.0,   50.0,   50.0,   50.0,
                   50.0,   50.0,   50.0,   50.0,   50.0,   50.0,
                   50.0,   50.0,   50.0,   50.0,   50.0,   50.0,
                   50.0,   50.0,   50.0,   50.0,   50.0,   50.0 *
 1    * WIDTH  =   62.26,   72.64,   80.8,   86.51,   89.59,   89.95,
                   87.58,   82.54,   75.0,   82.54,   87.58,   89.95,
                   89.59,   86.51,   80.8,   72.64,   62.26,   50.0,
                   62.26,   72.64,   80.8,   86.51,   89.59,   89.95,
                   87.58,   82.54,   75.0,   82.54,   87.58,   89.95,
                   89.59,   86.51,   80.8,   72.64,   62.26,   50.0 *
 1  *  LENGTH =  82.54,  87.58,  89.95,  89.59,  86.51,  80.80,
                 72.64,  62.26,  50.00,  62.26,  72.64,  80.80,
                 86.51,  89.59,  89.95,  87.58,  82.54,  75.00,
                 82.54,  87.58,  89.95,  89.59,  86.51,  80.80,
                 72.64,  62.26,  50.00,  62.26,  72.64,  80.80,
                 86.51,  89.59,  89.95,  87.58,  82.54,  75.00 *
 1  *  XBADJ =  -47.35, -55.76, -62.48, -67.29, -70.07, -70.71,
                -69.21, -65.60, -60.00, -65.60, -69.21, -70.71,
                -70.07, -67.29, -62.48, -55.76, -47.35, -37.50,
                -35.19, -31.82, -27.48, -22.30, -16.44, -10.09,
                 -3.43,   3.34,  10.00,   3.34,  -3.43, -10.09,
                -16.44, -22.30, -27.48, -31.82, -35.19, -37.50 *
```

```
 1  *  YBADJ =   34.47,  32.89,  30.31,  26.81,  22.50,  17.50,
                 11.97,   6.08,   0.00,  -6.08, -11.97, -17.50,
                -22.50, -26.81, -30.31, -32.89, -34.47, -35.00,
                -34.47, -32.89, -30.31, -26.81, -22.50, -17.50,
                -11.97,  -6.08,   0.00,   6.08,  11.97,  17.50,
                 22.50,  26.81,  30.31,  32.89,  34.47,  35.00 *
*END*

--------

    a
     Building height, width, length, and X/Y offset from the source are treated
     as a separate input subgroup for each source and therefore must end with
     an input group terminator.  The X/Y offset is the position, relative to the
     stack, of the center of the upwind face of the projected building, with the
     x-axis pointing along the flow direction.

---------------
Subgroup (13d)
---------------
                                                                a
          POINT SOURCE: VARIABLE EMISSIONS DATA
          ---------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 13b.  Factors entered multiply the rates in 13b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------


INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters
--------------------------------

---------------
Subgroup (14a)
---------------

     Number of polygon area sources with
     parameters specified below (NAR1)       No default  !  NAR1 =  0   !

     Units used for area source
     emissions below            (IARU)       Default: 1  !  IARU =   1  !
           1 =        g/m**2/s
           2 =       kg/m**2/hr
           3 =       lb/m**2/hr
           4 =     tons/m**2/yr
           5 =     Odour Unit * m/s  (vol. flux/m**2 of odour compound)
           6 =     Odour Unit * m/min
           7 =     metric tons/m**2/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  !  NSAR1 =  0  !

     Number of buoyant polygon area sources
     with variable location and emission
```

```
     parameters (NAR2)                        No default  !  NAR2 =  0   !
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                                    a
          AREA SOURCE: CONSTANT DATA
          ----------------------------
                                                                       b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

           COORDINATES (km) FOR EACH VERTEX(4) OF EACH POLYGON
           --------------------------------------------------------
Source                                                               a
 No.       Ordered list of X followed by list of Y, grouped by source
------     ------------------------------------------------------------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.


---------------
Subgroup (14d)
---------------
                                                              a
          AREA SOURCE: VARIABLE EMISSIONS DATA
          ------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 14b.  Factors entered multiply the rates in 14b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                  Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------
```

```
INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
--------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                             No default  !  NLN2 =  0   !

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)        No default   ! NLINES =  0  !

     Units used for line source
     emissions below               (ILNU)          Default: 1  !  ILNU =   1  !
           1 =       g/s
           2 =      kg/hr
           3 =      lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)       (NSLN1) Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                            Default: 7   ! MXNSEG =  7  !

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.

        Number of distances at which               Default: 6   ! NLRISE =  6  !
        transitional rise is computed

        Average building length (XL)               No default   ! XL = 0. !
                                                   (in meters)

        Average building height (HBL)              No default   ! HBL = 0. !
                                                   (in meters)

        Average building width (WBL)               No default   ! WBL = 0. !
                                                   (in meters)

        Average line source width (WML)            No default   ! WML = 0. !
                                                   (in meters)

        Average separation between buildings (DXL)  No default   ! DXL = 0. !
                                                   (in meters)

        Average buoyancy parameter (FPRIMEL)       No default   ! FPRIMEL = 0. !
                                                   (in m**4/s**3)

!END!

---------------
Subgroup (15b)
---------------

          BUOYANT LINE SOURCE: CONSTANT DATA
          ----------------------------------
                                                                                            a
Source     Beg. X      Beg. Y      End. X    End. Y     Release    Base        Emission
 No.     Coordinate  Coordinate  Coordinate Coordinate  Height    Elevation      Rates
            (km)        (km)        (km)      (km)        (m)       (m)
------   ----------  ----------  ---------  ----------  -------   ---------    ---------

--------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by ILNTU
```

```
     (e.g. 1 for g/s).

---------------
Subgroup (15c)
---------------
                                                        a
          BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA
          ----------------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 15b.  Factors entered multiply the rates in 15b.
     Skip sources here that have constant emissions.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                          Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------


INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters
---------------------------

---------------
Subgroup (16a)
---------------

     Number of volume sources with
     parameters provided in 16b,c (NVL1)     No default  !  NVL1 =  0   !

     Units used for volume source
     emissions below in 16b       (IVLU)     Default: 1  !  IVLU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  !  NSVL1 =  0  !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  !  NVL2 =   0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                          a
           VOLUME SOURCE: CONSTANT DATA
           ------------------------------
                                                                              b
         X           Y        Effect.    Base     Initial    Initial    Emission
     Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
```

```
        (km)       (km)        (m)       (m)        (m)       (m)
     ----------  ----------   ------    ------    --------   --------   --------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IVLU
     (e.g. 1 for g/s).

---------------
Subgroup (16c)
---------------
                                                  a
          VOLUME SOURCE: VARIABLE EMISSIONS DATA
          ----------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 16b.  Factors entered multiply the rates in 16b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information
-----------------------

---------------
Subgroup (17a)
---------------

     Number of non-gridded receptors (NREC)  No default  !  NREC =  804   !

!END!

---------------
Subgroup (17b)
---------------
                                                a
           NON-GRIDDED (DISCRETE) RECEPTOR DATA
           ------------------------------------

                   X            Y           Ground        Height   b
Receptor       Coordinate   Coordinate    Elevation   Above Ground
  No.             (km)         (km)          (m)           (m)
--------       ----------   ----------    ---------   ------------

 1 ! X =       1609.9180,     -633.6187,     0,       0 ! !END!cape romain begin
 2 ! X =       1610.6820,     -633.4711,     1,       0 ! !END!
 3 ! X =       1610.5061,     -632.5613,     1,       0 ! !END!
 4 ! X =       1611.2701,     -632.4136,     1,       0 ! !END!
 5 ! X =       1611.0941,     -631.5038,     1,       0 ! !END!
 6 ! X =       1611.8579,     -631.3560,     1,       0 ! !END!
 7 ! X =       1610.1544,     -630.7417,     1,       0 ! !END!
```

```
8 ! X =       1610.9181,     -630.5940,      1,       0 ! !END!
9 ! X =       1611.6819,     -630.4462,      1,       0 ! !END!
10 ! X =       1612.4456,     -630.2984,      1,       0 ! !END!
11 ! X =       1610.7422,     -629.6842,      1,       0 ! !END!
12 ! X =       1611.5058,     -629.5365,      1,       0 ! !END!
13 ! X =       1612.2695,     -629.3887,      1,       0 ! !END!
14 ! X =       1610.5662,     -628.7745,      0,       0 ! !END!
15 ! X =       1611.3298,     -628.6268,      1,       0 ! !END!
16 ! X =       1612.0934,     -628.4790,      1,       0 ! !END!
17 ! X =       1612.8569,     -628.3311,      1,       0 ! !END!
18 ! X =       1610.3903,     -627.8648,      1,       0 ! !END!
19 ! X =       1611.1538,     -627.7171,      1,       0 ! !END!
20 ! X =       1610.2143,     -626.9550,      1,       0 ! !END!
21 ! X =       1610.9777,     -626.8074,      1,       0 ! !END!
22 ! X =       1611.7411,     -626.6596,      1,       0 ! !END!
23 ! X =       1610.8017,     -625.8977,      1,       0 ! !END!
24 ! X =       1611.5650,     -625.7499,      1,       0 ! !END!
25 ! X =       1610.6257,     -624.9880,      1,       0 ! !END!
26 ! X =       1611.3889,     -624.8403,      2,       0 ! !END!
27 ! X =       1612.1521,     -624.6925,      1,       0 ! !END!
28 ! X =       1615.9680,     -623.9524,      0,       0 ! !END!
29 ! X =       1611.2128,     -623.9306,      1,       0 ! !END!
30 ! X =       1611.9759,     -623.7828,      1,       0 ! !END!
31 ! X =       1616.5544,     -622.8947,      0,       0 ! !END!
32 ! X =       1611.0367,     -623.0210,      1,       0 ! !END!
33 ! X =       1611.7997,     -622.8732,      1,       0 ! !END!
34 ! X =       1612.3865,     -621.8158,      1,       0 ! !END!
35 ! X =       1613.1494,     -621.6679,      1,       0 ! !END!
36 ! X =       1617.7267,     -620.7791,      0,       0 ! !END!
37 ! X =       1612.9731,     -620.7584,      1,       0 ! !END!
38 ! X =       1613.7359,     -620.6104,      1,       0 ! !END!
39 ! X =       1621.9489,     -618.0691,      0,       0 ! !END!
40 ! X =       1622.7115,     -617.9203,      1,       0 ! !END!
41 ! X =       1623.4741,     -617.7715,      1,       0 ! !END!
42 ! X =       1614.1457,     -618.6434,      1,       0 ! !END!
43 ! X =       1623.2965,     -616.8622,      1,       0 ! !END!
44 ! X =       1624.0590,     -616.7133,      1,       0 ! !END!
45 ! X =       1624.8215,     -616.5643,      1,       0 ! !END!
46 ! X =       1625.5839,     -616.4153,      1,       0 ! !END!
47 ! X =       1633.2077,     -614.9212,      1,       0 ! !END!
48 ! X =       1633.9700,     -614.7714,      0,       0 ! !END!
49 ! X =       1614.7317,     -617.5859,      1,       0 ! !END!
50 ! X =       1621.5942,     -616.2504,      0,       0 ! !END!
51 ! X =       1622.3566,     -616.1017,      1,       0 ! !END!
52 ! X =       1623.1190,     -615.9529,      1,       0 ! !END!
53 ! X =       1623.8814,     -615.8040,      1,       0 ! !END!
54 ! X =       1624.6438,     -615.6551,      1,       0 ! !END!
55 ! X =       1625.4062,     -615.5061,      1,       0 ! !END!
56 ! X =       1626.1685,     -615.3570,      1,       0 ! !END!
57 ! X =       1626.9309,     -615.2078,      1,       0 ! !END!
58 ! X =       1627.6932,     -615.0586,      1,       0 ! !END!
59 ! X =       1628.4555,     -614.9093,      2,       0 ! !END!
60 ! X =       1629.2178,     -614.7599,      2,       0 ! !END!
61 ! X =       1629.9801,     -614.6105,      1,       0 ! !END!
62 ! X =       1630.7424,     -614.4610,      2,       0 ! !END!
63 ! X =       1631.5047,     -614.3114,      1,       0 ! !END!
64 ! X =       1633.7914,     -613.8623,      0,       0 ! !END!
65 ! X =       1615.3176,     -616.5284,      1,       0 ! !END!
66 ! X =       1616.0801,     -616.3802,      1,       0 ! !END!
67 ! X =       1616.8425,     -616.2320,      1,       0 ! !END!
68 ! X =       1620.6545,     -615.4898,      0,       0 ! !END!
69 ! X =       1621.4168,     -615.3411,      1,       0 ! !END!
70 ! X =       1622.1792,     -615.1924,      1,       0 ! !END!
71 ! X =       1622.9415,     -615.0436,      1,       0 ! !END!
72 ! X =       1623.7038,     -614.8948,      1,       0 ! !END!
73 ! X =       1624.4661,     -614.7458,      1,       0 ! !END!
74 ! X =       1625.2284,     -614.5968,      1,       0 ! !END!
75 ! X =       1628.2774,     -614.0002,      1,       0 ! !END!
76 ! X =       1629.0397,     -613.8508,      1,       0 ! !END!
77 ! X =       1632.0884,     -613.2527,      1,       0 ! !END!
78 ! X =       1634.3748,     -612.8034,      0,       0 ! !END!
79 ! X =       1619.7149,     -614.7290,      0,       0 ! !END!
80 ! X =       1620.4772,     -614.5805,      1,       0 ! !END!
81 ! X =       1621.2395,     -614.4318,      1,       0 ! !END!
82 ! X =       1622.0018,     -614.2831,      1,       0 ! !END!
83 ! X =       1622.7640,     -614.1344,      1,       0 ! !END!
84 ! X =       1623.5262,     -613.9855,      1,       0 ! !END!
85 ! X =       1624.2885,     -613.8366,      1,       0 ! !END!
86 ! X =       1625.0507,     -613.6876,      1,       0 ! !END!
87 ! X =       1625.8129,     -613.5386,      1,       0 ! !END!
88 ! X =       1626.5750,     -613.3895,      1,       0 ! !END!
89 ! X =       1627.3372,     -613.2403,      1,       0 ! !END!
90 ! X =       1629.6236,     -612.7923,      1,       0 ! !END!
```

```
91 ! X =       1630.3857,     -612.6428,     1,       0 ! !END!
92 ! X =       1631.1478,     -612.4933,     1,       0 ! !END!
93 ! X =       1631.9099,     -612.3437,     1,       0 ! !END!
94 ! X =       1634.1961,     -611.8944,     0,       0 ! !END!
95 ! X =       1618.7756,     -613.9682,     1,       0 ! !END!
96 ! X =       1619.5378,     -613.8197,     1,       0 ! !END!
97 ! X =       1620.3000,     -613.6712,     1,       0 ! !END!
98 ! X =       1621.0622,     -613.5226,     1,       0 ! !END!
99 ! X =       1621.8243,     -613.3739,     1,       0 ! !END!
100 ! X =       1622.5865,     -613.2251,     1,       0 ! !END!
101 ! X =       1623.3487,     -613.0763,     1,       0 ! !END!
102 ! X =       1624.1108,     -612.9274,     1,       0 ! !END!
103 ! X =       1624.8729,     -612.7784,     1,       0 ! !END!
104 ! X =       1625.6350,     -612.6294,     1,       0 ! !END!
105 ! X =       1626.3971,     -612.4803,     1,       0 ! !END!
106 ! X =       1627.1592,     -612.3311,     1,       0 ! !END!
107 ! X =       1627.9213,     -612.1819,     1,       0 ! !END!
108 ! X =       1628.6833,     -612.0326,     1,       0 ! !END!
109 ! X =       1629.4453,     -611.8832,     1,       0 ! !END!
110 ! X =       1630.2074,     -611.7337,     1,       0 ! !END!
111 ! X =       1630.9694,     -611.5842,     1,       0 ! !END!
112 ! X =       1634.0173,     -610.9854,     0,       0 ! !END!
113 ! X =       1620.1227,     -612.7619,     1,       0 ! !END!
114 ! X =       1620.8848,     -612.6133,     1,       0 ! !END!
115 ! X =       1621.6469,     -612.4646,     1,       0 ! !END!
116 ! X =       1622.4090,     -612.3159,     1,       0 ! !END!
117 ! X =       1623.1711,     -612.1671,     1,       0 ! !END!
118 ! X =       1623.9331,     -612.0182,     1,       0 ! !END!
119 ! X =       1624.6952,     -611.8693,     1,       0 ! !END!
120 ! X =       1625.4572,     -611.7202,     1,       0 ! !END!
121 ! X =       1626.2192,     -611.5711,     1,       0 ! !END!
122 ! X =       1626.9812,     -611.4220,     1,       0 ! !END!
123 ! X =       1627.7432,     -611.2728,     1,       0 ! !END!
124 ! X =       1628.5051,     -611.1235,     1,       0 ! !END!
125 ! X =       1633.0767,     -610.2262,     0,       0 ! !END!
126 ! X =       1633.8385,     -610.0764,     1,       0 ! !END!
127 ! X =       1634.6004,     -609.9266,     1,       0 ! !END!
128 ! X =       1621.4695,     -611.5554,     1,       0 ! !END!
129 ! X =       1622.2315,     -611.4067,     1,       0 ! !END!
130 ! X =       1622.9935,     -611.2579,     1,       0 ! !END!
131 ! X =       1623.7555,     -611.1090,     1,       0 ! !END!
132 ! X =       1624.5174,     -610.9601,     1,       0 ! !END!
133 ! X =       1625.2793,     -610.8111,     1,       0 ! !END!
134 ! X =       1626.0413,     -610.6620,     1,       0 ! !END!
135 ! X =       1626.8032,     -610.5129,     1,       0 ! !END!
136 ! X =       1627.5651,     -610.3637,     1,       0 ! !END!
137 ! X =       1628.3270,     -610.2144,     1,       0 ! !END!
138 ! X =       1629.0888,     -610.0650,     1,       0 ! !END!
139 ! X =       1629.8507,     -609.9156,     1,       0 ! !END!
140 ! X =       1630.6126,     -609.7661,     1,       0 ! !END!
141 ! X =       1634.4216,     -609.0176,     0,       0 ! !END!
142 ! X =       1624.3397,     -610.0509,     1,       0 ! !END!
143 ! X =       1625.1015,     -609.9019,     1,       0 ! !END!
144 ! X =       1625.8634,     -609.7529,     1,       0 ! !END!
145 ! X =       1626.6252,     -609.6038,     1,       0 ! !END!
146 ! X =       1627.3870,     -609.4546,     1,       0 ! !END!
147 ! X =       1628.1488,     -609.3053,     1,       0 ! !END!
148 ! X =       1628.9106,     -609.1560,     1,       0 ! !END!
149 ! X =       1629.6724,     -609.0066,     1,       0 ! !END!
150 ! X =       1630.4341,     -608.8571,     1,       0 ! !END!
151 ! X =       1634.2427,     -608.1087,     0,       0 ! !END!
152 ! X =       1628.7324,     -608.2469,     1,       0 ! !END!
153 ! X =       1629.4940,     -608.0975,     1,       0 ! !END!
154 ! X =       1630.2557,     -607.9481,     1,       0 ! !END!
155 ! X =       1631.0174,     -607.7985,     1,       0 ! !END!
156 ! X =       1629.3157,     -607.1885,     1,       0 ! !END!
157 ! X =       1630.0773,     -607.0391,     1,       0 ! !END!
158 ! X =       1630.8389,     -606.8896,     1,       0 ! !END!
159 ! X =       1631.6005,     -606.7400,     1,       0 ! !END!
160 ! X =       1629.8989,     -606.1301,     1,       0 ! !END!
161 ! X =       1630.6604,     -605.9806,     1,       0 ! !END!
162 ! X =       1631.4219,     -605.8310,     1,       0 ! !END!
163 ! X =       1629.7205,     -605.2211,     1,       0 ! !END!
164 ! X =       1630.4819,     -605.0716,     1,       0 ! !END!cape romain end
165 ! X =       1418.3215,     -931.1034,     36,       0 ! !END!okefenokee begin
166 ! X =       1419.9041,     -930.8431,     36,       0 ! !END!
167 ! X =       1400.6116,     -932.1086,     27,       0 ! !END!
168 ! X =       1402.1943,     -931.8516,     27,       0 ! !END!
169 ! X =       1403.7771,     -931.5943,     30,       0 ! !END!
170 ! X =       1405.3597,     -931.3367,     36,       0 ! !END!
171 ! X =       1406.9424,     -931.0788,     36,       0 ! !END!
172 ! X =       1408.5250,     -930.8206,     36,       0 ! !END!
173 ! X =       1410.1075,     -930.5621,     37,       0 ! !END!
```

```
174 ! X =       1411.6900,     -930.3034,     36,        0 ! !END!
175 ! X =       1413.2724,     -930.0443,     36,        0 ! !END!
176 ! X =       1414.8548,     -929.7850,     36,        0 ! !END!
177 ! X =       1416.4371,     -929.5254,     36,        0 ! !END!
178 ! X =       1418.0194,     -929.2655,     36,        0 ! !END!
179 ! X =       1419.6017,     -929.0053,     36,        0 ! !END!
180 ! X =       1421.1839,     -928.7448,     36,        0 ! !END!
181 ! X =       1397.1482,     -930.7832,     27,        0 ! !END!
182 ! X =       1398.7307,     -930.5268,     27,        0 ! !END!
183 ! X =       1400.3132,     -930.2702,     30,        0 ! !END!
184 ! X =       1401.8956,     -930.0132,     27,        0 ! !END!
185 ! X =       1403.4780,     -929.7559,     31,        0 ! !END!
186 ! X =       1405.0604,     -929.4984,     36,        0 ! !END!
187 ! X =       1406.6427,     -929.2406,     36,        0 ! !END!
188 ! X =       1408.2249,     -928.9825,     36,        0 ! !END!
189 ! X =       1409.8071,     -928.7240,     36,        0 ! !END!
190 ! X =       1411.3893,     -928.4653,     36,        0 ! !END!
191 ! X =       1412.9714,     -928.2063,     36,        0 ! !END!
192 ! X =       1414.5534,     -927.9471,     36,        0 ! !END!
193 ! X =       1416.1354,     -927.6875,     36,        0 ! !END!
194 ! X =       1417.7174,     -927.4276,     36,        0 ! !END!
195 ! X =       1419.2993,     -927.1675,     36,        0 ! !END!
196 ! X =       1420.8812,     -926.9070,     36,        0 ! !END!
197 ! X =       1422.4630,     -926.6463,     36,        0 ! !END!
198 ! X =       1395.2683,     -929.2008,     27,        0 ! !END!
199 ! X =       1396.8505,     -928.9447,     30,        0 ! !END!
200 ! X =       1398.4327,     -928.6884,     31,        0 ! !END!
201 ! X =       1400.0149,     -928.4318,     32,        0 ! !END!
202 ! X =       1401.5970,     -928.1749,     27,        0 ! !END!
203 ! X =       1403.1790,     -927.9177,     27,        0 ! !END!
204 ! X =       1404.7610,     -927.6602,     36,        0 ! !END!
205 ! X =       1406.3430,     -927.4024,     36,        0 ! !END!
206 ! X =       1407.9249,     -927.1444,     36,        0 ! !END!
207 ! X =       1409.5067,     -926.8860,     36,        0 ! !END!
208 ! X =       1411.0886,     -926.6274,     36,        0 ! !END!
209 ! X =       1412.6703,     -926.3684,     36,        0 ! !END!
210 ! X =       1414.2520,     -926.1092,     36,        0 ! !END!
211 ! X =       1415.8337,     -925.8497,     36,        0 ! !END!
212 ! X =       1417.4153,     -925.5899,     36,        0 ! !END!
213 ! X =       1418.9969,     -925.3298,     37,        0 ! !END!
214 ! X =       1420.5784,     -925.0694,     36,        0 ! !END!
215 ! X =       1393.3890,     -927.6180,     27,        0 ! !END!
216 ! X =       1394.9710,     -927.3623,     27,        0 ! !END!
217 ! X =       1396.5529,     -927.1063,     27,        0 ! !END!
218 ! X =       1398.1347,     -926.8501,     27,        0 ! !END!
219 ! X =       1399.7165,     -926.5935,     30,        0 ! !END!
220 ! X =       1401.2983,     -926.3367,     34,        0 ! !END!
221 ! X =       1402.8800,     -926.0795,     36,        0 ! !END!
222 ! X =       1404.4617,     -925.8221,     36,        0 ! !END!
223 ! X =       1406.0433,     -925.5644,     36,        0 ! !END!
224 ! X =       1407.6249,     -925.3063,     36,        0 ! !END!
225 ! X =       1409.2064,     -925.0480,     36,        0 ! !END!
226 ! X =       1410.7879,     -924.7895,     36,        0 ! !END!
227 ! X =       1412.3693,     -924.5306,     36,        0 ! !END!
228 ! X =       1413.9507,     -924.2714,     36,        0 ! !END!
229 ! X =       1415.5320,     -924.0119,     36,        0 ! !END!
230 ! X =       1417.1133,     -923.7522,     36,        0 ! !END!
231 ! X =       1420.2757,     -923.2318,     36,        0 ! !END!
232 ! X =       1393.0921,     -925.7796,     33,        0 ! !END!
233 ! X =       1394.6737,     -925.5239,     38,        0 ! !END!
234 ! X =       1396.2552,     -925.2680,     29,        0 ! !END!
235 ! X =       1397.8367,     -925.0118,     32,        0 ! !END!
236 ! X =       1399.4182,     -924.7553,     36,        0 ! !END!
237 ! X =       1400.9996,     -924.4985,     36,        0 ! !END!
238 ! X =       1402.5810,     -924.2414,     36,        0 ! !END!
239 ! X =       1404.1623,     -923.9840,     37,        0 ! !END!
240 ! X =       1405.7436,     -923.7264,     38,        0 ! !END!
241 ! X =       1407.3249,     -923.4684,     37,        0 ! !END!
242 ! X =       1408.9060,     -923.2102,     37,        0 ! !END!
243 ! X =       1410.4872,     -922.9516,     36,        0 ! !END!
244 ! X =       1412.0683,     -922.6928,     36,        0 ! !END!
245 ! X =       1413.6493,     -922.4337,     36,        0 ! !END!
246 ! X =       1415.2303,     -922.1743,     36,        0 ! !END!
247 ! X =       1416.8113,     -921.9146,     36,        0 ! !END!
248 ! X =       1419.9730,     -921.3943,     36,        0 ! !END!
249 ! X =       1421.5538,     -921.1338,     36,        0 ! !END!
250 ! X =       1392.7951,     -923.9412,     38,        0 ! !END!
251 ! X =       1394.3764,     -923.6856,     37,        0 ! !END!
252 ! X =       1395.9576,     -923.4298,     38,        0 ! !END!
253 ! X =       1397.5388,     -923.1736,     36,        0 ! !END!
254 ! X =       1399.1199,     -922.9172,     36,        0 ! !END!
255 ! X =       1400.7010,     -922.6604,     36,        0 ! !END!
256 ! X =       1402.2820,     -922.4034,     38,        0 ! !END!
```

```
257 ! X =       1403.8630,     -922.1461,     38,        0 ! !END!
258 ! X =       1405.4440,     -921.8884,     37,        0 ! !END!
259 ! X =       1407.0249,     -921.6305,     37,        0 ! !END!
260 ! X =       1408.6057,     -921.3724,     36,        0 ! !END!
261 ! X =       1410.1865,     -921.1139,     36,        0 ! !END!
262 ! X =       1411.7673,     -920.8551,     36,        0 ! !END!
263 ! X =       1413.3480,     -920.5960,     36,        0 ! !END!
264 ! X =       1414.9286,     -920.3367,     36,        0 ! !END!
265 ! X =       1416.5092,     -920.0771,     36,        0 ! !END!
266 ! X =       1418.0898,     -919.8171,     36,        0 ! !END!
267 ! X =       1419.6703,     -919.5569,     36,        0 ! !END!
268 ! X =       1392.4981,     -922.1029,     37,        0 ! !END!
269 ! X =       1394.0791,     -921.8474,     38,        0 ! !END!
270 ! X =       1395.6600,     -921.5916,     38,        0 ! !END!
271 ! X =       1397.2408,     -921.3355,     38,        0 ! !END!
272 ! X =       1398.8216,     -921.0791,     36,        0 ! !END!
273 ! X =       1400.4024,     -920.8224,     36,        0 ! !END!
274 ! X =       1401.9831,     -920.5654,     36,        0 ! !END!
275 ! X =       1403.5637,     -920.3082,     36,        0 ! !END!
276 ! X =       1405.1443,     -920.0506,     36,        0 ! !END!
277 ! X =       1406.7249,     -919.7928,     36,        0 ! !END!
278 ! X =       1408.3054,     -919.5346,     36,        0 ! !END!
279 ! X =       1409.8858,     -919.2762,     36,        0 ! !END!
280 ! X =       1411.4663,     -919.0175,     36,        0 ! !END!
281 ! X =       1413.0466,     -918.7585,     36,        0 ! !END!
282 ! X =       1414.6270,     -918.4992,     36,        0 ! !END!
283 ! X =       1416.2072,     -918.2396,     36,        0 ! !END!
284 ! X =       1417.7875,     -917.9797,     36,        0 ! !END!
285 ! X =       1419.3676,     -917.7196,     36,        0 ! !END!
286 ! X =       1420.9478,     -917.4591,     36,        0 ! !END!
287 ! X =       1393.7818,     -920.0093,     37,        0 ! !END!
288 ! X =       1395.3624,     -919.7535,     36,        0 ! !END!
289 ! X =       1396.9429,     -919.4974,     36,        0 ! !END!
290 ! X =       1398.5233,     -919.2411,     36,        0 ! !END!
291 ! X =       1400.1037,     -918.9845,     36,        0 ! !END!
292 ! X =       1401.6841,     -918.7276,     36,        0 ! !END!
293 ! X =       1403.2644,     -918.4703,     36,        0 ! !END!
294 ! X =       1404.8447,     -918.2128,     36,        0 ! !END!
295 ! X =       1406.4249,     -917.9550,     36,        0 ! !END!
296 ! X =       1408.0051,     -917.6970,     36,        0 ! !END!
297 ! X =       1409.5852,     -917.4386,     36,        0 ! !END!
298 ! X =       1411.1653,     -917.1799,     36,        0 ! !END!
299 ! X =       1412.7453,     -916.9210,     36,        0 ! !END!
300 ! X =       1414.3253,     -916.6617,     36,        0 ! !END!
301 ! X =       1415.9052,     -916.4022,     36,        0 ! !END!
302 ! X =       1417.4851,     -916.1424,     36,        0 ! !END!
303 ! X =       1391.9043,     -918.4266,     37,        0 ! !END!
304 ! X =       1393.4845,     -918.1712,     36,        0 ! !END!
305 ! X =       1395.0648,     -917.9155,     36,        0 ! !END!
306 ! X =       1396.6449,     -917.6595,     36,        0 ! !END!
307 ! X =       1398.2250,     -917.4032,     36,        0 ! !END!
308 ! X =       1399.8051,     -917.1466,     36,        0 ! !END!
309 ! X =       1401.3851,     -916.8897,     36,        0 ! !END!
310 ! X =       1402.9651,     -916.6326,     36,        0 ! !END!
311 ! X =       1404.5451,     -916.3751,     36,        0 ! !END!
312 ! X =       1406.1249,     -916.1174,     36,        0 ! !END!
313 ! X =       1407.7048,     -915.8594,     36,        0 ! !END!
314 ! X =       1409.2846,     -915.6011,     36,        0 ! !END!
315 ! X =       1410.8643,     -915.3425,     36,        0 ! !END!
316 ! X =       1412.4440,     -915.0836,     36,        0 ! !END!
317 ! X =       1414.0237,     -914.8244,     36,        0 ! !END!
318 ! X =       1415.6033,     -914.5649,     36,        0 ! !END!
319 ! X =       1417.1828,     -914.3051,     36,        0 ! !END!
320 ! X =       1393.1873,     -916.3332,     36,        0 ! !END!
321 ! X =       1394.7672,     -916.0775,     36,        0 ! !END!
322 ! X =       1396.3470,     -915.8216,     36,        0 ! !END!
323 ! X =       1397.9268,     -915.5654,     36,        0 ! !END!
324 ! X =       1399.5065,     -915.3088,     36,        0 ! !END!
325 ! X =       1401.0862,     -915.0520,     36,        0 ! !END!
326 ! X =       1402.6659,     -914.7949,     36,        0 ! !END!
327 ! X =       1404.2455,     -914.5375,     36,        0 ! !END!
328 ! X =       1405.8250,     -914.2798,     36,        0 ! !END!
329 ! X =       1407.4045,     -914.0219,     36,        0 ! !END!
330 ! X =       1408.9840,     -913.7636,     36,        0 ! !END!
331 ! X =       1410.5634,     -913.5051,     36,        0 ! !END!
332 ! X =       1412.1427,     -913.2462,     36,        0 ! !END!
333 ! X =       1413.7220,     -912.9871,     36,        0 ! !END!
334 ! X =       1415.3013,     -912.7277,     36,        0 ! !END!
335 ! X =       1416.8805,     -912.4680,     36,        0 ! !END!
336 ! X =       1392.8901,     -914.4953,     36,        0 ! !END!
337 ! X =       1394.4696,     -914.2397,     36,        0 ! !END!
338 ! X =       1396.0491,     -913.9838,     36,        0 ! !END!
339 ! X =       1397.6285,     -913.7276,     36,        0 ! !END!
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```
340 ! X =       1399.2079,     -913.4711,     36,       0 ! !END!
341 ! X =       1400.7873,     -913.2144,     36,       0 ! !END!
342 ! X =       1402.3666,     -912.9573,     36,       0 ! !END!
343 ! X =       1403.9459,     -912.7000,     36,       0 ! !END!
344 ! X =       1405.5251,     -912.4424,     36,       0 ! !END!
345 ! X =       1407.1042,     -912.1844,     36,       0 ! !END!
346 ! X =       1408.6833,     -911.9262,     36,       0 ! !END!
347 ! X =       1410.2624,     -911.6677,     36,       0 ! !END!
348 ! X =       1411.8414,     -911.4090,     36,       0 ! !END!
349 ! X =       1413.4204,     -911.1499,     36,       0 ! !END!
350 ! X =       1414.9993,     -910.8905,     36,       0 ! !END!
351 ! X =       1416.5782,     -910.6309,     36,       0 ! !END!
352 ! X =       1418.1570,     -910.3709,     36,       0 ! !END!
353 ! X =       1419.7358,     -910.1107,     36,       0 ! !END!
354 ! X =       1392.5928,     -912.6574,     36,       0 ! !END!
355 ! X =       1394.1720,     -912.4019,     36,       0 ! !END!
356 ! X =       1395.7512,     -912.1460,     36,       0 ! !END!
357 ! X =       1397.3303,     -911.8899,     36,       0 ! !END!
358 ! X =       1398.9094,     -911.6335,     36,       0 ! !END!
359 ! X =       1400.4884,     -911.3768,     37,       0 ! !END!
360 ! X =       1402.0673,     -911.1198,     37,       0 ! !END!
361 ! X =       1403.6463,     -910.8625,     36,       0 ! !END!
362 ! X =       1405.2251,     -910.6049,     36,       0 ! !END!
363 ! X =       1406.8040,     -910.3471,     36,       0 ! !END!
364 ! X =       1408.3827,     -910.0889,     36,       0 ! !END!
365 ! X =       1409.9615,     -909.8305,     36,       0 ! !END!
366 ! X =       1411.5402,     -909.5718,     36,       0 ! !END!
367 ! X =       1413.1188,     -909.3127,     36,       0 ! !END!
368 ! X =       1414.6974,     -909.0534,     36,       0 ! !END!
369 ! X =       1416.2759,     -908.7938,     36,       0 ! !END!
370 ! X =       1417.8544,     -908.5339,     36,       0 ! !END!
371 ! X =       1419.4329,     -908.2738,     36,       0 ! !END!
372 ! X =       1397.0321,     -910.0523,     36,       0 ! !END!
373 ! X =       1398.6108,     -909.7959,     37,       0 ! !END!
374 ! X =       1400.1895,     -909.5393,     36,       0 ! !END!
375 ! X =       1401.7681,     -909.2823,     37,       0 ! !END!
376 ! X =       1403.3467,     -909.0251,     36,       0 ! !END!
377 ! X =       1404.9252,     -908.7676,     36,       0 ! !END!
378 ! X =       1406.5037,     -908.5098,     36,       0 ! !END!
379 ! X =       1408.0822,     -908.2517,     36,       0 ! !END!
380 ! X =       1409.6606,     -907.9933,     36,       0 ! !END!
381 ! X =       1411.2389,     -907.7346,     36,       0 ! !END!
382 ! X =       1412.8172,     -907.4757,     36,       0 ! !END!
383 ! X =       1414.3955,     -907.2164,     36,       0 ! !END!
384 ! X =       1415.9737,     -906.9569,     36,       0 ! !END!
385 ! X =       1417.5518,     -906.6970,     36,       0 ! !END!
386 ! X =       1419.1299,     -906.4369,     36,       0 ! !END!
387 ! X =       1396.7339,     -908.2147,     37,       0 ! !END!
388 ! X =       1398.3123,     -907.9584,     36,       0 ! !END!
389 ! X =       1399.8906,     -907.7018,     37,       0 ! !END!
390 ! X =       1401.4689,     -907.4450,     36,       0 ! !END!
391 ! X =       1403.0471,     -907.1878,     36,       0 ! !END!
392 ! X =       1404.6253,     -906.9303,     36,       0 ! !END!
393 ! X =       1406.2035,     -906.6726,     36,       0 ! !END!
394 ! X =       1407.7816,     -906.4145,     36,       0 ! !END!
395 ! X =       1409.3597,     -906.1562,     36,       0 ! !END!
396 ! X =       1410.9377,     -905.8976,     36,       0 ! !END!
397 ! X =       1412.5156,     -905.6387,     36,       0 ! !END!
398 ! X =       1414.0935,     -905.3795,     36,       0 ! !END!
399 ! X =       1415.6714,     -905.1200,     36,       0 ! !END!
400 ! X =       1417.2492,     -904.8602,     36,       0 ! !END!
401 ! X =       1418.8270,     -904.6002,     37,       0 ! !END!
402 ! X =       1388.5447,     -907.6542,     32,       0 ! !END!
403 ! X =       1390.1230,     -907.3994,     27,       0 ! !END!
404 ! X =       1398.0137,     -906.1210,     36,       0 ! !END!
405 ! X =       1399.5917,     -905.8645,     37,       0 ! !END!
406 ! X =       1401.1697,     -905.6077,     37,       0 ! !END!
407 ! X =       1402.7476,     -905.3505,     36,       0 ! !END!
408 ! X =       1404.3254,     -905.0931,     36,       0 ! !END!
409 ! X =       1405.9033,     -904.8354,     36,       0 ! !END!
410 ! X =       1407.4810,     -904.5775,     36,       0 ! !END!
411 ! X =       1409.0588,     -904.3192,     36,       0 ! !END!
412 ! X =       1410.6364,     -904.0606,     36,       0 ! !END!
413 ! X =       1412.2141,     -903.8018,     36,       0 ! !END!
414 ! X =       1413.7916,     -903.5426,     36,       0 ! !END!
415 ! X =       1415.3692,     -903.2832,     36,       0 ! !END!
416 ! X =       1416.9466,     -903.0235,     36,       0 ! !END!
417 ! X =       1418.5241,     -902.7635,     36,       0 ! !END!
418 ! X =       1380.3578,     -907.0859,     36,       0 ! !END!
419 ! X =       1381.9359,     -906.8326,     36,       0 ! !END!
420 ! X =       1383.5141,     -906.5790,     36,       0 ! !END!
421 ! X =       1385.0922,     -906.3251,     36,       0 ! !END!
422 ! X =       1386.6702,     -906.0710,     34,       0 ! !END!
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423 ! X =        1388.2482,     -905.8165,     29,        0 ! !END!
424 ! X =        1389.8261,     -905.5618,     30,        0 ! !END!
425 ! X =        1397.7152,     -904.2837,     36,        0 ! !END!
426 ! X =        1399.2929,     -904.0272,     36,        0 ! !END!
427 ! X =        1400.8705,     -903.7704,     36,        0 ! !END!
428 ! X =        1402.4480,     -903.5134,     36,        0 ! !END!
429 ! X =        1404.0256,     -903.2560,     36,        0 ! !END!
430 ! X =        1405.6031,     -902.9984,     36,        0 ! !END!
431 ! X =        1407.1805,     -902.7404,     36,        0 ! !END!
432 ! X =        1408.7579,     -902.4822,     36,        0 ! !END!
433 ! X =        1410.3352,     -902.2237,     36,        0 ! !END!
434 ! X =        1411.9125,     -901.9649,     36,        0 ! !END!
435 ! X =        1413.4897,     -901.7058,     36,        0 ! !END!
436 ! X =        1415.0669,     -901.4465,     36,        0 ! !END!
437 ! X =        1416.6441,     -901.1868,     36,        0 ! !END!
438 ! X =        1418.2212,     -900.9268,     36,        0 ! !END!
439 ! X =        1380.0629,     -905.2480,     36,        0 ! !END!
440 ! X =        1381.6408,     -904.9948,     36,        0 ! !END!
441 ! X =        1383.2186,     -904.7413,     36,        0 ! !END!
442 ! X =        1384.7963,     -904.4874,     32,        0 ! !END!
443 ! X =        1386.3740,     -904.2333,     30,        0 ! !END!
444 ! X =        1387.9517,     -903.9789,     33,        0 ! !END!
445 ! X =        1389.5293,     -903.7242,     33,        0 ! !END!
446 ! X =        1392.6844,     -903.2140,     30,        0 ! !END!
447 ! X =        1394.2619,     -902.9584,     36,        0 ! !END!
448 ! X =        1395.8393,     -902.7026,     36,        0 ! !END!
449 ! X =        1397.4167,     -902.4464,     36,        0 ! !END!
450 ! X =        1398.9940,     -902.1900,     36,        0 ! !END!
451 ! X =        1400.5713,     -901.9333,     36,        0 ! !END!
452 ! X =        1402.1485,     -901.6763,     36,        0 ! !END!
453 ! X =        1403.7257,     -901.4190,     36,        0 ! !END!
454 ! X =        1405.3029,     -901.1614,     36,        0 ! !END!
455 ! X =        1406.8799,     -900.9035,     36,        0 ! !END!
456 ! X =        1408.4570,     -900.6453,     36,        0 ! !END!
457 ! X =        1410.0340,     -900.3869,     36,        0 ! !END!
458 ! X =        1411.6109,     -900.1281,     36,        0 ! !END!
459 ! X =        1413.1879,     -899.8691,     36,        0 ! !END!
460 ! X =        1414.7647,     -899.6098,     36,        0 ! !END!
461 ! X =        1416.3415,     -899.3502,     36,        0 ! !END!
462 ! X =        1417.9183,     -899.0903,     36,        0 ! !END!
463 ! X =        1379.7682,     -903.4102,     36,        0 ! !END!
464 ! X =        1381.3457,     -903.1571,     36,        0 ! !END!
465 ! X =        1382.9231,     -902.9036,     34,        0 ! !END!
466 ! X =        1384.5005,     -902.6498,     30,        0 ! !END!
467 ! X =        1386.0779,     -902.3957,     33,        0 ! !END!
468 ! X =        1387.6552,     -902.1414,     33,        0 ! !END!
469 ! X =        1389.2325,     -901.8868,     33,        0 ! !END!
470 ! X =        1390.8097,     -901.6318,     31,        0 ! !END!
471 ! X =        1392.3869,     -901.3766,     31,        0 ! !END!
472 ! X =        1393.9640,     -901.1211,     36,        0 ! !END!
473 ! X =        1395.5411,     -900.8653,     36,        0 ! !END!
474 ! X =        1397.1182,     -900.6092,     36,        0 ! !END!
475 ! X =        1398.6952,     -900.3528,     36,        0 ! !END!
476 ! X =        1400.2721,     -900.0962,     36,        0 ! !END!
477 ! X =        1401.8490,     -899.8392,     36,        0 ! !END!
478 ! X =        1403.4259,     -899.5820,     36,        0 ! !END!
479 ! X =        1405.0027,     -899.3245,     36,        0 ! !END!
480 ! X =        1406.5794,     -899.0666,     36,        0 ! !END!
481 ! X =        1408.1561,     -898.8085,     36,        0 ! !END!
482 ! X =        1409.7328,     -898.5501,     36,        0 ! !END!
483 ! X =        1411.3094,     -898.2914,     36,        0 ! !END!
484 ! X =        1412.8860,     -898.0325,     36,        0 ! !END!
485 ! X =        1414.4625,     -897.7732,     36,        0 ! !END!
486 ! X =        1416.0390,     -897.5136,     36,        0 ! !END!
487 ! X =        1417.6154,     -897.2538,     36,        0 ! !END!
488 ! X =        1381.0505,     -901.3194,     36,        0 ! !END!
489 ! X =        1382.6277,     -901.0660,     32,        0 ! !END!
490 ! X =        1384.2047,     -900.8122,     33,        0 ! !END!
491 ! X =        1385.7818,     -900.5582,     35,        0 ! !END!
492 ! X =        1387.3588,     -900.3039,     35,        0 ! !END!
493 ! X =        1388.9357,     -900.0494,     33,        0 ! !END!
494 ! X =        1390.5126,     -899.7945,     31,        0 ! !END!
495 ! X =        1392.0894,     -899.5393,     30,        0 ! !END!
496 ! X =        1393.6662,     -899.2839,     31,        0 ! !END!
497 ! X =        1395.2430,     -899.0281,     36,        0 ! !END!
498 ! X =        1396.8197,     -898.7721,     36,        0 ! !END!
499 ! X =        1398.3963,     -898.5158,     37,        0 ! !END!
500 ! X =        1399.9729,     -898.2592,     36,        0 ! !END!
501 ! X =        1401.5495,     -898.0023,     36,        0 ! !END!
502 ! X =        1403.1260,     -897.7451,     36,        0 ! !END!
503 ! X =        1404.7025,     -897.4876,     36,        0 ! !END!
504 ! X =        1406.2789,     -897.2298,     36,        0 ! !END!
505 ! X =        1407.8553,     -896.9718,     36,        0 ! !END!
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506 ! X =       1409.4316,     -896.7135,      36,        0 ! !END!
507 ! X =       1411.0079,     -896.4548,      36,        0 ! !END!
508 ! X =       1412.5841,     -896.1959,      36,        0 ! !END!
509 ! X =       1414.1603,     -895.9367,      36,        0 ! !END!
510 ! X =       1415.7364,     -895.6772,      36,        0 ! !END!
511 ! X =       1417.3125,     -895.4174,      36,        0 ! !END!
512 ! X =       1382.3322,     -899.2284,      32,        0 ! !END!
513 ! X =       1383.9090,     -898.9748,      36,        0 ! !END!
514 ! X =       1385.4857,     -898.7208,      36,        0 ! !END!
515 ! X =       1387.0623,     -898.4666,      36,        0 ! !END!
516 ! X =       1388.6389,     -898.2120,      33,        0 ! !END!
517 ! X =       1390.2155,     -897.9572,      31,        0 ! !END!
518 ! X =       1391.7920,     -897.7021,      32,        0 ! !END!
519 ! X =       1393.3684,     -897.4467,      36,        0 ! !END!
520 ! X =       1394.9448,     -897.1910,      36,        0 ! !END!
521 ! X =       1396.5212,     -896.9351,      36,        0 ! !END!
522 ! X =       1398.0975,     -896.6788,      36,        0 ! !END!
523 ! X =       1399.6738,     -896.4222,      36,        0 ! !END!
524 ! X =       1401.2500,     -896.1654,      36,        0 ! !END!
525 ! X =       1402.8262,     -895.9083,      36,        0 ! !END!
526 ! X =       1404.4023,     -895.6508,      36,        0 ! !END!
527 ! X =       1405.9784,     -895.3931,      36,        0 ! !END!
528 ! X =       1407.5545,     -895.1351,      36,        0 ! !END!
529 ! X =       1409.1304,     -894.8768,      36,        0 ! !END!
530 ! X =       1410.7064,     -894.6183,      36,        0 ! !END!
531 ! X =       1412.2823,     -894.3594,      36,        0 ! !END!
532 ! X =       1413.8581,     -894.1002,      36,        0 ! !END!
533 ! X =       1415.4339,     -893.8408,      36,        0 ! !END!
534 ! X =       1417.0097,     -893.5811,      36,        0 ! !END!
535 ! X =       1383.6132,     -897.1374,      36,        0 ! !END!
536 ! X =       1385.1895,     -896.8835,      36,        0 ! !END!
537 ! X =       1386.7659,     -896.6293,      36,        0 ! !END!
538 ! X =       1388.3421,     -896.3748,      33,        0 ! !END!
539 ! X =       1389.9183,     -896.1200,      29,        0 ! !END!
540 ! X =       1391.4945,     -895.8650,      36,        0 ! !END!
541 ! X =       1393.0706,     -895.6096,      36,        0 ! !END!
542 ! X =       1394.6467,     -895.3540,      36,        0 ! !END!
543 ! X =       1396.2227,     -895.0981,      36,        0 ! !END!
544 ! X =       1397.7987,     -894.8419,      36,        0 ! !END!
545 ! X =       1399.3747,     -894.5854,      36,        0 ! !END!
546 ! X =       1400.9505,     -894.3286,      36,        0 ! !END!
547 ! X =       1402.5264,     -894.0715,      36,        0 ! !END!
548 ! X =       1404.1022,     -893.8141,      36,        0 ! !END!
549 ! X =       1405.6779,     -893.5565,      36,        0 ! !END!
550 ! X =       1407.2536,     -893.2985,      36,        0 ! !END!
551 ! X =       1408.8293,     -893.0403,      36,        0 ! !END!
552 ! X =       1410.4049,     -892.7818,      36,        0 ! !END!
553 ! X =       1411.9804,     -892.5230,      36,        0 ! !END!
554 ! X =       1413.5560,     -892.2639,      36,        0 ! !END!
555 ! X =       1415.1314,     -892.0045,      36,        0 ! !END!
556 ! X =       1416.7068,     -891.7448,      36,        0 ! !END!
557 ! X =       1384.8934,     -895.0462,      37,        0 ! !END!
558 ! X =       1386.4694,     -894.7920,      35,        0 ! !END!
559 ! X =       1388.0453,     -894.5376,      30,        0 ! !END!
560 ! X =       1389.6212,     -894.2829,      36,        0 ! !END!
561 ! X =       1391.1971,     -894.0279,      36,        0 ! !END!
562 ! X =       1392.7728,     -893.7726,      36,        0 ! !END!
563 ! X =       1394.3486,     -893.5170,      36,        0 ! !END!
564 ! X =       1395.9243,     -893.2612,      36,        0 ! !END!
565 ! X =       1397.4999,     -893.0050,      36,        0 ! !END!
566 ! X =       1399.0755,     -892.7486,      36,        0 ! !END!
567 ! X =       1400.6511,     -892.4918,      36,        0 ! !END!
568 ! X =       1402.2266,     -892.2348,      36,        0 ! !END!
569 ! X =       1403.8020,     -891.9775,      36,        0 ! !END!
570 ! X =       1405.3775,     -891.7199,      36,        0 ! !END!
571 ! X =       1406.9528,     -891.4620,      36,        0 ! !END!
572 ! X =       1408.5281,     -891.2038,      36,        0 ! !END!
573 ! X =       1410.1034,     -890.9454,      36,        0 ! !END!
574 ! X =       1411.6786,     -890.6866,      36,        0 ! !END!
575 ! X =       1413.2538,     -890.4276,      36,        0 ! !END!
576 ! X =       1414.8289,     -890.1682,      36,        0 ! !END!
577 ! X =       1416.4040,     -889.9086,      36,        0 ! !END!
578 ! X =       1387.7486,     -892.7005,      36,        0 ! !END!
579 ! X =       1389.3241,     -892.4459,      36,        0 ! !END!
580 ! X =       1390.8996,     -892.1909,      36,        0 ! !END!
581 ! X =       1392.4751,     -891.9357,      36,        0 ! !END!
582 ! X =       1394.0505,     -891.6802,      36,        0 ! !END!
583 ! X =       1395.6258,     -891.4243,      36,        0 ! !END!
584 ! X =       1397.2011,     -891.1682,      36,        0 ! !END!
585 ! X =       1398.7764,     -890.9119,      36,        0 ! !END!
586 ! X =       1400.3516,     -890.6552,      36,        0 ! !END!
587 ! X =       1401.9268,     -890.3982,      36,        0 ! !END!
588 ! X =       1403.5019,     -890.1410,      36,        0 ! !END!
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589 ! X =       1405.0770,     -889.8834,     36,       0 ! !END!
590 ! X =       1406.6520,     -889.6256,     36,       0 ! !END!
591 ! X =       1408.2270,     -889.3675,     36,       0 ! !END!
592 ! X =       1409.8019,     -889.1090,     36,       0 ! !END!
593 ! X =       1411.3768,     -888.8503,     36,       0 ! !END!
594 ! X =       1412.9516,     -888.5914,     36,       0 ! !END!
595 ! X =       1414.5264,     -888.3321,     36,       0 ! !END!
596 ! X =       1416.1012,     -888.0725,     36,       0 ! !END!
597 ! X =       1390.6022,     -890.3540,     41,       0 ! !END!
598 ! X =       1392.1773,     -890.0988,     37,       0 ! !END!
599 ! X =       1393.7524,     -889.8433,     36,       0 ! !END!
600 ! X =       1395.3274,     -889.5876,     36,       0 ! !END!
601 ! X =       1396.9024,     -889.3315,     36,       0 ! !END!
602 ! X =       1398.4773,     -889.0752,     36,       0 ! !END!
603 ! X =       1400.0522,     -888.8186,     36,       0 ! !END!
604 ! X =       1401.6270,     -888.5617,     36,       0 ! !END!
605 ! X =       1403.2018,     -888.3045,     36,       0 ! !END!
606 ! X =       1404.7765,     -888.0470,     36,       0 ! !END!
607 ! X =       1406.3512,     -887.7892,     36,       0 ! !END!
608 ! X =       1407.9259,     -887.5311,     36,       0 ! !END!
609 ! X =       1409.5005,     -887.2728,     36,       0 ! !END!
610 ! X =       1411.0750,     -887.0141,     36,       0 ! !END!
611 ! X =       1412.6495,     -886.7552,     36,       0 ! !END!
612 ! X =       1414.2240,     -886.4960,     36,       0 ! !END!
613 ! X =       1415.7984,     -886.2365,     36,       0 ! !END!
614 ! X =       1393.4543,     -888.0066,     36,       0 ! !END!
615 ! X =       1395.0290,     -887.7509,     36,       0 ! !END!
616 ! X =       1396.6036,     -887.4949,     36,       0 ! !END!
617 ! X =       1398.1782,     -887.2386,     36,       0 ! !END!
618 ! X =       1399.7528,     -886.9821,     36,       0 ! !END!
619 ! X =       1401.3272,     -886.7252,     36,       0 ! !END!
620 ! X =       1402.9017,     -886.4681,     36,       0 ! !END!
621 ! X =       1404.4761,     -886.2106,     36,       0 ! !END!
622 ! X =       1406.0504,     -885.9529,     36,       0 ! !END!
623 ! X =       1407.6248,     -885.6949,     36,       0 ! !END!
624 ! X =       1409.1990,     -885.4366,     36,       0 ! !END!
625 ! X =       1410.7732,     -885.1780,     36,       0 ! !END!
626 ! X =       1412.3474,     -884.9191,     36,       0 ! !END!
627 ! X =       1413.9215,     -884.6600,     36,       0 ! !END!
628 ! X =       1415.4956,     -884.4005,     37,       0 ! !END!
629 ! X =       1393.1562,     -886.1699,     37,       0 ! !END!
630 ! X =       1394.7306,     -885.9143,     36,       0 ! !END!
631 ! X =       1396.3049,     -885.6584,     36,       0 ! !END!
632 ! X =       1397.8791,     -885.4021,     36,       0 ! !END!
633 ! X =       1399.4533,     -885.1456,     36,       0 ! !END!
634 ! X =       1401.0275,     -884.8888,     36,       0 ! !END!
635 ! X =       1402.6016,     -884.6317,     36,       0 ! !END!
636 ! X =       1404.1757,     -884.3743,     36,       0 ! !END!
637 ! X =       1405.7497,     -884.1167,     36,       0 ! !END!
638 ! X =       1407.3237,     -883.8587,     36,       0 ! !END!
639 ! X =       1408.8976,     -883.6005,     36,       0 ! !END!
640 ! X =       1410.4714,     -883.3419,     36,       0 ! !END!
641 ! X =       1412.0453,     -883.0831,     36,       0 ! !END!
642 ! X =       1394.4322,     -884.0778,     37,       0 ! !END!
643 ! X =       1396.0061,     -883.8219,     37,       0 ! !END!
644 ! X =       1397.5801,     -883.5657,     37,       0 ! !END!
645 ! X =       1399.1539,     -883.3092,     37,       0 ! !END!
646 ! X =       1400.7277,     -883.0525,     37,       0 ! !END!
647 ! X =       1402.3015,     -882.7955,     37,       0 ! !END!
648 ! X =       1403.8752,     -882.5381,     37,       0 ! !END!
649 ! X =       1405.4489,     -882.2805,     37,       0 ! !END!
650 ! X =       1407.0226,     -882.0226,     37,       0 ! !END!
651 ! X =       1408.5961,     -881.7644,     37,       0 ! !END!
652 ! X =       1397.2810,     -881.7293,     37,       0 ! !END!
653 ! X =       1398.8545,     -881.4729,     37,       0 ! !END!
654 ! X =       1400.4280,     -881.2162,     37,       0 ! !END!
655 ! X =       1402.0015,     -880.9593,     37,       0 ! !END!
656 ! X =       1403.5748,     -880.7020,     37,       0 ! !END!
657 ! X =       1405.1482,     -880.4444,     37,       0 ! !END!
658 ! X =       1396.9820,     -879.8931,     37,       0 ! !END!
659 ! X =       1398.5552,     -879.6367,     37,       0 ! !END!
660 ! X =       1400.1283,     -879.3801,     37,       0 ! !END!
661 ! X =       1401.7014,     -879.1231,     37,       0 ! !END!
662 ! X =       1403.2745,     -878.8659,     37,       0 ! !END!
663 ! X =       1399.8286,     -877.5440,     37,       0 ! !END!
664 ! X =       1401.4014,     -877.2871,     37,       0 ! !END!
665 ! X =       1488.6896,     -835.1919,     1,       0 ! !END!okefenokee end
666 ! X =       1489.4721,     -835.0553,     1,       0 ! !END!wolf island begin
667 ! X =       1488.5298,     -834.2760,     1,       0 ! !END!
668 ! X =       1487.4280,     -832.5809,     3,       0 ! !END!
669 ! X =       1488.2103,     -832.4444,     2,       0 ! !END!
670 ! X =       1488.9925,     -832.3079,     1,       0 ! !END!
671 ! X =       1489.7748,     -832.1714,     1,       0 ! !END!
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672 ! X =       1486.4861,    -831.8014,    1,      0 ! !END!
673 ! X =       1487.2683,    -831.6651,    1,      0 ! !END!
674 ! X =       1488.0505,    -831.5287,    1,      0 ! !END!
675 ! X =       1488.8327,    -831.3922,    1,      0 ! !END!
676 ! X =       1489.6148,    -831.2556,    1,      0 ! !END!
677 ! X =       1486.3265,    -830.8856,    1,      0 ! !END!
678 ! X =       1487.1087,    -830.7493,    1,      0 ! !END!
679 ! X =       1487.8908,    -830.6129,    1,      0 ! !END!
680 ! X =       1488.6728,    -830.4764,    1,      0 ! !END!
681 ! X =       1489.4549,    -830.3399,    1,      0 ! !END!
682 ! X =       1485.3849,    -830.1061,    1,      0 ! !END!
683 ! X =       1486.1670,    -829.9699,    1,      0 ! !END!
684 ! X =       1486.9490,    -829.8335,    1,      0 ! !END!
685 ! X =       1487.7310,    -829.6972,    1,      0 ! !END!
686 ! X =       1488.5130,    -829.5607,    1,      0 ! !END!
687 ! X =       1489.2950,    -829.4242,    1,      0 ! !END!
688 ! X =       1485.2254,    -829.1903,    1,      0 ! !END!
689 ! X =       1486.0074,    -829.0541,    1,      0 ! !END!
690 ! X =       1486.7893,    -828.9178,    1,      0 ! !END!
691 ! X =       1487.5712,    -828.7814,    1,      0 ! !END!
692 ! X =       1488.3532,    -828.6450,    1,      0 ! !END!
693 ! X =       1489.1351,    -828.5085,    1,      0 ! !END!
694 ! X =       1485.8478,    -828.1384,    1,      0 ! !END!wolf island end
695 ! X =       1273.4399,    -416.5072,    1629,       0 ! !END!shining rock begin
696 ! X =       1274.1840,    -416.3904,    1586,       0 ! !END!
697 ! X =       1274.9281,    -416.2736,    1370,       0 ! !END!
698 ! X =       1275.6722,    -416.1566,    1274,       0 ! !END!
699 ! X =       1276.4163,    -416.0396,    1181,       0 ! !END!
700 ! X =       1268.8323,    -416.2944,    1183,       0 ! !END!
701 ! X =       1269.5764,    -416.1780,    1416,       0 ! !END!
702 ! X =       1270.3205,    -416.0616,    1541,       0 ! !END!
703 ! X =       1271.0646,    -415.9450,    1677,       0 ! !END!
704 ! X =       1271.8086,    -415.8285,    1640,       0 ! !END!
705 ! X =       1272.5527,    -415.7118,    1770,       0 ! !END!
706 ! X =       1273.2967,    -415.5951,    1679,       0 ! !END!
707 ! X =       1274.0408,    -415.4783,    1585,       0 ! !END!
708 ! X =       1274.7848,    -415.3614,    1529,       0 ! !END!
709 ! X =       1275.5288,    -415.2445,    1309,       0 ! !END!
710 ! X =       1276.2728,    -415.1275,    1128,       0 ! !END!
711 ! X =       1267.9457,    -415.4985,    1097,       0 ! !END!
712 ! X =       1268.6897,    -415.3822,    1217,       0 ! !END!
713 ! X =       1269.4337,    -415.2658,    1536,       0 ! !END!
714 ! X =       1270.1777,    -415.1493,    1463,       0 ! !END!
715 ! X =       1270.9217,    -415.0328,    1436,       0 ! !END!
716 ! X =       1271.6657,    -414.9163,    1629,       0 ! !END!
717 ! X =       1272.4096,    -414.7996,    1771,       0 ! !END!
718 ! X =       1273.1536,    -414.6829,    1622,       0 ! !END!
719 ! X =       1273.8975,    -414.5661,    1425,       0 ! !END!
720 ! X =       1274.6415,    -414.4493,    1312,       0 ! !END!
721 ! X =       1275.3854,    -414.3324,    1362,       0 ! !END!
722 ! X =       1276.1293,    -414.2154,    1067,       0 ! !END!
723 ! X =       1276.8732,    -414.0983,    1162,       0 ! !END!
724 ! X =       1277.6171,    -413.9812,    1399,       0 ! !END!
725 ! X =       1267.0592,    -414.7024,    1029,       0 ! !END!
726 ! X =       1267.8031,    -414.5862,    1227,       0 ! !END!
727 ! X =       1268.5470,    -414.4699,    1505,       0 ! !END!
728 ! X =       1269.2910,    -414.3536,    1347,       0 ! !END!
729 ! X =       1270.0349,    -414.2371,    1317,       0 ! !END!
730 ! X =       1270.7788,    -414.1206,    1536,       0 ! !END!
731 ! X =       1271.5227,    -414.0041,    1675,       0 ! !END!
732 ! X =       1272.2666,    -413.8874,    1729,       0 ! !END!
733 ! X =       1273.0104,    -413.7707,    1523,       0 ! !END!
734 ! X =       1273.7543,    -413.6540,    1544,       0 ! !END!
735 ! X =       1274.4981,    -413.5371,    1429,       0 ! !END!
736 ! X =       1275.2420,    -413.4202,    1315,       0 ! !END!
737 ! X =       1275.9858,    -413.3033,    1068,       0 ! !END!
738 ! X =       1276.7296,    -413.1862,    1066,       0 ! !END!
739 ! X =       1277.4734,    -413.0691,    1352,       0 ! !END!
740 ! X =       1266.1728,    -413.9063,    1024,       0 ! !END!
741 ! X =       1266.9167,    -413.7902,    1296,       0 ! !END!
742 ! X =       1267.6606,    -413.6740,    1404,       0 ! !END!
743 ! X =       1268.4044,    -413.5577,    1373,       0 ! !END!
744 ! X =       1269.1482,    -413.4414,    1198,       0 ! !END!
745 ! X =       1269.8921,    -413.3249,    1198,       0 ! !END!
746 ! X =       1270.6359,    -413.2085,    1419,       0 ! !END!
747 ! X =       1271.3797,    -413.0919,    1571,       0 ! !END!
748 ! X =       1272.1235,    -412.9753,    1741,       0 ! !END!
749 ! X =       1272.8673,    -412.8586,    1717,       0 ! !END!
750 ! X =       1273.6111,    -412.7418,    1616,       0 ! !END!
751 ! X =       1274.3548,    -412.6250,    1569,       0 ! !END!
752 ! X =       1275.0986,    -412.5081,    1422,       0 ! !END!
753 ! X =       1275.8423,    -412.3912,    1161,       0 ! !END!
754 ! X =       1265.2866,    -413.1101,    968,       0 ! !END!
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 755 ! X =       1266.0304,     -412.9941,     1198,        0 ! !END!
 756 ! X =       1266.7742,     -412.8779,     1362,        0 ! !END!
 757 ! X =       1267.5180,     -412.7617,     1470,        0 ! !END!
 758 ! X =       1268.2618,     -412.6455,     1248,        0 ! !END!
 759 ! X =       1269.0055,     -412.5291,     1058,        0 ! !END!
 760 ! X =       1269.7493,     -412.4127,     1170,        0 ! !END!
 761 ! X =       1270.4930,     -412.2963,     1415,        0 ! !END!
 762 ! X =       1271.2367,     -412.1797,     1689,        0 ! !END!
 763 ! X =       1271.9804,     -412.0631,     1547,        0 ! !END!
 764 ! X =       1272.7242,     -411.9465,     1550,        0 ! !END!
 765 ! X =       1273.4678,     -411.8297,     1437,        0 ! !END!
 766 ! X =       1274.2115,     -411.7129,     1508,        0 ! !END!
 767 ! X =       1274.9552,     -411.5960,     1300,        0 ! !END!
 768 ! X =       1275.6989,     -411.4791,     1176,        0 ! !END!
 769 ! X =       1268.8628,     -411.6170,     1012,        0 ! !END!
 770 ! X =       1269.6065,     -411.5006,     1285,        0 ! !END!
 771 ! X =       1270.3501,     -411.3841,     1366,        0 ! !END!
 772 ! X =       1271.0938,     -411.2676,     1566,        0 ! !END!
 773 ! X =       1271.8374,     -411.1510,     1451,        0 ! !END!
 774 ! X =       1272.5810,     -411.0343,     1359,        0 ! !END!
 775 ! X =       1273.3246,     -410.9176,     1273,        0 ! !END!
 776 ! X =       1274.0682,     -410.8008,     1274,        0 ! !END!
 777 ! X =       1274.8118,     -410.6839,     1280,        0 ! !END!
 778 ! X =       1275.5554,     -410.5670,     1155,        0 ! !END!
 779 ! X =       1270.2072,     -410.4719,     1179,        0 ! !END!
 780 ! X =       1270.9508,     -410.3554,     1348,        0 ! !END!
 781 ! X =       1271.6943,     -410.2389,     1488,        0 ! !END!
 782 ! X =       1270.8078,     -409.4433,     1442,        0 ! !END!
 783 ! X =       1271.5513,     -409.3267,     1565,        0 ! !END!
 784 ! X =       1272.2947,     -409.2101,     1505,        0 ! !END!
 785 ! X =       1273.0382,     -409.0934,     1409,        0 ! !END!
 786 ! X =       1273.7816,     -408.9766,     1380,        0 ! !END!
 787 ! X =       1274.5250,     -408.8598,     1303,        0 ! !END!
 788 ! X =       1275.2684,     -408.7429,     1104,        0 ! !END!
 789 ! X =       1269.9215,     -408.6476,     1500,        0 ! !END!
 790 ! X =       1271.4082,     -408.4146,     1678,        0 ! !END!
 791 ! X =       1272.1516,     -408.2980,     1707,        0 ! !END!
 792 ! X =       1272.8950,     -408.1813,     1515,        0 ! !END!
 793 ! X =       1273.6383,     -408.0645,     1321,        0 ! !END!
 794 ! X =       1274.3816,     -407.9477,     1219,        0 ! !END!
 795 ! X =       1271.2652,     -407.5025,     1394,        0 ! !END!
 796 ! X =       1272.0085,     -407.3859,     1522,        0 ! !END!
 797 ! X =       1272.7517,     -407.2692,     1411,        0 ! !END!
 798 ! X =       1273.4950,     -407.1525,     1234,        0 ! !END!
 799 ! X =       1271.1221,     -406.5904,     1189,        0 ! !END!
 800 ! X =       1271.8653,     -406.4738,     1343,        0 ! !END!
 801 ! X =       1272.6085,     -406.3571,     1265,        0 ! !END!
 802 ! X =       1270.9791,     -405.6783,     1045,        0 ! !END!
 803 ! X =       1271.7222,     -405.5617,     1235,        0 ! !END!
 804 ! X =       1272.4653,     -405.4451,     1066,        0 ! !END!shining rock end
```

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a
Data for each receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

b
Receptor height above ground is optional. If no value is entered, the receptor is placed on the ground.

Volume III, Attachment F –

Agency Correspondence Relating to the Class I AQRV and PSD Increment Modeling Protocol

Jon Bandzul

From: Jon Bandzul [jbandzul@smithaldridge.com]
Sent: Monday, July 25, 2011 12:27 PM
To: 'Catherine_Collins@fws.gov'; 'Tim_Allen@fws.gov'; 'Peter Courtney'
Cc: 'Craig Smith Ph. D.'; 'Jason' 'Goodwin'
Subject: AQRV Analysis for Proposed PSD Major Facility

Catherine,

Thank you for taking the time to speak with me this morning.

This e-mail is to confirm our conversation regarding the proposed CARBO Ceramics, Inc. proppant manufacturing facility in Millen, Jenkins County, Georgia. There are 4 Class I areas within 300 km of the facility, 3 of which are FWS wildlife refuges and have a Q/D ratio greater than 10:

Cape Romain - >15

Okefenokee - >17

Wolf Island - >20

Based on our conversation, I am proceeding with developing a protocol to address application of CALPUFF for LTR AQRV analysis; the closest Class I area is Wolf Island and is 164 km from the proposed project site. Project coordinates are 32.766451 latitude and -81.899474 longitude. Tim Allen confirmed that the CALMET 5.8 data set is the appropriate meteorology for PSD applicants.

Again, thank you for your time this morning and we are looking forward to working with FWS on another PSD project.

Jon Bandzul, Principal
Smith Aldridge, Inc.
6000 Lake Forrest Drive Suite 385
Atlanta, Georgia 30328

(office) 404-255-0928 x 117
(fax) 404-255-0948

Jon Bandzul

From: Jon Bandzul [jbandzul@smithaldridge.com]
Sent: Monday, July 25, 2011 7:42 PM
To: 'Melanie Pitrolo'; 'bjackson02@fs.fed.us'; 'Peter Courtney'
Cc: 'Craig Smith Ph. D.'; 'Jason' 'Goodwin'
Subject: RE: Class I Modeling Analysis - Request for Determination Form

Attachments: USFS Request for Determination CARBO Ceramics Millen Facility.pdf

USFS Request for Determination...

Melanie,

Thank you for taking the time to speak with me this afternoon.

This e-mail is to confirm our conversation regarding the proposed CARBO Ceramics, Inc. proppant manufacturing facility in Millen, Jenkins County, Georgia. Please find attached the completed "Request for Applicability of Class I Area Modeling Analysis" form you requested. There are 4 Class I areas within 300 km of the facility, 1 of which is a USFS wilderness area and has a Q/D ratio greater than 10:

Shining Rock - >11

FWS has requested that an AQRV analysis be performed for Cape Romain, Okefenokee and Wolf Island. Based on our conversation, I am proceeding with developing a protocol to address application of CALPUFF for LTR AQRV analysis; Shining Rock is 297 km from the proposed project site and we are planning to include this area in the protocol. I spoke with Tim Allen at FWS this morning and he confirmed that the CALMET 5.8 data set is the appropriate meteorology for PSD applicants.

Again, thank you for your time this afternoon and we are looking forward to working with USFS on another PSD project.

Jon Bandzul, Principal
Smith Aldridge, Inc.
6000 Lake Forrest Drive Suite 385
Atlanta, Georgia 30328

(office) 404-255-0928 x 117
(fax) 404-255-0948

From: Melanie Pitrolo [mailto:mpitrolo@fs.fed.us]
Sent: Monday, July 25, 2011 4:22 PM

To: jbandzul@smithaldridge.com
Subject: Class I Modeling Analysis - Request for Determination Form

Per our conversation this afternoon, attached please find the "Request for Applicability of Class I Area Modeling Analysis" form. If you could complete the form and submit it back to me, I will work with our FLM to make a determination as to whether a Modeling Analysis will be requested for any Forest Service Class I Areas. If you have any questions about the form, just let me know.

Thanks,
Melanie

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Melanie Caudle Pitrolo
Air Quality Specialist
U.S. Forest Service
160 Zillicoa Street, Suite A
Asheville, NC 28801
phone: (828) 257-4213
fax: (828) 257-4263
email: mpitrolo@fs.fed.us

Jon Bandzul

From:	Melanie Pitrolo [mpitrolo@fs.fed.us]
Sent:	Monday, July 25, 2011 4:22 PM
To:	jbandzul@smithaldridge.com
Subject:	Class I Modeling Analysis - Request for Determination Form
Attachments:	Request for Determination.doc

Per our conversation this afternoon, attached please find the "Request for Applicability of Class I Area Modeling Analysis" form. If you could complete the form and submit it back to me, I will work with our FLM to make a determination as to whether a Modeling Analysis will be requested for any Forest Service Class I Areas. If you have any questions about the form, just let me know.

Thanks,
Melanie

****

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fax: (828) 257-4263
email: mpitrolo@fs.fed.us

Request for Applicability of Class I Area Modeling Analysis
Southern Region, U.S. Forest Service

Facility Name (Company Name)	CARBO Ceramics, Inc.
New Facility or Modification?	New Facility
Source Type/BART Applicability	Nonmetallic Minerals Processing (kaolin clay)
Project Location (County/State/ Lat. & Long. in decimal degrees)	Millen, Jenkins County, Georgia (32.766451 lat., -81.899474 long.)

Application Contacts

Applicant		*Consultant*		*Air Agency Permit Engineer*	
Company	CARBO Ceramics, Inc.	**Company**	Smith Aldridge, Inc.	**Agency**	Georgia EPD Air Protection Branch
Contact	Jason Goodwin	**Contact**	Jon Bandzul	**Contact**	Eric Cornwell
Address	575 N. Dairy Ashford, Suite 300 Houston, Texas 77079	**Address**	6000 Lake Forrest Drive Suite 385 Atlanta, Georgia 30328	**Address**	4244 International Parkway Suite 120 Atlanta, Georgia 30354
Phone #	(281) 921-6472	**Phone #**	(404) 255-0928 x117	**Phone #**	(404) 363-7020
Email	jason.goodwin@carboceramics.com	**Email**	jbandzul@smithaldridge.com	**Email**	Eric.Cornwell@dnr.state.ga.us

Briefly Describe the Proposed Project

Greenfield major PSD source for the manufacturer of proppant which are used in oil and natural gas production. Facility will have 4 "wet" processing lines to form proppant from kaolin clay slurry. Each processing line will consist of 2 spray dryers (fluidizers), 1 direct-fired rotary kiln, 1 natural gas-fired boiler, and associated material handling and storage (pellet feed, kiln product, storage silos, and railcar loadout systems).

Proposed Emissions and BACT

Criteria Pollutant	*Emissions*		*Emission Factor (AP-42, Stack Test, Other?)*	*Proposed BACT*
	Maximum hourly (lb/hr)	*Proposed Annual (tons/yr)*		
Nitrogen Oxides	558.4	2,446	BACT	Low-NO_x technology
Sulfur Dioxide	141.0	618	BACT	Wet scrubber
Particulate Matter	56.8	249	BACT	High efficiency fabric filters/baghouses/bin vents
Sulfuric Acid Mist	<1.6	<7	PSD Avoidance	Not subject to PSD review

Proximity to U.S. Forest Service Class I Areas

Class I Area	Shining Rock	Cohutta/Joyce Kilmer-Slickrock	Bradwell Bay
Distance from Facility (km)	297	339/342	376

For Additional Information or Questions, Contact Melanie Pitrolo
(828) 257-4213 or mpitrolo@fs.fed.us

Jon Bandzul

From: Melanie Pitrolo [mpitrolo@fs.fed.us]
Sent: Wednesday, July 27, 2011 4:35 PM
To: Jon Bandzul
Cc: Bill Jackson
Subject: RE: Class I Modeling Analysis - Request for Determination Form

Jon,

Thank you for submitting the information regarding the proposed CARBO Ceramics, Inc. facility in Jenkins County, GA. Based on the information submitted, the USDA Forest Service is requesting a Class I AQRV Analysis for Shining Rock Wilderness Area. In order to facilitate review of the modeling analysis, a modeling protocol should be developed and submitted to us prior to conducting the analysis. Please refer to the latest version of FLAG (http://www.nature.nps.gov/air/permits/flag/index.cfm) for guidance on developing the modeling protocol.

Bill Jackson will be reviewing the modeling protocol and analysis, although I may be assisting him with the review. Should you wish to discuss this project in more detail prior to submitting the protocol, either Bill Jackson or I would be happy to set up a time in the near future to talk with you. I have copied Bill on this email, and his direct number is (828) 257-4815.

Melanie
****
Melanie Caudle Pitrolo
Air Quality Specialist
U.S. Forest Service
160 Zillicoa Street, Suite A
Asheville, NC 28801
phone: (828) 257-4213
fax: (828) 257-4263
email: mpitrolo@fs.fed.us

"Jon Bandzul" <jbandzul@smithaldridge.com>

07/25/2011 07:41 PM

To "'Melanie Pitrolo'" <mpitrolo@fs.fed.us>, <bjackson02@fs.fed.us>, "'Peter Courtney'" <Peter.Courtney@dnr.state.ga.us>
cc "'Craig Smith Ph. D.'" <csmith@smithaldridge.com>, "'Jason' 'Goodwin'" <Jason.Goodwin@carboceramics.com>
Subject RE: Class I Modeling Analysis - Request for Determination Form

Melanie,

Thank you for taking the time to speak with me this afternoon.

This e-mail is to confirm our conversation regarding the proposed CARBO Ceramics, Inc. proppant manufacturing facility in Millen, Jenkins County, Georgia. Please find attached the completed "Request for Applicability of Class I Area Modeling Analysis" form you requested. There are 4 Class I areas within 300 km of the facility, 1 of which is a USFS wilderness area and has a Q/D ratio greater than 10:

Shining Rock - >11

FWS has requested that an AQRV analysis be performed for Cape Romain, Okefenokee and Wolf Island. Based on our conversation, I am proceeding with developing a protocol to address application of CALPUFF for LTR AQRV analysis; Shining Rock is 297 km from the proposed project site and we are planning to include this area in the protocol. I spoke with Tim Allen at FWS this morning and he confirmed that the CALMET 5.8 data set is the appropriate meteorology for PSD applicants.

Again, thank you for your time this afternoon and we are looking forward to working with USFS on another PSD project.

Jon Bandzul, Principal
Smith Aldridge, Inc.
6000 Lake Forrest Drive Suite 385
Atlanta, Georgia 30328

(office) 404-255-0928 x 117
(fax) 404-255-0948

From: Melanie Pitrolo [mailto:mpitrolo@fs.fed.us]
Sent: Monday, July 25, 2011 4:22 PM
To: jbandzul@smithaldridge.com
Subject: Class I Modeling Analysis - Request for Determination Form

Per our conversation this afternoon, attached please find the "Request for Applicability of Class I Area Modeling Analysis" form. If you could complete the form and submit it back to me, I will work with our FLM to make a determination as to whether a Modeling Analysis will be requested for any Forest Service Class I Areas. If you have any questions about the form, just let me know.

Thanks,
Melanie

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Melanie Caudle Pitrolo
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U.S. Forest Service
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Asheville, NC 28801
phone: (828) 257-4213
fax: (828) 257-4263
email: mpitrolo@fs.fed.us

[attachment "USFS Request for Determination CARBO Ceramics Millen Facility.pdf" deleted by Melanie Pitrolo/R8/USDAFS]

Volume III, Attachment G –

NAAQS and PSD Increment Inventories

Table 1. Baseline Minor and Major Source Regional Inventory (Georgia and South Carolina) and Q/D Screening for Nearby Sources

Column D: Facilities that are highlighted in red in Column D are included in the 1-hour NO2 and SO2 NAAQS inventories

Columns O–R: Potential emissions listed for each pollutant in Columns O, P, Q, and R are facility-wide and are based on maximum hourly allowable emissions and do not take into account annualized emission limitations (e.g., SM sources will be >100 tpy)

Columns S–T: Short-term distance (d) codes are "CB" for county-boundary, "Z" for postal code, and "S" for source-to-source

Columns U–X: SIA's listed for each pollutant in Columns U, V, W, and X are the maximum for each averaging period, excluding 1-hour NO_2 and SO_2. No Q/D screening is performed for the new 1-hour NO_2 and SO_2 NAAQS

Columns Y–BB: Q/d screening values listed for each pollutant in Columns Y, Z, AA, and BB are for short-term averaging periods and are based on the source-to-source distance listed in Column S. Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E

Columns CC–FF: Q/d screening values listed for each pollutant in Columns CC, DD, EE, and FF are for long-term averaging periods and are based on the distance from the source to the outer edge of the SIA (D = d - SIA), except $PM_{2.5}$ which is based on the source-to-source distance using lower 2d threshold (Z = DD). Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E

Columns GG–KK: Facilites, or groups of facilities, highlighted in red exceed 20 (or 2 for $PM_{2.5}$) for the Q/d screening value and are modeled. Facilites, or groups of facilities, highlighted in blue were below 20 for the Q/d screening value but were included in the certain quality analyses (~10 or more)

Columns LL–OO: Facilites, or groups of facilities, highlighted in red exceed 20 (or 2 for $PM_{2.5}$) for the Q/d screening value and are modeled. Facilites, or groups of facilities, highlighted in blue were below 20 for the Q/D screening value but were included in the certain quality analyses (~10 or more)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	KK	LL	MM	NN	OO
					Geographic Coordinates		UTM NAD83 Coordinates		30° Wind Sector	Distance based on fastest sector wind speed (km)		General, PBR, Minor, Title V, PSD		"Q", Allowable Emissions, (tpy)				"d" Short-term Distance, (km)		Significant Impact Area, SIA, (km)				"Q/d", Short-term				"Q/D", Long-term				Short-term "Q/d" < 20 ($PM_{2.5}$ <2)				Long-term "Q/D" < 20 ($PM_{2.5}$ < 2)			
State	County	AIRS	Facility Name	2-km Groups	Latitude (dd)	Longitude (dd)	East (m)	North (m)	Wind blowing from...		Elevation (m)		Permitting Status	PM_{10}	$PM_{2.5}$	NO_x	SO_2		Code	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2
GA	Bulloch	03100002	Tillman & Deal Farm Supply Inc		32.47845	-81.76562	428,060.20	3,593,728.40	6	41.00	51.88	Minor	Active	63.3	11.2	6.2	0.7	34.3	S	3.4	4.4	6.5	4.0	1.85	0.33	N/A	0.02	2.05	0.33	0.22	0.02	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100003	Jones W K Lumber Co		32.29509	-81.70915	433,231.70	3,573,365.70	6	41.00	40.76	Minor	No Files																										
GA	Bulloch	03100005	W.M. Sheppard Lumber Company		32.35441	-81.65564	438,310.10	3,579,909.40	6	41.00	39.04	TV	Active	83.9	83.9	6.6	5.5	50.9	S	3.4	4.4	6.5	4.0	1.65	1.65	N/A	0.11	1.77	1.65	0.15	0.12	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100011	Reeves Construction Company	031-1	32.37297	-81.84944	420,091.10	3,582,095.00	6	41.00	52.16	Minor	Active	52.0	52.0	60.2	556.9	43.6	S	3.4	4.4	6.5	4.0	3.49	1.94	N/A	13.08	3.80	1.94	2.62	14.43	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100012	Emerson Electric Co (Brodie Meter)	031-2	32.44965	-81.77966	426,717.60	3,590,545.30	6	41.00	71.91	Minor	Active	26.3	26.3	0.7	0.0	36.8	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100020	Braswell A M Food Co Inc	031-2	32.45692	-81.77690	426,982.90	3,591,349.30	6	41.00	61.71	Minor	Active	0.8	0.8	5.6	14.9	36.2	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100028	Claude Howard Lumber Company	031-2	32.43370	-81.77433	427,205.80	3,588,773.50	6	41.00	60.47	TV	Active	85.6	85.6	7.4	4.2	38.5	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100031	Evans Concrete	031-2	32.43638	-81.77892	426,776.50	3,589,073.80	6	41.00	63.35	PBR	Active	4.7	4.7	0.0	0.0	38.1	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100036	Robbins Packing Plant		32.46502	-81.79989	424,828.90	3,592,263.20	6	41.00	76.30	Minor	Active	0.2	0.2	2.9	0.0	34.7	S	3.4	4.4	6.5	4.0	0.01	0.01	N/A	0.00	0.01	0.01	0.10	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100042	Denmark Feed		32.32906	-81.69711	434,389.80	3,577,123.90	6	41.00	46.99	Minor	No Files																										
GA	Bulloch	03100043	Bulloch Gin Co		32.39697	-81.66580	437,383.50	3,584,633.10	6	41.00	52.90	Minor	Active	72.0	5.8	0.0	0.0	46.4	S	3.4	4.4	6.5	4.0	1.55	0.12	N/A	0.00	1.67	0.12	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100044	Briggs & Stratton	031-1	32.38213	-81.84249	420,752.90	3,583,105.30	6	41.00	60.84	Minor	Active	23.9	23.9	34.2	1.1	42.7	S	3.4	4.4	6.5	4.0	3.49	1.94	N/A	13.08	3.80	1.94	2.62	14.43	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100045	Southern States Coop	031-1	32.37365	-81.84689	420,331.60	3,582,168.50	6	41.00	55.50	PBR	Active	72.0	5.8	0.0	0.0	43.6	S	3.4	4.4	6.5	4.0	3.49	1.94	N/A	13.08	3.80	1.94	2.62	14.43	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100046	Custom Cabinets		32.44371	-81.72961	431,417.60	3,589,853.60	6	41.00	61.52	PBR	Active	20.0	20.0	0.0	0.0	39.1	S	3.4	4.4	6.5	4.0	0.51	0.51	N/A	0.00	0.56	0.51	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100047	Northside Cabinets		32.50996	-81.86588	418,667.60	3,597,293.50	6	41.00	79.58	PBR	Active	20.0	20.0	0.0	0.0	28.6	S	3.4	4.4	6.5	4.0	0.70	0.70	N/A	0.00	0.79	0.70	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100048	Coastal Countertops	031-2	32.45084	-81.77873	426,806.00	3,590,676.60	6	41.00	68.58	PBR	Active	20.0	20.0	0.0	0.0	36.8	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100049	Kitchen Craft Cabinets		32.37690	-81.65749	438,151.40	3,582,403.50	6	41.00	45.37	PBR	Active	20.0	20.0	0.0	0.0	48.8	S	3.4	4.4	6.5	4.0	0.41	0.41	N/A	0.00	0.44	0.41	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100050	Harry Shurling Cabinets		32.32608	-81.55255	447,993.90	3,576,714.20	5	41.00	32.25	PBR	Active	20.0	20.0	0.0	0.0	58.6	S	3.4	4.4	6.5	4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100052	East Geogia Regional Medical Center		32.41438	-81.76982	427,614.40	3,586,628.80	6	41.00	63.86	Minor	Active	2.6	2.5	15.7	55.8	40.9	S	3.4	4.4	6.5	4.0	0.06	0.06	N/A	1.36	0.07	0.06	0.46	1.51	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100054	Viracon-Statesboro	031-1	32.38179	-81.84621	420,402.70	3,583,070.30	6	41.00	56.73	PBR	Active	0.0	0.0	0.0	0.0	42.9	S	3.4	4.4	6.5	4.0	3.49	1.94	N/A	13.08	3.80	1.94	2.62	14.43	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100055	Ellis Wood Contracting Co.	031-1	32.38238	-81.83594	421,369.20	3,583,128.10	6	41.00	61.07	Minor	Active	1.2	1.2	0.4	0.0	42.7	S	3.4	4.4	6.5	4.0	3.49	1.94	N/A	13.08	3.80	1.94	2.62	14.43	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100056	Franklin Chevrolet	031-2	32.43582	-81.75792	428,750.20	3,588,997.50	6	41.00	68.71	Minor	Active	0.0	0.0	0.0	0.0	39.0	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100057	Rozier Ford Lincoln-Mercury	031-3	32.40883	-81.80655	424,155.90	3,586,039.00	6	41.00	61.84	Minor	Active	0.0	0.0	0.0	0.0	40.6	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100058	Southern Eagle Collision Center	031-1	32.37753	-81.83957	421,023.60	3,582,593.20	6	41.00	57.79	Minor	Active	0.0	0.0	0.0	0.0	43.4	S	3.4	4.4	6.5	4.0	3.49	1.94	N/A	13.08	3.80	1.94	2.62	14.43	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100059	South 301 Auto Body Collision Center	031-3	32.41435	-81.80271	424,521.60	3,586,648.20	6	41.00	61.49	Minor	Active	0.0	0.0	0.0	0.0	40.0	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100060	Valli's Precision Collision		32.38888	-81.74976	429,480.80	3,583,788.60	6	41.00	60.25	Minor	Active	0.0	0.0	0.0	0.0	44.1	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Bulloch	03100061	Hall's Paint & Body	031-2	32.45704	-81.79031	425,722.70	3,591,371.90	6	41.00	75.82	Minor	Active	0.0	0.0	0.0	0.0	35.8	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Bulloch	03100062	Rempe's Collision & Auto Restoration	031-2	32.46167	-81.76978	427,655.90	3,591,871.00	6	41.00	60.81	Minor	Active	0.0	0.0	0.0	0.0	35.9	S	3.4	4.4	6.5	4.0	3.84	3.84	N/A	0.53	4.24	3.84	0.47	0.60	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300001	McBride Gin & Farm Supply		33.03768	-82.24755	383,504.90	3,656,155.70	11	41.00	107.33	Minor	Active	72.0	5.8	0.0	0.0	44.3	S	3.4	4.4	6.5	4.0	1.63	0.13	N/A	0.00	1.76	0.13	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Burke	03300002	Mundy, Inc.	033-1	33.08915	-82.00872	405,862.50	3,661,622.60	12	41.00	77.55	PBR	Active	58.6	4.7	0.0	0.0	37.4	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300004	Rayonier	033-2	32.81916	-82.23305	384,575.50	3,631,912.50	10	41.00	58.98		No Files																										
GA	Burke	03300007	Halliburton Industrial Services	033-1	33.09000	-82.01585	405,198.00	3,661,723.30	12	41.00	88.37	Minor	No Files																										
GA	Burke	03300008	Allen B. Wilson Combustion Turbine Plant	033-3	33.13770	-81.74835	430,200.30	3,666,801.70	1	41.00	62.99	PSD	Active	293.8	284.1	22,478.9	12,899.8	43.7	S	3.4	4.4	6.5	4.0	10.11	9.84	N/A	311.44	10.96	9.84	730.38	342.82	Yes	No	N/A	No	Yes	No	No	No
GA	Burke	03300010	Kelleys Gin	033-2	32.81719	-82.23687	384,215.30	3,631,698.30	10	41.00	55.87	Minor	Active	72.0	5.8	0.0	0.0	32.1	S	3.4	4.4	6.5	4.0	2.25	0.18	N/A	0.00	2.51	0.18	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Burke	03300011	Sardis Lumber Company		32.97527	-81.75783	429,186.10	3,648,800.30	1	41.00	72.81		Closed																										
GA	Burke	03300013	Waynesboro Concrete Products Co.	033-1	33.09876	-82.00840	405,902.60	3,662,687.80	12	41.00	88.85	Minor	Active	4.7	4.7	0.0	0.0	38.2	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300019	Lamb C B Lumber Co.	033-2	32.81724	-82.24078	383,849.40	3,631,708.10	10	41.00	56.74	Minor	No Files																										
GA	Burke	03300020	Builders Supply Co.	033-1	33.09478	-82.02756	404,110.30	3,662,263.90	12	41.00	95.57	Minor	Active	4.7	4.7	0.0	0.0	38.3	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300021	McKinney Wholesale Co	033-1	33.09541	-82.00561	406,159.40	3,662,313.90	12	41.00	87.36	Minor	Active	10.2	10.2	0.0	0.0	38.8	S	3.4	4.4	6.5	4.0	6.31	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Burke	03300025	Perfection-Schwank	033-1	33.10214	-82.00215	406,489.40	3,663,056.90	12	41.00	97.88	Minor	No Files																										
GA	Burke	03300027	Southern States Cooperative (Gold Kist Grain)		33.08724	-82.01186	405,567.40	3,661,413.70	12	41.00	82.20		Closed																										
GA	Burke	03300028	Collins Gin		33.02401	-82.05036	401,904.10	3,654,438.80	12	41.00	85.35	Minor	Active	43.1	3.4	0.0	0.0	31.8	S	3.4	4.4	6.5	4.0	1.35	0.11	N/A	0.00	1.52	0.11	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Burke	03300029	Farmers Gin Co.	033-1	33.08724	-82.01186	405,567.40	3,661,413.70	12	41.00	82.20	Minor	Active	72.0	5.8	0.0	0.0	37.5	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	0.00	3.05	0.00	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300030	Vogtle Electric Generating Plant	033-3	33.14203	-81.76176	428,952.90	3,667,290.80	1	41.00	63.98	PSD	Active	147.9	145.8	4,691.3	710.0	43.7	S	3.4	4.4	6.5	4.0	10.11	9.84	N/A	311.44	10.96	9.84	730.38	342.82	Yes	No	N/A	No	Yes	No	No	No
GA	Burke	03300031	Midville Warehouse		32.82952	-82.22580	385,267.50	3,633,053.20	10	41.00	68.61		Denied																										
GA	Burke	03300034	Fiamm Technologies	033-1	33.10511	-82.01164	405,607.00	3,663,394.70	12	41.00	87.79	Minor	Active	17.8	17.8	9.9	0.1	39.2	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300037	Reeves Construction Company	033-1	33.09260	-81.98810	407,790.50	3,661,986.80	12	41.00	77.13	Minor	Active	65.1	65.1	48.2	578.8	37.3	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300038	ASTA	033-1	33.10395	-82.01750	405,059.00	3,663,271.40	12	41.00	88.00	Minor	Active	0.0	0.0	5.0	0.0	39.2	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300039	Shaw Group, Inc. (for Vogtle Units 3 & 4)	033-3	33.14203	-81.76176	428,952.90	3,667,290.80	1	41.00	63.98		Temporary																										
GA	Burke	03300040	Burke County Concrete #29		33.16328	-81.80786	424,671.40	3,669,678.90	1	41.00	75.19	Minor	Active	99.4	99.4	0.0	0.0	45.0	S	3.4	4.4	6.5	4.0	2.21	2.21	N/A	0.00	2.39	2.21	0.00	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Burke	03300041	Burke County Body Shop	033-1	33.08626	-82.01071	405,673.70	3,661,304.00	12	41.00	81.12	Minor	Active	0.0	0.0	0.0	0.0	36.9	S	3.4	4.4	6.5	4.0	6.31	3.05	N/A	15.67	6.95	3.05	2.07	17.57	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Candler	04300003	Candler Gin & Warehouse	043-1	32.39682	-82.05726	400,566.20	3,584,913.10	7	41.00	63.73	Minor	Active	64.6	5.2	0.0	0.0	43.5	S	3.4	4.4	6.5	4.0	3.94	0.70	N/A	0.00	4.29	0.70	0.10	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Candler	04300004	Metter Concrete Products Co	043-1	32.39976	-82.05162	401,099.90	3,585,233.80	7	41.00	60.52	Minor	Active	3.4	3.4	0.0	0.0	43.1	S	3.4	4.4	6.5	4.0	3.94	0.70	N/A	0.00	4.29	0.70	0.10	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Candler	04300008	Allied Metals	043-1	32.40024	-82.03399	402,758.50	3,585,270.90	7	41.00	63.82	Minor	Active	13.0	13.0	0.0	0.0	42.3	S	3.4	4.4	6.5	4.0	3.94	0.70	N/A	0.00	4.29	0.70	0.10	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Candler	04300009	Growers Gin & Warehouse	043-1	32.39885	-82.04202	402,001.80	3,585,124.10	7	41.00	66.84	PBR	Active	84.1	6.7	0.0	0.0	42.7	S	3.4	4.4	6.5	4.0	3.94	0.70	N/A	0.00	4.29	0.70	0.10	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Candler	04300011	Moore Wallace Inc	043-1	32.39758	-82.04227	401,976.90	3,584,983.60	7	41.00	66.64	Minor	Active	1.4	1.4	3.7	0.0	43.0	S	3.4	4.4	6.5	4.0	3.94	0.70	N/A	0.00	4.29	0.70	0.10	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Effingham	10300013	GA Transmission Corp		32.49562	-81.43150	459,463.10	3,595,455.60	5	41.00	39.34	Minor	Active	3.7	3.7	64.3	1.7	53.0	S	3.4	4.4	6.5	4.0	0.07	0.07	N/A	0.03	0.08	0.07	1.38	0.03	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700010	Swainsboro Concrete Products	107-1	32.59604	-82.33098	375,097.10	3,607,287.00	8	41.00	95.70	Minor	Active	3.4	3.4	0.0	0.0	44.6	S	3.4	4.4	6.5	4.0	0.86	0.86	0.18	0.02	0.92	0.86	0.21	0.02	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700011	Rayonier Wood Products Swainsboro		32.50967	-82.33176	374,904.20	3,597,712.50	8	41.00	76.17	TV	Active	44.1	44.1	15.5	17.2	49.4	S	3.4	4.4	6.5	4.0	0.89	0.89	N/A	0.35	0.96	0.89	0.36	0.38	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700013	Lifeline Industries	107-1	32.59880	-82.32950	375,239.90	3,607,591.20	8	41.00	89.22	Minor	Active	14.3	14.3	6.1	0.7	44.4	S	3.4	4.4	6.5	4.0	0.86	0.86	N/A	0.02	0.92	0.86	0.21	0.02	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700016	American Yard Product	107-2	32.58230	-82.31788	376,307.70	3,605,748.40	8	41.00	93.57	Minor	No Files																										
GA	Emanuel	10700017	Rolander Bros Construction Co		32.81042	-82.39569	369,337.00	3,631,132.80	8	41.00	75.31		Closed																										
GA	Emanuel	10700019	American Steel Products	107-1	32.60209	-82.33565	374,667.30	3,607,963.20	8	41.00	96.42	Minor	Active	0.2	0.2	1.9	0.0	44.7	S	3.4	4.4	6.5	4.0	0.86	0.86	N/A	0.02	0.92	0.86	0.21	0.02	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700020	Swainsboro Electro Plating		32.56510	-82.33198	374,960.40	3,603,858.00	8	41.00	76.83		Closed																										

Table 1. Baseline Minor and Major Source Regional Inventory (Georgia and South Carolina) and Q/D Screening for Nearby Sources

			Facilities that are highlighted in red in Column D are included in the 1-hour NO2 and SO2 NAAQS inventories											Potential emissions listed for each pollutant in Columns O, P, Q, and R are facility-wide and are based on maximum hourly allowable emissions and do not take into account annualized emission limitations (e.g., SM sources will be >100 tpy)				Short-term distance (d) codes are "CB" for county-boundary, "Z" for postal code, and "S" for source-to-source		SIA's listed for each pollutant in Columns U, V, W, and X are the maximum for each averaging period, excluding 1-hour NO_2 and SO_2. No Q/D screening is performed for the new 1-hour NO_2 and SO_2 NAAQS				Q/d screening values listed for each pollutant in Columns Y, Z, AA, and BB are for short-term averaging periods and are based on the source-to-source distance listed in Column S. Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E				Q/d screening values listed for each pollutant in Columns CC, DD, EE, and FF are for long-term averaging periods and are based on the distance from the source to the outer edge of the SIA (D = d - SIA), except $PM_{2.5}$ which is based on the source-to-source distance using lower 2d threshold (Z = DD). Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E				Facilites, or groups of facilities, highlighted in red exceed 20 (or 2 for $PM_{2.5}$) for the Q/d screening value and are modeled. Facilites, or groups of facilities, highlighted in blue were below 20 for the Q/d screening value but were included in the certain quality analyses (~10 or more)				Facilites, or groups of facilities, highlighted in red exceed 20 (or 2 for $PM_{2.5}$) for the Q/d screening value and are modeled. Facilites, or groups of facilities, highlighted in blue were below 20 for the Q/D screening value but were included in the certain quality analyses (~10 or more)			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	KK	LL	MM	NN	OO
					Geographic Coordinates		UTM NAD83 Coordinates		30° Wind Sector					"Q", Allowable Emissions, (tpy)				"d"		Significant Impact Area, SIA, (km)				"Q/d", Short-term				"Q/D", Long-term				Short-term "Q/d" < 20 ($PM_{2.5}$ <2)				Long-term "Q/D" < 20 ($PM_{2.5}$ < 2)			
State	County	AIRS	Facility Name	2-km Groups	Latitude (dd)	Longitude (dd)	East (m)	North (m)	Wind blowing from…	Distance based on fastest sector wind speed (km)	Elevation (m)	General, PBR, Minor, Title V, PSD	Permitting Status	PM_{10}	$PM_{2.5}$	NO_x	SO_2	Short-term Distance, (km)	Code	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2	PM_{10}	$PM_{2.5}$	NOx	SO_2
GA	Emanuel	10700021	Cabinet Masters Inc	107-2	32.57888	-82.31217	376,839.00	3,605,362.60	8	41.00	92.80	PBR	Active	20.0	20.0	0.0	0.0	43.9	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700022	Boulineau's Cabinet Shop	107-1	32.59706	-82.33167	375,033.80	3,607,400.90	8	41.00	95.16	PBR	Active	20.0	20.0	0.0	0.0	44.6		3.4	4.4	6.5	4.0	0.86	0.86	N/A	0.02	0.92	0.86	0.21	0.02	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Emanuel	10700025	Crider Poultry		32.42792	-82.21256	385,998.70	3,588,515.90	8	41.00	78.95	Minor	Active	1.8	1.8	33.3	3.8	47.4	S	3.4	4.4	6.5	4.0	0.04	0.04	N/A	0.08	0.04	0.04	0.81	0.09	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Jefferson	16300007	Thermo King Corp		33.00277	-82.38831	370,308.70	3,652,450.00	10	41.00	99.26	Minor	Active	1.9	1.9	21.3	2.8	52.8	S	3.4	4.4	6.5	4.0	0.04	0.04	N/A	0.05	0.04	0.04	0.46	0.06	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Jefferson	16300008	Farmers Gin & Storage	163-1	32.86065	-82.39629	369,354.40	3,636,702.60	10	41.00	69.59	PBR	Active	87.2	12.7	5.0	0.6	47.7	S	3.4	4.4	6.5	4.0	4.41	2.69	N/A	0.17	4.75	2.69	1.75	0.19	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Jefferson	16300012	Battle Lumber Company	163-1	32.85708	-82.39358	369,602.80	3,636,303.50	10	41.00	67.91	Minor	Active	95.2	88.3	64.6	7.3	47.3	S	3.4	4.4	6.5	4.0	4.41	2.69	N/A	0.17	4.75	2.69	1.75	0.19	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Jefferson	16300027	Fulghum Industries	163-1	32.85366	-82.40274	368,740.50	3,635,935.60	10	41.00	67.25	Minor	Active	26.2	26.2	1.9	0.1	48.1	S	3.4	4.4	6.5	4.0	4.41	2.69	N/A	0.17	4.75	2.69	1.75	0.19	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Jefferson	16300033	Melvin Dye Body Shop		33.02467	-82.34402	374,477.50	3,654,824.30	10	41.00	95.64	Minor	Active	0.0	0.0	0.0	0.0	50.4	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Jenkins	16500006	Thompson Company		32.80378	-81.94924	411,128.31	3,629,933.18	11	41.00	62.31		Closed																										
GA	Jenkins	16500011	MI Metals		32.80250	-81.91806	414,046.60	3,629,765.50	12	41.00	57.71		Closed																										
GA	Jenkins	Greenfield	CARBO Ceramics Millen Facility		32.76645	-81.89947	415,753.10	3,625,754.00			65.53	PSD	Proposed	249.0	129.4	2,446.0	618.0															No	No	No	No	No	No	No	No
GA	Screven	25100002	Sylvania Yarn Systems	251-1	32.75274	-81.65301	438,828.40	3,624,064.80	4	41.00	58.22		Closed																										
GA	Screven	25100003	Feed Seed & Farm Supply	251-1	32.75446	-81.64802	439,297.00	3,624,252.60	4	41.00	55.08	Minor	Active	49.6	8.8	5.1	0.0	23.6	S	3.4	4.4	6.5	4.0	8.00	2.42	N/A	0.00	8.00	2.42	0.22	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Screven	25100004	Koyo Bearings USA		32.75770	-81.61908	442,010.10	3,624,595.60	4	41.00	55.77	Minor	Active	74.9	56.9	93.8	669.6	26.3	S	3.4	4.4	6.5	4.0	2.85	2.17	N/A	25.50	3.27	2.17	4.75	30.08	Yes	No	N/A	No	Yes	No	Yes	No
GA	Screven	25100005	Reed David W Company	251-1	32.75137	-81.64007	440,039.70	3,623,905.50	4	41.00	64.32	Minor	Active	36.8	2.9	0.0	0.0	24.3	S	3.4	4.4	6.5	4.0	8.00	2.42	N/A	0.00	8.00	2.42	0.22	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Screven	25100008	King America Finishing		32.60403	-81.74023	430,542.80	3,607,632.80	5	41.00	48.18	PSD	Active	37.1	36.0	376.6	770.7	23.2	S	3.4	4.4	6.5	4.0	1.60	1.56	N/A	33.29	1.88	1.56	22.62	40.24	Yes	Yes	N/A	No	Yes	Yes	No	No
GA	Screven	25100009	Sylvania Readymix Concrete	251-1	32.75559	-81.64431	439,645.30	3,624,375.80	4	41.00	55.65	Minor	Active	4.7	4.7	0.0	0.0	23.9	S	3.4	4.4	6.5	4.0	8.00	2.42	N/A	0.00	8.00	2.42	0.22	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Screven	25100010	Mobley Lumber Co		32.71352	-81.60031	443,740.60	3,619,687.80	4	41.00	64.43		Closed																										
GA	Screven	25100024	Cargill Peanut Products	251-1	32.75257	-81.64149	439,907.40	3,624,039.40	4	41.00	60.97	Minor	Active	95.0	39.9	0.0	0.0	24.8	S	3.4	4.4	6.5	4.0	8.00	2.42	N/A	0.00	8.00	2.42	0.22	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Screven	25100026	Bascom Gin Company		32.83943	-81.66904	437,387.50	3,633,684.60	3	41.00	36.13	Minor	Active	35.9	2.9	0.0	0.0	23.0	S	3.4	4.4	6.5	4.0	1.56	0.12	N/A	0.00	1.83	0.12	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Screven	25100027	Screven Gin Company		32.80533	-81.66035	438,177.20	3,629,899.20	3	41.00	39.19	Minor	Active	107.7	8.6	0.0	0.0	22.8	S	3.4	4.4	6.5	4.0	4.73	0.38	N/A	0.00	5.56	0.38	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Screven	25100029	SNG Woodcliff Gate Compressor Station		32.75076	-81.77416	427,477.60	3,623,921.80	4	41.00	85.09	TV	Active	1.6	1.6	134.1	0.8	11.8	S	3.4	4.4	6.5	4.0	0.14	0.14	N/A	0.07	0.19	0.14	25.21	0.10	Yes	Yes	N/A	Yes	Yes	Yes	No	Yes
GA	Screven	25100030	Mickey Lovett Body Shop		32.93039	-81.70911	433,705.20	3,643,793.00	2	41.00	64.32	Minor	Active	0.0	0.0	0.0	0.0	25.5	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
GA	Screven	25100031	Wallis Paint & Body	251-1	32.73160	-81.65440	438,683.70	3,621,722.10	4	41.00	54.91	Minor	Active	0.0	0.0	0.0	0.0	23.3	S	3.4	4.4	6.5	4.0	8.00	2.42	N/A	0.00	8.00	2.42	0.22	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Screven	25100032	McBride's Hill Paint & Body Shop	251-1	32.74620	-81.64550	439,527.50	3,623,335.50	4	41.00	72.39	Minor	Active	0.0	0.0	0.0	0.0	23.9	S	3.4	4.4	6.5	4.0	8.00	2.42	N/A	0.00	8.00	2.42	0.22	0.00	Yes	No	N/A	Yes	Yes	No	Yes	Yes
GA	Screven	25100033	Southeastern Aircraft Painting		32.64934	-81.59641	444,066.10	3,612,570.90	4	41.00	53.39	Minor	Active	0.0	0.0	0.0	0.0	31.2	S	3.4	4.4	6.5	4.0	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
SC	Aiken	00800041	Savannah River Nuclear Solutions SRS	008-6	33.27897	-81.70765	434,102.40	3,682,437.60	1	41.00	40.83	PSD	Active	207.4	207.4	2,492.5	59.4	59.7	S	3.4	4.4	6.5	4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
SC	Aiken	00800112	Three Rivers Landfill	008-6	33.26025	-81.73631	431,418.90	3,680,380.60	1	41.00	71.90	TV	Active	15.4	15.4	134.5	22.3	57.0	S	3.4	4.4	6.5	4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
SC	Aiken	00800144	Ameresco Federal Solutions	008-6	33.27405	-81.68724	435,999.50	3,681,879.40	1	41.00	79.32	PSD	Active	63.4	63.4	302.1	1,005.1	59.8	S	3.4	4.4	6.5	4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
SC	Allendale	01600006	Clariant Corporation		33.03899	-81.48098	455,088.40	3,655,712.20	2	41.00	49.62	Minor	Active	62.5	62.5	87.6	1.2	49.6	S	3.4	4.4	6.5	4.0	1.26	1.26	N/A	0.03	1.35	1.26	2.03	0.03	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
SC	Barnwell	03000036	Savannah River Nuclear Solutions SRS Area-D		33.20253	-81.73970	431,057.80	3,673,983.50	1	41.00	39.31	PSD	Active	707.8	707.8	2,794.9	9,664.0	50.8	S	3.4	4.4	6.5	4.0	13.94	13.94	N/A	190.35	14.94	13.94	63.13	206.63	Yes	No	N/A	No	Yes	No	No	No

Table 2. Refined $PM_{2.5}$ Screening using AERMOD

K: Potential emissions listed for each pollutant in Column K are facility-wide and are based on maximum hourly allowable emissions and do not take into account annualized emission limitations (e.g., SM sources will be >100 tpy)

L–M: Distance (d) codes are "CB" for county-boundary, "Z" for postal code, and "S" for source-to-source

N: SIA listed in Column N for $PM_{2.5}$ is the maximum for the 24-hour and annual averaging periods based on the form of the NAAQS (5 year average of highest first-highs)

O: Q/d screening values listed for $PM_{2.5}$ in Column O are valid for both 24-hr and annual averaging periods and are based on the source-to-source distance listed in Column P. Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E

P: Facilites, or groups of facilities, highlighted in red exceed 2 for the Q/d screening value and are evaluated using a refined method for screening

Q–T: For facilities, or groups of facilites, that exceed 2 for the "Q/d" screening value, AERMOD was used to determine the maximum significant impact for $PM_{2.5}$ for the 24-hour and annual averaging periods within the 4.4 km SIA using "Q" emitted from a default stack with parameters based on the original development of the 20d screening procedure

U–X: Concentrations in Columns U and N are the 24-hour and annual significant impact for the $PM_{2.5}$ NAAQS for each facility, or group of facilities, for the airport site surface characteristics. Columns W and X use the project site surface characteristics. Significant impacts are based on "Q", default stack parameters, and running AERMOD in using regulatory default control options. Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E (modeled source groups are denoted by xxxxxxGx)

SIL columns: Facilites, or groups of facilities, highlighted in red exceed the $PM_{2.5}$ NAAQS SIL and are included in the cumulative impact assessment. Facilites, or groups of facilities, highlighted in blue were below the PM2.5 NAAQS SIL but were included in the NAAQS quality analyses

A State	B County	C AIRS	D Facility Name	E 2-km Groups	F Geographic Coordinates Latitude (dd)	G Longitude (dd)	H UTM NAD83 Coordinates East (m)	I North (m)	J Elevation (m)	K "Q", Allowable Emissions, (tpy) $PM_{2.5}$	L "d" Distance, (km)	M Code	N $PM_{2.5}$	O "Q/d" $PM_{2.5}$	P "Q/d" < 2 $PM_{2.5}$	Q Screening Stack Parameters Release Height, (m)	R Exit Temp., (K)	S Exit Velocity, (m/s)	T Exit Diameter, (m)	Modeled Group ID or AIRS	U $PM_{2.5}$ Significant Impact Airport Site DNLFFC06-110 24-hour, (µg/m³)	N Annual, (µg/m³)	W $PM_{2.5}$ Significant Impact Project Site CBOFFC06-110 24-hour, (µg/m³)	X Annual, (µg/m³)	U $PM_{2.5}$ Significant Impact Airport Site DNLFFC06-110 < 1.2 SIL	N < 0.3 SIL	W $PM_{2.5}$ Significant Impact Project Site CBOFFC06-110 < 1.2 SIL	X < 0.3 SIL
GA	Bulloch	03100002	Tillman & Deal Farm Supply Inc		32.47845	-81.76562	428,060.20	3,593,728.40	51.88	11.2	34.3	S	4.4	0.33	Yes													
GA	Bulloch	03100003	Jones W K Lumber Co		32.29509	-81.70915	433,231.70	3,573,365.70	40.76																			
GA	Bulloch	03100005	W.M. Sheppard Lumber Company		32.35441	-81.65564	438,310.10	3,579,909.40	39.04	83.9	50.9	S	4.4	1.65	Yes													
GA	Bulloch	03100011	Reeves Construction Company	031-1	32.37297	-81.84944	420,091.10	3,582,095.00	52.16	52.0	43.6	S	4.4	1.94	Yes	10	0	0.01	1	031000G1	0.48	0.02	0.17	0.01	Yes	Yes	Yes	Yes
GA	Bulloch	03100012	Emerson Electric Co (Brodie Meter)	031-2	32.44965	-81.77966	426,717.60	3,590,545.30	71.91	26.3	36.8	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100020	Braswell A M Food Co Inc	031-2	32.45692	-81.77690	426,982.90	3,591,349.30	61.71	0.8	36.2	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100028	Claude Howard Lumber Company	031-2	32.43370	-81.77433	427,205.80	3,588,773.50	60.47	85.6	38.5	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100031	Evans Concrete	031-2	32.43638	-81.77892	426,776.50	3,589,073.80	63.35	4.7	38.1	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100036	Robbins Packing Plant		32.46502	-81.79989	424,828.90	3,592,263.20	76.30	0.2	34.7	S	4.4	0.01	Yes													
GA	Bulloch	03100042	Denmark Feed		32.32906	-81.69711	434,389.80	3,577,123.90	46.99																			
GA	Bulloch	03100043	Bulloch Gin Co		32.39697	-81.66580	437,383.50	3,584,633.10	52.90	5.8	46.4	S	4.4	0.12	Yes													
GA	Bulloch	03100044	Briggs & Stratton	031-1	32.38213	-81.84249	420,752.90	3,583,105.30	60.84	23.9	42.7	S	4.4	1.94	Yes	10	0	0.01	1	031000G1	0.48	0.02	0.17	0.01	Yes	Yes	Yes	Yes
GA	Bulloch	03100045	Southern States Coop	031-1	32.37365	-81.84689	420,331.60	3,582,168.50	55.50	5.8	43.6	S	4.4	1.94	Yes	10	0	0.01	1	031000G1	0.48	0.02	0.17	0.01	Yes	Yes	Yes	Yes
GA	Bulloch	03100046	Custom Cabinets		32.44371	-81.72961	431,417.60	3,589,853.60	61.52	20.0	39.1	S	4.4	0.51	Yes													
GA	Bulloch	03100047	Northside Cabinets		32.50996	-81.86588	418,667.60	3,597,293.50	79.58	20.0	28.6	S	4.4	0.70	Yes													
GA	Bulloch	03100048	Coastal Countertops	031-2	32.45084	-81.77873	426,806.00	3,590,676.60	68.58	20.0	36.8	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100049	Kitchen Craft Cabinets		32.37690	-81.65749	438,151.40	3,582,403.50	45.37	20.0	48.8	S	4.4	0.41	Yes													
GA	Bulloch	03100050	Harry Shurling Cabinets		32.32608	-81.55255	447,993.90	3,576,714.20	32.25	20.0	58.6	S	4.4	N/A	Yes													
GA	Bulloch	03100052	East Geogia Regional Medical Center		32.41438	-81.76982	427,614.40	3,586,628.80	63.86	2.5	40.9	S	4.4	0.06	Yes													
GA	Bulloch	03100054	Viracon-Statesboro	031-1	32.38179	-81.84621	420,402.70	3,583,070.30	56.73	0.0	42.9	S	4.4	1.94	Yes	10	0	0.01	1	031000G1	0.48	0.02	0.17	0.01	Yes	Yes	Yes	Yes
GA	Bulloch	03100055	Ellis Wood Contracting Co.	031-1	32.38238	-81.83594	421,369.20	3,583,128.10	61.07	1.2	42.7	S	4.4	1.94	Yes	10	0	0.01	1	031000G1	0.48	0.02	0.17	0.01	Yes	Yes	Yes	Yes
GA	Bulloch	03100056	Franklin Chevrolet	031-2	32.43582	-81.75792	428,750.20	3,588,997.50	68.71	0.0	39.0	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100057	Rozier Ford Lincoln-Mercury	031-3	32.40883	-81.80655	424,155.90	3,586,039.00	61.84	0.0	40.6	S	4.4	0.00	Yes													
GA	Bulloch	03100058	Southern Eagle Collision Center	031-1	32.37753	-81.83957	421,023.60	3,582,593.20	57.79	0.0	43.4	S	4.4	1.94	Yes	10	0	0.01	1	031000G1	0.48	0.02	0.17	0.01	Yes	Yes	Yes	Yes
GA	Bulloch	03100059	South 301 Auto Body Collision Center	031-3	32.41435	-81.80271	424,521.60	3,586,648.20	61.49	0.0	40.0	S	4.4	0.00	Yes													
GA	Bulloch	03100060	Valli's Precision Collision		32.38888	-81.74976	429,480.80	3,583,788.60	60.25	0.0	44.1	S	4.4	0.00	Yes													
GA	Bulloch	03100061	Hall's Paint & Body	031-2	32.45704	-81.79031	425,722.70	3,591,371.90	75.82	0.0	35.8	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Bulloch	03100062	Rempe's Collision & Auto Restoration	031-2	32.46167	-81.76978	427,655.90	3,591,871.00	60.81	0.0	35.9	S	4.4	3.84	No	10	0	0.01	1	031000G2	0.91	0.04	0.36	0.02	Yes	Yes	Yes	Yes
GA	Burke	03300001	McBride Gin & Farm Supply		33.03768	-82.24755	383,504.90	3,656,155.70	107.33	5.8	44.3	S	4.4	0.13	Yes													
GA	Burke	03300002	Mundy, Inc.	033-1	33.08915	-82.00872	405,862.50	3,661,622.60	77.55	4.7	37.4	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300004	Rayonier	033-2	32.81916	-82.23305	384,575.50	3,631,912.50	58.98																			
GA	Burke	03300007	Halliburton Industrial Services	033-1	33.09000	-82.01585	405,198.00	3,661,723.30	88.37																			
GA	Burke	03300008	Allen B. Wilson Combustion Turbine Plant	033-3	33.13770	-81.74835	430,200.30	3,666,801.70	62.99	284.1	43.7	S	4.4	9.84	No	10	0	0.01	1	033000G3	3.00	0.10	1.11	0.04	No	Yes	Yes	Yes
GA	Burke	03300010	Kelleys Gin	033-2	32.81719	-82.23687	384,215.30	3,631,698.30	55.87	5.8	32.1	S	4.4	0.18	Yes													
GA	Burke	03300011	Sardis Lumber Company		32.97527	-81.75783	429,186.10	3,648,800.30	72.81																			
GA	Burke	03300013	Waynesboro Concrete Products Co.	033-1	33.09876	-82.00840	405,902.60	3,662,687.80	88.85	4.7	38.2	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300019	Lamb C B Lumber Co.	033-2	32.81724	-82.24078	383,849.40	3,631,708.10	56.74																			
GA	Burke	03300020	Builders Supply Co.	033-1	33.09478	-82.02756	404,110.30	3,662,263.90	95.57	4.7	38.3	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300021	McKinney Wholesale Co	033-1	33.09541	-82.00561	406,159.40	3,662,313.90	87.36	10.2	38.8	S	4.4	0.00	Yes													
GA	Burke	03300025	Perfection-Schwank	033-1	33.10214	-82.00215	406,489.40	3,663,056.90	97.88																			
GA	Burke	03300027	Southern States Cooperative (Gold Kist Grain)		33.08724	-82.01186	405,567.40	3,661,413.70	82.20																			
GA	Burke	03300028	Collins Gin		33.02401	-82.05036	401,904.10	3,654,438.80	85.35	3.4	31.8	S	4.4	0.11	Yes													
GA	Burke	03300029	Farmers Gin Co.	033-1	33.08724	-82.01186	405,567.40	3,661,413.70	82.20	5.8	37.5	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300030	Vogtle Electric Generating Plant	033-3	33.14203	-81.76176	428,952.90	3,667,290.80	63.98	145.8	43.7	S	4.4	9.84	No	10	0	0.01	1	033000G3	3.00	0.10	1.11	0.04	No	Yes	Yes	Yes
GA	Burke	03300031	Midville Warehouse		32.82952	-82.22580	385,267.50	3,633,053.20	68.61																			
GA	Burke	03300034	Fiamm Technologies	033-1	33.10511	-82.01164	405,607.00	3,663,394.70	87.79	17.8	39.2	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300037	Reeves Construction Company	033-1	33.09260	-81.98810	407,790.50	3,661,986.80	77.13	65.1	37.3	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300038	ASTA	033-1	33.10395	-82.01750	405,059.00	3,663,271.40	88.00	0.0	39.2	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300039	Shaw Group, Inc. (for Vogtle Units 3 & 4)	033-3	33.14203	-81.76176	428,952.90	3,667,290.80	63.98																			
GA	Burke	03300040	Burke County Concrete #29		33.16328	-81.80786	424,671.40	3,669,678.90	75.19	99.4	45.0	S	4.4	2.21	No	10	0	0.01	1	03300040	0.70	0.02	0.43	0.01	Yes	Yes	Yes	Yes
GA	Burke	03300041	Burke County Body Shop	033-1	33.08626	-82.01071	405,673.70	3,661,304.00	81.12	0.0	36.9	S	4.4	3.05	No	10	0	0.01	1	033000G1	0.31	0.02	0.12	0.01	Yes	Yes	Yes	Yes

Table 2. Refined $PM_{2.5}$ Screening using AERMOD

Column K: Potential emissions listed for each pollutant in Column K are facility-wide and are based on maximum hourly allowable emissions and do not take into account annualized emission limitations (e.g., SM sources will be >100 tpy)

Columns L–M: Distance (d) codes are "CB" for county-boundary, "Z" for postal code, and "S" for source-to-source

Column N: SIA listed in Column N for $PM_{2.5}$ is the maximum for the 24-hour and annual averaging periods based on the form of the NAAQS (5 year average of highest first-highs)

Column O: Q/d screening values listed for $PM_{2.5}$ in Column O are valid for both 24-hr and annual averaging periods and are based on the source-to-source distance listed in Column P. Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E

Column PM2.5: Facilites, or groups of facilities, highlighted in red exceed 2 for the Q/d screening value and are evaluated using a refined method for screening

Columns Q–T: For facilities, or groups of facilites, that exceed 2 for the "Q/d" screening value, AERMOD was used to determine the maximum significant impact for $PM_{2.5}$ for the 24-hour and annual averaging periods within the 4.4 km SIA using "Q" emitted from a default stack with parameters based on the original development of the 20d screening procedure

Columns U, N, W, X (concentrations): Concentrations in Columns U and N are the 24-hour and annual significant impact for the $PM_{2.5}$ NAAQS for each facility, or group of facilities, for the airport site surface characteristics. Columns W and X use the project site surface characteristics. Significant impacts are based on "Q", default stack parameters, and running AERMOD in using regulatory default control options. Screening values highlighed in red are controlling for the 2-km source groupings listed in Column E (modeled source groups are denoted by xxxxxxGx)

Columns U, N, W, X (SIL): Facilites, or groups of facilities, highlighted in red exceed the $PM_{2.5}$ NAAQS SIL and are included in the cumulative impact assessment. Facilites, or groups of facilities, highlighted in blue were below the PM2.5 NAAQS SIL but were included in the NAAQS quality analyses

A State	B County	C AIRS	D Facility Name	E 2-km Groups	F Geographic Coordinates Latitude (dd)	G Longitude (dd)	H UTM NAD83 Coordinates East (m)	I North (m)	J Elevation (m)	K "Q", Allowable Emissions, (tpy) $PM_{2.5}$	L "d" Distance, (km)	M Code	N $PM_{2.5}$	O "Q/d" $PM_{2.5}$	PM2.5 "Q/d" < 2 $PM_{2.5}$	Q Screening Stack Parameters Release Height, (m)	R Exit Temp., (K)	S Exit Velocity, (m/s)	T Exit Diameter, (m)	Modeled Group ID or AIRS	U $PM_{2.5}$ Significant Impact Airport Site DNLFFC06-110 24-hour, ($\mu g/m^3$)	N Annual, ($\mu g/m^3$)	W $PM_{2.5}$ Significant Impact Project Site CBOFFC06-110 24-hour, ($\mu g/m^3$)	X Annual, ($\mu g/m^3$)	U $PM_{2.5}$ Significant Impact Airport Site DNLFFC06-110 < 1.2 SIL	N < 0.3 SIL	W $PM_{2.5}$ Significant Impact Project Site CBOFFC06-110 < 1.2 SIL	X < 0.3 SIL
GA	Candler	04300003	Candler Gin & Warehouse	043-1	32.39682	-82.05726	400,566.20	3,584,913.10	63.73	5.2	43.5	S	4.4	0.70	Yes													
GA	Candler	04300004	Metter Concrete Products Co	043-1	32.39976	-82.05162	401,099.90	3,585,233.80	60.52	3.4	43.1	S	4.4	0.70	Yes													
GA	Candler	04300008	Allied Metals	043-1	32.40024	-82.03399	402,758.50	3,585,270.90	63.82	13.0	42.3	S	4.4	0.70	Yes													
GA	Candler	04300009	Growers Gin & Warehouse	043-1	32.39885	-82.04202	402,001.80	3,585,124.10	66.84	6.7	42.7	S	4.4	0.70	Yes													
GA	Candler	04300011	Moore Wallace Inc	043-1	32.39758	-82.04227	401,976.90	3,584,983.60	66.64	1.4	43.0	S	4.4	0.70	Yes													
GA	Effingham	10300013	GA Transmission Corp		32.49562	-81.43150	459,463.10	3,595,455.60	39.34	3.7	53.0	S	4.4	0.07	Yes													
GA	Emanuel	10700010	Swainsboro Concrete Products	107-1	32.59604	-82.33098	375,097.10	3,607,287.00	95.70	3.4	44.6	S	4.4	0.86	Yes													
GA	Emanuel	10700011	Rayonier Wood Products Swainsboro		32.50967	-82.33176	374,904.20	3,597,712.50	76.17	44.1	49.4	S	4.4	0.89	Yes													
GA	Emanuel	10700013	Lifeline Industries	107-1	32.59880	-82.32950	375,239.90	3,607,591.20	89.22	14.3	44.4	S	4.4	0.86	Yes													
GA	Emanuel	10700016	American Yard Product	107-2	32.58230	-82.31788	376,307.70	3,605,748.40	93.57																			
GA	Emanuel	10700017	Rolander Bros Construction Co		32.81042	-82.39569	369,337.00	3,631,132.80	75.31																			
GA	Emanuel	10700019	American Steel Product	107-1	32.60209	-82.33565	374,667.30	3,607,963.20	96.42	0.2	44.7	S	4.4	0.86	Yes													
GA	Emanuel	10700020	Swainsboro Electro Plating		32.56510	-82.33198	374,960.40	3,603,858.00	76.83																			
GA	Emanuel	10700021	Cabinet Masters Inc	107-2	32.57888	-82.31217	376,839.00	3,605,362.60	92.80	20.0	43.9	S	4.4	0.00	Yes													
GA	Emanuel	10700022	Boulineau's Cabinet Shop	107-1	32.59706	-82.33167	375,033.80	3,607,400.90	95.16	20.0	44.6		4.4	0.86	Yes													
GA	Emanuel	10700025	Crider Poultry		32.42792	-82.21256	385,998.70	3,588,515.90	78.95	1.8	47.4	S	4.4	0.04	Yes													
GA	Jefferson	16300007	Thermo King Corp		33.00277	-82.38831	370,308.70	3,652,450.00	99.26	1.9	52.8	S	4.4	0.04	Yes													
GA	Jefferson	16300008	Farmers Gin & Storage	163-1	32.86065	-82.39629	369,354.40	3,636,702.60	69.59	12.7	47.7	S	4.4	2.69	No	10	0	0.01	1	163000G1	1.01	0.04	0.31	0.01	Yes	Yes	Yes	Yes
GA	Jefferson	16300012	Battle Lumber Company	163-1	32.85708	-82.39358	369,602.80	3,636,303.50	67.91	88.3	47.3	S	4.4	2.69	No	10	0	0.01	1	163000G1	1.01	0.04	0.31	0.01	Yes	Yes	Yes	Yes
GA	Jefferson	16300027	Fulghum Industries	163-1	32.85366	-82.40274	368,740.50	3,635,935.60	67.25	26.2	48.1	S	4.4	2.69	No	10	0	0.01	1	163000G1	1.01	0.04	0.31	0.01	Yes	Yes	Yes	Yes
GA	Jefferson	16300033	Melvin Dye Body Shop		33.02467	-82.34402	374,477.50	3,654,824.30	95.64	0.0	50.4	S	4.4	0.00	Yes													
GA	Jenkins	16500006	Thompson Company		32.80378	-81.94924	411,128.31	3,629,933.18	62.31																			
GA	Jenkins	16500011	MI Metals		32.80250	-81.91806	414,046.60	3,629,765.50	57.71																			
GA	Jenkins	Greenfield	CARBO Ceramics Millen Facility		32.76645	-81.89947	415,753.10	3,625,754.00	65.53	129.4					No													
GA	Screven	25100002	Sylvania Yarn Systems	251-1	32.75274	-81.65301	438,828.40	3,624,064.80	58.22																			
GA	Screven	25100003	Feed Seed & Farm Supply	251-1	32.75446	-81.64802	439,297.00	3,624,252.60	55.08	8.8	23.6	S	4.4	2.42	No	10	0	0.01	1	251000G1	1.12	0.04	0.99	0.03	Yes	Yes	Yes	Yes
GA	Screven	25100004	Koyo Bearings USA		32.75770	-81.61908	442,010.10	3,624,595.60	55.77	56.9	26.3	S	4.4	2.17	No	10	0	0.01	1	25100004	0.92	0.03	0.88	0.02	Yes	Yes	Yes	Yes
GA	Screven	25100005	Reed David W Company	251-1	32.75137	-81.64007	440,039.70	3,623,905.50	64.32	2.9	24.3	S	4.4	2.42	No	10	0	0.01	1	251000G1	1.12	0.04	0.99	0.03	Yes	Yes	Yes	Yes
GA	Screven	25100008	King America Finishing		32.60403	-81.74023	430,542.80	3,607,632.80	48.18	36.0	23.2	S	4.4	1.56	Yes													
GA	Screven	25100009	Sylvania Readymix Concrete	251-1	32.75559	-81.64431	439,645.30	3,624,375.80	55.65	4.7	23.9	S	4.4	2.42	No	10	0	0.01	1	251000G1	1.12	0.04	0.99	0.03	Yes	Yes	Yes	Yes
GA	Screven	25100010	Mobley Lumber Co		32.71352	-81.60031	443,740.60	3,619,687.80	64.43																			
GA	Screven	25100024	Cargill Peanut Products	251-1	32.75257	-81.64149	439,907.40	3,624,039.40	60.97	39.9	24.8	S	4.4	2.42	No	10	0	0.01	1	251000G1	1.12	0.04	0.99	0.03	Yes	Yes	Yes	Yes
GA	Screven	25100026	Bascom Gin Company		32.83943	-81.66904	437,387.50	3,633,684.60	36.13	2.9	23.0	S	4.4	0.12	Yes													
GA	Screven	25100027	Screven Gin Company		32.80533	-81.66035	438,177.20	3,629,899.20	39.19	8.6	22.8	S	4.4	0.38	Yes													
GA	Screven	25100029	SNG Woodcliff Gate Compressor Station		32.75076	-81.77416	427,477.60	3,623,921.80	85.09	1.6	11.8	S	4.4	0.14	Yes													
GA	Screven	25100030	Mickey Lovett Body Shop		32.93039	-81.70911	433,705.20	3,643,793.00	64.32	0.0	25.5	S	4.4	0.00	Yes													
GA	Screven	25100031	Wallis Paint & Body	251-1	32.73160	-81.65440	438,683.70	3,621,722.10	54.91	0.0	23.3	S	4.4	2.42	No	10	0	0.01	1	251000G1	1.12	0.04	0.99	0.03	Yes	Yes	Yes	Yes
GA	Screven	25100032	McBride's Hill Paint & Body Shop	251-1	32.74620	-81.64550	439,527.50	3,623,335.50	72.39	0.0	23.9	S	4.4	2.42	No	10	0	0.01	1	251000G1	1.12	0.04	0.99	0.03	Yes	Yes	Yes	Yes
GA	Screven	25100033	Southeastern Aircraft Painting		32.64934	-81.59641	444,066.10	3,612,570.90	53.39	0.0	31.2	S	4.4	0.00	Yes													
SC	Aiken	00800041	Savannah River Nuclear Solutions SRS	008-6	33.27897	-81.70765	434,102.40	3,682,437.60	40.83	207.4	59.7	S	4.4	N/A	Yes													
SC	Aiken	00800112	Three Rivers Landfill	008-6	33.26025	-81.73631	431,418.90	3,680,380.60	71.90	15.4	57.0	S	4.4	N/A	Yes													
SC	Aiken	00800144	Ameresco Federal Solutions	008-6	33.27405	-81.68724	435,999.50	3,681,879.40	79.32	63.4	59.8	S	4.4	N/A	Yes													
SC	Allendale	01600006	Clariant Corporation		33.03899	-81.48098	455,088.40	3,655,712.20	49.62	62.5	49.6	S	4.4	1.26	Yes													
SC	Barnwell	03000036	Savannah River Nuclear Solutions SRS Area-D		33.20253	-81.73970	431,057.80	3,673,983.50	39.31	707.8	50.8	S	4.4	13.94	No	10	0	0.01	1	03000036	3.71	0.11	1.74	0.05	No	Yes	No	Yes

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK
Unit Description						Operating Levels used for Maximum Allowable Emissions									Nitrogen Oxides (NO_x)				Sulfur Dioxide (SO_2)				Particulate Matter <10 mm (PM_{10})							Particulate Matter <2.5 mm ($PM_{2.5}$)						
Modeled Source ID	Permitted Source ID	Source Description	Control Device Description	Construction Date	Modification Date	Maximum Hourly Processing Weight Rate tons	Maximum Rated Heat Input mmBtu	Maximum Rated Brake Horsepower bhp	Maximum Hourly Fuel Consumption	Units	Fuel Type	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate lb/hr	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate lb/hr	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit filterable	units	Basis	condensable	units	Basis	Mass Emission Rate (sum of filterable and condensable) lb/hr	Maximum Allowable Emission Limitation or Potential-to-Emit filterable	units	Basis	condensable	units	Basis	Mass Emission Rate (sum of filterable and condensable) lb/hr
		Georgia - Bulloch County **AIRS 03100002 Tillman & Deal Farm Supply Inc**																																		
0310000201	1	Grain Dryer	None	1976		19.20	10.00		109	gph	Propane			3/30/1982	13	lb/mgal	1.42E+00	AP42 1.5-1	1.5	lb/mgal	1.64E-01	AP42 1.5-1 15 gr/mcf	0.75	lb/ton	AP42 9.9.1-1	0.5	lb/mgal	AP42 1.5-1	1.45E+01	0.13	lb/ton	AP42 9.9.1-1	0.5	lb/mgal	AP42 1.5-1	2.55E+00
		Georgia - Bulloch County **AIRS 03100003 Jones W K Lumber Co** *Jones W K Lumber Company is listed as a lumber and sawmill. No application files could be found for this facility.*																																		
		Georgia - Bulloch County **AIRS 03100005 W.M. Sheppard Lumber Company**																																		
03100005K4	DK04	Direct-fired Lumber Drying Kiln #4	None	1998		13.93	25.00		5,556	pph	Green Sawdust			#19736	0.135	lb/mbf	7.53E-01	NCASI 098-022394A-1K098 5.58 thousand board feet (mbf) per hour #19736	0.025	lb/mmBtu	6.25E-01	AP42 1.6-2	0.384	lb/mbf	NCASI 098-022394B-1K098 5.58 thousand board feet (mbf) per hour #19736	included in NCASI emission factor			2.14E+00						Same as PM10	2.14E+00
03100005K5	DK05	Direct-fired Lumber Drying Kiln #5	None	1999		13.93	25.00		5,556	pph	Green Sawdust			#19736	0.135	lb/mbf	7.53E-01	NCASI 098-022394A-1K098 5.58 thousand board feet (mbf) per hour #19736	0.025	lb/mmBtu	6.25E-01	AP42 1.6-2	0.384	lb/mbf	NCASI 098-022394B-1K098 5.58 thousand board feet (mbf) per hour #19736	included in NCASI emission factor			2.14E+00						Same as PM10	2.14E+00
		Georgia - Bulloch County **AIRS 03100011 Reeves Construction Company Plant 10**																																		
0310001101		Hot Mix Asphalt Plant Dryer Stack	Baghouse	unk		250.00	100.00		714	gph	No. 2	37,092	20,512	#19283 and 8/10/2010 stack test	0.055	lb/ton	1.38E+01	AP42 11.1-7	0.51	lb/ton	1.27E+02	S-01-0 2.2.a 1.5% sulfur max of 50% or 0.1 lb/ton sulfur retained	0.04	gr/dscf	S-01-0 5.a. NSPS I	0.0194	lb/ton	AP42 11.1-3	1.19E+01						Same as PM10	1.19E+01
		Georgia - Bulloch County **AIRS 03100012 Emerson Electric Co** *Emerson Electric Company is a manufacturer of electric metering equipment. On June 20, 2000, Emerson provided GA EPD notification of the shut down of its rotational molding operations (#12160). According to a January 15, 1990 letter, prior to installation of the rotational molding operations, the facility only operated 2 exhaust stacks for spray paint booths.* *This would indicate that the 3.6 mmBtuhr natural gas-fired boilers (Source Code 5 and 6) installed in 1955 and authorized by the June 9, 1976 permit to operate are no longer in operation.* *Since the facility is a minor PSD source and was originally constructed prior to the major source baselines dates, emission changes at this facility to do affect the available increments.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																		
		Georgia - Bulloch County **AIRS 03100020 Braswell A M Food Co Inc**																																		
0310002001	1-1	200-hp Fitz Gibbon Boiler	None	1969			6.70		48	gph	No. 2			10/19/1973	20	lb/mgal	9.56E-01	AP42 1.3-1	0.5	% sulfur	3.40E+00	AP42 1.3-1	2	lb/mgal	AP42 1.3-1	1.3	lb/mgal	AP42 1.3-2 Total CPM	1.58E-01			0.967 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil				1.53E-01
0310002002	1-2	100-hp Titusville Boiler	None	1964			3.35		3,256	scfh	Nat. Gas			10/19/1973	100	lb/mmscf	3.26E-01	AP42 1.4-1	0.6	lb/mmscf	1.95E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.47E-02						Same as PM10	2.47E-02
		Georgia - Bulloch County **AIRS 03100028 Claude Howard Lumber Company**																																		
03100028K1	DFK1	Direct-fired Lumber Drying Kiln #1	None	1980		7.90	18.00		2,308	pph	Dry Wood Sawdust			#17314	0.135	lb/mbf	8.48E-01	NCASI 098-022394A-1K098 6.28 thousand board feet (mbf) per hour #17314	0.025	lb/mmBtu	4.50E-01	AP42 1.6-2	0.384	lb/mbf	NCASI 098-022394B-1K098 6.28 thousand board feet (mbf) per hour #17314	included in NCASI emission factor			2.41E+00						Same as PM10	2.41E+00
03100028K2	DFK2	Direct-fired Lumber Drying Kiln #2	None	1980		7.90	20.00		4,444	pph	Green Sawdust			#17314	0.135	lb/mbf	8.48E-01	NCASI 098-022394A-1K098 6.28 thousand board feet (mbf) per hour #17314	0.025	lb/mmBtu	5.00E-01	AP42 1.6-2	0.384	lb/mbf	NCASI 098-022394B-1K098 6.28 thousand board feet (mbf) per hour #17314	included in NCASI emission factor			2.41E+00						Same as PM10	2.41E+00
		Georgia - Bulloch County **AIRS 03100031 Evans Concrete** *Evans Concrete is a Permit-by-Rule (PBR) dry batch ready mix (truck) concrete plant. Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																		
		Georgia - Bulloch County **AIRS 03100036 Robbins Packing Co**																																		
0310003602	2	80-hp Boiler	None	1949			3.35		3,256	scfh	Nat. Gas			10/21/1974	100	lb/mmscf	3.26E-01	AP42 1.4-1	0.6	lb/mmscf	1.95E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.47E-02						Same as PM10	2.47E-02
0310003603	3	100-hp Boiler	None	1949			3.35		3,256	scfh	Nat. Gas			10/21/1974	100	lb/mmscf	3.26E-01	AP42 1.4-1	0.6	lb/mmscf	1.95E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.47E-02						Same as PM10	2.47E-02
		Georgia - Bulloch County **AIRS 03100042 Denmark Feed** *Denmark Feed is listed as a prepared feeds operation. No application files could be found for this facility.*																																		
		Georgia - Bulloch County **AIRS 03100043 Bulloch Gin** *Bulloch Gin is listed as a cottong ginning operation. No application files could be found for this facility.* *Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 120,000 standard bales of cotton per year (391-3-1-.03(11)(b)6.(i)(II)).* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																		
		Georgia - Bulloch County **AIRS 03100044 Briggs & Stratton**																																		
031000441B	P01 P01B	Aluminum Melting Tower Aluminum Melting Furnace		1995 2001		Allowable emissions determined from October 3, 2005 application #16438; BriggsInput2000.xls											3.70E+00	#16438			1.00E-02	#16438			#16438			#16438	1.02E+00						Same as PM10	1.02E+00
0310004402	P02	Die Casting Machines		1995		"__"											8.00E-02	#16438			1.70E-01	#16438			#16438			#16438	4.17E+00						Same as PM10	4.17E+00
0310004403	P03	Landis Grinders		unk		"__"	Discharges inside building (emissions considered zero); March 27, 2006 EPD memo										0.00E+00	#16438			0.00E+00	#16438			#16438			#16438	0.00E+00						Same as PM10	0.00E+00
031000445A	P05A	Stress Relief Oven	Dust Collector	1995		"__"											6.10E-01	#16438			2.40E-03	#16438			#16438			#16438	3.00E-02						Same as PM10	3.00E-02
031000446A	P06A	Four-stage Aqueous Parts Washer		1995		"__"											3.10E-01	#16438			1.20E-03	#16438			#16438			#16438	2.00E-02						Same as PM10	2.00E-02
0310004407	P07	Engine Testing Stations		1995		"__"											4.80E-03	#16438			3.00E-02	#16438			#16438			#16438	4.00E-02						Same as PM10	4.00E-02
0310004411	P11	Dynamometer Testing Stands		1995		"__"											1.20E-01	#16438			1.00E-02	#16438			#16438			#16438	1.00E-02						Same as PM10	1.00E-02
0310004412	P12	Epxoy Drying Ovens		2004		"__"											3.10E-01	#16438			1.20E-03	#16438			#16438			#16438	2.00E-02						Same as PM10	2.00E-02
0310004413	P13	Outdoor Endurance Test Stands		2005		"__"											1.20E-01	#16438			1.00E-02	#16438			#16438			#16438	1.00E-02						Same as PM10	1.00E-02
03100044B1	B10A	Boiler		1995		"__"											2.56E+00	#16438			1.00E-02	#16438			#16438			#16438	1.30E-01						Same as PM10	1.30E-01
		Georgia - Bulloch County **AIRS 03100045 Southern States Coop** *Southern States Cooperative is a Permit-by-Rule (PBR) cotton ginning operation. Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																		
		Georgia - Bulloch County **AIRS 03100046 Custom Cabinets**																																		

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

Custom Cabinets is a wood furniture manufacturer and is Permit-by-Rule (PBR) coating and gluing operation. Application files (August 28, 1996; 07-WFM00130) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.
Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)
*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100047 Northside Cabinets
Northside Cabinets is a wood furniture manufacturer and is Permit-by-Rule (PBR) coating and gluing operation. Application files (September 11, 1996; 07-WFM00296) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.
Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)
*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100048 Coastal Counter Tops
Coastal Counter Tops is a manufacturer of laminate counter tops and is Permit-by-Rule (PBR) coating and gluing operation. Application files (August 26, 1996; 07-WFM00641) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.
Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)
*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100049 Kitchen Craft
Kitchen Craft is a wood furniture manufacturer and is Permit-by-Rule (PBR) coating and gluing operation. Application files (September 26, 1996; 07-WFM00238) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.
Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)
*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100050 Harry Shurling Cabinets
Harry Shurling Cabinets is a wood furniture manufacturer and is Permit-by-Rule (PBR) coating and gluing operation. Application files (October 24, 1996; 07-WFM01033) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.
Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)
*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100052 East Geogia Regional Medical Center

Modeled Source ID (A)	Permitted Source ID (B)	Source Description (C)	Control Device Description (D)	Construction Date (E)	Modification Date (F)	Maximum Hourly Processing Weight Rate, tons (G)	Maximum Rated Heat Input, mmBtu (H)	Maximum Rated Brake Horsepower, bhp (I)	Maximum Hourly Fuel Consumption (J)	Units (K)	Fuel Type (L)	Actual Exhaust Volumetric Flow Rate, acfm (M)	Dry Standard Exhaust Volumetric Flow Rate, dscfm (N)	Basis (O)	NOx: Maximum Allowable Emission Limitation or Potential-to-Emit (P)	NOx units (Q)	NOx Mass Emission Rate, lb/hr (R)	NOx Basis (S)	SO2: Maximum Allowable Emission Limitation or Potential-to-Emit (T)	SO2 units (U)	SO2 Mass Emission Rate, lb/hr (V)	SO2 Basis (W)	PM10 filterable (X)	PM10 filterable units (Y)	PM10 Basis (Z)	PM10 condensable (AA)	PM10 condensable units (BB)	PM10 Basis (CC)	PM10 Mass Emission Rate (sum of filterable and condensable), lb/hr (DD)	PM2.5 filterable (EE)	PM2.5 filterable units (FF)	PM2.5 Basis (GG)	PM2.5 condensable (HH)	PM2.5 condensable units (II)	PM2.5 Basis (JJ)	PM2.5 Mass Emission Rate (sum of filterable and condensable), lb/hr (KK)
03100052B1	B1	Cleaver-Brooks CB200-300-125HW Boiler	None	1999			12.55		90	gph	No. 2			#11635	20	lb/mgal	1.79E+00	AP42 1.3-1	0.5	% sulfur	6.36E+00	B-01-1 2.2 NSPS Dc AP42 1.3-1	2	lb/mgal	AP42 1.3-1	1.3	lb/mgal	AP42 1.3-2 Total CPM	2.96E-01			0.967 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil				2.86E-01
							12.55		12,208	scfh	Nat. Gas			#11635	100	lb/mmscf	1.22E+00	AP42 1.4-1	0.6	lb/mmscf	7.32E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	9.28E-02			Same as PM10				9.28E-02
03100052B2	B2	Cleaver-Brooks CB200-300-125HW Boiler	None	1999			12.55		90	gph	No. 2			#11635	20	lb/mgal	1.79E+00	AP42 1.3-1	0.5	% sulfur	6.36E+00	B-01-1 2.2 NSPS Dc	2	lb/mgal	AP42 1.3-1	1.3	lb/mgal	AP42 1.3-2 Total CPM	2.96E-01			0.967 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil				2.86E-01
							12.55		12,208	scfh	Nat. Gas			#11635	100	lb/mmscf	1.22E+00	AP42 1.4-1	0.6	lb/mmscf	7.32E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	9.28E-02			Same as PM10				9.28E-02
	EDG	Emergency Generator	None	1999		*Operation of the emergency diesel generator is assumed to be "intermittent"*																														

Boilers B1 and B2 use natural gas as primary fuel; No. 2 fuel oil as backup during emergency (8/18/1999 #11635 Section III-A form); NOx and SO2 emission scenario sare assumed to be "intermittent" for the 1-hour NAAQS

Georgia - Bulloch County
AIRS 03100054 Viracon-Statesboro
Viracon-Statesboro is a manfuacturer of glass windows and is Permit-by-Rule (PBR) coating and gluing operation. Application files indicate that the facility is a source of VOC/HAP (area source) only and no other emission are quantifiable (electric oven).
The facility will not affects the available increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100056 Franklin Chevrolet Co., Inc.
Franklin Chevrolet is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
The only record in the application files is an initial notification/compliance certification submitted on December 28, 2009 for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100057 Rozier Ford Lincoln-Mercury, Inc.
Rozier Ford Lincoln-Mercury is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100058 Southern Eagle Collision Center
Southern Eagle Collision Center is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100059 South 301 Auto Body Collision Center
South 301 Auto Body Collision Center is listed as an automotive collision and repair operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
The only record in the application files is an initial notification/compliance certification submitted on January 11, 2010 for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100060 Valli's Precision Collision
Valli's Precision Collision is listed as an automotive collision and repair operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
The only record in the application files is an initial notification/compliance certification submitted on January 12, 2010 for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100061 Hall's Paint & Body
Hall's Paint & Body is listed as an automotive collision and repair operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100062 Rempe's Collision & Auto Restoration
Rempe's Collision & Auto Restoration is listed as an automotive collision and repair operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.
No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).
The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.
For all NAAQS, this source is assumed to be included in the background air quality concentrations.

Georgia - Bulloch County
AIRS 03100055 Ellis Wood Contracting Co.

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK
Unit Description						Operating Levels used for Maximum Allowable Emissions									Nitrogen Oxides (NO_x)				Sulfur Dioxide (SO_2)				Particulate Matter <10 mm (PM_{10})							Particulate Matter <2.5 mm ($PM_{2.5}$)						
Modeled Source ID	Permitted Source ID	Source Description	Control Device Description	Construction Date	Modification Date	Maximum Hourly Processing Weight Rate	Maximum Rated Heat Input	Maximum Rated Brake Horsepower	Maximum Hourly Fuel Consumption			Actual Exhaust Volumetric Flow Rate	Dry Standard Exhaust Volumetric Flow Rate		Maximum Allowable Emission Limitation or Potential-to-Emit		Mass Emission Rate		Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit						Mass Emission Rate (sum of filterable and condensable)	Maximum Allowable Emission Limitation or Potential-to-Emit						Mass Emission Rate (sum of filterable and condensable)
						tons	mmBtu	bhp		Units	Fuel Type	acfm	dscfm	Basis		units	lb/hr	Basis			lb/hr		filterable	units	Basis	condensable	units	Basis	lb/hr	filterable	units	Basis	condensable	units	Basis	lb/hr
	Ellis Wood Contracting conducts land clearing operations as part of its business and operates an air curtain destructor (ACD) to dispose of tree trunks, stumps, limbs, and other small brush from clearing activities.																																			
	*The ACD will not have a significant concentration gradient for all NAAQS (exluding 1-hr NO2 and SO2) and increments based on 20*D with 2-km grouping.*																																			
	For the 1-hr NO2 and SO2 NAAQS, the ACD emissions are "intermittent" and do not occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations.																																			
	Based on information provided in December 10, 2009 application #19357, the ACD operates on six days per year.																																			
	For other NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300001 McBride Gin & Farm Supply																																			
	McBride Gin & Farm Supply is listed as a cottong ginning operation. No application files could be found for this facility.																																			
	Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 120,000 standard bales of cotton per year (391-3-1-.03(11)(b)6.(i)(II)).																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For all NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300002 Mundy, Inc.																																			
	Mundy Inc. is a Permit-by-Rule cotton ginning operation. Application files indicate that the facility is a source of particulate matter only.																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For the NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300004 Rayonier																																			
	Jones W K Lumber Company is listed as a pulp wood chips operation. No application files could be found for this facility.																																			
	Georgia - Burke County																																			
	AIRS 03300007 Halliburton Industrial Services																																			
	Halliburton Industrial Services is listed as a chemical storage operation. No application files could be found for this facility.																																			
	Georgia - Burke County																																			
	AIRS 03300008 Allen B. Wilson Combustion Turbine Plant																																			
003000086A	CTA6A	Peaking Combustion Turbine	None	1972			972.00		7,018	gph	Diesel			#19931	0.88	lb/mmBtu	8.55E+02	AP42 3.1-1	0.5	% sulfur	4.91E+02	AP42 3.1-2a	0.0043	lb/mmBtu	AP42 3.1-2a	0.0072	lb/mmBtu	AP42 3.1-2a	1.12E+01	0.967	PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil					1.08E+01
003000086B	CTA6B	Peaking Combustion Turbine	None	1972			972.00		7,018	gph	Diesel			#19931	0.88	lb/mmBtu	8.55E+02	AP42 3.1-1	0.5	% sulfur	4.91E+02	AP42 3.1-2a	0.0043	lb/mmBtu	AP42 3.1-2a	0.0072	lb/mmBtu	AP42 3.1-2a	1.12E+01	0.967	PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil					1.08E+01
003000086C	CTA6C	Peaking Combustion Turbine	None	1972			972.00		7,018	gph	Diesel			#19931	0.88	lb/mmBtu	8.55E+02	AP42 3.1-1	0.5	% sulfur	4.91E+02	AP42 3.1-2a	0.0043	lb/mmBtu	AP42 3.1-2a	0.0072	lb/mmBtu	AP42 3.1-2a	1.12E+01	0.967	PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil					1.08E+01
003000086D	CTA6D	Peaking Combustion Turbine	None	1973			972.00		7,018	gph	Diesel			#19931	0.88	lb/mmBtu	8.55E+02	AP42 3.1-1	0.5	% sulfur	4.91E+02	AP42 3.1-2a	0.0043	lb/mmBtu	AP42 3.1-2a	0.0072	lb/mmBtu	AP42 3.1-2a	1.12E+01	0.967	PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil					1.08E+01
003000086E	CTA6E	Peaking Combustion Turbine	None	1973			972.00		7,018	gph	Diesel			#19931	0.88	lb/mmBtu	8.55E+02	AP42 3.1-1	0.5	% sulfur	4.91E+02	AP42 3.1-2a	0.0043	lb/mmBtu	AP42 3.1-2a	0.0072	lb/mmBtu	AP42 3.1-2a	1.12E+01	0.967	PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil					1.08E+01
003000086F	CTA6F	Peaking Combustion Turbine	None	1973			972.00		7,018	gph	Diesel			#19931	0.88	lb/mmBtu	8.55E+02	AP42 3.1-1	0.5	% sulfur	4.91E+02	AP42 3.1-2a	0.0043	lb/mmBtu	AP42 3.1-2a	0.0072	lb/mmBtu	AP42 3.1-2a	1.12E+01	0.967	PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil					1.08E+01
	Georgia - Burke County																																			
	AIRS 03300010 Kelleys Gin Inc																																			
	Kelleys Gin is listed as a cottong ginning operation. No application files could be found for this facility.																																			
	Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 120,000 standard bales of cotton per year (391-3-1-.03(11)(b)6.(i)(II)).																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For all NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300011 Sardis Lumber Co																																			
	A 1985 inspection of Sardis Lumber concluded that the facility has been abandoned and operations discontinued permanently (please see February 12, 1985 letter from Alfred T. Bazemore, Environmental Specialist, Middle Georgia Region)																																			
	Georgia - Burke County																																			
	AIRS 03300013 Waynesboro Concrete Products Co Inc																																			
	Waynesboro Concrete Products Co is listed as a concrete products facility. No permit could be found for this facility.																																			
	Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 600,000 cubic yards of production per year (391-3-1-.03(11)(b)4.(i)(II)).																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For all NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300019 Lamb C B Lumber Co																																			
	Lamb C B Lumber is listed as a lumber mill operation. No application files could be found for this facility.																																			
	Georgia - Burke County																																			
	AIRS 03300020 Builders Supply Co																																			
	Waynesboro Concrete Products Co is listed as a concrete products facility. Application files indicate that the facility is a source of particulate matter only (cement silo loading and unloading).																																			
	Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 600,000 cubic yards of production per year (391-3-1-.03(11)(b)4.(i)(II)).																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For all NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300021 McKinney Wholesale Co Inc																																			
	McKinney Wholesale is listed as a ready mix concrete facility. Application files indicate that the facility is a source of particulate matter only (150 yards per hour of concrete mixing).																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For all NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300025 Perfection-Schwank Inc																																			
	Perfection-Schwank is listed as a manufacturer of room heating equipment. No application files could be found for this facility.																																			
	Georgia - Burke County																																			
	AIRS 03300027 Southern States Cooperative																																			
	Southern States Coop is listed as a grain storage operation. A May 7, 1996 letter indicates that this facility has permanently ceased operation.																																			
	Georgia - Burke County																																			
	AIRS 03300028 Collins Gin																																			
	Collins Gin is a cotton ginning operation (12 bales per hour). Application files indicate that the facility is a source of particulate matter only.																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For the NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300029 Farmers Gin Co Inc																																			
	Farmers Gin Co is listed as a cottong ginning operation. No application files could be found for this facility.																																			
	Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 120,000 standard bales of cotton per year (391-3-1-.03(11)(b)6.(i)(II)).																																			
	*The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.*																																			
	For all NAAQS, this source is assumed to be included in the background air quality concentrations.																																			
	Georgia - Burke County																																			
	AIRS 03300030 Vogtle Electric Generating Plant																																			
	Existing Equipment (Units 1 and 2)																																			
03300030VD1	VD01	Unit 1 Emergency Diesel Generator 1A	None	1981			69.90	9,700	505	gph	Diesel			#18986	0.024	lb/bhp-hr	2.33E+02	AP42 3.4-1	0.5	% sulfur	3.92E+01	AP42 3.4-1	0.0496	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	4.01E+00	0.0479	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	3.89E+00
03300030VD2	VD02	Unit 1 Emergency Diesel Generator 1B	None	1981			69.90	9,700	505	gph	Diesel			#18986	0.024	lb/bhp-hr	2.33E+02	AP42 3.4-1	0.5	% sulfur	3.92E+01	AP42 3.4-1	0.0496	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	4.01E+00	0.0479	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	3.89E+00
03300030VD3	VD03	Unit 2 Emergency Diesel Generator 2A	None	1981			69.90	9,700	505	gph	Diesel			#18986	0.024	lb/bhp-hr	2.33E+02	AP42 3.4-1	0.5	% sulfur	3.92E+01	AP42 3.4-1	0.0496	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	4.01E+00	0.0479	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	3.89E+00
03300030VD4	VD04	Unit 2 Emergency Diesel Generator 2B	None	1981			69.90	9,700	505	gph	Diesel			#18986	0.024	lb/bhp-hr	2.33E+02	AP42 3.4-1	0.5	% sulfur	3.92E+01	AP42 3.4-1	0.0496	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	4.01E+00	0.0479	lb/mmBtu	AP42 3.4-2	0.0077	lb/mmBtu	AP42 3.4-2	3.89E+00

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA BB CC DD EE FF GG HH II JJ KK

Unit Description						Operating Levels used for Maximum Allowable Emissions								Nitrogen Oxides (NO_x)			Sulfur Dioxide (SO_2)			Particulate Matter <10 mm (PM_{10})					Particulate Matter <2.5 mm ($PM_{2.5}$)				
Modeled Source ID	Permitted Source ID	Source Description	Control Device Description	Construction Date	Modification Date	Maximum Hourly Processing Weight Rate (tons)	Maximum Rated Heat Input (mmBtu)	Maximum Rated Brake Horsepower (bhp)	Maximum Hourly Fuel Consumption (Units)	Fuel Type	Actual Exhaust Volumetric Flow Rate (acfm)	Dry Standard Exhaust Volumetric Flow Rate (dscfm)	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit (units)	Mass Emission Rate (lb/hr)	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit (units)	Mass Emission Rate (lb/hr)	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit: filterable units	Basis	condensable units	Basis	Mass Emission Rate (sum of filterable and condensable) (lb/hr)	Maximum Allowable Emission Limitation or Potential-to-Emit: filterable units	Basis	condensable units	Basis	Mass Emission Rate (sum of filterable and condensable) (lb/hr)
03300030FD1	FPD1	Replacement Fire Pump Diesel Unit 1	None	2010			2.12	350	15 gph	Diesel			#19578 502(b)(10)	7.8 g/bhp-hr	6.02E+00	V-02-4 3.3.19.a NSPS IIII	15 ppm sulfur	3.24E-03	V-02-4 3.3.20 NSPS IIII diesel 7.05 lb/gal	0.4 g/bhp-hr	V-02-4 3.3.19.c NSPS IIII		assumed to be included in NSPS IIII PM emission limitation	3.09E-01				Same as PM10	3.09E-01
03300030FD2	FPD2	Fire Pump Diesel Unit 2	None	1977			2.30	380	17 gph	Diesel			#18986	0.031 lb/bhp-hr	1.18E+01	AP42 3.3-1	0.00205 lb/bhp-hr	7.79E-01	AP42 3.3-1	0.0022 lb/bhp-hr	AP42 3.3-1		assumed to be included in PM10 emission factor	8.36E-01				Same as PM10	8.36E-01
03300030SD1	SD01	Security Diesel	None	1986			8.03	1,000	58 gph	Diesel			#18986	0.024 lb/bhp-hr	2.40E+01	AP42 3.4-1	0.5 % sulfur	4.05E+00	AP42 3.4-1	0.0496 lb/mmBtu	AP42 3.4-2	0.0077 lb/mmBtu	AP42 3.4-2	4.60E-01	0.0479 lb/mmBtu	AP42 3.4-2	0.0077 lb/mmBtu	AP42 3.4-2	4.46E-01
0330003CWS1	CWS1	Circulating Water System Cooling Tower 1	Drift Eliminator	unk									Same as CWS3		0.00E+00			0.00E+00		1.8 lb/hr	Same as CWS3		assumed to be included in emission estimate for PM	1.80E+00				Same as PM10	1.80E+00
0330003CWS2	CWS2	Circulating Water System Cooling Tower 2	Drift Eliminator	unk									Same as CWS4		0.00E+00			0.00E+00		1.8 lb/hr	Same as CWS4		assumed to be included in emission estimate for PM	1.80E+00				Same as PM10	1.80E+00
0330003SWS1	SWS1	Service Water System Cooling Tower 1	Drift Eliminator	unk									Same as SWS3		0.00E+00			0.00E+00		0.08 lb/hr	Same as SWS3		assumed to be included in emission estimate for PM	8.00E-02				Same as PM10	8.00E-02
0330003SWS2	SWS2	Service Water System Cooling Tower 2	Drift Eliminator	unk									Same as SWS4		0.00E+00			0.00E+00		0.08 lb/hr	Same as SWS4		assumed to be included in emission estimate for PM	8.00E-02				Same as PM10	8.00E-02
	New Equipment (Units 3 and 4)																												
03300030VD5	VD05	Unit 3 Emergency Diesel Generator 1	None	2010			45.00	7,456	325 gph	Diesel			#18986	1.2 g/bhp-hr	1.97E+01	V-02-3 3.3.7.b	15 ppm sulfur	6.87E-02	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.7.d		assumed to be included in BACT emission limitation based on NSPS	1.81E+00				Same as PM10	1.81E+00
03300030VD6	VD06	Unit 3 Emergency Diesel Generator 2	None	2010			45.00	7,456	325 gph	Diesel			#18986	1.2 g/bhp-hr	1.97E+01	V-02-3 3.3.7.b	15 ppm sulfur	6.87E-02	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.7.d		assumed to be included in BACT emission limitation based on NSPS	1.81E+00				Same as PM10	1.81E+00
03300030VD7	VD07	Unit 4 Emergency Diesel Generator 1	None	2010			45.00	7,456	325 gph	Diesel			#18986	1.2 g/bhp-hr	1.97E+01	V-02-3 3.3.7.b	15 ppm sulfur	6.87E-02	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.7.d		assumed to be included in BACT emission limitation based on NSPS	1.81E+00				Same as PM10	1.81E+00
03300030VD8	VD08	Unit 4 Emergency Diesel Generator 2	None	2010			45.00	7,456	325 gph	Diesel			#18986	1.2 g/bhp-hr	1.97E+01	V-02-3 3.3.7.b	15 ppm sulfur	6.87E-02	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.7.d		assumed to be included in BACT emission limitation based on NSPS	1.81E+00				Same as PM10	1.81E+00
03300030FD3	FPD3	Units 3 and 4 Fire Pump Diesel 1	None	2010			1.60	225	12 gph	Diesel			#18986	2.44 g/bhp-hr	1.21E+00	V-02-3 3.3.9.b	15 ppm sulfur	2.44E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.9.d		assumed to be included in BACT emission limitation based on NSPS	5.46E-02				Same as PM10	5.46E-02
03300030FD4	FPD4	Units 3 and 4 Fire Pump Diesel 2	None	2010			1.60	225	12 gph	Diesel			#18986	2.44 g/bhp-hr	1.21E+00	V-02-3 3.3.9.b	15 ppm sulfur	2.44E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.9.d		assumed to be included in BACT emission limitation based on NSPS	5.46E-02				Same as PM10	5.46E-02
03300030FD5	FPD5	Units 3 and 4 Fire Pump Diesel 3	None	2010			1.60	225	12 gph	Diesel			#18986	2.44 g/bhp-hr	1.21E+00	V-02-3 3.3.9.b	15 ppm sulfur	2.44E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.9.d		assumed to be included in BACT emission limitation based on NSPS	5.46E-02				Same as PM10	5.46E-02
03300030AX1	AUX1	Units 3 and 4 Ancillary Diesel Generator 1	None	2010			0.73	100	5 gph	Diesel			#18986	5.63 g/bhp-hr	1.24E+00	V-02-3 3.3.8.b	15 ppm sulfur	1.11E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.3 g/bhp-hr	V-02-3 3.3.8.d		assumed to be included in BACT emission limitation based on NSPS	6.61E-02				Same as PM10	6.61E-02
03300030AX2	AUX2	Units 3 and 4 Ancillary Diesel Generator 2	None	2010			0.73	100	5 gph	Diesel			#18986	5.63 g/bhp-hr	1.24E+00	V-02-3 3.3.8.b	15 ppm sulfur	1.11E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.3 g/bhp-hr	V-02-3 3.3.8.d		assumed to be included in BACT emission limitation based on NSPS	6.61E-02				Same as PM10	6.61E-02
03300030AX3	AUX3	Units 3 and 4 Ancillary Diesel Generator 3	None	2010			0.73	100	5 gph	Diesel			#18986	5.63 g/bhp-hr	1.24E+00	V-02-3 3.3.8.b	15 ppm sulfur	1.11E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.3 g/bhp-hr	V-02-3 3.3.8.d		assumed to be included in BACT emission limitation based on NSPS	6.61E-02				Same as PM10	6.61E-02
03300030AX4	AUX4	Units 3 and 4 Ancillary Diesel Generator 4	None	2010			0.73	100	5 gph	Diesel			#18986	5.63 g/bhp-hr	1.24E+00	V-02-3 3.3.8.b	15 ppm sulfur	1.11E-03	V-02-3 3.3.10 diesel 7.05 lb/gal	0.3 g/bhp-hr	V-02-3 3.3.8.d		assumed to be included in BACT emission limitation based on NSPS	6.61E-02				Same as PM10	6.61E-02
03300030RWD	ODG1	Units 3 and 4 Raw Water Diesel Generator	None	2010			13.00	2,000	94 gph	Diesel			#18986	1.2 g/bhp-hr	5.29E+00	V-02-3 3.3.7.b	15 ppm sulfur	1.99E-02	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.7.d		assumed to be included in BACT emission limitation based on NSPS	4.85E-01				Same as PM10	4.85E-01
03300030TSC	TSC1	Technical Support Center Disel Generator	None	2010			13.00	2,000	94 gph	Diesel			#18986	1.2 g/bhp-hr	5.29E+00	V-02-3 3.3.7.b	15 ppm sulfur	1.99E-02	V-02-3 3.3.10 diesel 7.05 lb/gal	0.11 g/bhp-hr	V-02-3 3.3.7.d		assumed to be included in BACT emission limitation based on NSPS	4.85E-01				Same as PM10	4.85E-01
0330003CWS3	CWS3	Circulating Water System Cooling Tower 3	Drift Eliminator	2010									#18986		0.00E+00			0.00E+00		1.8 lb/hr	AP42 13.4 #18986 Table 3.1-6		assumed to be included in emission estimate for PM	1.80E+00				Same as PM10	1.80E+00
0330003CWS4	CWS4	Circulating Water System Cooling Tower 4	Drift Eliminator	2010									#18986		0.00E+00			0.00E+00		1.8 lb/hr	AP42 13.4 #18986 Table 3.1-6		assumed to be included in emission estimate for PM	1.80E+00				Same as PM10	1.80E+00
0330003SWS3	SWS3	Service Water System Cooling Tower 3	Drift Eliminator	2010									#18986		0.00E+00			0.00E+00		0.08 lb/hr	AP42 13.4 #18986 Table 3.1-6		assumed to be included in emission estimate for PM	8.00E-02				Same as PM10	8.00E-02
0330003SWS4	SWS4	Service Water System Cooling Tower 4	Drift Eliminator	2010									#18986		0.00E+00			0.00E+00		0.08 lb/hr	AP42 13.4 #18986 Table 3.1-6		assumed to be included in emission estimate for PM	8.00E-02				Same as PM10	8.00E-02
	Georgia - Burke County **AIRS 03300031 Midville Warehouse** *Midville Warehouse is listed as a cottong ginning operation. Application files for this facility indicate that an operating permit was denied (please refer to March 24, 1995 letter regarding #6308).*																												
	Georgia - Burke County **AIRS 03300034 Fiamm Technologies, Inc.**																												
03300034SC6	P1A P2	Lead Cylinder Production Grid Casting	Scrubber	2001			3.78		3,677 scfh	Nat. Gas	11,362	10,791	#11916 includes melting, casting and post- casting pots	100 lb/mmscf	3.68E-01	AP42 1.4-1	0.6 lb/mmscf	2.21E-03	AP42 1.4-2	0.000176 gr/dscf	S-02-2 2.1.a NSPS KK		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	1.63E-01				Same as PM10	1.63E-01
03300034B1A	P1B	Lead Oxide Production	Baghouse	2001							846	759	#11916		0.00E+00			0.00E+00		0.00044 gr/dscf	S-02-2 2.1.e NSPS KK		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	2.86E-02				Same as PM10	2.86E-02
03300034B1B	P1B	Lead Oxide Production	Baghouse	2001							920	828	#11916		0.00E+00			0.00E+00		0.00044 gr/dscf	S-02-2 2.1.e NSPS KK		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	3.12E-02				Same as PM10	3.12E-02
03300034B03	P1C	Lead Oxide Mill	Baghouse	2001		0.63					1,309	949	#11916		0.00E+00			0.00E+00		0.01 lb/ton	S-02-2 2.1.d NSPS KK 5 mg/kg		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	6.25E-02				Same as PM10	6.25E-02
03300034SC7	P3	Paste Mixing	Scrubber	2001							14,635	13,987	#11916		0.00E+00			0.00E+00		0.00044 gr/dscf	S-02-2 2.1.b NSPS KK		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	5.27E-01				Same as PM10	5.27E-01
03300034B02	P5 P6 P7	Three-Process Operation	Baghouse	2001			9.72		9,450 scfh	Nat. Gas	43,839	42,064	#11916 includes drying and curing ovens	100 lb/mmscf	9.45E-01	AP42 1.4-1	0.6 lb/mmscf	5.67E-03	AP42 1.4-2	0.00044 gr/dscf	S-02-2 2.1.c NSPS KK		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	1.59E+00				Same as PM10	1.59E+00
03300034B05	P5 P6 P7	Three-Process Operation	Baghouse	2001			9.72		9,450 scfh	Nat. Gas	15,653	15,105	#11916 includes drying and curing ovens	100 lb/mmscf	9.45E-01	AP42 1.4-1	0.6 lb/mmscf	5.67E-03	AP42 1.4-2	0.00044 gr/dscf	S-02-2 2.1.c NSPS KK		assumed to be included in NSPS KK PM emission limitation PM assumed 10*Pb based on AP42	5.70E-01				Same as PM10	5.70E-01
03300034DM8	P8A	SLAH Charging Area	Demister	2000							12,446	12,028	#11916		0.00E+00			0.00E+00		12.96 lb/1000	AP42 12.15-2 pounds per 1,000 batteries at 1,200 units per day; 60% control based on 11/3/2009 stack test		assumed to be included in emission factor PM assumed as PM10	6.48E-01				Same as PM10	6.48E-01
03300034DM9	P8B	SLA Charging Area	Demister	2000							15,208	14,125	#11916		0.00E+00			0.00E+00		8.748 lb/1000	AP42 12.15-2 pounds per 1,000 batteries at 1,200 units per day; 73% control based on 11/3/2009 stack test		assumed to be included in emission factor PM assumed as PM10	4.37E-01				Same as PM10	4.37E-01
	Georgia - Burke County **AIRS 03300037 Reeves Construction Company GFL Waynesboro Plant**																												
0330003701		Hot Mix Asphalt Plant Dryer Stack	Baghouse	unk		200.00	100.00		714 gph	No. 2	43,099	32,051	#19283 and 8/10/2010 stack test	0.055 lb/ton	1.10E+01	AP42 11.1-7	0.66 lb/ton	1.32E+02	S-01-0 2.3.a 1.5% sulfur max of 50% or 0.1 lb/ton sulfur retained	0.04 gr/dscf	S-03-0 2.1.a NSPS I	0.0194 lb/ton	AP42 11.1-3	1.49E+01				Same as PM10	1.49E+01
	Georgia - Burke County **AIRS 03300038 ASTA, Inc.**																												
0330003801	BC01-BC06	Electric Enamel Base Coat Ovens	Catalytic Oxidizer	2008									#18225		9.78E-01	4/28/2008 Nuova Tecno Tau letter included in #18225		0.00E+00	Oxidizer for VOC's					0.00E+00					0.00E+00
0330003802	SB01-SB02	Self-bonding Coating Ovens	Catalytic Oxidizer	2008									#18225		1.63E-01	4/28/2008 Nuova Tecno Tau letter included in #18225		0.00E+00	Oxidizer for VOC's					0.00E+00					0.00E+00

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK
Unit Description						Operating Levels used for Maximum Allowable Emissions									Nitrogen Oxides (NO_x)				Sulfur Dioxide (SO_2)				Particulate Matter <10 mm (PM_{10})							Particulate Matter <2.5 mm ($PM_{2.5}$)						
Modeled Source ID	Permitted Source ID	Source Description	Control Device Description	Construction Date	Modification Date	Maximum Hourly Processing Weight Rate (tons)	Maximum Rated Heat Input (mmBtu)	Maximum Rated Brake Horsepower (bhp)	Maximum Hourly Fuel Consumption	Units	Fuel Type	Actual Exhaust Volumetric Flow Rate (acfm)	Dry Standard Exhaust Volumetric Flow Rate (dscfm)	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate (lb/hr)	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate (lb/hr)	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit: filterable	units	Basis	condensable	units	Basis	Mass Emission Rate (sum of filterable and condensable) (lb/hr)	Maximum Allowable Emission Limitation or Potential-to-Emit: filterable	units	Basis	condensable	units	Basis	Mass Emission Rate (sum of filterable and condensable) (lb/hr)
		Georgia - Burke County **AIRS 03300040 Burke County Concrete #29** *Evans Concrete is a Permit-by-Rule (PBR) dry batch ready mix (truck) concrete plant. Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Burke County **AIRS 03300041 Burke County Body Shop, Inc.** *Burke County Body Shop is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.* *The only record in the application files is an initial notification/compliance certification submitted on January 26, 2010 for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).* *The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Candler County **AIRS 04300003 Candler Gin & Warehouse** *Candler Gin & Warehouse is a cotton ginning operation (18 bales per hour). Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Candler County **AIRS 04300004 Metter Concrete Products Co** *Metter Concrete Products is listed as a ready mix concrete facility. Application files indicate that the facility is a source of particulate matter only (50 yards per hour of truck loading and silo filling).* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Candler County **AIRS 04300008 Allied Metals**																																
0430000801		Automobile Shredder	Cyclone	1994	2008	80.00						6,832	6,285	#6519			0.00E+00				0.00E+00		0.055	gr/dscf	4/30/2009 stack test			automobile shredder is not expected to be associated with condensable PM	2.96E+00						Same as PM10	2.96E+00
		Georgia - Candler County **AIRS 04300009 Growers Gin and Warehouse** *Growers Gin and Warehouse is a cotton ginning operation. Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Candler County **AIRS 04300011 Moore Wallace Inc**																																
04300011B1	B1	Kewanee Boiler	None	1980			4.19		46	gph	Propane			#14513	13	lb/mgal	5.95E-01	AP42 1.5-1	1.5	lb/mgal	6.86E-02	AP42 1.5-1 15 gr/mcf	0.2	lb/mgal	AP42 1.5-1	0.5	lb/mgal	AP42 1.5-1	3.20E-02						Same as PM10	3.20E-02
		Georgia - Effingham County **AIRS 10300013 Georgia Transmission**																																
10300013G1	G1	Caterpillar CAT 3516 B TA Generator Set	None	2001			16.69	2,450	120.50	gph	Diesel			#12924	6.9	g/bhp-hr	3.73E+01	40 CFR Part 89 Tier 1 #12924	0.05	% sulfur	9.91E-01	S-01-0 6. AP42 3.4-1	0.4	g/bhp-hr	40 CFR Part 89 Tier 1 #12924			assumed to be included in emission estimate for PM	2.16E+00						Same as PM10	2.16E+00
10300013G2	G2	Caterpillar CAT 3516 B TA Generator Set	None	2001			16.69	2,450	120.50	gph	Diesel			#12924	6.9	g/bhp-hr	3.73E+01	40 CFR Part 89 Tier 1 #12924	0.05	% sulfur	9.91E-01	S-01-0 6. AP42 3.4-1	0.4	g/bhp-hr	40 CFR Part 89 Tier 1 #12924			assumed to be included in emission estimate for PM	2.16E+00						Same as PM10	2.16E+00
10300013G3	G3	Caterpillar CAT 3516 B TA Generator Set	None	2001			16.69	2,450	120.50	gph	Diesel			#12924	6.9	g/bhp-hr	3.73E+01	40 CFR Part 89 Tier 1 #12924	0.05	% sulfur	9.91E-01	S-01-0 6. AP42 3.4-1	0.4	g/bhp-hr	40 CFR Part 89 Tier 1 #12924			assumed to be included in emission estimate for PM	2.16E+00						Same as PM10	2.16E+00
10300013G4	G4	Caterpillar CAT 3516 B TA Generator Set	None	2001			16.69	2,450	120.50	gph	Diesel			#12924	6.9	g/bhp-hr	3.73E+01	40 CFR Part 89 Tier 1 #12924	0.05	% sulfur	9.91E-01	S-01-0 6. AP42 3.4-1	0.4	g/bhp-hr	40 CFR Part 89 Tier 1 #12924			assumed to be included in emission estimate for PM	2.16E+00						Same as PM10	2.16E+00
10300013G5	G5	Caterpillar CAT 3516 B TA Generator Set	None	2001			16.69	2,450	120.50	gph	Diesel			#12924	6.9	g/bhp-hr	3.73E+01	40 CFR Part 89 Tier 1 #12924	0.05	% sulfur	9.91E-01	S-01-0 6. AP42 3.4-1	0.4	g/bhp-hr	40 CFR Part 89 Tier 1 #12924			assumed to be included in emission estimate for PM	2.16E+00						Same as PM10	2.16E+00
		Georgia - Emanuel County **AIRS 10700010 Swainsboro Concrete Products Co** *Swainsboro Concrete Products is listed as a ready mix concrete facility. Application files indicate that the facility is a source of particulate matter only (50 yards per hour of truck loading and silo filling).* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Emanuel County **AIRS 10700011 Rayonier Wood Products Swainsboro**																																
10700011K09	DK09	Direct-fired Lumber Drying Kiln #7 (batch) converted to Kiln #9 (continuous)	None	2005			78.60		10,077	pph	Dry Wood Sawdust			#17314	0.135	lb/mbf	1.77E+00	NCASI 098-022394A-1K098 13.1 thousand board feet (mbf) per hour #19880	0.025	lb/mmBtu	1.97E+00	AP42 1.6-2	0.384	lb/mbf	NCASI 098-022394B-1K098 13.1 thousand board feet (mbf) per hour #19980			included in NCASI emission factor	5.03E+00						Same as PM10	5.03E+00
10700011K10	DK10	Direct-fired Lumber Drying Kiln #8 (batch) converted to Kiln #10 (continuous)	None	2005			78.60		10,077	pph	Dry Wood Sawdust			#17314	0.135	lb/mbf	1.77E+00	NCASI 098-022394A-1K098 13.1 thousand board feet (mbf) per hour #19880	0.025	lb/mmBtu	1.97E+00	AP42 1.6-2	0.384	lb/mbf	NCASI 098-022394B-1K098 13.1 thousand board feet (mbf) per hour #19880			included in NCASI emission factor	5.03E+00						Same as PM10	5.03E+00
		Georgia - Emanuel County **AIRS 10700013 Lifeline Industries**																																
10700013B1	B1	Bell Industries Lumber Drying Kiln Boiler	Multicyclone	1983			6.32		790	pph	Dry Wood Sawdust			#1056	0.22	lb/mmBtu	1.39E+00	AP42 1.6-2	0.025	lb/mmBtu	1.58E-01	AP42 1.6-2	0.500	lb/mmBtu	Rule (d)	0.017	lb/mmBtu	AP42 1.6-1	3.27E+00						Same as PM10	3.27E+00
		Georgia - Emanuel County **AIRS 10700016 American Yard Product** *American Yard Products is listed as a lawnmower manufacturer. No application files could be found for this facility.*																																
		Georgia - Emanuel County **AIRS 10700017 Rolander Bros Construction Co** *Rolander Bros Construction is listed as a wood lumber drying kiln. After review of application files available for this facility, it was determined that Rolander is no longer in operation and the land on which the facility was built has been reclaimed.* *Please refer to the facility location map provided in #4474 (July 5, 1990); Latitude 32.597290, Longitude -82.334152.*																																
		Georgia - Emanuel County **AIRS 10700019 American Steel Products**																																
10700019D1	D01 D02 D03	3 Maxon Size PM 1200 Drying Ovens	None	unk			4.50		4,377	scfh	Nat. Gas			#5885	100	lb/mmscf	4.38E-01	AP42 1.4-1	0.6	lb/mmscf	2.63E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	3.33E-02						Same as PM10	3.33E-02
		Georgia - Emanuel County **AIRS 10700020 Swainsboro Electro Plating** *Swainsboro Electro Plating is listed as a decorative plating operation. A November 12, 2003 letter indicates that the air quality permit for the facility was revoked (#2796-053-12406; #14733).*																																
		Georgia - Emanuel County **AIRS 10700021 Cabinet Masters Inc** *Cabinets Masters is a wood furniture manufacturer and is Permit-by-Rule (PBR) coating and gluing operation. Application files (August 12, 1996; 07-WFM00075) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.* *Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																
		Georgia - Emanuel County **AIRS 10700022 Boulineau's Cabinet** *Boulineau's is a wood furniture manufacturer and is Permit-by-Rule (PBR) coating and gluing operation. Application files (August 30, 1996; 07-WFM00053) indicate that the facility is a source of VOC/HAP (area source) only with no quantifiable particulate matter emissions.* *Since the facility does not have an air quality permit, particulate matter emissions are assumed to be less than 20 tpy (the SIP permitting threshold for non-exempt source activities)* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK
Unit Description						Operating Levels used for Maximum Allowable Emissions									Nitrogen Oxides (NO_x)				Sulfur Dioxide (SO_2)				Particulate Matter <10 mm (PM_{10})							Particulate Matter <2.5 mm ($PM_{2.5}$)						
Modeled Source ID	Permitted Source ID	Source Description	Control Device Description	Construction Date	Modification Date	Maximum Hourly Processing Weight Rate tons	Maximum Rated Heat Input mmBtu	Maximum Rated Brake Horsepower bhp	Maximum Hourly Fuel Consumption	Units	Fuel Type	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate lb/hr	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit	units	Mass Emission Rate lb/hr	Basis	Maximum Allowable Emission Limitation or Potential-to-Emit filterable	units	Basis	condensable	units	Basis	Mass Emission Rate (sum of filterable and condensable) lb/hr	Maximum Allowable Emission Limitation or Potential-to-Emit filterable	units	Basis	condensable	units	Basis	Mass Emission Rate (sum of filterable and condensable) lb/hr
		Georgia - Emanuel County **AIRS 10700025 Crider Poultry**																																		
10700025B1	BL1	600-hp Boiler 1	None	2000			20.09		220	gph	Propane			#12119	13	lb/mgal	2.85E+00	AP42 1.5-1	1.5	lb/mgal	3.29E-01	AP42 1.5-1 15 gr/mcf	0.2	lb/mgal	AP42 1.5-1	0.5	lb/mgal	AP42 1.5-1	1.54E-01						Same as PM10	1.54E-01
10700025B2	BL2	300-hp Boiler 2	None	2000			10.04		110	gph	Propane			#12119	13	lb/mgal	1.43E+00	AP42 1.5-1	1.5	lb/mgal	1.65E-01	AP42 1.5-1 15 gr/mcf	0.2	lb/mgal	AP42 1.5-1	0.5	lb/mgal	AP42 1.5-1	7.68E-02						Same as PM10	7.68E-02
10700025B5	BL5	700-hp Boiler 5	None	2002			23.43		22,794	scfh	Nat. Gas			#13548	100	lb/mmscf	2.28E+00	AP42 1.4-1	0.6	lb/mmscf	1.37E-02	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	1.73E-01						Same as PM10	1.73E-01
							23.43		256	gph	Propane			#13548	13	lb/mgal	3.33E+00	AP42 1.5-1	1.5	lb/mgal	3.84E-01	AP42 1.5-1 15 gr/mcf	0.2	lb/mgal	AP42 1.5-1	0.5	lb/mgal	AP42 1.5-1	1.79E-01						Same as PM10	1.79E-01
		Georgia - Jefferson County **AIRS 16300007 Thermo King Corp**																																		
16300007107	107	Coil Oven	None	1995			0.40		389	scfh	Nat. Gas			#7737	100	lb/mmscf	3.89E-02	AP42 1.4-1	0.6	lb/mmscf	2.33E-04	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.96E-03						Same as PM10	2.96E-03
16300007306	306	Pretreat Oven	None	1995			0.80		778	scfh	Nat. Gas			#7737	100	lb/mmscf	7.78E-02	AP42 1.4-1	0.6	lb/mmscf	4.67E-04	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	5.91E-03						Same as PM10	5.91E-03
16300007014	14	14 Diesel Testing Stands	None	1992			0.85	333	6	gph	Diesel			#16090	0.0115	lb/hp-hr	3.83E+00	#16090 Table 3 vendor data	0.0021	lb/hp-hr	7.00E-01	#16090 Table 3 vendor data	0.001	lb/hp-hr	#16090 Table 3 vendor data			assumed to be included in emission estimate for PM	3.33E-01						Same as PM10	3.33E-01
		Georgia - Jefferson County **AIRS 16300008 Farmers Gin and Storage**																																		
16300008CG		Cotton Ginning Process	Cyclones	1975	2010		8.00		87	gph	Propane			#19448	13	lb/mgal	1.14E+00	AP42 1.5-1	1.5	lb/mgal	1.31E-01	AP42 1.5-1 15 gr/mcf	18.49	lb/hr	#19448 Attach. D Sum of all cotton ginning equipment			cotton ginning is not expected to be associated with condensable PM	1.85E+01						0.080 PM2.5/PM ratio from CARB Modeling PM Size Profiles http://www.arb.ca.gov/ei/speciate/pmsizeprofile07282009.xls	1.48E+00
16300008GE		Grain Receiving/Shipping Process	Bin Vents	1975	2010									#19448			0.00E+00				0.00E+00		1.42	lb/hr	#19448 Attach. D Sum of all grain equipment			grain receiving/shipping is not expected to be associated with condensable PM	1.42E+00						Same as PM10	1.42E+00
		Georgia - Jefferson County **AIRS 16300012 Battle Lumber Company**																																		
16300012B1	B1	Steam Boiler for Lumber Drying Kilns	Cyclone	1992			9.60		2,133	pph	Green Sawdust			#19713	0.22	lb/mmBtu	2.11E+00	AP42 1.6-2	0.025	lb/mmBtu	2.40E-01	AP42 1.6-2	0.5	lb/mmBtu	B-01-0 2.2			assumed to be included in emission limitation for PM	4.80E+00						0.927 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Wood/bark waste	4.45E+00
16300012B2	B2	Steam Boiler for Lumber Drying Kilns	Cyclone	1998			28.70		6,378	pph	Green Sawdust			#19713	0.22	lb/mmBtu	6.31E+00	AP42 1.6-2	0.025	lb/mmBtu	7.18E-01	AP42 1.6-2	0.295	lb/mmBtu	B-01-0 2.1			assumed to be included in emission limitation for PM	8.47E+00						0.927 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Wood/bark waste	7.85E+00
16300012B3	B3	Steam Boiler for Lumber Drying Kilns	Cyclone	2010			28.70		6,378	pph	Green Sawdust			#19713	0.22	lb/mmBtu	6.31E+00	AP42 1.6-2	0.025	lb/mmBtu	7.18E-01	AP42 1.6-2	0.295	lb/mmBtu	B-01-0 2.1			assumed to be included in emission limitation for PM	8.47E+00						0.927 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Wood/bark waste	7.85E+00
		Georgia - Jefferson County **AIRS 16300027 Fulghum Industries** *Fulghum Industries manufactures equipment for the forest products industry. Potential emissions of criteria pollutants primarily result from painting, welding and sandblasting operations.* *The facility will not have a significant concentration gradient for all NAAQS (exluding 1-hr NO2 and SO2) and increments based on 20*D with 2-km grouping.* *Potential emissions of NOx and SO2 result from propane-fired space heaters.* *For the 1-hr NO2 and SO2 NAAQS, these sources are assumed to be included in the background air quality concentrations.*																																		
		Georgia - Jefferson County **AIRS 16300033 Melvin Dye Paint & Body** *Melvin Dye Paint & Body is listed as an automotive collision and repair operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.* *No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).* *The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																		
		Georgia - Jenkins County **AIRS 16500006 Thomson Co** *Thomas Company is listed as a clothing manufacturer. The last correspondence from the facility found in the application files was in March 1975.* *The facility is not part of the list of companies contained in the Jenkins County Chamber of Commerce business directory (http://www.jenkinscountyga.com/business_directory.html). This facility is assumed to have ceased operation.*																																		
		Georgia - Jenkins County **AIRS 16500011 MI Metals** *MI Metals is an aluminum door and window frame manufacturing and coating facility. GA EPD's PSD resources source listing (http://www.georgiaair.org/airpermit/downloads/sspp/sourcelist.xls) indicates that the facility has ceased operation, as of August 24, 2010.* *The most recent TV permit for the facility expired on June 5, 2011 and no renewal has been submitted.*																																		
		Georgia - Screven County **AIRS 25100002 Sylvania Yarn Systems** *Sylvania Yarn Systems is a yarn manufacturing and processing facility. The facility has ceased operations, as of the end of 2009. Please see http://www.floordaily.net/flooring-news/Recession_Forces_Closing_of_Sylvania_Yarn_Systems.aspx* *The Screven County Chamber of Commerce also lists the facilities existing building as for-sale. Please see http://www.screvencounty.com/pdf/bldg-yarn.pdf.*																																		
		Georgia - Screven County **AIRS 25100003 Feed Seed & Farm Supply**																																		
2510000307	7	Grain Dryer	None	1957		15.00	12.00		11,673	scfh	Nat. Gas			11/13/1973	100	lb/mmscf	1.17E+00	AP42 1.4-1	0.6	lb/mmscf	7.00E-03	AP42 1.4-2	0.75	lb/ton	AP42 9.9.1-1	5.7	lb/mmscf	AP42 1.4-2	1.13E+01	0.13	lb/ton	AP42 9.9.1-1	5.7	lb/mmscf	AP42 1.4-2	2.02E+00
		Georgia - Screven County **AIRS 25100004 Koyo Bearings USA, LLC**																																		
25100004B1	B1	700-hp Boiler 1	None	1974			29.21		28,414	scfh	Nat. Gas			#7113	100	lb/mmscf	2.84E+00	AP42 1.4-1	0.6	lb/mmscf	1.70E-02	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.16E-01						Same as PM10	2.16E-01
		No. 5 backup during curtailment (11/13/1996 memo); "intermittent"					29.21		195	gph	No. 5			#7113	55	lb/mgal	1.07E+01	AP42 1.3-1 Normal Firing	2.5	% sulfur	7.64E+01	V-03-0 3.4.4 AP42 1.3-1	0.293	lb/mmBtu	Rule (d) for No. 5 FO			assumed to be included in emission limitation for PM	8.55E+00						0.760 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Residual fuel oil except utility boilers	6.49E+00
25100004B2	B2	700-hp Boiler 2	None	1974			29.21		28,414	scfh	Nat. Gas			#7113	100	lb/mmscf	2.84E+00	AP42 1.4-1	0.6	lb/mmscf	1.70E-02	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.16E-01						Same as PM10	2.16E-01
		No. 5 backup during curtailment (11/13/1996 memo); "intermittent"					29.21		195	gph	No. 5			#7113	55	lb/mgal	1.07E+01	AP42 1.3-1 Normal Firing	2.5	% sulfur	7.64E+01	V-03-0 3.4.4 AP42 1.3-1	0.293	lb/mmBtu	Rule (d) for No. 5 FO			assumed to be included in emission limitation for PM	8.55E+00						0.760 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Residual fuel oil except utility boilers	6.49E+00
		Georgia - Screven County **AIRS 25100005 Reed David W Co** *Reed David is a cotton ginning operation (7 bales per hour). Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																		
		Georgia - Screven County **AIRS 25100008 King America Finishing, Inc.**																																		
25100008B01	B001	Babcock & Wilcox Boiler	None	1970	2010		150.00		145,914	scfh	Nat. Gas			#16554	280	lb/mmscf	4.09E+01	AP42 1.4-1 Pre-NSPS	0.6	lb/mmscf	8.75E-02	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	1.11E+00						Same as PM10	1.11E+00
							150.00		1,071	gph	No. 2			#16554	24	lb/mgal	2.57E+01	AP42 1.3-1 Normal Firing	0.5	% sulfur	8.41E+01	#20427 SO2 PSD Avoidance	2	lb/mgal	AP42 1.3-1	1.3	lb/mgal	AP42 1.3-2 Total CPM	3.54E+00						0.967 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil	3.42E+00
		TV application #20427 is for the repair of Boiler B001, including replacing boiler water tubes and other boiler components with no change in boiler capacity or rating. As part of PSD avoidance, King America Finishing will only combust No. 2 fuel oil in the boiler with a maximum sulfur content of 0.5%, by weight. Increment expansion is not included in the modeling analyses.																																		
25100008B02	B002	Babcock & Wilcox Boiler	None	1998			181.00		176,070	scfh	Nat. Gas			#10444 #16554	0.2	lb/mmBtu	3.62E+01	V-03-0 3.3.3.a	0.6	lb/mmscf	1.06E-01	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	1.34E+00						Same as PM10	1.11E+00
		Replaced 233 mmBtu/hr coal-fired boiler listed in PSDINVEN_1.xls in 1998.					181.00		1,293	gph	No. 2			#10444 #16554	0.2	lb/mmBtu	3.62E+01	V-03-0 3.3.3.a	0.5	% sulfur	9.18E+01	V-03-0 3.3.2 NSPS Db	2	lb/mgal	AP42 1.3-1	1.3	lb/mgal	AP42 1.3-2 Total CPM	4.27E+00						0.967 PM2.5/PM ratio from CARB/SCAQMD CEDAIRS Table A Liquid fuel except residual oil	4.13E+00
25100008DNR	DNR1	Dye Narrow Range Pad Application	None	1976	1993		4.60		4,475	scfh	Nat. Gas			#16554	100	lb/mmscf	4.47E-01	AP42 1.4-1	0.6	lb/mmscf	2.68E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	3.40E-02						Same as PM10	3.40E-02
25100008DWR	DWR1	Dye Wide Range Pad Application	None	1966	1994		4.60		4,475	scfh	Nat. Gas			#16554	100	lb/mmscf	4.47E-01	AP42 1.4-1	0.6	lb/mmscf	2.68E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	3.40E-02						Same as PM10	3.40E-02
25100008PHT	PD01 HD01 TH01	Dry Range No. 3 Predryer, Hot Flame Dryer and Thermosol	None	2008			21.00		20,428	scfh	Nat. Gas			#18171 502(b)(10)	100	lb/mmscf	2.04E+00	AP42 1.4-1	0.6	lb/mmscf	1.23E-02	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	1.55E-01						Same as PM10	1.55E-01
25100008R40	FR40	Aztec Finishing Range	None	1976			12.00		11,673	scfh	Nat. Gas			#16554	100	lb/mmscf	1.17E+00	AP42 1.4-1	0.6	lb/mmscf	7.00E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	8.87E-02						Same as PM10	8.87E-02

Table 3. Backup Data for Emissions Limitations used in Baseline Inventory Screening and Air Quality Modeling Analysis (Georgia)

A: Unit Description – Modeled Source ID	B: Permitted Source ID	C: Source Description	D: Control Device Description	E: Construction Date	F: Modification Date	G: Operating Levels – Maximum Hourly Processing Weight Rate (tons)	H: Maximum Rated Heat Input (mmBtu)	I: Maximum Rated Brake Horsepower (bhp)	J: Maximum Hourly Fuel Consumption	K: Units	L: Fuel Type	M: Actual Exhaust Volumetric Flow Rate (acfm)	N: Dry Standard Exhaust Volumetric Flow Rate (dscfm)	O: Basis	P: Nitrogen Oxides (NO_x) – Maximum Allowable Emission Limitation or Potential-to-Emit	Q: units	R: Mass Emission Rate (lb/hr)	S: Basis	T: Sulfur Dioxide (SO_2) – Maximum Allowable Emission Limitation or Potential-to-Emit	U: units	V: Mass Emission Rate (lb/hr)	W: Basis	X: Particulate Matter <10 mm (PM_{10}) – Maximum Allowable Emission Limitation or Potential-to-Emit – filterable	Y: units	Z: Basis	AA: condensable	BB: units	CC: Basis	DD: Mass Emission Rate (sum of filterable and condensable) (lb/hr)	EE: Particulate Matter <2.5 mm ($PM_{2.5}$) – Maximum Allowable Emission Limitation or Potential-to-Emit – filterable	FF: units	GG: Basis	HH: condensable	II: units	JJ: Basis	KK: Mass Emission Rate (sum of filterable and condensable) (lb/hr)
25100008R51	FR51	Aztec Finishing Range	None	1988			3.90		3,794	scfh	Nat. Gas			#16554	100	lb/mmscf	3.79E-01	AP42 1.4-1	0.6	lb/mmscf	2.28E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	2.88E-02						Same as PM10	2.88E-02
25100008R58	FR58	Aztec Finishing Range	None	1969			9.00		8,755	scfh	Nat. Gas			#16554	100	lb/mmscf	8.75E-01	AP42 1.4-1	0.6	lb/mmscf	5.25E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	6.65E-02						Same as PM10	6.65E-02
25100008R59	FR59	Aztec Finishing Range	None	1976			12.00		11,673	scfh	Nat. Gas			#16554	100	lb/mmscf	1.17E+00	AP42 1.4-1	0.6	lb/mmscf	7.00E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	8.87E-02						Same as PM10	8.87E-02
25100008FR1	FRL1	Flame Retardant Fabric Finishing Line 1	None				*Steam heated*							#16554			0.00E+00				0.00E+00								0.00E+00							0.00E+00
25100008FR2	FRL2	Flame Retardant Fabric Finishing Line 2	None				*Steam heated*							#16554			0.00E+00				0.00E+00								0.00E+00							0.00E+00
25100008PHS	PHS1	Heat Setting	None	1978			6.00		5,837	scfh	Nat. Gas			#16554	100	lb/mmscf	5.84E-01	AP42 1.4-1	0.6	lb/mmscf	3.50E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	4.44E-02						Same as PM10	4.44E-02
25100008POW	POW1	Preparation Open Width Range	None	1970			*Bleaching operation*							#16554			0.00E+00				0.00E+00								0.00E+00							0.00E+00
25100008PRR	PRR1	Rope Range	None	1966	1999		1.70		1,654	scfh	Nat. Gas			#16554	100	lb/mmscf	1.65E-01	AP42 1.4-1	0.6	lb/mmscf	9.92E-04	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	1.26E-02						Same as PM10	1.26E-02
25100008PYP	PYP1	Yarn Preparation	None	1994			1.00		973	scfh	Nat. Gas			#16554	100	lb/mmscf	9.73E-02	AP42 1.4-1	0.6	lb/mmscf	5.84E-04	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	7.39E-03						Same as PM10	7.39E-03
25100008P01	P001	Zimmer Printer & Aztec Tubular Jet Print Dryer 1	None	1991			8.00		7,782	scfh	Nat. Gas			#16554	100	lb/mmscf	7.78E-01	AP42 1.4-1	0.6	lb/mmscf	4.67E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	5.91E-02						Same as PM10	5.91E-02
25100008P02	P002	Zimmer Printer & Aztec Tubular Jet Print Dryer 2	None	1993			8.00		7,782	scfh	Nat. Gas			#16554	100	lb/mmscf	7.78E-01	AP42 1.4-1	0.6	lb/mmscf	4.67E-03	AP42 1.4-2	1.9	lb/mmscf	AP42 1.4-2	5.7	lb/mmscf	AP42 1.4-2	5.91E-02						Same as PM10	5.91E-02
		Georgia - Screven County **AIRS 25100009 Sylvania Readymix Concrete Co Inc** *Sylvania Readymix Concrete is listed as a concrete products facility. No application files could be found for this facility.* *Since no air quality permit for the facility could be found in the application files, particulate matter emissions are assumed to be based on 600,000 cubic yards of production per year (391-3-1-.03(11)(b)4.(i)(II)).* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100010 Mobley Lumber Co Inc** *Mobley Lumber is listed as operating a wood refuse conic burner. The last correspondence from the facility found in the application files was in February 1977. This facility is assumed to have ceased operation.*																																			
		Georgia - Screven County **AIRS 25100024 Cargill (Sylvania) Peanut Products** *Cargill is a peanut shelling operation. Application files indicate that the facility is a source of particulate matter only.* *AP42 Chapter 9.10.2.2 also indicates that the facility would be a source of particulate matter only (peanut drying is an open-air, mechnical process).* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100026 Bascom Gin Company** *Bascom Gin Company is a cotton ginning operation (10 bales per hour). Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100027 Screven Gin Company** *Screven Gin Company is a cotton ginning operation (30 bales per hour). Application files indicate that the facility is a source of particulate matter only.* *The facility will not have a significant concentration gradient for the PM10 and PM2.5 NAAQS and increments based on 20*D with 2-km grouping.* *For the NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100029 Southern Natural Gas Company-Woodcliff Gate Compressor Station**																																			
25100029T1	PT01	Natural Gas-Fired Turbine Allison Model 501-KC	None	2005			55.42	5,278	53,911	scfh	Nat. Gas			#17143	150	ppmvd 15% O2	3.06E+01	V-03-0 3.3.3 NSPS GG RM19 19-1	0.0034	lb/mmBtu	1.77E-01	AP42 3.1-2a footnote h	0.0019	lb/mmBtu	AP42 3.1-2a	4.70E-03	lb/mmBtu	AP42 3.1-2a	3.66E-01						Same as PM10	3.66E-01
		Georgia - Screven County **AIRS 25100030 Mickey Lovett Body Shop** *Mickey Lovett Body Shop is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.* *No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).* *The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100031 Wallis Paint & Body, Inc.** *Wallis Paint & Body, Inc. is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.* *No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).* *The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100032 McBride's Hill Paint & Body Shop, Inc.** *McBride's Hill Paint & Body Shop, Inc. is listed as an automotive painting and refinishing operation. The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.* *No application files could be found for this facility. The only record likely to exist for this facility is an initial notification for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).* *The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			
		Georgia - Screven County **AIRS 25100033 Southeastern Aircraft Painting, Inc.** *Southeastern Aircraft Painting, Inc. is listed as an automotive collision and repair operation (likely aircraft). The facility does not have any quantifiable PM10, PM2.5, NOx or SO2 emissions.* *The only record in the application files is an initial notification/compliance certification submitted on March 1, 2010 for the paint stripping and miscellaneous surface coating operations area source MACT rule (40 CFR 63 Subpart HHHHHH).* *The facility is assumed to not have a significant concentration gradient for the NAAQS and increments.* *For all NAAQS, this source is assumed to be included in the background air quality concentrations.*																																			

Table 4a. PSD Point Source Inventory for the 1-hour NO2 and SO2 NAAQS

Unit Description					Stack Parameters									
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	NO_x lb/hr	SO_2 lb/hr	In-Stack NO2/NOx Ratio
	Georgia - Bulloch County **AIRS 03100002 Tillman & Deal Farm Supply Inc**													
0310000201	1	Grain Dryer	1976		428,060.20	3,593,728.40	51.88	40.0	78	7.80	14.00	1.421E+00	1.639E-01	0.50
	Georgia - Bulloch County **AIRS 03100011 Reeves Construction Company Plant #10**													
0310001101		Hot Mix Asphalt Plant Dryer Stack	unk		420,058.18	3,582,140.49	52.01	28.5	286	64.25	42.00	1.375E+01	1.271E+02	0.50
	Georgia - Bulloch County **AIRS 03100020 Braswell A M Food Co Inc**													
0310002001	1-1	200-hp Fitz Gibbon Boiler	1969		424,828.90	3,592,263.20	76.30	30.0	350	17.32	18.00	9.564E-01	3.395E+00	0.50
0310002002	1-2	100-hp Titusville Boiler	1964		424,828.90	3,592,263.20	76.30	40.0	350	8.66	18.00	3.256E-01	1.954E-03	0.50
	Georgia - Bulloch County **AIRS 03100036 Robbins Packing Co**													
0310003602	2	80-hp Boiler	1949		426,982.90	3,591,349.30	61.71	40.0	425	21.00	24.00	3.256E-01	1.954E-03	0.50
0310003603	3	100-hp Boiler	1949		426,982.90	3,591,349.30	61.71	40.0	425	21.00	24.00	3.256E-01	1.954E-03	0.50
	Georgia - Bulloch County **AIRS 03100044 Briggs & Stratton**													
031000441B	P01 P01B	Aluminum Melting Tower and Furnace	1995 2001		420,753.57	3,583,049.15	61.40	32.0	350	47.16	36.00	3.700E+00	1.000E-02	0.50
0310004402	P02	Die Casting Machines	1995		420,753.57	3,583,049.15	61.40	32.0	200	50.88	64.00	8.000E-02	1.700E-01	0.50
031000445A	P05A	Stress Relief Oven	1995		420,753.57	3,583,049.15	61.40	32.0	305	49.62	28.00	6.100E-01	2.400E-03	0.50
031000446A	P06A	Four-stage Aqueous Parts Washer	1995		420,753.57	3,583,049.15	61.40	32.0	105	47.33	52.00	3.100E-01	1.200E-03	0.50
0310004407	P07	Engine Testing Stations	1995		420,753.57	3,583,049.15	61.40	42.0	74	8.10	32.50	4.800E-03	3.000E-02	0.50
0310004411	P11	Dynamometer Testing Stands	1995		420,753.57	3,583,049.15	61.40	32.0	74	91.13	32.50	1.200E-01	1.000E-02	0.50
0310004412	P12	Epxoy Drying Ovens	2004		420,753.57	3,583,049.15	61.40	32.0	249	48.47	18.00	3.100E-01	1.200E-03	0.50
0310004413	P13	Outdoor Endurance Test Stands	2005		420,753.57	3,583,049.15	61.40	32.0	74	52.07	32.50	1.200E-01	1.000E-02	0.50
03100044B1	B10A	Boiler	1995		420,753.57	3,583,049.15	61.40	32.0	121	49.27	14.00	2.560E+00	1.000E-02	0.50
	Georgia - Bulloch County **AIRS 03100052 East Geogia Regional Medical Center**													
03100052B1	B1	Cleaver-Brooks CB200-300-125HW Boiler	1999		427,535.99	3,586,613.62	64.02	27.8	325	27.69	20.00	1.221E+00	7.325E-03	0.50
Boiler B1 uses natural gas as primary fuel; No. 2 fuel oil as backup during emergency (8/18/1999 #11635 Section III-A form); NOx and SO2 emission scenario are "intermittent" for the 1-hour NAAQS														
03100052B2	B2	Cleaver-Brooks CB200-300-125HW Boiler	1999		427,535.99	3,586,613.62	64.02	27.8	325	27.69	20.00	1.221E+00	7.325E-03	0.50
Boiler B2 uses natural gas as primary fuel; No. 2 fuel oil as backup during emergency (8/18/1999 #11635 Section III-A form); NOx and SO2 emission scenario are "intermittent" for the 1-hour NAAQS														
	Georgia - Burke County **AIRS 03300008 Allen B. Wilson Combustion Turbine Plant**													
003000086A	CTA6A	Peaking Combustion Turbine	1972		430,217.17	3,666,866.79	63.43	50.0	760	97.64	195.28	8.554E+02	4.909E+02	0.20
003000086B	CTA6B	Peaking Combustion Turbine	1972		430,216.79	3,666,840.85	63.29	50.0	760	97.64	195.28	8.554E+02	4.909E+02	0.20
003000086C	CTA6C	Peaking Combustion Turbine	1972		430,216.54	3,666,815.11	63.22	50.0	760	97.64	195.28	8.554E+02	4.909E+02	0.20
003000086D	CTA6D	Peaking Combustion Turbine	1973		430,216.19	3,666,789.11	63.31	50.0	760	97.64	195.28	8.554E+02	4.909E+02	0.20
003000086E	CTA6E	Peaking Combustion Turbine	1973		430,215.75	3,666,762.95	63.70	50.0	760	97.64	195.28	8.554E+02	4.909E+02	0.20
003000086F	CTA6F	Peaking Combustion Turbine	1973		430,215.53	3,666,736.94	63.86	50.0	760	97.64	195.28	8.554E+02	4.909E+02	0.20
	Georgia - Burke County **AIRS 03300034 Fiamm Technologies, Inc.**													
03300034SC6	P1A P2	Lead Cylinder Production and Grid Casting	2001		405,054.23	3,663,711.27	86.00	35.0	82	38.58	30.00	3.677E-01	2.206E-03	0.50
03300034B02	P5 P6	Three-Process Operation	2001		405,132.33	3,663,704.32	86.11	35.0	80	37.21	60.00	9.450E-01	5.670E-03	0.50
03300034B05	P5 P6	Three-Process Operation	2001		405,050.68	3,663,711.91	85.97	35.0	76	36.91	36.00	9.450E-01	5.670E-03	0.50
	Georgia - Burke County **AIRS 03300037 Reeves Construction Company GFL Waynesboro Plant**													

Table 4a. PSD Point Source Inventory for the 1-hour NO2 and SO2 NAAQS

Unit Description					Stack Parameters									
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	NO_x lb/hr	SO_2 lb/hr	In-Stack NO2/NOx Ratio
0330003701		Hot Mix Asphalt Plant Dryer Stack	unk		407,980.29	3,661,898.82	76.85	34.0	250	74.66	42.00	1.100E+01	1.321E+02	0.50
	Georgia - Burke County **AIRS 03300038 ASTA, Inc.**													
0330003801	BC01-BC06	Electric Enamel Base Coat Ovens	2008		404,857.25	3,663,545.69	88.45	40.0	1,000	47.00	6.50	9.785E-01	0.000E+00	0.50
0330003802	SB01-SB02	Self-bonding Coating Ovens	2008		404,857.25	3,663,545.69	88.45	40.0	1,300	28.00	6.50	1.631E-01	0.000E+00	0.50
	Georgia - Candler County **AIRS 04300011 Moore Wallace Inc**													
04300011B1	B1	Kewanee Boiler	1980		401,976.90	3,584,983.60	66.64	30.0	350	10.26	18.00	5.946E-01	6.861E-02	0.50
	Georgia - Effingham County **AIRS 10300013 Georgia Transmission**													
10300013G1	G1	Caterpillar CAT 3516 B TA Generator Set	2001		459,487.70	3,595,455.40	38.97	25.0	847	241.38	14.00	3.727E+01	beyond screening area	0.50
10300013G2	G2	Caterpillar CAT 3516 B TA Generator Set	2001		459,482.57	3,595,460.68	39.16	25.0	847	241.38	14.00	3.727E+01	" "	0.50
10300013G3	G3	Caterpillar CAT 3516 B TA Generator Set	2001		459,478.34	3,595,465.92	39.32	25.0	847	241.38	14.00	3.727E+01	" "	0.50
10300013G4	G4	Caterpillar CAT 3516 B TA Generator Set	2001		459,473.52	3,595,471.08	39.40	25.0	847	241.38	14.00	3.727E+01	" "	0.50
10300013G5	G5	Caterpillar CAT 3516 B TA Generator Set	2001		459,469.32	3,595,475.40	39.45	25.0	847	241.38	14.00	3.727E+01	" "	0.50
	Georgia - Emanuel County **AIRS 10700013 Lifeline Industries**													
10700013B1	B1	Bell Industries Lumber Drying Kiln Boiler	1983		375,239.90	3,607,591.20	89.22	30.0	450	30.00	16.00	1.390E+00	1.580E-01	0.50
	Georgia - Emanuel County **AIRS 10700019 American Steel Products**													
10700019D1	D01 D02 D03	3 Maxon Size PM 1200 Drying Ovens	unk		374,667.30	3,607,963.20	96.42	24.0	70	37.40	14.00	4.377E-01	2.626E-03	0.50
	Georgia - Emanuel County **AIRS 10700025 Crider Poultry**													
10700025B1	BL1	600-hp Boiler 1	2000		386,060.03	3,588,435.81	75.92	24.0	390	29.07	24.00	2.854E+00	beyond screening area	0.50
10700025B2	BL2	300-hp Boiler 2	2000		386,047.67	3,588,434.57	76.20	24.0	390	14.54	24.00	1.427E+00	" "	0.50
10700025B5	BL5	700-hp Boiler 5	2002		386,078.09	3,588,436.38	75.60	24.0	350	34.11	24.00	3.329E+00	" "	0.50
	Georgia - Jefferson County **AIRS 16300007 Thermo King Corp**													
16300007107	107	Coil Oven	1995		370,309.00	3,652,450.28	99.26	20.0	130	11.50	12.00	3.891E-02	beyond screening area	0.50
16300007306	306	Pretreat Oven	1995		370,309.00	3,652,450.28	99.26	20.0	130	11.50	12.00	7.782E-02	" "	0.50
16300007014	14	14 Diesel Testing Stands	1992		370,309.00	3,652,450.28	99.26	4.0	450	75.62	4.00	3.832E+00	" "	0.50
	Georgia - Jefferson County **AIRS 16300008 Farmers Gin and Storage**													
16300008CG		Cotton Ginning Process	1975	2010	369,360.88	3,636,743.00	69.91	26.0	75	36.88	16.00	1.137E+00	beyond screening area	0.50
	Georgia - Jefferson County **AIRS 16300012 Battle Lumber Company**													
16300012B1	B1	Steam Boiler for Lumber Drying Kilns	1992		369,557.87	3,636,201.85	67.88	35.0	400	52.00	16.80	2.112E+00	beyond screening area	0.50
16300012B2	B2	Steam Boiler for Lumber Drying Kilns	1998		369,557.87	3,636,201.85	67.88	40.0	865	47.67	30.25	6.314E+00	" "	0.50
16300012B3	B3	Steam Boiler for Lumber Drying Kilns	2010		369,557.87	3,636,201.85	67.88	40.0	865	47.67	30.25	6.314E+00	" "	0.50
	Georgia - Screven County **AIRS 25100003 Feed Seed & Farm Supply**													
2510000307	7	Grain Dryer	1957		428,060.20	3,593,728.40	51.88	40.0	78	7.80	14.00	1.167E+00	7.004E-03	0.50
	Georgia - Screven County **AIRS 25100004 Koyo Bearings USA, LLC**													
25100004B1	B1	700-hp Boiler 1	1974		442,044.99	3,624,657.32	55.30	38.7	315	86.74	16.00	2.841E+00	1.705E-02	0.50
Boiler B1 uses No. 5 fuel oil only during curtailment (11/13/1996 memo); NOx and SO2 emission scenario are "intermittent" for the 1-hour NAAQS														
25100004B2	B2	700-hp Boiler 2	1974		442,044.99	3,624,657.32	55.30	38.7	315	86.74	16.00	2.841E+00	1.705E-02	0.50
Boiler B2 uses No. 5 fuel oil only during curtailment (11/13/1996 memo); NOx and SO2 emission scenario are "intermittent" for the 1-hour NAAQS														
	Georgia - Screven County **AIRS 25100008 King America Finishing, Inc.**													
25100008B01	B001	Babcock & Wilcox Boiler	1970	2010	430,543.80	3,607,588.13	47.76	140.0	500	41.40	60.00	4.086E+01	8.411E+01	0.50
25100008B02	B002	Babcock & Wilcox Boiler	1998		430,534.13	3,607,576.97	47.59	60.0	450	32.89	72.00	3.620E+01	9.179E+01	0.50
25100008DNR	DNR1	Dye Narrow Range Pad Application	1976	1993	430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	4.475E-01	2.685E-03	0.50

Table 4a. PSD Point Source Inventory for the 1-hour NO2 and SO2 NAAQS

Unit Description					Stack Parameters									
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	NO_x lb/hr	SO_2 lb/hr	In-Stack NO2/NOx Ratio
25100008DWR	DWR1	Dye Wide Range Pad Application	1966	1994	430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	4.475E-01	2.685E-03	0.50
25100008PHT	PD01 HD01	Dry Range No. 3 Predryer, Hot Flame Dryer and Thermosol	2008		430,464.05	3,607,785.12	49.10	38.0	140	29.11	22.00	2.043E+00	1.226E-02	0.50
25100008R40	FR40	Aztec Finishing Range	1976		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	1.167E+00	7.004E-03	0.50
25100008R51	FR51	Aztec Finishing Range	1988		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	3.794E-01	2.276E-03	0.50
25100008R58	FR58	Aztec Finishing Range	1969		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	8.755E-01	5.253E-03	0.50
25100008R59	FR59	Aztec Finishing Range	1976		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	1.167E+00	7.004E-03	0.50
25100008PHS	PHS1	Heat Setting	1978		430,482.52	3,607,699.59	48.62	38.0	140	29.11	22.00	5.837E-01	3.502E-03	0.50
25100008PRR	PRR1	Rope Range	1966	1999	430,554.56	3,607,682.53	48.56	38.0	140	29.11	22.00	1.654E-01	9.922E-04	0.50
25100008PYP	PYP1	Yarn Preparation	1994		430,579.21	3,607,648.21	48.47	38.0	140	29.11	22.00	9.728E-02	5.837E-04	0.50
25100008P01	P001	Zimmer Printer & Aztec Tubular Jet Print Dryer 1	1991		430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	7.782E-01	4.669E-03	0.50
25100008P02	P002	Zimmer Printer & Aztec Tubular Jet Print Dryer 2	1993		430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	7.782E-01	4.669E-03	0.50
	Georgia - Screven County													
	AIRS 25100029 Southern Natural Gas Company-Woodcliff Gate Compressor Station													
25100029T1	PT01	Natural Gas-Fired Turbine Allison Model 501-KC	2005		427,200.00	3,623,900.00	80.40	37.7	1,073	13.76	66.50	3.062E+01	1.771E-01	0.20
	South Carolina - Aiken County													
	Permit No. 0080-0041 Savannah River Nuclear Solutions LLC - Savannah River Site													
0080004101		APF2 - 784-7A Steam Facility Biomass Boiler	2008		431,534.89	3,689,173.83	119.25	50.0	350	44.00	35.99	1.317E+01	beyond screening area	0.50
0080004102		APF3 - 784-7A Steam Facility Oil Fired Boiler	2008		431,559.32	3,689,180.83	119.15	45.0	458	47.00	30.00	2.857E+00	" "	0.50
0080004103		BQH1 - 735-1B Lab Hotwater Heater/Boiler 1, 2, & 3	1998		431,835.06	3,682,911.95	92.47	33.0	500	**0.00328**	26.38	1.675E+00	" "	0.50
0080004105		HSE12 - 254-19H 800 kW Production Diesel Engine A	2000		440,409.08	3,683,561.32	93.75	12.0	999	**0.00328**	9.96	2.675E+01	" "	0.50
0080004106		HSE13 - 254-19H 800 kW Production Diesel Engine B	2000		440,416.53	3,683,566.37	93.60	12.0	999	**0.00328**	9.96	2.675E+01	" "	0.50
0080004107		HSP2 - H Canyon, HB Line, 221-H, etc.	1985		440,467.08	3,683,435.62	91.95	200.0	78	59.60	120.00	3.373E+02	" "	0.50
0080004108		NBJ28 - 725-1N Abrasive Blasting	1975	1992	439,318.70	3,679,031.55	91.19	6.0	**-460**	**0.00328**	0.00	0.000E+00	" "	0.50
0080004109		NGE44 - 2 Portable Air Compressors in D-Area	2000	2010	430,862.28	3,673,991.55	37.56	7.7	884	215.00	5.08	2.278E+01	" "	0.50
0080004110		NGE45 - 10 Portable Air Compressors	2000	2010	431,282.94	3,689,932.21	113.43	7.7	884	215.00	5.08	1.143E+02	" "	0.50
0080004111		SDP7 - 221-S Zone 2 Stack, 221-S Prod., etc	1988	2004	440,290.18	3,684,003.70	84.11	147.0	80	85.00	60.00	2.349E+01	" "	0.50
	South Carolina - Aiken County													
	Permit No. 0080-0112 Three Rivers Landfill													
0080011201		Tub Grinder Engine	2005		431,419.00	3,680,380.00	71.88	11.6	800	305.53	6.00	1.102E+01	beyond screening area	0.50
0080011202		Scalping Screen Engine	unk		431,419.00	3,680,380.00	71.88	10.0	800	76.41	3.96	2.600E+00	" "	0.50
0080011203		Terminator Grinder Engine	unk		431,419.00	3,680,380.00	71.88	10.3	800	305.53	6.00	9.740E+00	" "	0.50
0080011204		Trommel Screen Engine	unk		431,419.00	3,680,380.00	71.88	9.4	800	305.53	6.00	2.240E+00	" "	0.50
0080011206		Flare	unk		431,455.35	3,679,828.44	60.12	42.0	1,832	65.62	60.00	5.100E+00	" "	0.50
	South Carolina - Aiken County													
	Permit No. 0080-0144 Ameresco Federal Solutions													
0080014401		1STACK - Biomass Cogeneration Boiler	2008		436,002.16	3,681,877.04	79.25	100.0	325	59.61	66.14	3.150E+01	beyond screening area	0.50
0080014402		2STACK - Biomass Cogeneration Boiler	2008		436,015.32	3,681,858.30	78.28	100.0	325	59.61	66.14	3.150E+01	" "	0.50
0080014403		KBIOB - Biomass Steam Generation Unit	2008		438,359.75	3,674,696.84	82.96	49.0	450	53.71	19.68	2.980E+00	" "	0.50
0080014404		LBIOB - Biomass Steam Generation Unit	2008		441,886.13	3,674,882.91	76.85	49.0	450	53.71	19.68	2.980E+00	" "	0.50
	South Carolina - Allendale County													
	Permit No. 0160-0006 Clariant Corporation													
0160000601		Boiler #1	1999		455,144.27	3,655,701.15	48.69	42.0	350	34.50	39.96	1.000E+01	beyond screening area	0.50
0160000602		Boiler #2	1999		455,147.76	3,655,700.35	48.61	42.0	350	40.00	39.96	1.000E+01	" "	0.50
0160000603		Scrubbers	1999		454,885.43	3,655,126.55	43.16	94.8	70	53.95	39.96	0.000E+00	" "	0.50
	South Carolina - Barnwell County													
	Permit No. 0300-0036 Savannah River Nuclear Solutions LLC Savannah River Site - D-Area Powerhouse													
0300003601		DPF1 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler #	1952		431,022.38	3,673,996.77	39.08	125.0	370	35.00	118.56	3.191E+02	beyond screening area	0.50
0300003602		DPF2 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler #	1952		431,020.71	3,673,999.52	39.07	125.0	370	35.00	118.56	3.191E+02	" "	0.50

Table 4b. PSD Volume Source Inventory for the 1-hour NO2 and SO2 NAAQS

Unit Description					Volume Source Parameters								
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Release Height ft	Horizontal Dimension ft	Vertical Dimension ft	NO_x lb/hr	SO_2 lb/hr	In-Stack NO2/NOx Ratio
		Georgia - Bulloch County											
		AIRS 03100005 W.M. Sheppard Lumber Company											
03100005K4	DK04	Direct-fired Lumber Drying Kiln #4	1998		438,293.75	3,579,706.34	38.29	35	10.72	16.28	7.535E-01	6.250E-01	0.50
03100005K5	DK05	Direct-fired Lumber Drying Kiln #5	1999		438,375.83	3,579,700.40	37.85	35	10.72	16.28	7.535E-01	6.250E-01	0.50
		Georgia - Bulloch County											
		AIRS 03100028 Claude Howard Lumber Company											
03100028K1	DFK1	Direct-fired Lumber Drying Kiln #1	1980		427,118.28	3,588,883.68	62.05	42	68.90	74.80	8.476E-01	4.500E-01	0.50
03100028K2	DFK2	Direct-fired Lumber Drying Kiln #2	1980		427,145.49	3,588,874.80	61.55	42	68.90	74.80	8.476E-01	5.000E-01	0.50
		Georgia - Emanuel County											
		AIRS 10700011 Rayonier Wood Products Swainsboro											
10700011K09	DK09	Direct-fired Lumber Drying Kiln #7 (batch) converted to Kiln #9 (continuous)	2005		374,904.36	3,597,713.56	76.19	27	14.71	12.56	1.769E+00	beyond screening area	0.50
10700011K10	DK10	Direct-fired Lumber Drying Kiln #8 (batch) converted to Kiln #10 (continuous)	2005		374,942.32	3,597,713.56	75.84	27	14.71	12.56	1.769E+00	" "	0.50

Table 5. PSD Inventory for the PM10 and PM2.5 24-hour and Annual NAAQS and Increments

Unit Description					Increment		Stack Parameters								
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
	Georgia - Burke County														
	AIRS 03300008 Allen B. Wilson Combustion Turbine Plant														
003000086A	CTA6A	Peaking Combustion Turbine	1972				430,217.17	3,666,866.79	63.43	50.0	760	97.64	195.28	1.118E+01	1.081E+01
003000086B	CTA6B	Peaking Combustion Turbine	1972				430,216.79	3,666,840.85	63.29	50.0	760	97.64	195.28	1.118E+01	1.081E+01
003000086C	CTA6C	Peaking Combustion Turbine	1972				430,216.54	3,666,815.11	63.22	50.0	760	97.64	195.28	1.118E+01	1.081E+01
003000086D	CTA6D	Peaking Combustion Turbine	1973				430,216.19	3,666,789.11	63.31	50.0	760	97.64	195.28	1.118E+01	1.081E+01
003000086E	CTA6E	Peaking Combustion Turbine	1973				430,215.75	3,666,762.95	63.70	50.0	760	97.64	195.28	1.118E+01	1.081E+01
003000086F	CTA6F	Peaking Combustion Turbine	1973				430,215.53	3,666,736.94	63.86	50.0	760	97.64	195.28	1.118E+01	1.081E+01
	Georgia - Burke County														
	AIRS 03300030 Vogtle Electric Generating Plant														
	Existing Equipment (Units 1 and 2)														
03300030VD1	VD01	Unit 1 Emergency Diesel Generator 1A	1981		✓		428,765.22	3,667,265.29	65.40	63.0	700	**0.00328**	42.00	4.005E+00	3.886E+00
03300030VD2	VD02	Unit 1 Emergency Diesel Generator 1B	1981		✓		428,778.92	3,667,265.05	65.07	63.0	700	**0.00328**	42.00	4.005E+00	3.886E+00
03300030VD3	VD03	Unit 2 Emergency Diesel Generator 2A	1981		✓		428,981.22	3,667,262.56	64.53	63.0	700	**0.00328**	42.00	4.005E+00	3.886E+00
03300030VD4	VD04	Unit 2 Emergency Diesel Generator 2B	1981		✓		428,994.88	3,667,262.28	64.56	63.0	700	**0.00328**	42.00	4.005E+00	3.886E+00
03300030FD1	FPD1	Replacement Fire Pump Diesel Unit 1	2010		✓		429,083.94	3,667,465.93	61.41	25.0	850	153.00	5.00	3.086E-01	3.086E-01
03300030FD2	FPD2	Fire Pump Diesel Unit 2	1977		✓		429,091.18	3,667,465.87	61.57	25.0	850	153.00	5.00	8.360E-01	8.360E-01
03300030SD1	SD01	Security Diesel	1986		✓		429,136.56	3,667,260.08	65.29	30.0	850	245.00	6.00	4.601E-01	4.465E-01
0330003CWS1	CWS1	Circulating Water System Cooling Tower 1	unk		✓		429,450.43	3,667,305.53	65.79	600.0	80	9.74	3960.00	1.800E+00	1.800E+00
0330003CWS2	CWS2	Circulating Water System Cooling Tower 2	unk		✓		429,448.13	3,667,514.53	63.01	600.0	80	9.74	3960.00	1.800E+00	1.800E+00
0330003SWS1	SWS1	Service Water System Cooling Tower 1	unk		✓		428,985.11	3,667,307.90	63.93	600.0	106	24.78	268.80	8.000E-02	8.000E-02
0330003SWS2	SWS2	Service Water System Cooling Tower 2	unk		✓		428,786.46	3,667,310.41	65.15	600.0	106	24.78	268.80	8.000E-02	8.000E-02
	New Equipment (Units 3 and 4)														
03300030VD5	VD05	Unit 3 Emergency Diesel Generator 1	2010		✓		428,406.35	3,667,182.63	69.37	35.5	710	364.50	18.00	1.808E+00	1.808E+00
03300030VD6	VD06	Unit 3 Emergency Diesel Generator 2	2010		✓		428,413.71	3,667,182.63	69.42	35.5	710	364.50	18.00	1.808E+00	1.808E+00
03300030VD7	VD07	Unit 4 Emergency Diesel Generator 1	2010		✓		428,160.59	3,667,178.43	69.13	35.5	710	364.50	18.00	1.808E+00	1.808E+00
03300030VD8	VD08	Unit 4 Emergency Diesel Generator 2	2010		✓		428,167.33	3,667,178.43	69.17	35.5	710	364.50	18.00	1.808E+00	1.808E+00
03300030FD3	FPD3	Units 3 and 4 Fire Pump Diesel 1	2010		✓		428,275.84	3,667,271.06	69.05	12.0	868	168.30	5.00	5.456E-02	5.456E-02
03300030FD4	FPD4	Units 3 and 4 Fire Pump Diesel 2	2010		✓		428,028.78	3,667,266.87	69.22	12.0	868	168.30	5.00	5.456E-02	5.456E-02
03300030FD5	FPD5	Units 3 and 4 Fire Pump Diesel 3	2010		✓		428,431.22	3,666,576.29	74.00	12.0	868	168.30	5.00	5.456E-02	5.456E-02
03300030AX1	AUX1	Units 3 and 4 Ancillary Diesel Generator 1	2010		✓		428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	6.614E-02	6.614E-02
03300030AX2	AUX2	Units 3 and 4 Ancillary Diesel Generator 2	2010		✓		428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	6.614E-02	6.614E-02
03300030AX3	AUX3	Units 3 and 4 Ancillary Diesel Generator 3	2010		✓		428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	6.614E-02	6.614E-02
03300030AX4	AUX4	Units 3 and 4 Ancillary Diesel Generator 4	2010		✓		428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	6.614E-02	6.614E-02
03300030RWD	ODG1	Units 3 and 4 Raw Water Diesel Generator	2010		✓		428,398.28	3,666,578.01	74.18	20.0	851	252.10	12.00	4.850E-01	4.850E-01
03300030TSC	TSC1	Technical Support Center Disel Generator	2010		✓		428,663.17	3,667,142.45	72.04	20.0	851	252.10	12.00	4.850E-01	4.850E-01
0330003CWS3	CWS3	Circulating Water System Cooling Tower 3	2010		✓		427,985.26	3,666,795.15	71.31	600.0	80	9.74	3960.00	1.800E+00	1.800E+00
0330003CWS4	CWS4	Circulating Water System Cooling Tower 4	2010		✓		428,321.88	3,666,798.14	76.73	600.0	80	9.74	3960.00	1.800E+00	1.800E+00
0330003SWS3	SWS3	Service Water System Cooling Tower 3	2010		✓		428,022.65	3,667,251.06	69.09	600.0	106	24.78	268.80	8.000E-02	8.000E-02
0330003SWS4	SWS4	Service Water System Cooling Tower 4	2010		✓		428,269.78	3,667,252.78	69.05	600.0	106	24.78	268.80	8.000E-02	8.000E-02
	South Carolina - Barnwell County														
	Permit No. 0300-0036 Savannah River Nuclear Solutions LLC Savannah River Site - D-Area Powerhouse														
0300003601	DPF1 - 484-D	396 x 106 btu/hr Pulverized Coal Boiler #	1952				431,022.38	3,673,996.77	39.08	125.0	370	35.00	118.56	7.230E+01	7.230E+01
0300003602	DPF2 - 484-D	396 x 106 btu/hr Pulverized Coal Boiler #	1952				431,020.71	3,673,999.52	39.07	125.0	370	35.00	118.56	7.230E+01	7.230E+01

Table 6. PSD Inventory for the NO2 Annual NAAQS and Increment

Unit Description					Increment	Stack Parameters							
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	NO_x lb/hr
	Georgia - Burke County												
	AIRS 03300008 Allen B. Wilson Combustion Turbine Plant												
003000086A	CTA6A	Peaking Combustion Turbine	1972			430,217.17	3,666,866.79	63.43	50.0	760	97.64	195.28	8.554E+02
003000086B	CTA6B	Peaking Combustion Turbine	1972			430,216.79	3,666,840.85	63.29	50.0	760	97.64	195.28	8.554E+02
003000086C	CTA6C	Peaking Combustion Turbine	1972			430,216.54	3,666,815.11	63.22	50.0	760	97.64	195.28	8.554E+02
003000086D	CTA6D	Peaking Combustion Turbine	1973			430,216.19	3,666,789.11	63.31	50.0	760	97.64	195.28	8.554E+02
003000086E	CTA6E	Peaking Combustion Turbine	1973			430,215.75	3,666,762.95	63.70	50.0	760	97.64	195.28	8.554E+02
003000086F	CTA6F	Peaking Combustion Turbine	1973			430,215.53	3,666,736.94	63.86	50.0	760	97.64	195.28	8.554E+02
	Georgia - Burke County												
	AIRS 03300030 Vogtle Electric Generating Plant												
	Existing Equipment (Units 1 and 2)												
03300030VD1	VD01	Unit 1 Emergency Diesel Generator 1A	1981			428,765.22	3,667,265.29	65.40	63.0	700	0.00328	42.00	2.328E+02
03300030VD2	VD02	Unit 1 Emergency Diesel Generator 1B	1981			428,778.92	3,667,265.05	65.07	63.0	700	0.00328	42.00	2.328E+02
03300030VD3	VD03	Unit 2 Emergency Diesel Generator 2A	1981			428,981.22	3,667,262.56	64.53	63.0	700	0.00328	42.00	2.328E+02
03300030VD4	VD04	Unit 2 Emergency Diesel Generator 2B	1981			428,994.88	3,667,262.28	64.56	63.0	700	0.00328	42.00	2.328E+02
03300030FD1	FPD1	Replacement Fire Pump Diesel Unit 1	2010		✓	429,083.94	3,667,465.93	61.41	25.0	850	153.00	5.00	6.019E+00
03300030FD2	FPD2	Fire Pump Diesel Unit 2	1977			429,091.18	3,667,465.87	61.57	25.0	850	153.00	5.00	1.178E+01
03300030SD1	SD01	Security Diesel	1986			429,136.56	3,667,260.08	65.29	30.0	850	245.00	6.00	2.400E+01
	New Equipment (Units 3 and 4)												
03300030VD5	VD05	Unit 3 Emergency Diesel Generator 1	2010		✓	428,406.35	3,667,182.63	69.37	35.5	710	364.50	18.00	1.973E+01
03300030VD6	VD06	Unit 3 Emergency Diesel Generator 2	2010		✓	428,413.71	3,667,182.63	69.42	35.5	710	364.50	18.00	1.973E+01
03300030VD7	VD07	Unit 4 Emergency Diesel Generator 1	2010		✓	428,160.59	3,667,178.43	69.13	35.5	710	364.50	18.00	1.973E+01
03300030VD8	VD08	Unit 4 Emergency Diesel Generator 2	2010		✓	428,167.33	3,667,178.43	69.17	35.5	710	364.50	18.00	1.973E+01
03300030FD3	FPD3	Units 3 and 4 Fire Pump Diesel 1	2010		✓	428,275.84	3,667,271.06	69.05	12.0	868	168.30	5.00	1.210E+00
03300030FD4	FPD4	Units 3 and 4 Fire Pump Diesel 2	2010		✓	428,028.78	3,667,266.87	69.22	12.0	868	168.30	5.00	1.210E+00
03300030FD5	FPD5	Units 3 and 4 Fire Pump Diesel 3	2010		✓	428,431.22	3,666,576.29	74.00	12.0	868	168.30	5.00	1.210E+00
03300030AX1	AUX1	Units 3 and 4 Ancillary Diesel Generator 1	2010		✓	428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	1.241E+00
03300030AX2	AUX2	Units 3 and 4 Ancillary Diesel Generator 2	2010		✓	428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	1.241E+00
03300030AX3	AUX3	Units 3 and 4 Ancillary Diesel Generator 3	2010		✓	428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	1.241E+00
03300030AX4	AUX4	Units 3 and 4 Ancillary Diesel Generator 4	2010		✓	428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	1.241E+00
03300030RWD	ODG1	Units 3 and 4 Raw Water Diesel Generator	2010		✓	428,398.28	3,666,578.01	74.18	20.0	851	252.10	12.00	5.291E+00
03300030TSC	TSC1	Technical Support Center Disel Generator	2010		✓	428,663.17	3,667,142.45	72.04	20.0	851	252.10	12.00	5.291E+00
	Georgia - Screven County												
	AIRS 25100008 King America Finishing, Inc.												
25100008B01	B001	Babcock & Wilcox Boiler	1970	2010	*expanding mod in 2010 not considered for increment*	430,543.80	3,607,588.13	47.76	140.0	500	41.40	60.00	4.086E+01
25100008B02	B002	Babcock & Wilcox Boiler	1998		✓	430,534.13	3,607,576.97	47.59	60.0	450	32.89	72.00	3.620E+01
25100008DNR	DNR1	Dye Narrow Range Pad Application	1976	1993	✓	430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	4.475E-01
25100008DWR	DWR1	Dye Wide Range Pad Application	1966	1994	✓	430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	4.475E-01
25100008PHT	PD01 HD01	Dry Range No. 3 Predryer, Hot Flame Dryer and Thermosol	2008		✓	430,464.05	3,607,785.12	49.10	38.0	140	29.11	22.00	2.043E+00
25100008R40	FR40	Aztec Finishing Range	1976			430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	1.167E+00
25100008R51	FR51	Aztec Finishing Range	1988		✓	430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	3.794E-01

Table 6. PSD Inventory for the NO2 Annual NAAQS and Increment

Unit Description					Increment	Stack Parameters							
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	NO_x lb/hr
25100008R58	FR58	Aztec Finishing Range	1969			430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	8.755E-01
25100008R59	FR59	Aztec Finishing Range	1976			430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	1.167E+00
25100008PHS	PHS1	Heat Setting	1978			430,482.52	3,607,699.59	48.62	38.0	140	29.11	22.00	5.837E-01
25100008PRR	PRR1	Rope Range	1966	1999	✓	430,554.56	3,607,682.53	48.56	38.0	140	29.11	22.00	1.654E-01
25100008PYP	PYP1	Yarn Preparation	1994		✓	430,579.21	3,607,648.21	48.47	38.0	140	29.11	22.00	9.728E-02
25100008P01	P001	Zimmer Printer & Aztec Tubular Jet Print Dryer 1	1991		✓	430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	7.782E-01
25100008P02	P002	Zimmer Printer & Aztec Tubular Jet Print Dryer 2	1993		✓	430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	7.782E-01
	Georgia - Screven County												
	AIRS 25100029 Southern Natural Gas Company-Woodcliff Gate Compressor Station												
25100029T1	PT01	Natural Gas-Fired Turbine Allison Model 501-KC	2005		✓	427,200.00	3,623,900.00	80.40	37.7	1,073	13.76	66.50	3.062E+01
	South Carolina - Aiken County												
	Permit No. 0080-0041 Savannah River Nuclear Solutions LLC - Savannah River Site												
0080004101		APF2 - 784-7A Steam Facility Biomass Boiler	2008		✓	431,534.89	3,689,173.83	119.25	50.0	350	44.00	35.99	1.317E+01
0080004102		APF3 - 784-7A Steam Facility Oil Fired Boiler	2008		✓	431,559.32	3,689,180.83	119.15	45.0	458	47.00	30.00	2.857E+00
0080004103		BQH1 - 735-1B Lab Hotwater Heater/Boiler 1, 2, & 3	1998		✓	431,835.06	3,682,911.95	92.47	33.0	500	**0.00328**	26.38	1.675E+00
0080004105		HSE12 - 254-19H 800 kW Production Diesel Engine A	2000		✓	440,409.08	3,683,561.32	93.75	12.0	999	**0.00328**	9.96	2.675E+01
0080004106		HSE13 - 254-19H 800 kW Production Diesel Engine B	2000		✓	440,416.53	3,683,566.37	93.60	12.0	999	**0.00328**	9.96	2.675E+01
0080004107		HSP2 - H Canyon, HB Line, 221-H, etc.	1985		✓	440,467.08	3,683,435.62	91.95	200.0	78	59.60	120.00	3.373E+02
0080004109		NGE44 - 2 Portable Air Compressors in D-Area	2000	2010	✓	430,862.28	3,673,991.55	37.56	7.7	884	215.00	5.08	2.278E+01
0080004110		NGE45 - 10 Portable Air Compressors	2000	2010	✓	431,282.94	3,689,932.21	113.43	7.7	884	215.00	5.08	1.143E+02
0080004111		SDP7 - 221-S Zone 2 Stack, 221-S Prod., etc	1988	2004	✓	440,290.18	3,684,003.70	84.11	147.0	80	85.00	60.00	2.349E+01
	South Carolina - Aiken County												
	Permit No. 0080-0112 Three Rivers Landfill												
0080011201		Tub Grinder Engine	2005		✓	431,419.00	3,680,380.00	71.88	11.6	800	305.53	6.00	1.102E+01
0080011202		Scalping Screen Engine	unk		✓	431,419.00	3,680,380.00	71.88	10.0	800	76.41	3.96	2.600E+00
0080011203		Terminator Grinder Engine	unk		✓	431,419.00	3,680,380.00	71.88	10.3	800	305.53	6.00	9.740E+00
0080011204		Trommel Screen Engine	unk		✓	431,419.00	3,680,380.00	71.88	9.4	800	305.53	6.00	2.240E+00
0080011206		Flare	unk		✓	431,455.35	3,679,828.44	60.12	42.0	1,832	65.62	60.00	5.100E+00
	South Carolina - Aiken County												
	Permit No. 0080-0144 Ameresco Federal Solutions												
0080014401		1STACK - Biomass Cogeneration Boiler	2008		✓	436,002.16	3,681,877.04	79.25	100.0	325	59.61	66.14	3.150E+01
0080014402		2STACK - Biomass Cogeneration Boiler	2008		✓	436,015.32	3,681,858.30	78.28	100.0	325	59.61	66.14	3.150E+01
0080014403		KBIOB - Biomass Steam Generation Unit	2008		✓	438,359.75	3,674,696.84	82.96	49.0	450	53.71	19.68	2.980E+00
0080014404		LBIOB - Biomass Steam Generation Unit	2008		✓	441,886.13	3,674,882.91	76.85	49.0	450	53.71	19.68	2.980E+00
	South Carolina - Barnwell County												
	Permit No. 0300-0036 Savannah River Nuclear Solutions LLC Savannah River Site - D-Area Powerhouse												
0300003601		DPF1 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952			431,022.38	3,673,996.77	39.08	125.0	370	35.00	118.56	3.191E+02
0300003602		DPF2 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952			431,020.71	3,673,999.52	39.07	125.0	370	35.00	118.56	3.191E+02

Table 7. PSD Inventory for the SO2 3-hour, 24-hour and Annual NAAQS and Increments

Unit Description					Increment	Stack Parameters							
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	SO_2	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	SO_2 lb/hr
		Georgia - Bulloch County											
		AIRS 03100011 Reeves Construction Company Plant #10											
0310001101		Hot Mix Asphalt Plant Dryer Stack	unk			420,058.18	3,582,140.49	52.01	28.5	286	64.25	42.00	1.271E+02
		Georgia - Burke County											
		AIRS 03300008 Allen B. Wilson Combustion Turbine Plant											
003000086A	CTA6A	Peaking Combustion Turbine	1972			430,217.17	3,666,866.79	63.43	50.0	760	97.64	195.28	4.909E+02
003000086B	CTA6B	Peaking Combustion Turbine	1972			430,216.79	3,666,840.85	63.29	50.0	760	97.64	195.28	4.909E+02
003000086C	CTA6C	Peaking Combustion Turbine	1972			430,216.54	3,666,815.11	63.22	50.0	760	97.64	195.28	4.909E+02
003000086D	CTA6D	Peaking Combustion Turbine	1973			430,216.19	3,666,789.11	63.31	50.0	760	97.64	195.28	4.909E+02
003000086E	CTA6E	Peaking Combustion Turbine	1973			430,215.75	3,666,762.95	63.70	50.0	760	97.64	195.28	4.909E+02
003000086F	CTA6F	Peaking Combustion Turbine	1973			430,215.53	3,666,736.94	63.86	50.0	760	97.64	195.28	4.909E+02
		Georgia - Burke County											
		AIRS 03300030 Vogtle Electric Generating Plant											
		Existing Equipment (Units 1 and 2)											
03300030VD1	VD01	Unit 1 Emergency Diesel Generator 1A	1981		✓	428,765.22	3,667,265.29	65.40	63.0	700	**0.00328**	42.00	3.924E+01
03300030VD2	VD02	Unit 1 Emergency Diesel Generator 1B	1981		✓	428,778.92	3,667,265.05	65.07	63.0	700	**0.00328**	42.00	3.924E+01
03300030VD3	VD03	Unit 2 Emergency Diesel Generator 2A	1981		✓	428,981.22	3,667,262.56	64.53	63.0	700	**0.00328**	42.00	3.924E+01
03300030VD4	VD04	Unit 2 Emergency Diesel Generator 2B	1981		✓	428,994.88	3,667,262.28	64.56	63.0	700	**0.00328**	42.00	3.924E+01
03300030FD1	FPD1	Replacement Fire Pump Diesel Unit 1	2010		✓	429,083.94	3,667,465.93	61.41	25.0	850	153.00	5.00	3.237E-03
03300030FD2	FPD2	Fire Pump Diesel Unit 2	1977		✓	429,091.18	3,667,465.87	61.57	25.0	850	153.00	5.00	7.790E-01
03300030SD1	SD01	Security Diesel	1986		✓	429,136.56	3,667,260.08	65.29	30.0	850	245.00	6.00	4.045E+00
		New Equipment (Units 3 and 4)											
03300030VD5	VD05	Unit 3 Emergency Diesel Generator 1	2010		✓	428,406.35	3,667,182.63	69.37	35.5	710	364.50	18.00	6.872E-02
03300030VD6	VD06	Unit 3 Emergency Diesel Generator 2	2010		✓	428,413.71	3,667,182.63	69.42	35.5	710	364.50	18.00	6.872E-02
03300030VD7	VD07	Unit 4 Emergency Diesel Generator 1	2010		✓	428,160.59	3,667,178.43	69.13	35.5	710	364.50	18.00	6.872E-02
03300030VD8	VD08	Unit 4 Emergency Diesel Generator 2	2010		✓	428,167.33	3,667,178.43	69.17	35.5	710	364.50	18.00	6.872E-02
03300030FD3	FPD3	Units 3 and 4 Fire Pump Diesel 1	2010		✓	428,275.84	3,667,271.06	69.05	12.0	868	168.30	5.00	2.443E-03
03300030FD4	FPD4	Units 3 and 4 Fire Pump Diesel 2	2010		✓	428,028.78	3,667,266.87	69.22	12.0	868	168.30	5.00	2.443E-03
03300030FD5	FPD5	Units 3 and 4 Fire Pump Diesel 3	2010		✓	428,431.22	3,666,576.29	74.00	12.0	868	168.30	5.00	2.443E-03
03300030AX1	AUX1	Units 3 and 4 Ancillary Diesel Generator 1	2010		✓	428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	1.115E-03
03300030AX2	AUX2	Units 3 and 4 Ancillary Diesel Generator 2	2010		✓	428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	1.115E-03
03300030AX3	AUX3	Units 3 and 4 Ancillary Diesel Generator 3	2010		✓	428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	1.115E-03
03300030AX4	AUX4	Units 3 and 4 Ancillary Diesel Generator 4	2010		✓	428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	1.115E-03
03300030RWD	ODG1	Units 3 and 4 Raw Water Diesel Generator	2010		✓	428,398.28	3,666,578.01	74.18	20.0	851	252.10	12.00	1.985E-02
03300030TSC	TSC1	Technical Support Center Disel Generator	2010		✓	428,663.17	3,667,142.45	72.04	20.0	851	252.10	12.00	1.985E-02
		Georgia - Burke County											
		AIRS 03300037 Reeves Construction Company GFL Waynesboro Plant											
0330003701		Hot Mix Asphalt Plant Dryer Stack	unk			407,980.29	3,661,898.82	76.85	34.0	250	74.66	42.00	1.321E+02
		Georgia - Screven County											
		AIRS 25100004 Koyo Bearings USA, LLC											
25100004B1	B1	700-hp Boiler 1	1974			442,044.99	3,624,657.32	55.30	38.7	315	86.74	16.00	7.643E+01
25100004B2	B2	700-hp Boiler 2	1974			442,044.99	3,624,657.32	55.30	38.7	315	86.74	16.00	7.643E+01
		Georgia - Screven County											
		AIRS 25100008 King America Finishing, Inc.											
25100008B01	B001	Babcock & Wilcox Boiler	1970	2010	*expanding mod in 2010 not considered for increment*	430,543.80	3,607,588.13	47.76	140.0	500	41.40	60.00	8.411E+01

Table 7. PSD Inventory for the SO2 3-hour, 24-hour and Annual NAAQS and Increments

Unit Description					Increment	Stack Parameters							
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	SO_2	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	SO_2 lb/hr
25100008B02	B002	Babcock & Wilcox Boiler	1998		✓	430,534.13	3,607,576.97	47.59	60.0	450	32.89	72.00	9.179E+01
25100008DNR	DNR1	Dye Narrow Range Pad Application	1976	1993	✓	430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	2.685E-03
25100008DWR	DWR1	Dye Wide Range Pad Application	1966	1994	✓	430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	2.685E-03
25100008PHT	PD01 HD01	Dry Range No. 3 Predryer, Hot Flame Dryer and Thermosol	2008		✓	430,464.05	3,607,785.12	49.10	38.0	140	29.11	22.00	1.226E-02
25100008R40	FR40	Aztec Finishing Range	1976		✓	430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	7.004E-03
25100008R51	FR51	Aztec Finishing Range	1988		✓	430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	2.276E-03
25100008R58	FR58	Aztec Finishing Range	1969			430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	5.253E-03
25100008R59	FR59	Aztec Finishing Range	1976		✓	430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	7.004E-03
25100008PHS	PHS1	Heat Setting	1978		✓	430,482.52	3,607,699.59	48.62	38.0	140	29.11	22.00	3.502E-03
25100008PRR	PRR1	Rope Range	1966	1999	✓	430,554.56	3,607,682.53	48.56	38.0	140	29.11	22.00	9.922E-04
25100008PYP	PYP1	Yarn Preparation	1994		✓	430,579.21	3,607,648.21	48.47	38.0	140	29.11	22.00	5.837E-04
25100008P01	P001	Zimmer Printer & Aztec Tubular Jet Print Dryer 1	1991		✓	430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	4.669E-03
25100008P02	P002	Zimmer Printer & Aztec Tubular Jet Print Dryer 2	1993		✓	430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	4.669E-03
	South Carolina - Aiken County												
	Permit No. 0080-0041 Savannah River Nuclear Solutions LLC - Savannah River Site												
0080004101		APF2 - 784-7A Steam Facility Biomass Boiler	2008		✓	431,534.89	3,689,173.83	119.25	50.0	350	44.00	35.99	1.000E+00
0080004102		APF3 - 784-7A Steam Facility Oil Fired Boiler	2008		✓	431,559.32	3,689,180.83	119.15	45.0	458	47.00	30.00	2.064E+00
0080004103		BQH1 - 735-1B Lab Hotwater Heater/Boiler 1, 2, & 3	1998		✓	431,835.06	3,682,911.95	92.47	33.0	500	**0.00328**	26.38	6.032E-01
0080004105		HSE12 - 254-19H 800 kW Production Diesel Engine A	2000		✓	440,409.08	3,683,561.32	93.75	12.0	999	**0.00328**	9.96	3.381E-01
0080004106		HSE13 - 254-19H 800 kW Production Diesel Engine B	2000		✓	440,416.53	3,683,566.37	93.60	12.0	999	**0.00328**	9.96	4.222E-01
0080004109		NGE44 - 2 Portable Air Compressors in D-Area	2000	2010	✓	430,862.28	3,673,991.55	37.56	7.7	884	215.00	5.08	1.500E+00
0080004110		NGE45 - 10 Portable Air Compressors	2000	2010	✓	431,282.94	3,689,932.21	113.43	7.7	884	215.00	5.08	7.500E+00
0080004111		SDP7 - 221-S Zone 2 Stack, 221-S Prod., etc	1988	2004	✓	440,290.18	3,684,003.70	84.11	147.0	80	85.00	60.00	1.246E-01
	South Carolina - Aiken County												
	Permit No. 0080-0112 Three Rivers Landfill												
0080011201		Tub Grinder Engine	2005			431,419.00	3,680,380.00	71.88	11.6	800	305.53	6.00	1.740E+00
0080011202		Scalping Screen Engine	unk			431,419.00	3,680,380.00	71.88	10.0	800	76.41	3.96	4.100E-01
0080011203		Terminator Grinder Engine	unk			431,419.00	3,680,380.00	71.88	10.3	800	305.53	6.00	1.540E+00
0080011204		Trommel Screen Engine	unk			431,419.00	3,680,380.00	71.88	9.4	800	305.53	6.00	3.500E-01
0080011206		Flare	unk			431,455.35	3,679,828.44	60.12	42.0	1,832	65.62	60.00	1.046E+00
	South Carolina - Aiken County												
	Permit No. 0080-0144 Ameresco Federal Solutions												
0080014401		1STACK - Biomass Cogeneration Boiler	2008		✓	436,002.16	3,681,877.04	79.25	100.0	325	59.61	66.14	1.144E+02
0080014402		2STACK - Biomass Cogeneration Boiler	2008		✓	436,015.32	3,681,858.30	78.28	100.0	325	59.61	66.14	1.144E+02
0080014403		KBIOB - Biomass Steam Generation Unit	2008		✓	438,359.75	3,674,696.84	82.96	49.0	450	53.71	19.68	3.720E-01
0080014404		LBIOB - Biomass Steam Generation Unit	2008		✓	441,886.13	3,674,882.91	76.85	49.0	450	53.71	19.68	3.720E-01
	South Carolina - Barnwell County												
	Permit No. 0300-0036 Savannah River Nuclear Solutions LLC Savannah River Site - D-Area Powerhouse												
0300003601		DPF1 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952			431,022.38	3,673,996.77	39.08	125.0	370	35.00	118.56	1.103E+03
0300003602		DPF2 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952			431,020.71	3,673,999.52	39.07	125.0	370	35.00	118.56	1.103E+03

Table 8. Backup Data for Point Source Parameters used in Air Quality Modeling Analysis (Georgia and South Carolina)

Unit Description					Increment				Stack Parameters										Short-term				Long-term			
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	SO_2	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
	Georgia - Bulloch County **AIRS 03100002 Tillman & Deal Farm Supply Inc**																									
0310000201	1	Grain Dryer	1976						428,060.20	3,593,728.40	51.88	40.0	78	7.80	14.00			2002 NEI SCC 30200504 Food and Agriculture, Feed and Grain Terminal Elevators, Drying	1.421E+00	1.639E-01	1.445E+01	2.551E+00	Same as short-term emission rates			
	Georgia - Bulloch County **AIRS 03100005 W.M. Sheppard Lumber Company**																									
03100005K4	DK04	Direct-fired Lumber Drying Kiln # 4	1998		Volume Source. Please refer to Tabe 9														7.535E-01	6.250E-01	2.143E+00	2.143E+00	Same as short-term emission rates			
03100005K5	DK05	Direct-fired Lumber Drying Kiln # 5	1999		" "														7.535E-01	6.250E-01	2.143E+00	2.143E+00	" "			
	Georgia - Bulloch County **AIRS 03100011 Reeves Construction Company Plant #10**																									
0310001101		Hot Mix Asphalt Plant Dryer Stack	unk		✓				420,058.18	3,582,140.49	52.01	28.5	286	64.25	42.00	37,092	20,512	#19283 and 8/10/2010 stack test	1.375E+01	1.271E+02	1.188E+01	1.188E+01	Same as short-term emission rates			
	Georgia - Bulloch County **AIRS 03100020 Braswell A M Food Co Inc**																									
0310002001	1-1	200-hp Fitz Gibbon Boiler	1969						424,828.90	3,592,263.20	76.30	30.0	350	17.32	18.00	1,837	1,197	10/19/1973 *dscfm at 9,190 dscf/mmBtu, maximum heat input and 3% O2 assumed temp. for fps*	9.564E-01	3.395E+00	1.578E-01	1.526E-01	Same as short-term emission rates			
0310002002	1-2	100-hp Titusville Boiler	1964						424,828.90	3,592,263.20	76.30	40.0	350	8.66	18.00	918	599	Same as 0310002001	3.256E-01	1.954E-03	2.475E-02	2.475E-02	" "			
	Georgia - Bulloch County **AIRS 03100028 Claude Howard Lumber Company**																									
03100028K1	DFK1	Direct-fired Lumber Drying Kiln # 1	1980		Volume Source. Please refer to Tabe 9														8.476E-01	4.500E-01	2.411E+00	2.411E+00	Same as short-term emission rates			
03100028K2	DFK2	Direct-fired Lumber Drying Kiln # 2	1980		" "														8.476E-01	5.000E-01	2.411E+00	2.411E+00	" "			
	Georgia - Bulloch County **AIRS 03100036 Robbins Packing Co**																									
0310003602	2	80-hp Boiler	1949						426,982.90	3,591,349.30	61.71	40.0	425	21.00	24.00			2002 NEI SCC 10300701 External Combustion, CI Boilers, Natural Gas, <10 Million Btu/hr	3.256E-01	1.954E-03	2.475E-02	2.475E-02	Same as short-term emission rates			
0310003603	3	100-hp Boiler	1949						426,982.90	3,591,349.30	61.71	40.0	425	21.00	24.00			Same as 0310003602	3.256E-01	1.954E-03	2.475E-02	2.475E-02	" "			
	Georgia - Bulloch County **AIRS 03100044 Briggs & Stratton**																									
031000441B	P01 P01B	Aluminum Melting Tower Aluminum Melting Furnace	1995 2001		✓				420,753.57	3,583,049.15	61.40	32.0	350	47.16	36.00	20,000	13,037	#16438 BriggsInput2000.xls	3.700E+00	1.000E-02	1.020E+00	1.020E+00	Same as short-term emission rates			
0310004402	P02	Die Casting Machines	1995		✓				420,753.57	3,583,049.15	61.40	32.0	200	50.88	64.00	68,200	54,560	*The application files contained complete modeling information only for P07, P11, and P13. Stack release heights and actual volumetric flow rates were provided for the remaining emission points. Exit diameters for the remaining stacks were assumed to result in a reasonalbe velocity.*	8.000E-02	1.700E-01	4.170E+00	4.170E+00	" "			
0310004403	P03	Landis Grinders	unk		*Discharges inside building (emissions considered zero); March 27, 2006 EPD memo*														0.000E+00	0.000E+00	0.000E+00	0.000E+00	" "			
031000445A	P05A	Stress Relief Oven	1995		✓				420,753.57	3,583,049.15	61.40	32.0	305	49.62	28.00	12,730	8,786		6.100E-01	2.400E-03	3.000E-02	3.000E-02	" "			
031000446A	P06A	Four-stage Aqueous Parts Washer	1995		✓				420,753.57	3,583,049.15	61.40	32.0	105	47.33	52.00	41,885	39,142		3.100E-01	1.200E-03	2.000E-02	2.000E-02	" "			
0310004407	P07	Engine Testing Stations	1995		✓				420,753.57	3,583,049.15	61.40	42.0	74	8.10	32.50	2,800	2,769		4.800E-03	3.000E-02	4.000E-02	4.000E-02	" "			
0310004411	P11	Dynamometer Testing Stands	1995		✓				420,753.57	3,583,049.15	61.40	32.0	74	91.13	32.50	31,500	31,146		1.200E-01	1.000E-02	1.000E-02	1.000E-02	" "			
0310004412	P12	Epxoy Drying Ovens	2004		✓				420,753.57	3,583,049.15	61.40	32.0	249	48.47	18.00	5,139	3,827		3.100E-01	1.200E-03	2.000E-02	2.000E-02	" "			
0310004413	P13	Outdoor Endurance Test Stands	2005		✓				420,753.57	3,583,049.15	61.40	32.0	74	52.07	32.50	18,000	17,798		1.200E-01	1.000E-02	1.000E-02	1.000E-02	" "			
03100044B1	B10A	Boiler	1995		✓				420,753.57	3,583,049.15	61.40	32.0	121	49.27	14.00	3,160	2,872		2.560E+00	1.000E-02	1.300E-01	1.300E-01	" "			
	Georgia - Bulloch County **AIRS 03100052 East Geogia Regional Medical Center**																									
03100052B1	B1	Cleaver-Brooks CB200-300-125HW Boiler	1999		✓				427,535.99	3,586,613.62	64.02	27.8	325	27.69	20.00			#11635	1.793E+00	6.365E+00	2.958E-01	2.861E-01	Same as short-term emission rates			
03100052B2	B2	Cleaver-Brooks CB200-300-125HW Boiler	1999		✓				427,535.99	3,586,613.62	64.02	27.8	325	27.69	20.00			#11635	1.793E+00	6.365E+00	2.958E-01	2.861E-01	" "			
	Georgia - Burke County **AIRS 03300008 Allen B. Wilson Combustion Turbine Plant**																									
003000086A	CTA6A	Peaking Combustion Turbine	1972						430,217.17	3,666,866.79	63.43	50.0	760	97.64	195.28	1,218,571	527,381	#19931 CAIR Monitoring Plan 13' x 16' dia.	8.554E+02	4.909E+02	1.118E+01	1.081E+01	Same as short-term emission rates			

Table 8. Backup Data for Point Source Parameters used in Air Quality Modeling Analysis (Georgia and South Carolina)

Unit Description					Increment				Stack Parameters										Short-term				Long-term			
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	SO_2	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
003000086B	CTA6B	Peaking Combustion Turbine	1972						430,216.79	3,666,840.85	63.29	50.0	760	97.64	195.28	1,218,571	527,381	#19931 CAIR Monitoring Plan 13' x 16' dia.	8.554E+02	4.909E+02	1.118E+01	1.081E+01	" "			
003000086C	CTA6C	Peaking Combustion Turbine	1972						430,216.54	3,666,815.11	63.22	50.0	760	97.64	195.28	1,218,571	527,381	#19931 CAIR Monitoring Plan 13' x 16' dia.	8.554E+02	4.909E+02	1.118E+01	1.081E+01	" "			
003000086D	CTA6D	Peaking Combustion Turbine	1973						430,216.19	3,666,789.11	63.31	50.0	760	97.64	195.28	1,218,571	527,381	#19931 CAIR Monitoring Plan 13' x 16' dia.	8.554E+02	4.909E+02	1.118E+01	1.081E+01	" "			
003000086E	CTA6E	Peaking Combustion Turbine	1973						430,215.75	3,666,762.95	63.70	50.0	760	97.64	195.28	1,218,571	527,381	#19931 CAIR Monitoring Plan 13' x 16' dia.	8.554E+02	4.909E+02	1.118E+01	1.081E+01	" "			
003000086F	CTA6F	Peaking Combustion Turbine	1973						430,215.53	3,666,736.94	63.86	50.0	760	97.64	195.28	1,218,571	527,381	#19931 CAIR Monitoring Plan 13' x 16' dia.	8.554E+02	4.909E+02	1.118E+01	1.081E+01	" "			
	Georgia - Burke County																									
	AIRS 03300030 Vogtle Electric Generating Plant																									
	Existing Equipment (Units 1 and 2)																									
03300030VD1	VD01	Unit 1 Emergency Diesel Generator 1A	1981			✓	✓		428,765.22	3,667,265.29	65.40	63.0	700	0.00328	42.00	raincap		Vogtle Units 3 and 4 PSD #18986	2.328E+02	3.924E+01	4.005E+00	3.886E+00	Same as short-term emission rates			
03300030VD2	VD02	Unit 1 Emergency Diesel Generator 1B	1981			✓	✓		428,778.92	3,667,265.05	65.07	63.0	700	0.00328	42.00	raincap		Vogtle Units 3 and 4 PSD #18986	2.328E+02	3.924E+01	4.005E+00	3.886E+00	" "			
03300030VD3	VD03	Unit 2 Emergency Diesel Generator 2A	1981			✓	✓		428,981.22	3,667,262.56	64.53	63.0	700	0.00328	42.00	raincap		Vogtle Units 3 and 4 PSD #18986	2.328E+02	3.924E+01	4.005E+00	3.886E+00	" "			
03300030VD4	VD04	Unit 2 Emergency Diesel Generator 2B	1981			✓	✓		428,994.88	3,667,262.28	64.56	63.0	700	0.00328	42.00	raincap		Vogtle Units 3 and 4 PSD #18986	2.328E+02	3.924E+01	4.005E+00	3.886E+00	" "			
03300030FD1	FPD1	Replacement Fire Pump Diesel Unit 1	2010			✓	✓		429,083.94	3,667,465.93	61.41	25.0	850	153.00	5.00	1,252	505	Vogtle Units 3 and 4 PSD #18986	6.019E+00	3.237E-03	3.086E-01	3.086E-01	" "			
03300030FD2	FPD2	Fire Pump Diesel Unit 2	1977			✓	✓		429,091.18	3,667,465.87	61.57	25.0	850	153.00	5.00	1,252	505	Vogtle Units 3 and 4 PSD #18986	1.178E+01	7.790E-01	8.360E-01	8.360E-01	" "			
03300030SD1	SD01	Security Diesel	1986			✓	✓		429,136.56	3,667,260.08	65.29	30.0	850	245.00	6.00	2,886	1,163	Vogtle Units 3 and 4 PSD #18986	2.400E+01	4.045E+00	4.601E-01	4.465E-01	" "			
0330003CWS1	CWS1	Circulating Water System Cooling Tower 1	unk				✓		429,450.43	3,667,305.53	65.79	600.0	80	9.74	3960.00	50,000,000		Same as 0330003CWS3	0.000E+00	0.000E+00	1.800E+00	1.800E+00	" "			
0330003CWS2	CWS2	Circulating Water System Cooling Tower 2	unk				✓		429,448.13	3,667,514.53	63.01	600.0	80	9.74	3960.00	50,000,000		Same as 0330003CWS4	0.000E+00	0.000E+00	1.800E+00	1.800E+00	" "			
0330003SWS1	SWS1	Service Water System Cooling Tower 1	unk				✓		428,985.11	3,667,307.90	63.93	600.0	106	24.78	268.80	586,000		Same as 0330003SWS3	0.000E+00	0.000E+00	8.000E-02	8.000E-02	" "			
0330003SWS2	SWS2	Service Water System Cooling Tower 2	unk				✓		428,786.46	3,667,310.41	65.15	600.0	106	24.78	268.80	586,000		Same as 0330003SWS4	0.000E+00	0.000E+00	8.000E-02	8.000E-02	" "			
	New Equipment (Units 3 and 4)																									
03300030VD5	VD05	Unit 3 Emergency Diesel Generator 1	2010		✓	✓	✓		428,406.35	3,667,182.63	69.37	35.5	710	364.50	18.00	38,647	17,441	Vogtle Units 3 and 4 PSD #18986	1.973E+01	6.872E-02	1.808E+00	1.808E+00	Same as short-term emission rates			
03300030VD6	VD06	Unit 3 Emergency Diesel Generator 2	2010		✓	✓	✓		428,413.71	3,667,182.63	69.42	35.5	710	364.50	18.00	38,647	17,441	Vogtle Units 3 and 4 PSD #18986	1.973E+01	6.872E-02	1.808E+00	1.808E+00	" "			
03300030VD7	VD07	Unit 4 Emergency Diesel Generator 1	2010		✓	✓	✓		428,160.59	3,667,178.43	69.13	35.5	710	364.50	18.00	38,647	17,441	Vogtle Units 3 and 4 PSD #18986	1.973E+01	6.872E-02	1.808E+00	1.808E+00	" "			
03300030VD8	VD08	Unit 4 Emergency Diesel Generator 2	2010		✓	✓	✓		428,167.33	3,667,178.43	69.17	35.5	710	364.50	18.00	38,647	17,441	Vogtle Units 3 and 4 PSD #18986	1.973E+01	6.872E-02	1.808E+00	1.808E+00	" "			
03300030FD3	FPD3	Units 3 and 4 Fire Pump Diesel 1	2010		✓	✓	✓		428,275.84	3,667,271.06	69.05	12.0	868	168.30	5.00	1,377	547	Vogtle Units 3 and 4 PSD #18986	1.210E+00	2.443E-03	5.456E-02	5.456E-02	" "			
03300030FD4	FPD4	Units 3 and 4 Fire Pump Diesel 2	2010		✓	✓	✓		428,028.78	3,667,266.87	69.22	12.0	868	168.30	5.00	1,377	547	Vogtle Units 3 and 4 PSD #18986	1.210E+00	2.443E-03	5.456E-02	5.456E-02	" "			
03300030FD5	FPD5	Units 3 and 4 Fire Pump Diesel 3	2010		✓	✓	✓		428,431.22	3,666,576.29	74.00	12.0	868	168.30	5.00	1,377	547	Vogtle Units 3 and 4 PSD #18986	1.210E+00	2.443E-03	5.456E-02	5.456E-02	" "			
03300030AX1	AUX1	Units 3 and 4 Ancillary Diesel Generator 1	2010		✓	✓	✓		428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	500	210	Vogtle Units 3 and 4 PSD #18986	1.241E+00	1.115E-03	6.614E-02	6.614E-02	" "			
03300030AX2	AUX2	Units 3 and 4 Ancillary Diesel Generator 2	2010		✓	✓	✓		428,364.04	3,667,119.69	70.33	12.0	800	169.80	3.00	500	210	Vogtle Units 3 and 4 PSD #18986	1.241E+00	1.115E-03	6.614E-02	6.614E-02	" "			
03300030AX3	AUX3	Units 3 and 4 Ancillary Diesel Generator 3	2010		✓	✓	✓		428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	500	210	Vogtle Units 3 and 4 PSD #18986	1.241E+00	1.115E-03	6.614E-02	6.614E-02	" "			
03300030AX4	AUX4	Units 3 and 4 Ancillary Diesel Generator 4	2010		✓	✓	✓		428,116.71	3,667,116.86	69.28	12.0	800	169.80	3.00	500	210	Vogtle Units 3 and 4 PSD #18986	1.241E+00	1.115E-03	6.614E-02	6.614E-02	" "			
03300030RWD	ODG1	Units 3 and 4 Raw Water Diesel Generator	2010		✓	✓	✓		428,398.28	3,666,578.01	74.18	20.0	851	252.10	12.00	11,880	4,785	Vogtle Units 3 and 4 PSD #18986	5.291E+00	1.985E-02	4.850E-01	4.850E-01	" "			
03300030TSC	TSC1	Technical Support Center Disel Generator	2010		✓	✓	✓		428,663.17	3,667,142.45	72.04	20.0	851	252.10	12.00	11,880	4,785	Vogtle Units 3 and 4 PSD #18986	5.291E+00	1.985E-02	4.850E-01	4.850E-01	" "			
0330003CWS3	CWS3	Circulating Water System Cooling Tower 3	2010				✓		427,985.26	3,666,795.15	71.31	600.0	80	9.74	3960.00	50,000,000		Vogtle Units 3 and 4 PSD #18986	0.000E+00	0.000E+00	1.800E+00	1.800E+00	" "			
0330003CWS4	CWS4	Circulating Water System Cooling Tower 4	2010				✓		428,321.88	3,666,798.14	76.73	600.0	80	9.74	3960.00	50,000,000		Vogtle Units 3 and 4 PSD #18986	0.000E+00	0.000E+00	1.800E+00	1.800E+00	" "			
0330003SWS3	SWS3	Service Water System Cooling Tower 3	2010				✓		428,022.65	3,667,251.06	69.09	600.0	106	24.78	268.80	586,000		Vogtle Units 3 and 4 PSD #18986	0.000E+00	0.000E+00	8.000E-02	8.000E-02	" "			
0330003SWS4	SWS4	Service Water System Cooling Tower 4	2010				✓		428,269.78	3,667,252.78	69.05	600.0	106	24.78	268.80	586,000		Vogtle Units 3 and 4 PSD #18986	0.000E+00	0.000E+00	8.000E-02	8.000E-02	" "			
	Georgia - Burke County																									
	AIRS 03300034 Fiamm Technologies, Inc.																									
03300034SC6	P1A P2	Lead Cylinder Production Grid Casting	2001		✓				405,054.23	3,663,711.27	86.00	35.0	82	38.58	30.00	11,362	10,791	#11916 and 11/2/2009 stack test	3.677E-01	2.206E-03	1.628E-01	1.628E-01	Same as short-term emission rates			
03300034B1A	P1B	Lead Oxide Production	2001		✓				405,048.19	3,663,709.06	85.95	35.0	119	10.09	16.00	846	759	#11916 and 10/28/2009 stack test	0.000E+00	0.000E+00	2.861E-02	2.861E-02	" "			

Table 8. Backup Data for Point Source Parameters used in Air Quality Modeling Analysis (Georgia and South Carolina)

Unit Description					Increment				Stack Parameters										Short-term				Long-term			
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	SO_2	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
03300034B1B	P1B	Lead Oxide Production	2001		✓				405,048.19	3,663,709.06	85.95	35.0	119	10.99	16.00	920	828	#11916 and 10/28/2009 stack test	0.000E+00	0.000E+00	3.124E-02	3.124E-02	" "			
03300034B03	P1C	Lead Oxide Production	2001		✓				405,118.45	3,663,701.28	86.19	35.0	202	15.63	16.00	1,309	949	#11916 and 10/28/2009 stack test	0.000E+00	0.000E+00	6.250E-02	6.250E-02	" "			
03300034SC7	P3	Paste Mixing	2001		✓				405,043.63	3,663,660.55	86.03	35.0	83	34.51	36.00	14,635	13,987	#11916 and 11/2/2009 stack test	0.000E+00	0.000E+00	5.275E-01	5.275E-01	" "			
03300034B02	P5 P6	Three-Process Operation	2001		✓				405,132.33	3,663,704.32	86.11	35.0	80	37.21	60.00	43,839	42,064	#11916 and 11/2/2009 stack test	9.450E-01	5.670E-03	1.586E+00	1.586E+00	" "			
03300034B05	P5 P6	Three-Process Operation	2001		✓				405,050.68	3,663,711.91	85.97	35.0	76	36.91	36.00	15,653	15,105	#11916 and 11/2/2009 stack test	9.450E-01	5.670E-03	5.697E-01	5.697E-01	" "			
03300034DM8	P8A	SLAH Charging Area	2000		✓				405,183.90	3,663,691.30	85.81	35.0	66	29.35	36.00	12,446	12,028	#11916 and 11/3/2009 stack test	0.000E+00	0.000E+00	6.480E-01	6.480E-01	" "			
03300034DM9	P8B	SLA Charging Area	2000		✓				405,183.90	3,663,691.30	85.81	35.0	87	35.86	36.00	15,208	14,125	#11916 and 11/3/2009 stack test	0.000E+00	0.000E+00	4.374E-01	4.374E-01	" "			
	Georgia - Burke County																									
	AIRS 03300037 Reeves Construction Company GFL Waynesboro Plant																									
0330003701		Hot Mix Asphalt Plant Dryer Stack	unk		✓				407,980.29	3,661,898.82	76.85	34.0	250	74.66	42.00	43,099	32,051	10/4/2007 SCREEN3	1.100E+01	1.321E+02	1.487E+01	1.487E+01	Same as short-term emission rates			
	Georgia - Burke County																									
	AIRS 03300038 ASTA, Inc.																									
0330003801	BC01-BC06	Electric Enamel Base Coat Ovens	2008		✓				404,857.25	3,663,545.69	88.45	40.0	1,000	47.00	6.50	650	235	#18225 SCREEN3	9.785E-01	0.000E+00	0.000E+00	0.000E+00	Same as short-term emission rates			
0330003802	SB01-SB02	Self-bonding Coating Ovens	2008		✓				404,857.25	3,663,545.69	88.45	40.0	1,300	28.00	6.50	387	116	#18225 SCREEN3	1.631E-01	0.000E+00	0.000E+00	0.000E+00	" "			
	Georgia - Candler County																									
	AIRS 04300008 Allied Metals																									
0430000801		Automobile Shredder	1995	2008	✓				402,849.86	3,585,229.95	62.98	28.0	95	20.39	32.00	6,832	6,285	4/30/2009 stack test	0.000E+00	0.000E+00	2.963E+00	2.963E+00	Same as short-term emission rates			
	Georgia - Candler County																									
	AIRS 04300011 Moore Wallace Inc																									
04300011B1	B1	Kewanee Boiler	1980						401,976.90	3,584,983.60	66.64	30.0	350	10.26	18.00	1,088	709	Same as 0310002001 *8,710 dscf/mmBtu*	5.946E-01	6.861E-02	3.202E-02	3.202E-02	Same as short-term emission rates			
	Georgia - Effingham County																									
	AIRS 10300013 Georgia Transmission																									
10300013G1	G1	Caterpillar CAT 3516 B TA Generator Set	2001		✓				459,487.70	3,595,455.40	38.97	25.0	847	241.38	14.00	15,482	6,254	#12924	3.727E+01	9.910E-01	2.161E+00	2.161E+00	Same as short-term emission rates			
10300013G2	G2	Caterpillar CAT 3516 B TA Generator Set	2001		✓				459,482.57	3,595,460.68	39.16	25.0	847	241.38	14.00	15,482	6,254	#12924	3.727E+01	9.910E-01	2.161E+00	2.161E+00	" "			
10300013G3	G3	Caterpillar CAT 3516 B TA Generator Set	2001		✓				459,478.34	3,595,465.92	39.32	25.0	847	241.38	14.00	15,482	6,254	#12924	3.727E+01	9.910E-01	2.161E+00	2.161E+00	" "			
10300013G4	G4	Caterpillar CAT 3516 B TA Generator Set	2001		✓				459,473.52	3,595,471.08	39.40	25.0	847	241.38	14.00	15,482	6,254	#12924	3.727E+01	9.910E-01	2.161E+00	2.161E+00	" "			
10300013G5	G5	Caterpillar CAT 3516 B TA Generator Set	2001		✓				459,469.32	3,595,475.40	39.45	25.0	847	241.38	14.00	15,482	6,254	#12924	3.727E+01	9.910E-01	2.161E+00	2.161E+00	" "			
	Georgia - Emanuel County																									
	AIRS 10700011 Rayonier Wood Products Swainsboro																									
10700011K09	DK09	Direct-fired Lumber Drying Kiln #7 (batch) converted to Kiln #9 (continuous)	2005		Volume Source. Please refer to Tabe 9														1.769E+00	1.965E+00	5.030E+00	5.030E+00	Same as short-term emission rates			
10700011K10	DK10	Direct-fired Lumber Drying Kiln #8 (batch) converted to Kiln #10 (continuous)	2005		" "														1.769E+00	1.965E+00	5.030E+00	5.030E+00	" "			
	Georgia - Emanuel County																									
	AIRS 10700013 Lifeline Industries																									
10700013B1	B1	Bell Industries Lumber Drying Kiln Boiler	1983						375,239.90	3,607,591.20	89.22	30.0	450	30.00	16.00			#1056	1.390E+00	1.580E-01	3.267E+00	3.267E+00	Same as short-term emission rates			
	Georgia - Emanuel County																									
	AIRS 10700019 American Steel Products																									
10700019D1	D01 D02 D03	3 Maxon Size PM 1200 Drying Ovens	unk		✓				374,667.30	3,607,963.20	96.42	24.0	70	37.40	14.00			#5885	4.377E-01	2.626E-03	3.327E-02	3.327E-02	Same as short-term emission rates			
	Georgia - Emanuel County																									
	AIRS 10700025 Crider Poultry																									
10700025B1	BL1	600-hp Boiler 1	2000		✓				386,060.03	3,588,435.81	75.92	24.0	390	29.07	24.00	5,480	3,404	#12119	2.854E+00	3.293E-01	1.537E-01	1.537E-01	Same as short-term emission rates			
10700025B2	BL2	300-hp Boiler 2	2000		✓				386,047.67	3,588,434.57	76.20	24.0	390	14.54	24.00	2,740	1,702	#12119	1.427E+00	1.646E-01	7.683E-02	7.683E-02	" "			
10700025B5	BL5	700-hp Boiler 5	2002		✓				386,078.09	3,588,436.38	75.60	24.0	350	34.11	24.00	6,429	4,191	#13548	3.329E+00	3.841E-01	1.793E-01	1.793E-01	" "			
	Georgia - Jefferson County																									
	AIRS 16300007 Thermo King Corp																									
16300007107	107	Coil Oven	1995		✓				370,309.00	3,652,450.28	99.26	20.0	130	11.50	12.00	542	485	#7737	3.891E-02	2.335E-04	2.957E-03	2.957E-03	Same as short-term emission rates			
16300007306	306	Pretreat Oven	1995		✓				370,309.00	3,652,450.28	99.26	20.0	130	11.50	12.00	542	485	#7737	7.782E-02	4.669E-04	5.914E-03	5.914E-03	" "			
16300007014	14	14 Diesel Testing Stands	1992		✓				370,309.00	3,652,450.28	99.26	4.0	450	75.62	4.00	396	230	#16090	3.832E+00	6.997E-01	3.332E-01	3.332E-01	" "			
	Georgia - Jefferson County																									
	AIRS 16300008 Farmers Gin and Storage																									

Table 8. Backup Data for Point Source Parameters used in Air Quality Modeling Analysis (Georgia and South Carolina)

Unit Description					Increment				Stack Parameters										Short-term				Long-term			
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	SO_2	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
16300008CG		Cotton Ginning Process	1975	2010	✓				369,360.88	3,636,743.00	69.91	26.0	75	36.88	16.00	3,090	3,049	2002 NEI SCC 30200410 Cotton Ginning, General - Entire Process, Sum of Typical Equip Used	1.137E+00	1.311E-01	1.849E+01	1.479E+00	Same as short-term emission rates			
16300008GE		Grain Receiving/Shipping Process	1975	2010	✓				369,360.88	3,636,743.00	69.91	60.0	80	47.63	26.50	10,946	10,703	2002 NEI SCC 30200501 Feed and Grain Terminal Elevators, Shipping/Receiving	0.000E+00	0.000E+00	1.416E+00	1.416E+00	" "			
		Georgia - Jefferson County																								
		AIRS 16300012 Battle Lumber Company																								
16300012B1	B1	Steam Boiler for Lumber Drying Kilns	1992		✓				369,557.87	3,636,201.85	67.88	35.0	400	52.00	16.80	4,803	2,949	#5645	2.112E+00	2.400E-01	4.800E+00	4.450E+00	Same as short-term emission rates			
16300012B2	B2	Steam Boiler for Lumber Drying Kilns	1998		✓				369,557.87	3,636,201.85	67.88	40.0	865	47.67	30.25	14,706	6,586	#9990 7/21/1998 stack test	6.314E+00	7.175E-01	8.471E+00	7.852E+00	" "			
16300012B3	B3	Steam Boiler for Lumber Drying Kilns	2010		✓				369,557.87	3,636,201.85	67.88	40.0	865	47.67	30.25	14,706	6,586	Same as 16300012B2	6.314E+00	7.175E-01	8.471E+00	7.852E+00	" "			
		Georgia - Screven County																								
		AIRS 25100003 Feed Seed & Farm Supply																								
2510000307	7	Grain Dryer	1957						428,060.20	3,593,728.40	51.88	40.0	78	7.80	14.00			Same as 0310000201	1.167E+00	7.004E-03	1.132E+01	2.017E+00	Same as short-term emission rates			
		Georgia - Screven County																								
		AIRS 25100004 Koyo Bearings USA, LLC																								
25100004B1	B1	700-hp Boiler 1	1974						442,044.99	3,624,657.32	55.30	38.7	315	86.74	16.00	7,267	4,951	3/22/1976 application	1.071E+01	7.643E+01	8.545E+00	6.495E+00	Same as short-term emission rates			
25100004B2	B2	700-hp Boiler 2	1974						442,044.99	3,624,657.32	55.30	38.7	315	86.74	16.00	7,267	4,951	3/22/1976 application	1.071E+01	7.643E+01	8.545E+00	6.495E+00	" "			
		Georgia - Screven County																								
		AIRS 25100008 King America Finishing, Inc.																								
25100008B01	B001	Babcock & Wilcox Boiler	1970	2010	*Expanding*				430,543.80	3,607,588.13	47.76	140.0	500	41.40	60.00	48,774	26,826	GA EPD PDSINVEN_1.xls #16554	4.086E+01	8.411E+01	3.536E+00	3.419E+00	Same as short-term emission rates			
25100008B02	B002	Babcock & Wilcox Boiler	1998		✓	✓	✓		430,534.13	3,607,576.97	47.59	60.0	450	32.89	72.00	55,788	32,370	#10444	3.620E+01	9.179E+01	4.266E+00	4.126E+00	" "			
25100008DNR	DNR1	Dye Narrow Range Pad Application	1976	1993	✓	✓	✓		430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	4,611	4,057	2002 NEI SCC 33000599 Textile Products, Fabric Finishing, Other Not Classified	4.475E-01	2.685E-03	3.401E-02	3.401E-02	" "			
25100008DWR	DWR1	Dye Wide Range Pad Application	1966	1994	✓	✓	✓		430,657.92	3,607,626.13	48.73	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	4.475E-01	2.685E-03	3.401E-02	3.401E-02	" "			
25100008PHT	PD01	Dry Range No. 3 Predryer, Hot Flame Dryer and HD01 Thermosol	2008		✓	✓	✓		430,464.05	3,607,785.12	49.10	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	2.043E+00	1.226E-02	1.553E-01	1.553E-01	" "			
25100008R40	FR40	Aztec Finishing Range	1976			✓	✓		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	1.167E+00	7.004E-03	8.872E-02	8.872E-02	" "			
25100008R51	FR51	Aztec Finishing Range	1988		✓	✓	✓		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	3.794E-01	2.276E-03	2.883E-02	2.883E-02	" "			
25100008R58	FR58	Aztec Finishing Range	1969						430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	8.755E-01	5.253E-03	6.654E-02	6.654E-02	" "			
25100008R59	FR59	Aztec Finishing Range	1976			✓	✓		430,568.88	3,607,693.97	48.69	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	1.167E+00	7.004E-03	8.872E-02	8.872E-02	" "			
25100008PHS	PHS1	Heat Setting	1978			✓	✓		430,482.52	3,607,699.59	48.62	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	5.837E-01	3.502E-03	4.436E-02	4.436E-02	" "			
25100008PRR	PRR1	Rope Range	1966	1999	✓	✓	✓		430,554.56	3,607,682.53	48.56	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	1.654E-01	9.922E-04	1.257E-02	1.257E-02	" "			
25100008PYP	PYP1	Yarn Preparation	1994		✓	✓	✓		430,579.21	3,607,648.21	48.47	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	9.728E-02	5.837E-04	7.393E-03	7.393E-03	" "			
25100008P01	P001	Zimmer Printer & Aztec Tubular Jet Print Dryer 1	1991		✓	✓	✓		430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	7.782E-01	4.669E-03	5.914E-02	5.914E-02	" "			
25100008P02	P002	Zimmer Printer & Aztec Tubular Jet Print Dryer 2	1993		✓	✓	✓		430,534.46	3,607,777.31	49.21	38.0	140	29.11	22.00	4,611	4,057	Same as 25100008DNR	7.782E-01	4.669E-03	5.914E-02	5.914E-02	" "			
		Georgia - Screven County																								
		AIRS 25100029 Southern Natural Gas Company-Woodcliff Gate Compressor Station																								
25100029T1	PT01	Natural Gas-Fired Turbine Allison Model 501-KC	2005		✓				427,200.00	3,623,900.00	80.40	37.7	1,073	13.76	66.50	19,831	6,830	#17143	3.062E+01	1.771E-01	3.658E-01	3.658E-01	Same as short-term emission rates			
		South Carolina - Aiken County																								
		Permit No. 0080-0041 Savannah River Nuclear Solutions LLC - Savannah River Site																								
0080004101		APF2 - 784-7A Steam Facility Biomass Boiler	2008		✓	✓	✓		431,534.89	3,689,173.83	119.25	50.0	350	44.00	35.99	18,649	12,156	SC DEHC Aik_0080.xls	1.317E+01	1.000E+00	2.278E+00	2.278E+00	Same as short-term emission rates			
0080004102		APF3 - 784-7A Steam Facility Oil Fired Boiler	2008		✓	✓	✓		431,559.32	3,689,180.83	119.15	45.0	458	47.00	30.00	13,843	7,962	SC DEHC Aik_0080.xls	2.857E+00	2.064E+00	6.572E-01	6.572E-01	" "			
0080004103		BQH1 - 735-1B Lab Hotwater Heater/Boiler 1, 2, & 3	1998		✓	✓	✓		431,835.06	3,682,911.95	92.47	33.0	500	**0.00328**	26.38	**raincap**		SC DEHC Aik_0080.xls	1.675E+00	6.032E-01	1.984E-01	1.984E-01	" "			
0080004104		FPJ6 - 288-F Ash Basin (Fugitive Emissions)	1985		**Area source not included in modeling assessment (located beyond the inventory screening are**													SC DEHC Aik_0080.xls	0.000E+00	0.000E+00	1.409E+01	1.409E+01	" "			
0080004105		HSE12 - 254-19H 800 kW Production Diesel Engine A	2000		✓	✓	✓		440,409.08	3,683,561.32	93.75	12.0	999	**0.00328**	9.96	**raincap**		SC DEHC Aik_0080.xls	2.675E+01	3.381E-01	6.873E-01	6.873E-01	" "			
0080004106		HSE13 - 254-19H 800 kW Production Diesel Engine B	2000		✓	✓	✓		440,416.53	3,683,566.37	93.60	12.0	999	**0.00328**	9.96	**raincap**		SC DEHC Aik_0080.xls	2.675E+01	4.222E-01	6.873E-01	6.873E-01	" "			

Table 8. Backup Data for Point Source Parameters used in Air Quality Modeling Analysis (Georgia and South Carolina)

Unit Description					Increment				Stack Parameters										Short-term				Long-term			
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	SO_2	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Stack Release Height ft	Stack Exit Temperature F	Stack Exit Velocity fps	Stack Exit Diameter in	Actual Exhaust Volumetric Flow Rate acfm	Dry Standard Exhaust Volumetric Flow Rate dscfm	Basis	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
0080004107		HSP2 - H Canyon, HB Line, 221-H, etc.	1985		✓	✓	✓		440,467.08	3,683,435.62	91.95	200.0	78	59.60	120.00	280,858	275,638	SC DEHC Aik_0080.xls	3.373E+02	0.000E+00	0.000E+00	0.000E+00	" "			
0080004108		NBJ28 - 725-1N Abrasive Blasting	1975	1992	✓	✓	✓		439,318.70	3,679,031.55	91.19	6.0	-460	0.00328	0.00	virtual		SC DEHC Aik_0080.xls	0.000E+00	0.000E+00	1.172E+01	1.172E+01	" "			
0080004109		NGE44 - 2 Portable Air Compressors in D-Area	2000	2010	✓	✓	✓	✓	430,862.28	3,673,991.55	37.56	7.7	884	215.00	5.08	1,813	712	SC DEHC Aik_0080.xls	2.278E+01	1.500E+00	1.603E+00	1.603E+00	" "			
0080004110		NGE45 - 10 Portable Air Compressors	2000	2010	✓	✓	✓	✓	431,282.94	3,689,932.21	113.43	7.7	884	215.00	5.08	1,813	712	SC DEHC Aik_0080.xls	1.143E+02	7.500E+00	8.016E+00	8.016E+00	" "			
0080004111		SDP7 - 221-S Zone 2 Stack, 221-S Prod., etc	1988	2004	✓	✓	✓		440,290.18	3,684,003.70	84.11	147.0	80	85.00	60.00	100,138	97,913	SC DEHC Aik_0080.xls	2.349E+01	1.246E-01	7.413E+00	7.413E+00	" "			
	South Carolina - Aiken County Permit No. 0080-0112 Three Rivers Landfill																									
0080011201		Tub Grinder Engine	2005		✓				431,419.00	3,680,380.00	71.88	11.6	800	305.53	6.00	3,599	1,508	SC DEHC Aik_0080.xls	1.102E+01	1.740E+00	2.000E-01	2.000E-01	Same as short-term emission rates			
0080011202		Scalping Screen Engine	unk		✓				431,419.00	3,680,380.00	71.88	10.0	800	76.41	3.96	392	164	SC DEHC Aik_0080.xls	2.600E+00	4.100E-01	5.000E-02	5.000E-02	" "			
0080011203		Terminator Grinder Engine	unk		✓				431,419.00	3,680,380.00	71.88	10.3	800	305.53	6.00	3,599	1,508	SC DEHC Aik_0080.xls	9.740E+00	1.540E+00	1.700E-01	1.700E-01	" "			
0080011204		Trommel Screen Engine	unk		✓				431,419.00	3,680,380.00	71.88	9.4	800	305.53	6.00	3,599	1,508	SC DEHC Aik_0080.xls	2.240E+00	3.500E-01	4.000E-02	4.000E-02	" "			
0080011205		Truck Traffic	unk		Volume Source. Please refer to Tabe 9													SC DEHC Aik_0080.xls	0.000E+00	0.000E+00	1.784E+00	1.784E+00	" "			
0080011206		Flare	unk		✓				431,455.35	3,679,828.44	60.12	42.0	1,832	65.62	60.00	77,307	17,809	SC DEHC Aik_0080.xls	5.100E+00	1.046E+00	1.275E+00	1.275E+00	" "			
	South Carolina - Aiken County Permit No. 0080-0144 Ameresco Federal Solutions																									
0080014401		1STACK - Biomass Cogeneration Boiler	2008		✓	✓	✓		436,002.16	3,681,877.04	79.25	100.0	325	59.61	66.14	85,343	57,403	SC DEHC Aik_0080.xls	3.150E+01	1.144E+02	4.263E+00	4.263E+00	Same as short-term emission rates			
0080014402		2STACK - Biomass Cogeneration Boiler	2008		✓	✓	✓		436,015.32	3,681,858.30	78.28	100.0	325	59.61	66.14	85,343	57,403	SC DEHC Aik_0080.xls	3.150E+01	1.144E+02	4.263E+00	4.263E+00	" "			
0080014403		KBIOB - Biomass Steam Generation Unit	2008		✓	✓	✓		438,359.75	3,674,696.84	82.96	49.0	450	53.71	19.68	6,807	3,950	SC DEHC Aik_0080.xls	2.980E+00	3.720E-01	2.980E+00	2.980E+00	" "			
0080014404		LBIOB - Biomass Steam Generation Unit	2008		✓	✓	✓		441,886.13	3,674,882.91	76.85	49.0	450	53.71	19.68	6,807	3,950	SC DEHC Aik_0080.xls	2.980E+00	3.720E-01	2.980E+00	2.980E+00	" "			
	South Carolina - Allendale County Permit No. 0160-0006 Clariant Corporation																									
0160000601		Boiler #1	1999		✓				455,144.27	3,655,701.15	48.69	42.0	350	34.50	39.96	18,028	11,752	SC DEHC All_0160.xls	1.000E+01	1.686E-01	3.700E-01	3.700E-01	Same as short-term emission rates			
0160000602		Boiler #2	1999		✓				455,147.76	3,655,700.35	48.61	42.0	350	40.00	39.96	20,902	13,625	SC DEHC All_0160.xls	1.000E+01	1.153E-01	2.526E-01	2.526E-01	" "			
0160000603		Scrubbers	1999		✓				454,885.43	3,655,126.55	43.16	94.8	70	53.95	39.96	28,192	28,085	SC DEHC All_0160.xls	0.000E+00	0.000E+00	1.364E+01	1.364E+01	" "			
	South Carolina - Barnwell County Permit No. 0300-0036 Savannah River Nuclear Solutions LLC Savannah River Site - D-Area Powerhouse																									
0300003601		DPF1 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952						431,022.38	3,673,996.77	39.08	125.0	370	35.00	118.56	160,999	102,419	SC DEHC Bar_0300.xls	3.191E+02	1.103E+03	7.230E+01	7.230E+01	Same as short-term emission rates			
0300003602		DPF2 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952						431,020.71	3,673,999.52	39.07	125.0	370	35.00	118.56	160,999	102,419	SC DEHC Bar_0300.xls	3.191E+02	1.103E+03	7.230E+01	7.230E+01	" "			
		DPF3 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952		Only two of the four DPF boilers may operate at any given time. Modeled units 1 and 2.													SC DEHC Bar_0300.xls								
		DPF4 - 484-D 396 x 106 btu/hr Pulverized Coal Boiler	1952		" "													SC DEHC Bar_0300.xls								
0300003605		DPJ19	unk		Area source not included in modeling assessment (screening value is less than 20; only point sources are included)													SC DEHC Bar_0300.xls	0.000E+00	0.000E+00	4.082E+00	4.082E+00	Same as short-term emission rates			
0300003606		DPJ5 - 484-D Coal Handling Operations	1952		" "													SC DEHC Bar_0300.xls	0.000E+00	0.000E+00	1.080E+01	1.080E+01	" "			
0300003607		DPJ6 - Coal Storage Pile	1952		" "													SC DEHC Bar_0300.xls	0.000E+00	0.000E+00	2.101E+00	2.101E+00	" "			

Table 9. Backup Data for Volume Source Parameters used in Air Quality Modeling Analysis (Georgia and South Carolina)

Unit Description					Increment				Volume Source Parameters							Short-term				Long-term			
Modeled Source ID	Permitted Source ID	Source Description	Contruction Date	Modification Date	NO_x	SO_2	PM_{10}	$PM_{2.5}$	UTM NAD 83 Easting m	UTM NAD 83 Northing m	AERMAP NED 1 arc-sec Elevation m	Release Height ft	Horizontal Dimension ft	Vertical Dimension ft	Basis	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr
	Georgia - Bulloch County																						
	AIRS 03100005 W.M. Sheppard Lumber Company																						
03100005K4	DK04	Direct-fired Lumber Drying Kiln #4	1998		✓				438,293.75	3,579,706.34	38.29	35	10.72	16.28	single elevated volume source on or adj to building 25' w x 85' l x 35' h	7.535E-01	6.250E-01	2.143E+00	2.143E+00	Same as short-term emission rates			
03100005K5	DK05	Direct-fired Lumber Drying Kiln #5	1999		✓				438,375.83	3,579,700.40	37.85	35	10.72	16.28	same as 03100005K4	7.535E-01	6.250E-01	2.143E+00	2.143E+00	" "			
	Georgia - Bulloch County																						
	AIRS 03100028 Claude Howard Lumber Company																						
03100028K1	DFK1	Direct-fired Lumber Drying Kiln #1	1980						427,118.28	3,588,883.68	62.05	42	68.90	74.80	10/11/2006 SCREEN3	8.476E-01	4.500E-01	2.411E+00	2.411E+00	Same as short-term emission rates			
03100028K2	DFK2	Direct-fired Lumber Drying Kiln #2	1980						427,145.49	3,588,874.80	61.55	42	68.90	74.80	same as 03100028K1	8.476E-01	5.000E-01	2.411E+00	2.411E+00	" "			
	Georgia - Emanuel County																						
	AIRS 10700011 Rayonier Wood Products Swainsboro																						
10700011K09	DK09	Direct-fired Lumber Drying Kiln #7 (batch) converted tc Kiln #9 (continuous)	2005		✓				374,904.36	3,597,713.56	76.19	27	14.71	12.56	single elevated volume source on or adj to building 40' w x 100' l x 27' h	1.769E+00	1.965E+00	5.030E+00	5.030E+00	Same as short-term emission rates			
10700011K10	DK10	Direct-fired Lumber Drying Kiln #8 (batch) converted tc Kiln #10 (continuous)	2005		✓				374,942.32	3,597,713.56	75.84	27	14.71	12.56	same as 10711K09	1.769E+00	1.965E+00	5.030E+00	5.030E+00	" "			
	South Carolina - Aiken County																						
	Permit No. 0080-0112 Three Rivers Landfill																						
0080011205		Truck Traffic	unk						431,419.00	3,680,380.00	71.88	3	45.77	5.05	SC DEHC Aik_0080.xls	0.000E+00	0.000E+00	1.784E+00	1.784E+00	Same as short-term emission rates			

Volume III, Attachment H –

Electronic Files