REVISED AIR DISPERSION MODELING REPORT
FOR PSD PERMIT APPLICATION
SUWANNEE AMERICAN CEMENT

Prepared for:

Suwannee American Cement Company
U.S. Route 27
Branford, Florida 32008

PN 050430.0001.002
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EXECUTIVE SUMMARY

This document provides the dispersion modeling analysis required as part of the Prevention of Significant Deterioration (PSD) submittal for the proposed Suwannee American Cement Company (SAC) Line 2 expansion project in Branford, Florida. The document includes an evaluation of the Class II area Significant Impact Levels (SILs) and associated Significant Impact Areas (SIA), Class I and II area PSD increment consumption, impact on the National Ambient Air Quality Standards (NAAQS) in the Class II area, and Class I area visibility impacts and sulfate/nitrate deposition, and other additional impacts. Based on the dispersion modeling performed for pollutant emissions from the existing and the proposed new and modified sources at SAC, the ambient air impacts of the project are below the levels specified by all applicable regulatory requirements, and the application should be approvable on the basis of the proposed impacts on air quality.

The SIA analysis for CO, SO_2, and NO_2 resulted in less than SILs, but greater than the SIL for PM_{10}. Impacts of PM_{10} greater than the SILs required that additional modeling be performed for Class II area PSD increment and NAAQS analyses for PM_{10}. Building downwash was included in the modeling. Terrain in the area is flat to gently rolling and thus, not a significant concern. Nonetheless, elevations for all source, building, and receptor locations were included in the analysis.

Other existing sources in the region out to about 100 km were considered in terms of their potential interactive impacts for the NAAQS and PSD increment analysis. A 20D analysis was conducted on the inventory of PM_{10} sources provided by FDEP with those not screening out being included in the modeling. The results of the Class I area visibility, nitrate/sulfate deposition, and increment consumption analyses indicated all impacts at the four Class I areas were less than the applicable Air Quality Related Values (Okefenokee, Chasshowitka, St. Marks, and Bradwell Bay). Additional impacts analysis for emissions associated with growth in the area and vegetation and soils showed impacts that were insignificant when compared to overall emissions in the area and applicable levels of effect, respectively.

SECTION 1

PROJECT AND ANALYSIS OVERVIEW

1.1 Project Overview

The Line 2 expansion project consists of adding a second dry process preheater/precalciner kiln to the existing facility located northeast of the intersection of U.S. Route 27 (east-west highway) and County Road 49 (north-south roadway). The facility property is located about 3.7 miles east of Branford. Figure 1-1 shows the location of the property with respect to the roadway landmarks and surrounding area geographical setting which is predominantly rural and mixed pine forest. Additional operations that will be affected by the Line 2 expansion are increased quarry and conveying activity, increased material handling and storage, and increased roadway traffic due to incoming supplies and outgoing cement trucks.

Detailed discussion of the project is provided in the permit application. As discussed in the Regulatory Analysis Report for that application, Prevention of Significant Deterioration (PSD) review is required under the provisions of FAC 62-212.400 for all criteria pollutants except lead. The pollutants requiring ambient air quality impact assessment are: PM_{10}, NO_2, SO_2, and CO.

This document provides the dispersion modeling documentation that fulfills the ambient air quality impact requirements of the permit application. This document covers all aspects of the required modeling including an evaluation of the Class II area, SILs and associated SIA, Class I and II area PSD increment consumption, impact on the NAAQS in the Class II area, Class I area visibility impacts and sulfate/nitrate deposition, and other additional impacts.

The facility is subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Portland Cement facilities, and no State air toxics impact analysis is required (memorandum from Howard Rhodes, Director of the Florida Division of Air Resources Management, March 1, 2000, *Revised Guidance on the Permitting of Sources Emitting Hazardous Air Pollutants*).

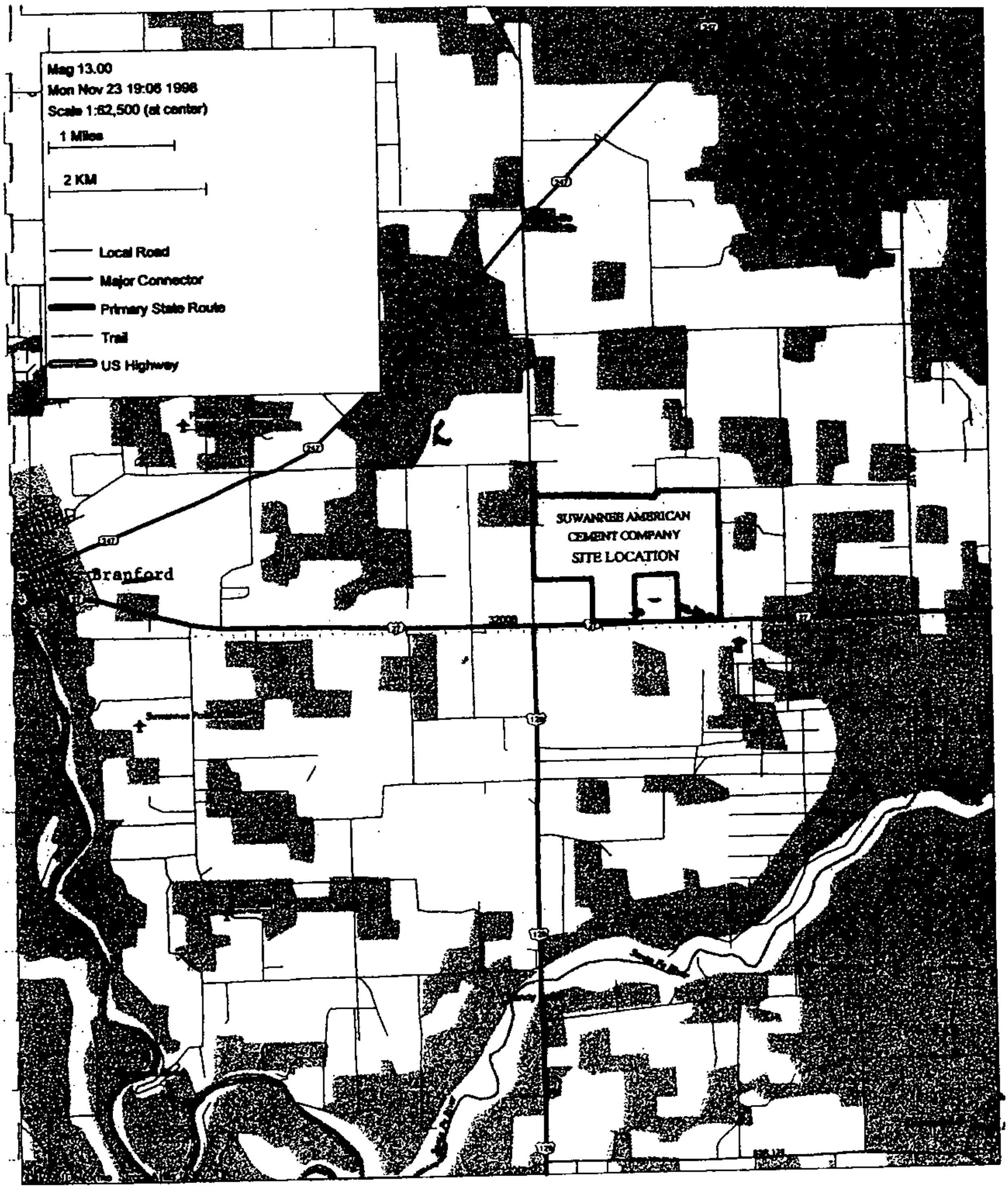


Figure 1-1. Location of Suwannee American Cement

1.2 Modeling Overview

This section provides an overview of the dispersion modeling analysis which was followed to perform the air quality impact assessments in support of the permit application. This analysis addresses the methodologies and models that were used to assess the SIA's for each criteria pollutant, the significant monitoring impacts, the PSD increment consumption due to all PSD increment consuming sources for any pollutants that exceed the applicable SIL, the overall impacts on the NAAQS (including other sources in the area) for any pollutants that exceed the applicable SIL, Class I impacts, and additional air impacts. A summary of the completed dispersion modeling is as follows:

- Used the ISCST3 Model (Industrial Source Complex Model, Version 3 in its short-term mode - Version 00101 - using the BeeLine software called BEEST - Version 9.40) including terrain in the area in the model using 30m Digital Elevation Model (DEM) data as well as building downwash.

- Used the BPIP (Building Profile Input Program) model for all downwash calculations (latest version is included in the BEEST software).

- Performed ISCST3 modeling to discern the significant impact area (SIA) for each SIL for all proposed sources and source modifications for each applicable criteria pollutant; for those pollutants where no significant impacts occur at or beyond the plant fence line, no further modeling analysis is required for that pollutant.

- For any SIL that was exceeded beyond the fence line, additional modeling was performed using the ISCST3 Model for PSD increment concentration impacts, preconstruction monitoring exemptions, and NAAQS analysis including other sources of that pollutant located within the SIA as well as other sources within about 75 km that had emissions greater than the 20D distance (i.e., were included in the analysis) and background concentrations supplied by the FDEP.

- Used the CALPUFF Model in its screening mode (CALPUFF-lite) to estimate visibility, nitrate/sulfate concentrations, and Class I increment consumption for the four Class I areas within 200 km of the SAC Branford site. Used the receptors and their respective distances to SAC for each of the four Class I areas.

- Included all modeling elements as applicable and discussed with FDEP at the modeling meeting held November 15, 2004 and summarized in a letter to FDEP dated November 23, 2004 (attached as Appendix A to this modeling report). Followed modeling guidance given verbally by the State as well that in the *Guideline on Air Quality Models*, FR Volume 68, No. 72, 18440, April 15, 2003.

- Will submit electronic copies of all input and output files from the models (including the ISCST3, CALPUFF, and BPIP models) to FDEP.

1.3 PSD Baseline and Increment Availability

The baseline date in an area is defined as the date at the time of the first permit application in the area subject to PSD requirements. Baseline dates must be defined for each pollutant that consumes PSD increments. The area in question is that area designated as attainment or unclassifiable in the area surrounding the SAC plant in which the source would exceed the SIL's. The baseline date for this area was established previously by other facilities' PSD applications, specifically by the Florida Rock Cement plant near Gainesville which constructed a cement production facility in 1994 30 km to the southeast of SAC. The baseline date was set for PM_{10}, NO_x, and SO_2. All the Florida Rock sources (current and proposed) were therefore considered in the combined PSD increment consumption analysis for the area around SAC.

Because the significant impact area for PM_{10} was within 10 km of the proposed site and existing monitors were located in nearby counties, preconstruction monitoring was not required at the discretionary authority exercised by the FDEP. All background air concentrations were provided by those monitors in the FDEP monitoring network.

SECTION 2

SAC PLANT DESCRIPTION

The site of the proposed Line 2 Expansion for SAC is the Branford facility located just northeast of the junction of U.S. Route 27 and County Road 49 in Suwannee County, Florida. Figure 1-1 shows the location of the facility with regard to the roads and surrounding geographical setting. Figure 2-1 presents a closer view of the site including the outline of existing paved roads, buildings, proposed sources, and the fenced property boundary. The site being considered in this modeling is the immediate area just west of the location of Line 1 of SAC.

The geographical setting around the plant is very flat to gently rolling with very few significant elevated terrain features. The Suwannee River runs from north northwest to the south southeast a few miles to the west of the plant and the Santa Fe River runs from northeast to southwest about two miles to the southeast of the plant. Neither river creates much of a terrain change from the surrounding near flat topography. Most terrain within 10 kilometers of the site is at about the same elevation as the plant, i.e., in the 55 to 90 foot range above sea level. The area is characterized by small farms, small businesses, pine tree plantations, and sparse residences. The town of Branford lies 3.7 miles to the west on U.S. Route 27 and has less than 1000 persons.

The building configuration at the plant consists of multiple building complexes and many outbuildings used for storage, maintenance, and other support services. Many of these buildings were constructed with their major building axes laying from north to south in keeping with the straight line of operations for the cement line. The exception is various storage areas and buildings as well as the quarry operations and conveying systems which are spread throughout the facility. Figure 2-2 presents the existing and proposed buildings and sources for the SAC plant. The figure also shows silos, stacks, parking areas, roadways, and materials handling areas.

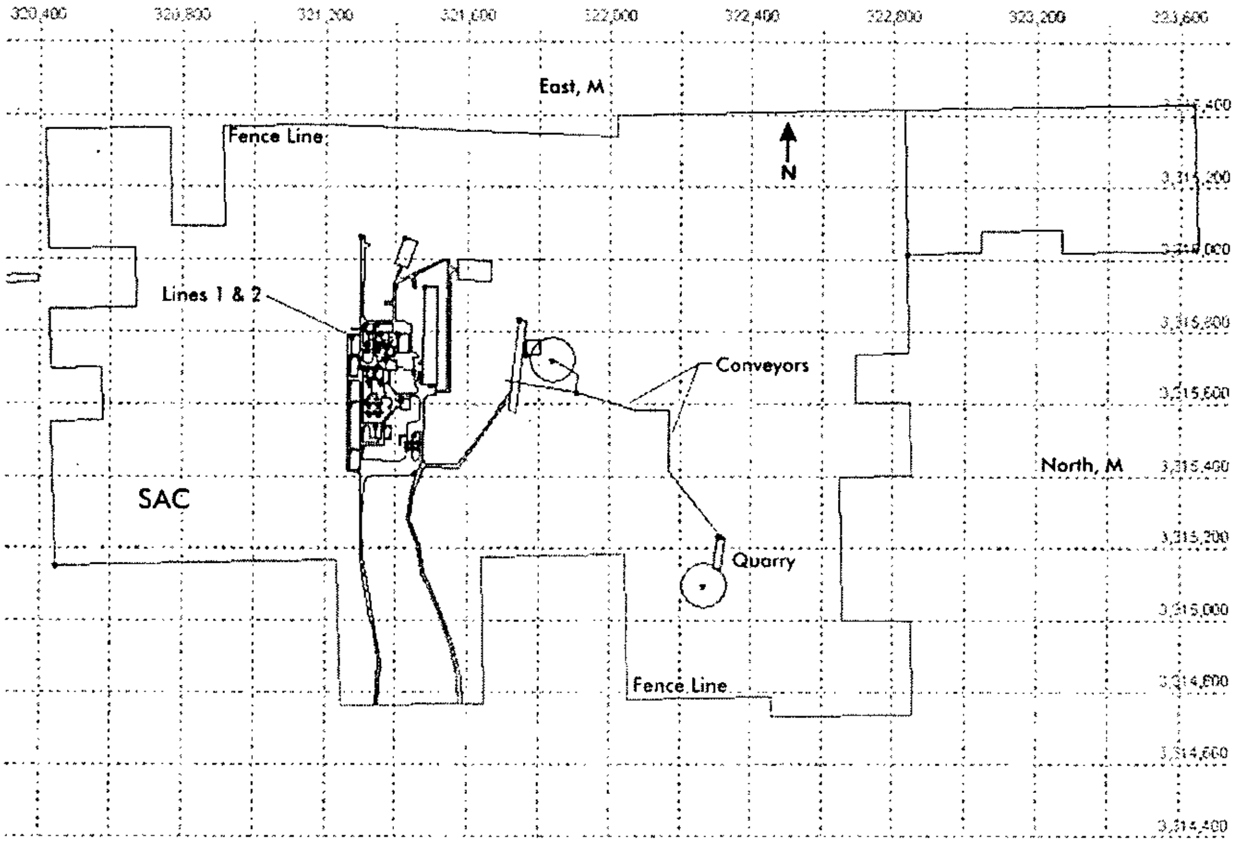


Figure 2-1. Layout of SAC Plant

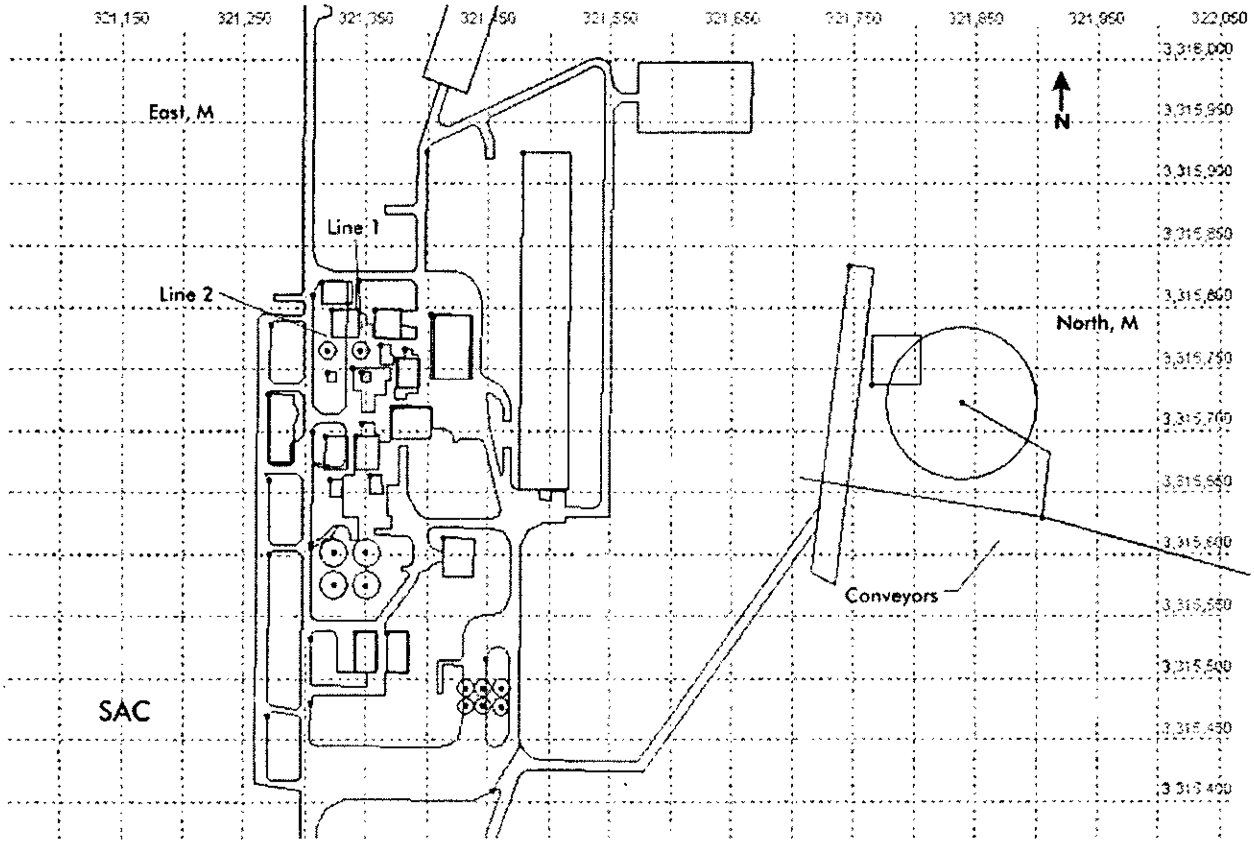
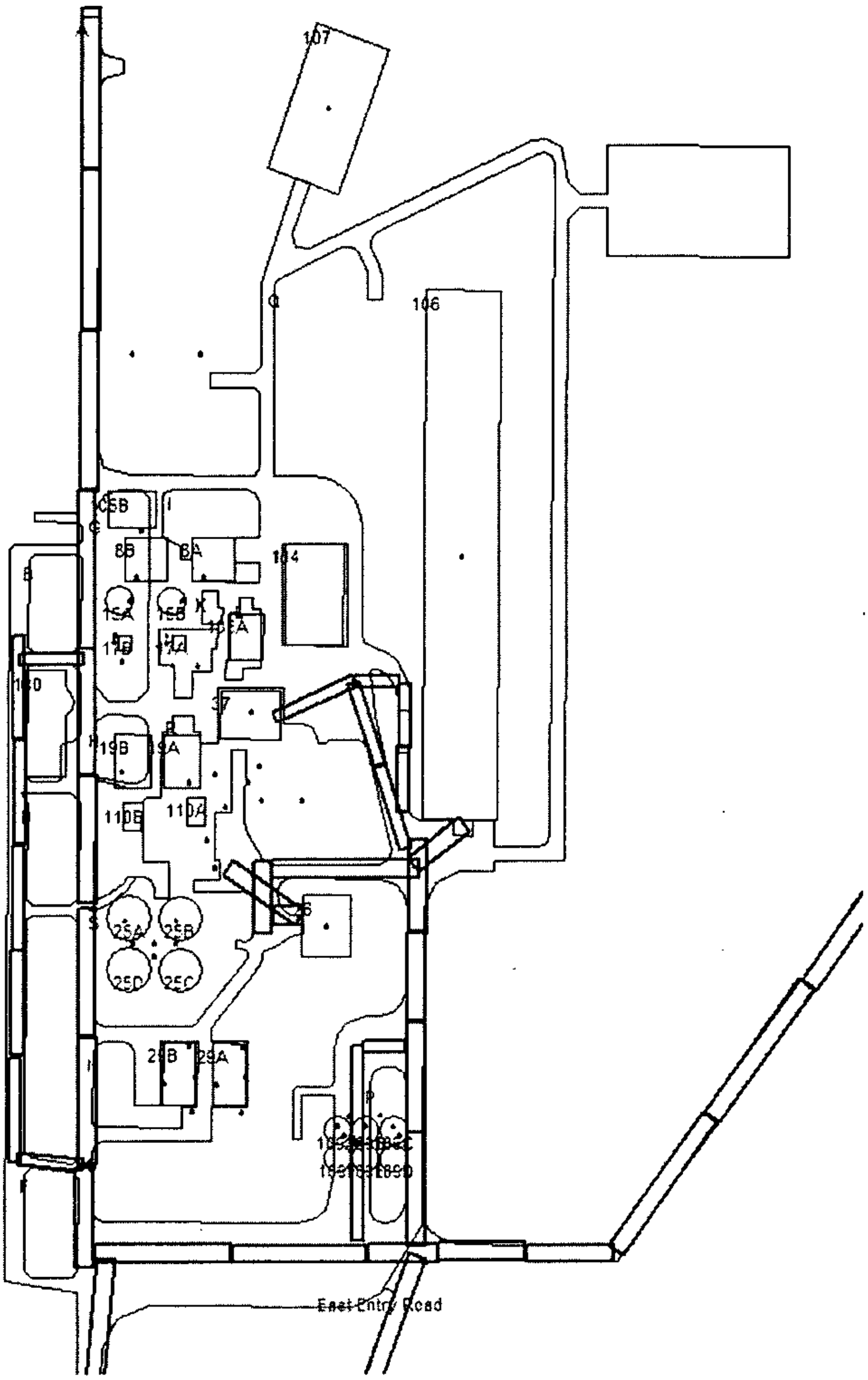


Figure 2-2. SAC Facility Building and Source Configuration

Figure 2-3, Table 2-1, and Appendix A identify the structures and dimensions used in the modeling to determine downwash impacts.



SAC - Branford Florida (Line Nos.1&2) 03/01/05

Scale: 1" = 81.6 Meters

Figure 2-3. Structure Identification

TABLE 2-1. STRUCTURE IDENTIFICATION AND HEIGHT[1]

Structure Identification	Structure Name	Structure Height, m
106	Raw Material Storage	26.87
107	Fly Ash Storage	28.70
8A	Raw Mill	32.0
8B	Raw Mill (new)	32.0
17A	Preheater Tower	80.31
17B	Preheater Tower (new)	80.31
19A	Clinker Cooler	22.4
19B	Clinker Cooler (new)	22.4
110A	Cooler ESP	30.86
110B	Cooler ESP (new)	30.86
29A	Finish Mill (new)	32.11
29B	Finish Mill	32.11
100	Office	10.67
104	Maintenance	10.67
37	Coal Storage	12.19
26	Gypsum Storage	12.19
105A	Kiln Baghouse	12.19
105B	Kiln Baghouse (new)	12.19
25A	Clinker Silo (new)	56.9
25B	Clinker Silo	56.9
25C	Clinker Silo	56.9
25D	Clinker Silo (new)	56.9
15A	Homo Silo (new)	76.81
15B	Homo Silo	76.81
109A	Cement Silo	57.91
109B	Cement Silo	57.91
109C	Cement Silo (new)	57.91
109D	Cement Silo (new)	57.91
109E	Cement Silo	57.91
109F	Cement Silo	57.91

[1]See Appendix A for building dimension information.

SECTION 3

SOURCE IDENTIFICATION AND CHARACTERIZATION

All proposed sources and source modifications are described in the *Application for Prevention of Significant Deterioration (PSD) Permit.* New sources consist of a full Line 2 cement production operation consisting of a raw mill, a vertical preheater and calciner, an in-line kiln and clinker cooler, clinker handling and storage, finish mill, and cement storage and loadout operations. Other emission increases will occur at a number of existing sources due to increased throughput at the quarry, the primary crusher, conveying, material handling and storage, and roadway traffic. These increases have been considered in the SIA and PSD increment analyses. In addition, existing Line 1 sources at SAC were considered in the NAAQS analysis as were sources within about 75 km that did not pass the other source screening analysis (the so-called 20D analysis whereby individual source emissions in tons per year were greater than 20 times the distance between the facility and SAC in kilometers). Each source (whether characterized as a point, area, or volume) was assigned a unique alphanumeric name in the modeling generally related to the source identification in the SAC permitting or some descriptive name (e.g., the existing finish mill stack was N09-01, where the "01" indicates that the source was related to Line 1; the proposed finish mill stack was N09-02, where the "02" indicates that the source was related to Line 2; and paved road segments were indicated by segment number and subsequent number, such as, PV15-1).

3.1 Proposed or Modified SAC Sources

Table 3-1 presents a complete set of stack, baghouse, and other point sources and their related identifiers along with all associated source parameters, emissions, and locations for all proposed and modified stacks. This table includes all stack parameters and coordinates.

TABLE 3-1. NEW OR MODIFIED SAC POINT SOURCE PARAMETERS AND INCREASED PM_{10} EMISSIONS

Source Identification in ISCST3 Model	Source Description	East, m	North, m	Base Elevation, m	Stack Height, m	Stack Gas Temperature, K	Stack Gas Exit Velocity, m/s	Stack Diameter, m	PM_{10} Emission Rate, lb/hr
E21_02	Kiln/Raw Mill Baghouse Stack	321329.84	3315801.25	17.1	96.0	375	24.3	2.87	23.7
E28_02	Raw Mill - Aeropol	321326.92	3315777.75	17	17.1	422	0.001	0.30	0.15
E34_02	Off Spec. Feed Handling	321315.69	3315744.15	16.8	15.2	422	0.001	0.30	0.10
G07_02	Homogenizing Silo Inlet	321323.66	3315766.04	16.9	73.8	366	0.001	0.67	0.86
H08_02	Poldos Homogenizing Silo Outlet	321315.72	3315747.64	16.8	15.2	366	0.001	0.30	0.11
H08A_02	Hydrated Lime Silo	321319.66	3315733.89	16.8	10.7	333	0.001	0.37	0.17
L03_02	Clinker Pan Conveyor	321319.57	3315676.91	16.8	11.3	422	0.001	0.30	0.15
L06_02	Clinker Silo Inlet	321321.29	3315600.46	17.1	58.5	422	0.001	0.34	0.56
L25_02	Gyp/OS Clinker Transport (Relocated)	321336.66	3315582.26	16.9	25.0	305	0.001	0.30	0.41
M08_02	Clinker Silo Outlet Conveyor	321325.54	3315589.03	17	5.8	373	0.001	0.34	0.34
M09_02	Gyp/OS Clinker Silo Outlet (Relocated)	321336.54	3315589.17	16.9	3.0	305	0.001	0.34	0.31
N09_02	Finish Mill Separator	321368.94	3315515.75	16.8	53.3	343	57.6	1.22	7.29
N12_02	Finish Mill BH	321382.38	3315535.75	16.8	53.3	368	56.6	0.91	1.95
N36_02	Fringe Cement Bin	321381.97	3315501.82	16.8	19.8	328	0.001	0.43	0.26
N91_02	Finish Mill Baghouse No. 3 (S)	321384.16	3315520	16.8	14.3	366	0.001	0.43	0.34
P03_02	Cement Transport Conveyor	321453.65	3315500.32	16.8	16.5	328	0.001	0.30	0.19

Source Identification in ISCST3 Model	Source Description	East, m	North, m	Base Elevation, m	Stack Height, m	Stack Gas Temperature, K	Stack Gas Exit Velocity, m/s	Stack Diameter, m	PM_{10} Emission Rate, lb/hr
P11_02	Cement Silos	321464.26	3315489.46	16.8	59.4	328	0.001	0.61	0.64
Q17_02	Truck Load-out No. 3	321460.9	3315494.33	16.8	11.9	328	0.001	0.30	0.19
S17_02	Coal Mill No. 1 & 2 BH	321384.96	3315671.46	16.9	30.5	339	18.0	0.91	1.47
S21_02	Pulverized Coal Bin	321390.98	3315679.87	16.9	18.3	339	0.001	0.30	0.12
U05_02	Fly Ash Silo	321412.88	3315661.79	17.1	36.6	333	0.001	0.37	0.17

Emissions for each road segment that will have increased traffic as a result of the Line 2 expansion are presented in Table 3-2. Table 3-3 presents the source characteristics and increased emissions for the storage piles, conveyors, crushers, and other material transfer operations (process-related fugitive sources).

Emissions tabulations are presented elsewhere in the permit application and are only presented here in the format used in the modeling. These emissions represent the potential short-term and long-term scenarios of operation and thus, will give representative potential air impacts for both the short-term and annual air quality analyses. All coordinates for the sources (as well as all coordinates for other sources, fence lines, and receptors around the plant) were referenced to the Universal Transverse Mercator (UTM) NAD27 format.

3.2 Existing SAC Sources and Other Non-SAC Sources

As shown in Section 4, only PM_{10} was significant in terms of the SIL analysis. Therefore, the only sources that were required for completing the Class II PSD and NAAQS analysis were sources of PM_{10} emissions.

Tables 3-1 and 3-4 through 3-6 provide the point source, road segments, and process-related fugitive emission source parameters and information needed for modeling total emissions for new and existing sources at SAC. Table 3-1 presents the Line 2 (new) point source information, Table 3-4 presents the Line 1 (existing) point source information, Table 3-5 presents the road segments, and Table 3-6 presents the process-related fugitive source information. All of the existing SAC sources consume increment and thus were included in the Class I and Class II increment analysis as well as the NAAQS analysis.

It should be noted that the road emissions in Tables 3-2 and 3-5 were calculated using site-specific silt loading data measured in accordance with ASTM Method C-136, as opposed to default values in AP-42. This results in the most accurate estimation of PM_{10} emissions and PM_{10} concentrations from paved and unpaved roads.

In order to meet the PSD modeling criteria for reviewing the impacts of other sources within and outside of the SIA, several inventories of facilities and sources were obtained from the FDEP for PM_{10} within a 100 km radius. FDEP's latest inventories were all obtained electronically. These inventories were used as received from FDEP including actual or potential

TABLE 3-2. NEW OR MODIFIED SAC ROADWAY CHARACTERISTICS AND INCREASED PM_{10} EMISSIONS

Road Segment Identification	Road Segment Description	Southwest Corner - East, m	Southwest Corner - North, m	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
PV2	Paved Road Segment No.2 (1 of 1)	321305.06	3315473.5	16.8	4	9.14	51.82	180	1.4	0.0037
PV6_1	Paved Road Segment No.6 (1 of 2)	321306.22	3315433.5	16.8	4	9.14	70.10	90	1.4	0.0259
PV6_2	Paved Road Segment No.6 (2 of 2)	321377.16	3315433	16.8	4	9.14	70.10	90	1.4	0.0259
PV9_1	Paved Road Segment No.9 (1 of 3)	321439.44	3315435.5	16.8	4	6.10	50.29	0	1.4	0.0134
PV9_2	Paved Road Segment No.9 (2 of 3)	321439.5	3315486	16.8	4	6.10	50.29	0	1.4	0.0134
PV9_3	Paved Road Segment No.9 (3 of 3)	321445.63	3315538.5	17	4	6.10	21.34	90	1.4	0.0057
PV7	Paved Road Segment No.7 (1 of 1)	321448.06	3315433.5	16.8	4	9.14	36.58	90	1.4	0.0081
PV8_1	Paved Road Segment No.8 (1 of 2)	321468.22	3315433	16.8	4	9.14	57.91	0	1.4	0.0125
PV8_2	Paved Road Segment No.8 (2 of 2)	321468.25	3315491	16.8	4	9.14	57.91	0	1.4	0.0125
PV10_1	Paved Road Segment No.10 (1 of 2)	321468.59	3315548	17	4	9.14	47.24	0	1.4	0.0063
PV10_2	Paved Road Segment No.10 (2 of 2)	321469.22	3315594.5	16.8	4	9.14	47.24	0	1.4	0.0063
PV3_1	Paved Road Segment No.3 (1 of 4)	321297.75	3315475.25	16.8	4	9.14	65.53	0	1.4	0.0055
PV3_2	Paved Road Segment No.3 (2 of 4)	321297.13	3315541.75	16.8	4	9.14	65.53	0	1.4	0.0055
PV3_3	Paved Road Segment No.3 (3 of 4)	321297.75	3315609	17	4	9.14	65.53	0	1.4	0.0055
PV3_4	Paved Road Segment No.3 (4 of 4)	321297.13	3315675.5	16.8	4	9.14	65.53	0	1.4	0.0055
PV5_1	Paved Road Segment No.5 (1 of 4)	321297.13	3315741.5	16.8	4	9.14	81.53	0	1.4	0.0085
PV5_2	Paved Road Segment No.5 (2 of 4)	321298.34	3315822.25	17.1	4	9.14	81.53	0	1.4	0.0085

Road Segment Identification	Road Segment Description	Southwest Corner - East, m	Southwest Corner - North, m	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
PV5_3	Paved Road Segment No.5 (3 of 4)	321298.97	3315904.75	17.4	4	9.14	81.53	0	1.4	0.0085
PV5_4	Paved Road Segment No.5 (4 of 4)	321298.97	3315986.75	17.4	4	9.14	81.53	0	1.4	0.0085
PV14_1	Paved Road Segment No.14 (1 of 5)	321530.59	3315433	16.9	4	9.14	44.96	90	1.4	0.0013
PV14_2	Paved Road Segment No.14 (2 of 5)	321484.13	3315434	16.8	4	9.14	44.96	90	1.4	0.0013
PV14_3	Paved Road Segment No.14 (3 of 5)	321572.78	3315433	17.1	4	9.14	83.82	35	1.4	0.0024
PV14_4	Paved Road Segment No.14 (4 of 5)	321622.28	3315501.25	17.3	4	9.14	83.82	35	1.4	0.0024
PV14_5	Paved Road Segment No.14 (5 of 5)	321672.06	3315569.75	17.4	4	9.14	83.82	35	1.4	0.0024
PV11_1	Paved Road Segment No.11 (1 of 3)	321474.13	3315622.25	16.8	4	9.14	76.20	270	1.4	0.0024
PV11_2	Paved Road Segment No.11 (2 of 3)	321397.38	3315631	17	4	9.14	36.58	180	1.4	0.0012
PV11_3	Paved Road Segment No.11 (3 of 3)	321398.91	3315607.5	16.8	4	9.14	15.24	90	1.4	0.0005
PV4_1	Paved Road Segment No.4 (1 of 7)	321298.97	3315471.5	16.8	4	6.10	33.53	-84	1.4	0.00003
PV4_2	Paved Road Segment No.4 (2 of 7)	321261.66	3315476.25	16.8	4	6.10	53.64	0	1.4	0.00004
PV4_3	Paved Road Segment No.4 (3 of 7)	321262.91	3315532	16.8	4	6.10	53.64	0	1.4	0.00004
PV4_4	Paved Road Segment No.4 (4 of 7)	321263.5	3315585.75	16.8	4	6.10	53.64	0	1.4	0.00004
PV4_5	Paved Road Segment No.4 (5 of 7)	321264.13	3315640	16.8	4	6.10	53.64	0	1.4	0.00004
PV4_6	Paved Road Segment No.4 (6 of 7)	321263.5	3315694.5	16.8	4	6.10	53.64	0	1.4	0.00004
PV4_7	Paved Road Segment No.4 (7 of 7)	321266.56	3315739	16.8	4	6.10	33.53	90	1.4	0.00003
PV12	Paved Road Segment	321468.59	3315632.25	16.8	4	9.14	33.53	51	1.4	0.0011

Road Segment Identification	Road Segment Description	Southwest Corner - East, m	Southwest Corner - North, m	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
	No.12 (1 of 1)									
PV13_1	Paved Road Segment No.13 (1 of 5)	321464.31	3315636.5	16.8	4	6.10	45.72	-18	1.4	0.0014
PV13_2	Paved Road Segment No.13 (2 of 5)	321450.88	3315678.75	17.1	4	6.10	45.72	-18	1.4	0.0014
PV13_3	Paved Road Segment No.13 (3 of 5)	321439.88	3315727	17.1	4	6.10	24.38	90	1.4	0.0008
PV13_4	Paved Road Segment No.13 (4 of 5)	321469.81	3315722.75	17.1	4	6.10	33.53	180	1.4	0.0010
PV13_5	Paved Road Segment No.13 (5 of 5)	321469.22	3315689.75	17.1	4	6.10	33.53	180	1.4	0.0010
PV16	Paved Road Segment No.16 (1 of 1)	321409.59	3315598	16.8	4	9.14	45.72	-55	1.4	0.0055
PV17	Paved Road Segment No.17 (1 of 1)	321441.69	3315722	17.1	4	6.10	45.72	-115	1.4	0.0033
PV1C_1	Paved Road Segment No.1C (1 of 9)	321315.84	3315425.75	16.8	4	9.14	74.68	185	1.4	0.0268
PV1C_2	Paved Road Segment No.1C (2 of 9)	321310.19	3315352.5	16.8	4	9.14	74.68	185	1.4	0.0268
PV1C_3	Paved Road Segment No.1C (3 of 9)	321304.22	3315279.75	16.5	4	9.14	74.68	180	1.4	0.0268
PV1C_4	Paved Road Segment No.1C (4 of 9)	321304.69	3315206.5	16.2	4	9.14	74.68	172	1.4	0.0268
PV1C_5	Paved Road Segment No.1C (5 of 9)	321314.53	3315132.5	16.4	4	9.14	74.68	170	1.4	0.0268
PV1C_6	Paved Road Segment No.1C (6 of 9)	321327.22	3315060.25	17.1	4	9.14	74.68	170	1.4	0.0268
PV1C_7	Paved Road Segment No.1C (7 of 9)	321342.25	3314988.25	17.6	4	9.14	74.68	167	1.4	0.0268
PV1C_8	Paved Road Segment No.1C (8 of 9)	321358.69	3314914.25	18.3	4	9.14	74.68	182	1.4	0.0268
PV1C_9	Paved Road Segment No.1C (9 of 9)	321355.63	3314838.5	15.1	4	9.14	74.68	187	1.4	0.0268
PV1A_1	Paved Road Segment No.1A (1 of 9)	321477.34	3315426.25	16.1	4	9.14	76.20	200	1.86	0.0506

Road Segment Identification	Road Segment Description	Southwest Corner - East, m	Southwest Corner - North, m	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
PV1A_2	Paved Road Segment No.1A (2 of 9)	321452.06	3315355	16.3	4	9.14	76.20	190	1.86	0.0506
PV1A_3	Paved Road Segment No.1A (3 of 9)	321439.56	3315281.75	17	4	9.14	76.20	160	1.86	0.0506
PV1A_4	Paved Road Segment No.1A (4 of 9)	321465.84	3315209.25	17	4	9.14	76.20	170	1.86	0.0506
PV1A_5	Paved Road Segment No.1A (5 of 9)	321478.97	3315134.75	17.4	4	9.14	76.20	155	1.86	0.0506
PV1A_6	Paved Road Segment No.1A (6 of 9)	321512.09	3315065.5	17.1	4	9.14	76.20	160	1.86	0.0506
PV1A_7	Paved Road Segment No.1A (7 of 9)	321540.22	3314992.75	16.6	4	9.14	76.20	160	1.86	0.0506
PV1A_8	Paved Road Segment No.1A (8 of 9)	321565.56	3314920.5	16.6	4	9.14	76.20	170	1.86	0.0506
PV1A_9	Paved Road Segment No.1A (9 of 9)	321582.09	3314843	16.6	4	9.14	76.20	175	1.86	0.0506
PV15_1	Paved Road Segment No.15 (1 of 8)	321718.97	3315639	17.8	4	6.40	64.01	8	1.4	0.0097
PV15_2	Paved Road Segment No.15 (2 of 8)	321727.97	3315702.75	18.1	4	6.40	64.01	8	1.4	0.0097
PV15_3	Paved Road Segment No.15 (3 of 8)	321736.69	3315766.25	18.2	4	6.40	64.01	8	1.4	0.0097
PV15_4	Paved Road Segment No.15 (4 of 8)	321722.25	3315637.25	17.7	4	6.40	50.29	13	1.4	0.0077
PV15_5	Paved Road Segment No.15 (5 of 8)	321733.66	3315686.5	18	4	6.40	50.29	13	1.4	0.0077
PV15_6	Paved Road Segment No.15 (6 of 8)	321745.78	3315735.5	18.2	4	6.40	50.29	13	1.4	0.0077
PV15_7	Paved Road Segment No.15 (7of 8)	321757.22	3315784.5	17.9	4	6.40	50.29	13	1.4	0.0077
PV15_8	Paved Road Segment No.15 (8 of 8)	321748.16	3315836	16.9	4	6.40	21.00	90	1.4	0.0032

TABLE 3-3. SAC PROCESS-RELATED FUGITIVE SOURCE CHARACTERISTICS AND INCREASED PM_{10} EMISSIONS

Source Identification in ISCST3 Model	Source Description	East, m	North, M	Base Elevation, m	Release Height, m	Initial Horizontal Dispersion Coefficient, m	Initial Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/hr
UP19	Crusher Loading at the Quarry	322298.63	3315139.25	17.4	4	10.72	1.86	0.2850
UP20	Baserock Loadout	321785.44	3315758.5	17.9	3	9.3	1.4	0.0070
SP2	Base Rock Pile	321838.69	3315723.25	18	3.05	28.93	2.83	0.0005
SP1	Stone Pile	322266.41	3315097.75	16.5	3.05	28.93	2.83	0.0156
SP345FR1	Limestone, Sand & Iron Ore Storage; Raw Material Storage Building	321496.18	3315788.34	17.8	4.1	24	12.5	0.0375
FQ1_CRSH	Quarry Crusher Area: Loading & Primary Crusher Operations	322314.84	3315235.75	17.1	7	0.7	3.26	0.1247
FQ1_B01	Quarry Crusher Area: Conveyor B01	322297.13	3315253.75	17.3	2	0.47	0.93	0.0155
FQ1_B02	Quarry Crusher Area: Conveyor B02	322281	3315273.75	17.5	2	0.47	0.93	0.0155
FQ1_B03	Quarry Crusher Area: Conveyor B03	322264.78	3315294	17.4	2	0.47	0.93	0.0155
FQ1_B04	Quarry Crusher Area: Conveyor B04	322248.44	3315314	17.4	2	0.47	0.93	0.0155
FQ1_B05	Quarry Crusher Area: Conveyor B05	322232.34	3315334	17.1	2	0.47	0.93	0.0155
FQ1_B06	Quarry Crusher Area: Conveyor B06	322216.19	3315354	17.1	2	0.47	0.93	0.0155
FQ1_B07	Quarry Crusher Area: Conveyor B07	322199.97	3315374.25	16.9	2	0.47	0.93	0.0155
FQ1_B08	Quarry Crusher Area: Conveyor B08	322183.5	3315394.5	16.9	2	0.47	0.93	0.0155
FQ2_B08	Quarry Conveyors: B08 to B20	322168.69	3315415	17.8	2	0.47	0.93	0.0155
FQ2_B20	Quarry Conveyors: B20 to B21	322166.56	3315583.5	17.1	2	0.47	0.93	0.0155

Source Identification in ISCST3 Model	Source Description	East, m	North, M	Base Elevation, m	Release Height, m	Initial Horizontal Dispersion Coefficient, m	Initial Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/hr
FQ2_B21	Quarry Conveyors: B21 to B22	322072.34	3315584.25	16.8	2	0.47	0.93	0.0155
FQ2_B22	Quarry Conveyors: B22 to B24 & B22 to B40	321905.56	3315631	17.9	2	0.47	0.93	0.0005
FQ2_B24	Quarry Conveyors: B24 to B27	321910.81	3315683	17.9	2	0.47	0.93	0.0005
FQ2_B27	Quarry Conveyors: B27 to Radial Stacker	321838.88	3315724	18	2	0.47	0.93	0.0005
FQ2_B40	Quarry Conveyors: B40 to C01	321705.63	3315663	17.9	7	0.47	3.26	0.0015
SP6_FR2	Ash Storage; Fly Ash Storage Building	321426.38	3316017.05	18	10.35	12.88	9.63	0.0038
SP7	Gypsum Storage	321425.9	3315597.77	16.8	6.1	6.48	5.67	0.0007
SP8_FF1	Coal Storage; Coal Handling	321386.56	3315708.25	16.8	6.1	6.55	5.67	0.0037
FR3B_02	Raw Storage Bins (New)	321325.03	3315891.34	17.4	4.57	2.46	2.13	0.0146
FR4	Gypsum Transfer	321367.59	3315627.25	16.8	0.3	0.47	0.47	0.0019

TABLE 3-4. EXISTING SAC POINT SOURCE PARAMETERS AND PM_{10} EMISSIONS

Source Identification in ISCST3 Model	Source Description	East, M	North, m	Base Elevation, m	Stack Height, m	Stack Gas Temperature, K	Stack Gas Exit Velocity, m/s	Stack Diameter, m	PM_{10} Emission Rate, lb/hr
E21_01	Kiln/Raw Mill Baghouse Stack	321359.01	3315731.44	16.9	96.0	375	16.0	2.87	19.6
E28_01	Raw Mill - Aeropol	321361.74	3315777.53	17.1	17.1	422	0.001	0.30	0.15
E34_01	Off Spec. Feed Handling	321342.86	3315744.06	16.9	15.2	422	0.001	0.30	0.10
G07_01	Homogenizing Silo Inlet	321350.87	3315765.87	17	73.8	366	0.001	0.67	0.86
H08_01	Poldos Homogenizing Silo Outlet	321342.87	3315747.48	16.9	15.2	366	0.001	0.30	0.11
H08A_01	Hydrated Lime Silo	321345.83	3315732.22	16.8	10.7	333	0.001	0.37	0.17
K15_01	Clinker Cooler ESP Stack	321363.4	3315641.91	16.9	65.2	547	21.1	2.13	10.7
L03_01	Clinker Pan Conveyor	321354.19	3315671.73	16.8	11.3	422	0.001	0.30	0.15
L06_01	Clinker Silo Inlet	321347.97	3315600.47	16.9	58.5	422	0.001	0.34	0.56
M08_01	Clinker Silo Outlet Conveyor	321347.27	3315588.75	16.8	5.8	373	0.001	0.34	0.34
N09_01	Finish Mill BH Sepol No.1 (W)	321341.97	3315516.75	16.8	39.9	343	57.6	1.22	7.29
N12_01	Finish Mill BH-Mill No.2 (E)	321354.63	3315536	16.8	39.9	368	56.6	0.91	1.95
N36_01	Fringe Cement Bin	321355.89	3315502.01	16.8	19.8	328	0.001	0.43	0.26
N91_01	Finish Mill Baghouse No. 3 (S)	321357.94	3315520	16.8	14.3	366	0.001	0.43	0.34
P03_01	Cement Transport Conveyor	321437.87	3315499.72	16.8	16.5	328	0.001	0.30	0.19
P11_01	Cement Silo Input	321435.09	3315489.69	16.8	59.4	328	0.001	0.61	0.96
Q14_01	Truck Load-out No. 1 (W)	321445.95	3315494.46	16.8	8.8	328	0.001	0.30	0.19
Q17_01	Truck Load-out No. 2 (E)	321431.92	3315494.52	16.8	11.9	328	0.001	0.30	0.19
Q24_01	Railcar Load-out	321460.9	3315494.33	16.8	17.4	328	0.001	0.30	0.32

Source Identification in ISCST3 Model	Source Description	East, M	North, m	Base Elevation, m	Stack Height, m	Stack Gas Temperature, K	Stack Gas Exit Velocity, m/s	Stack Diameter, m	PM_{10} Emission Rate, lb/hr
S17_01	Coal Mill No. 1 & 2 BH	321373.45	3315659.12	16.9	30.5	339	18.0	0.91	1.47
S21_01	Pulverized Coal Bin	321367.61	3315675.79	16.8	18.3	339	0.001	0.30	0.12
U05_01	Fly Ash Silo	321392.14	3315661.79	17.1	36.6	333	0.001	0.37	0.17

TABLE 3-5. SAC ROADWAY CHARACTERISTICS AND TOTAL PM_{10} EMISSIONS

Road Segment Identification	Road Segment Description	Southwest Corner - East, M	Southwest Corner - North, M	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
PV2	Paved Road Segment No.2 (1 of 1)	321305.06	3315473.5	16.8	4	9.14	51.82	180	1.4	0.0060
PV6_1	Paved Road Segment No.6 (1 of 2)	321306.22	3315433.5	16.8	4	9.14	70.10	90	1.4	0.0490
PV6_2	Paved Road Segment No.6 (2 of 2)	321377.16	3315433	16.8	4	9.14	70.10	90	1.4	0.0490
PV9_1	Paved Road Segment No.9 (1 of 3)	321439.44	3315435.5	16.8	4	6.10	50.29	0	1.4	0.0270
PV9_2	Paved Road Segment No.9 (2 of 3)	321439.5	3315486	16.8	4	6.10	50.29	0	1.4	0.0270
PV9_3	Paved Road Segment No.9 (3 of 3)	321445.63	3315538.5	17	4	6.10	21.34	90	1.4	0.0110
PV7	Paved Road Segment No.7 (1 of 1)	321448.06	3315433.5	16.8	4	9.14	36.58	90	1.4	0.0150
PV8_1	Paved Road Segment No.8 (1 of 2)	321468.22	3315433	16.8	4	9.14	57.91	0	1.4	0.0240
PV8_2	Paved Road Segment No.8 (2 of 2)	321468.25	3315491	16.8	4	9.14	57.91	0	1.4	0.0240
PV10_1	Paved Road Segment No.10 (1 of 2)	321468.59	3315548	17	4	9.14	47.24	0	1.4	0.0120
PV10_2	Paved Road Segment No.10 (2 of 2)	321469.22	3315594.5	16.8	4	9.14	47.24	0	1.4	0.0120
PV3_1	Paved Road Segment No.3 (1 of 4)	321297.75	3315475.25	16.8	4	9.14	65.53	0	1.4	0.0090
PV3_2	Paved Road Segment No.3 (2 of 4)	321297.13	3315541.75	16.8	4	9.14	65.53	0	1.4	0.0090
PV3_3	Paved Road Segment No.3 (3 of 4)	321297.75	3315609	17	4	9.14	65.53	0	1.4	0.0090
PV3_4	Paved Road Segment No.3 (4 of 4)	321297.13	3315675.5	16.8	4	9.14	65.53	0	1.4	0.0090
PV5_1	Paved Road Segment No.5 (1 of 4)	321297.13	3315741.5	16.8	4	9.14	81.53	0	1.4	0.0150
PV5_2	Paved Road Segment No.5 (2 of 4)	321298.34	3315822.25	17.1	4	9.14	81.53	0	1.4	0.0150

Road Segment Identification	Road Segment Description	Southwest Corner - East, M	Southwest Corner - North, M	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
PV5_3	Paved Road Segment No.5 (3 of 4)	321298.97	3315904.75	17.4	4	9.14	81.53	0	1.4	0.0150
PV5_4	Paved Road Segment No.5 (4 of 4)	321298.97	3315986.75	17.4	4	9.14	81.53	0	1.4	0.0150
PV14_1	Paved Road Segment No.14 (1 of 5)	321530.59	3315433	16.9	4	9.14	44.96	90	1.4	0.0020
PV14_2	Paved Road Segment No.14 (2 of 5)	321484.13	3315434	16.8	4	9.14	44.96	90	1.4	0.0020
PV14_3	Paved Road Segment No.14 (3 of 5)	321572.78	3315433	17.1	4	9.14	83.82	35	1.4	0.0040
PV14_4	Paved Road Segment No.14 (4 of 5)	321622.28	3315501.25	17.3	4	9.14	83.82	35	1.4	0.0040
PV14_5	Paved Road Segment No.14 (5 of 5)	321672.06	3315569.75	17.4	4	9.14	83.82	35	1.4	0.0040
PV11_1	Paved Road Segment No.11 (1 of 3)	321474.13	3315622.25	16.8	4	9.14	76.20	270	1.4	0.0050
PV11_2	Paved Road Segment No.11 (2 of 3)	321397.38	3315631	17	4	9.14	36.58	180	1.4	0.0020
PV11_3	Paved Road Segment No.11 (3 of 3)	321398.91	3315607.5	16.8	4	9.14	15.24	90	1.4	0.0010
PV4_1	Paved Road Segment No.4 (1 of 7)	321298.97	3315471.5	16.8	4	6.10	33.53	-84	1.4	0.0001
PV4_2	Paved Road Segment No.4 (2 of 7)	321261.66	3315476.25	16.8	4	6.10	53.64	0	1.4	0.0001
PV4_3	Paved Road Segment No.4 (3 of 7)	321262.91	3315532	16.8	4	6.10	53.64	0	1.4	0.0001
PV4_4	Paved Road Segment No.4 (4 of 7)	321263.5	3315585.75	16.8	4	6.10	53.64	0	1.4	0.0001
PV4_5	Paved Road Segment No.4 (5 of 7)	321264.13	3315640	16.8	4	6.10	53.64	0	1.4	0.0001
PV4_6	Paved Road Segment No.4 (6 of 7)	321263.5	3315694.5	16.8	4	6.10	53.64	0	1.4	0.0001
PV4_7	Paved Road Segment No.4 (7 of 7)	321266.56	3315739	16.8	4	6.10	33.53	90	1.4	0.0001
PV12	Paved Road Segment	321468.59	3315632.25	16.8	4	9.14	33.53	51	1.4	0.0020

Road Segment Identification	Road Segment Description	Southwest Corner - East, M	Southwest Corner - North, M	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
	No.12 (1 of 1)									
PV13_1	Paved Road Segment No.13 (1 of 5)	321464.31	3315636.5	16.8	4	6.10	45.72	-18	1.4	0.0026
PV13_2	Paved Road Segment No.13 (2 of 5)	321450.88	3315678.75	17.1	4	6.10	45.72	-18	1.4	0.0026
PV13_3	Paved Road Segment No.13 (3 of 5)	321439.88	3315727	17.1	4	6.10	24.38	90	1.4	0.0014
PV13_4	Paved Road Segment No.13 (4 of 5)	321469.81	3315722.75	17.1	4	6.10	33.53	180	1.4	0.0019
PV13_5	Paved Road Segment No.13 (5 of 5)	321469.22	3315689.75	17.1	4	6.10	33.53	180	1.4	0.0019
PV16	Paved Road Segment No.16 (1 of 1)	321409.59	3315598	16.8	4	9.14	45.72	-55	1.4	0.0109
PV17	Paved Road Segment No.17 (1 of 1)	321441.69	3315722	17.1	4	6.10	45.72	-115	1.4	0.0061
PV1C_1	Paved Road Segment No.1C (1 of 9)	321315.84	3315425.75	16.8	4	9.14	74.68	185	1.4	0.0510
PV1C_2	Paved Road Segment No.1C (2 of 9)	321310.19	3315352.5	16.8	4	9.14	74.68	185	1.4	0.0510
PV1C_3	Paved Road Segment No.1C (3 of 9)	321304.22	3315279.75	16.5	4	9.14	74.68	180	1.4	0.0510
PV1C_4	Paved Road Segment No.1C (4 of 9)	321304.69	3315206.5	16.2	4	9.14	74.68	172	1.4	0.0510
PV1C_5	Paved Road Segment No.1C (5 of 9)	321314.53	3315132.5	16.4	4	9.14	74.68	170	1.4	0.0510
PV1C_6	Paved Road Segment No.1C (6 of 9)	321327.22	3315060.25	17.1	4	9.14	74.68	170	1.4	0.0510
PV1C_7	Paved Road Segment No.1C (7 of 9)	321342.25	3314988.25	17.6	4	9.14	74.68	167	1.4	0.0510
PV1C_8	Paved Road Segment No.1C (8 of 9)	321358.69	3314914.25	18.3	4	9.14	74.68	182	1.4	0.0510
PV1C_9	Paved Road Segment No.1C (9 of 9)	321355.63	3314838.5	15.1	4	9.14	74.68	187	1.4	0.0510
PV1A_1	Paved Road Segment No.1A (1 of 9)	321477.34	3315426.25	16.1	4	9.14	76.20	200	1.86	0.0510

Road Segment Identification	Road Segment Description	Southwest Corner - East, M	Southwest Corner - North, M	Base Elevation, m	Release Height, m	East Length, m	North Length, m	Angle of Road Segment from North	Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/h
PV1A_2	Paved Road Segment No.1A (2 of 9)	321452.06	3315355	16.3	4	9.14	76.20	190	1.86	0.0510
PV1A_3	Paved Road Segment No.1A (3 of 9)	321439.56	3315281.75	17	4	9.14	76.20	160	1.86	0.0510
PV1A_4	Paved Road Segment No.1A (4 of 9)	321465.84	3315209.25	17	4	9.14	76.20	170	1.86	0.0510
PV1A_5	Paved Road Segment No.1A (5 of 9)	321478.97	3315134.75	17.4	4	9.14	76.20	155	1.86	0.0510
PV1A_6	Paved Road Segment No.1A (6 of 9)	321512.09	3315065.5	17.1	4	9.14	76.20	160	1.86	0.0510
PV1A_7	Paved Road Segment No.1A (7 of 9)	321540.22	3314992.75	16.6	4	9.14	76.20	160	1.86	0.0510
PV1A_8	Paved Road Segment No.1A (8 of 9)	321565.56	3314920.5	16.6	4	9.14	76.20	170	1.86	0.0510
PV1A_9	Paved Road Segment No.1A (9 of 9)	321582.09	3314843	16.6	4	9.14	76.20	175	1.86	0.0510
PV15_1	Paved Road Segment No.15 (1 of 8)	321718.97	3315639	17.8	4	6.40	64.01	8	1.4	0.0020
PV15_2	Paved Road Segment No.15 (2 of 8)	321727.97	3315702.75	18.1	4	6.40	64.01	8	1.4	0.0020
PV15_3	Paved Road Segment No.15 (3 of 8)	321736.69	3315766.25	18.2	4	6.40	64.01	8	1.4	0.0020
PV15_4	Paved Road Segment No.15 (4 of 8)	321722.25	3315637.25	17.7	4	6.40	50.29	13	1.4	0.0010
PV15_5	Paved Road Segment No.15 (5 of 8)	321733.66	3315686.5	18	4	6.40	50.29	13	1.4	0.0010
PV15_6	Paved Road Segment No.15 (6 of 8)	321745.78	3315735.5	18.2	4	6.40	50.29	13	1.4	0.0010
PV15_7	Paved Road Segment No.15 (7of 8)	321757.22	3315784.5	17.9	4	6.40	50.29	13	1.4	0.0010
PV15_8	Paved Road Segment No.15 (8 of 8)	321748.16	3315836	16.9	4	6.40	21.00	90	1.4	0.0010

TABLE 3-6. PROCESS-RELATED FUGITIVE SOURCE CHARACTERISTICS AND TOTAL PM_{10} EMISSIONS

Source Identification in ISCST3 Model	Source Description	East, m	North, M	Base Elevation, m	Release Height, m	Initial Horizontal Dispersion Coefficient, M	Initial Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/hr
UP19	Crusher Loading at the Quarry	322298.63	3315139.25	17.4	4	10.72	1.86	0.5560
UP20	Baserock Loadout	321785.44	3315758.5	17.9	3	9.3	1.4	0.0120
SP2	Base Rock Pile	321838.69	3315723.25	18	3.05	28.93	2.83	0.1890
SP1	Stone Pile	322266.41	3315097.75	16.5	3.05	28.93	2.83	0.2190
SP345FR1	Limestone, Sand & Iron Ore Storage; Raw Material Storage Building	321496.18	3315788.34	17.8	4.1	24	12.5	0.1630
FQ1_CRSH	Quarry Crusher Area: Loading & Primary Crusher Operations	322314.84	3315235.75	17.1	7	0.7	3.26	0.2400
FQ1_B01	Quarry Crusher Area: Conveyor B01	322297.13	3315253.75	17.3	2	0.47	0.93	0.0300
FQ1_B02	Quarry Crusher Area: Conveyor B02	322281	3315273.75	17.5	2	0.47	0.93	0.0300
FQ1_B03	Quarry Crusher Area: Conveyor B03	322264.78	3315294	17.4	2	0.47	0.93	0.0300
FQ1_B04	Quarry Crusher Area: Conveyor B04	322248.44	3315314	17.4	2	0.47	0.93	0.0300
FQ1_B05	Quarry Crusher Area: Conveyor B05	322232.34	3315334	17.1	2	0.47	0.93	0.0300
FQ1_B06	Quarry Crusher Area: Conveyor B06	322216.19	3315354	17.1	2	0.47	0.93	0.0300
FQ1_B07	Quarry Crusher Area: Conveyor B07	322199.97	3315374.25	16.9	2	0.47	0.93	0.0300
FQ1_B08	Quarry Crusher Area: Conveyor B08	322183.5	3315394.5	16.9	2	0.47	0.93	0.0300
FQ2_B08	Quarry Conveyors: B08 to B20	322168.69	3315415	17.8	2	0.47	0.93	0.0300
FQ2_B20	Quarry Conveyors: B20 to B21	322166.56	3315583.5	17.1	2	0.47	0.93	0.0300

Source Identification in ISCST3 Model	Source Description	East, m	North, M	Base Elevation, m	Release Height, m	Initial Horizontal Dispersion Coefficient, M	Initial Vertical Dispersion Coefficient, m	PM_{10} Emission Rate, lb/hr
FQ2_B21	Quarry Conveyors: B21 to B22	322072.34	3315584.25	16.8	2	0.47	0.93	0.0300
FQ2_B22	Quarry Conveyors: B22 to B24 & B22 to B40	321905.56	3315631	17.9	2	0.47	0.93	0.0010
FQ2_B24	Quarry Conveyors: B24 to B27	321910.81	3315683	17.9	2	0.47	0.93	0.0010
FQ2_B27	Quarry Conveyors: B27 to Radial Stacker	321838.88	3315724	18	2	0.47	0.93	0.0010
FQ2_B40	Quarry Conveyors: B40 to C01	321705.63	3315663	17.9	7	0.47	3.26	0.0290
SP6_FR2	Ash Storage; Fly Ash Storage Building	321426.38	3316017.05	18	10.35	12.88	9.63	0.0510
SP7	Gypsum Storage	321425.9	3315597.77	16.8	6.1	6.48	5.67	0.0090
SP8_FF1	Coal Storage; Coal Handling	321386.56	3315708.25	16.8	6.1	6.55	5.67	0.0200
FR3A_01	Raw Storage Bins (Existing)	321359.93	3315891.13	17.6	4.57	2.46	2.13	0.0136
FR3B_02	Raw Storage Bins (New)	321325.03	3315891.34	17.4	4.57	2.46	2.13	0.0146
FR4	Gypsum Transfer	321367.59	3315627.25	16.8	0.3	0.47	0.47	0.0040

emissions of PM_{10} as provided. Coordinates for each source were tabulated and compared to the SAC facility (using a coordinate that represented the location of the kiln/raw mill baghouse stack for Line 1, E21-01, as a reference point). The distance between each other source and SAC was calculated (in kilometers) and multiplied by 20 (the so-called 20D). This calculation was limited to all PM_{10} sources within about 100 km of SAC (as per the FDEP's provided data base). Each source which remained on this list along with its calculated 20D distance was compared to the annual tonnage of PM_{10}. Those sources with annual emissions greater than 20D were retained and considered in both the PSD modeling and the full NAAQS analysis. For PSD increment consumption, this methodology was conservative as some of the sources in Gainesville may not be PSD increment consuming. Gainesville Power boilers and Florida Rock Cement were considered in the PSD and NAAQS modeling (all Florida Rock sources, current and future, were included in this analysis due to the proximity of the facility and its recent permitting activity).

The sources remaining after the 20D analysis and which were considered in the modeling are presented in Table 3-7 along with their source characteristics and emissions. Appendix B presents the FDEP inventory used in the 20D analysis.

TABLE 3-7. NON-SAC SOURCE PARAMETERS AND EMISSIONS OF PM_{10} (Revised)

Source Identification[a]	Source description	UTM East, m	UTM North, m	Base elevation, m	Stack height, m	Stack gas temperature, K	Stack gas velocity, m/s	Stack diameter, m	PM_{10} emissions, lb/hr
GVDH_E03	Fossil Fuel Fired Steam Generator #1(Phase II AR Unit)	365700	3292600	16.9	91.4	400	14.3	3.4	288.00
GVDH_E05	Fossil Fuel Fired Steam Generator #2 (Phase I & II AR Unit)	365700	3292600	16.9	106.7	408	15.2	5.6	242.80
FR1_E28	Recycle dust + raw meal to homogenization silo	346357.7	3285762	16.9	12.2	450	20.1	0.7	0.70
FR1_G07	Recycle dust + raw meal into homogenization silo	346385.9	3285747	16.9	68.6	366	21.4	0.7	0.91
FR1_H08	Raw meal + recycle dust to preheater	346401	3285770	26.1	18.3	366	20.4	0.4	0.34
FR1_E21	kiln	346417.1	3285766	26	76.2	375	16.4	2.9	22.10
FR1_K15	cooler	346504.4	3285787	25.5	60.0	522	12.8	2.7	7.70
FR1_L03	Clinker cooler discharge and breaker	346480.2	3285769	25.8	3.1	422	20.0	0.3	0.15
FR1_L06	Clinker into clinker silos	346546.2	3285781	25.5	57.9	422	20.8	0.3	0.20
FR1_L08	Clinker into clinker silos	346546.2	3285781	25.5	57.9	422	20.8	0.3	0.20
FR1_M08	Clinker to finish mill	346554.3	3285708	25.4	3.1	373	20.8	0.3	0.22
FR1_N09	Finish mill air separator	346567.9	3285693	25.4	40.8	372	13.9	2.3	5.56
FR1_N12	Finish mill	346567.5	3285697	25.4	40.8	372	20.4	0.9	1.39
FR1_N91	Cement handling in finish mill	346558.2	3285693	25.3	37.5	366	20.4	0.4	0.34
FR1_Q25	Cement storage silos	346618.7	3285848	24.9	79.3	339	20.0	0.6	0.74
FR1_Q26	Cement storage silos	346632.9	3285851	25.1	79.3	339	20.0	0.6	0.74
FR1_Q14	Cement silo loadout	346619.9	3285841	25	9.2	339	20.0	0.3	0.19
FR1_Q17	Cement silo loadout	346634.3	3285843	25.1	9.2	339	20.0	0.3	0.19
FR1_Q21	Cement silo loadout	346631.5	3285859	25	9.2	339	20.0	0.3	0.19

TABLE 3-7. NON-SAC SOURCE PARAMETERS AND EMISSIONS OF PM_{10} (Revised) (continued)

Source Identification[a]	Source description	UTM East, m	UTM North, m	Base elevation, m	Stack height, m	Stack gas temperature, K	Stack gas velocity, m/s	Stack diameter, m	PM_{10} emissions, lb/hr
FR1_R12	Cement bagging operation	346639.6	3285813	25.5	30.5	339	20.0	0.6	0.74
FR1_S17	Coal mill	346466.9	3285785	25.9	50.0	339	20.3	0.7	1.25
FR1_S21	Pulverized coal storage bin	346461.3	3285781	25.9	105.6	339	20.0	0.3	0.22
FR2_D33	Transfer D32-34 belts	346357	3285635	25.5	5.5	298	11.3	0.4	0.20
FR2_D35	Transfer D34-D36 belts	346280	3285735	26.1	51.4	298	11.3	0.4	0.20
FR2_D37	Transfer D36-39 belts and bins	346276	3285738	26.1	48.7	298	12.7	0.5	0.33
FR2_D49	D Bins unloading to belts	346289	3285739	26.1	25.5	298	12.7	0.5	0.33
FR2_2D37	Transfer D36-2D39 belts and bins	346278	3285727	26	48.7	298	12.7	0.5	0.33
FR2_2D49	2D Bins unloading to belts	346291	3285730	26	25.5	298	12.7	0.5	0.33
FR2_2E21	Inline kiln/raw mill w/air heater	346430	3285693	25.6	95.9	453	16.0	2.9	25.00
FR2_2E28	Airslides and bottom of airlift	346395	3285686	25.7	13.0	422	11.3	0.4	0.14
FR2_2E34	Bin 2E30	346403	3285693	25.7	30.5	422	7.5	0.4	0.09
FR2_2G07	Top of airlift and homogenizing silo	346412	3285694	25.6	73.3	366	14.3	0.8	0.81
FR2_2H08	Homogenizing silo to preheater feed	346515	3285729	25.6	15.4	366	7.5	0.4	0.11
FR2_2K15	Clinker cooler + coal mill gases after ESP	346490	3285716	25.7	60.3	522	13.7	2.7	8.75
FR2_2L03	Cooler discharge	346388	3285697	25.8	11.6	422	8.6	0.5	0.14
FR2_2L13	Clinker transport (2L20, 2L08)	346538	3285777	25.4	57.9	422	9.1	0.4	0.14
FR2_2L15	Clinker transport (2L20, 2L01, 2L08, 2L09)	346546	3285756	25.6	57.8	422	20.9	0.4	0.28

TABLE 3-7. NON-SAC SOURCE PARAMETERS AND EMISSIONS OF PM_{10} (Revised) (continued)

Source Identification[a]	Source description	UTM East, m	UTM North, m	Base elevation, m	Stack height, m	Stack gas temperature, K	Stack gas velocity, m/s	Stack diameter, m	PM_{10} emissions, lb/hr
FR2_2L16	Clinker transport (2L01, 2L20)	346554	3285726	25.4	57.8	422	13.9	0.4	0.19
FR2_2L18	Clinker into quadrated silo	346522	3285753	25.6	57.8	373	13.9	0.4	0.21
FR2_2M07	Clinker from quadrated silo	346526	3285730	25.6	5.0	373	13.9	0.4	0.21
FR2_2M08	Clinker/additives to Mill #2	346526	3285717	25.6	13.4	373	13.9	0.4	0.21
FR2_2N93	Finish mill #2 air separator	346528	3285669	25.4	39.8	343	14.7	2.3	6.43
FR2_2N94	Finish mill #2	346538	3285691	25.5	39.8	368	14.2	1.2	1.64
FR2_2N91	Airlift to separator	346539	3285669	25.4	13.6	366	18.3	0.4	0.32
FR2_2N36	Cement to fringe silo	346544	3285659	25.3	19.4	328	15.7	0.4	0.24
FR2_2Q25	Cement to silo #6	346657	3285776	25.7	58.4	339	11.4	0.8	0.70
FR2_2Q26	Cement to silo #7	346672	3285779	25.8	58.4	339	11.4	0.8	0.70
FR2_2Q14	Loadout from silos 6/7	346661	3285771	25.7	9.1	339	8.6	0.5	0.17
FR2_2S17	Coal mill #2	346484	3285727	25.8	60.3	339	1.9	2.7	1.67
FR2_2S21	Pulverized coal bin	346515	3285729	25.6	20.7	339	7.5	0.4	0.15

a. GV- Gainesville Municipal Power
FR – Florida Rock Industries

SECTION 4

AIR QUALITY MODELING METHODOLOGY

4.1 Model Specification

Dispersion modeling procedures followed U.S. EPA recommended model selection and application protocol and were used throughout this analysis primarily following the *Guideline on Air Quality Models* (April 15, 2003), the personal direction provided by FDEP (Mr. Cleve Holladay), and the U.S. EPA *New Source Review Workshop Manual* (draft, October 1990). This methodology implemented both the new source only analysis and the full impact analysis (detailed modeling and all source consideration). The new source modeling followed the threefold goal of:

- Determining whether the impact analysis can forego further modeling for each PSD pollutant depending on the significant impact analysis and the associated SIA.
- Defining the impact area for which a full impact analysis will be performed.
- Determining other sources and background concentrations that should be included in the analysis.

Based on the review of the pollutants and emission rates associated with the proposed modifications at the facility, dispersion modeling was required for emissions of SO_2, PM_{10}, NO_x, and CO. The level of detail of the modeling for these criteria pollutants depended on the determination of the extent of the significant impact areas for each constituent. Because the significant impact area for PM_{10} lay beyond the facility fence line, modeling was performed also for all SAC sources and other identified interacting and significant sources (from 20D) within about a 75-km radius of the facility.

These other sources included all those within the SIA (there were none) as well as those beyond the SIA with allowable emissions that may cause them to interact with the SAC sources either in terms of PSD increment consumption or NAAQS impacts. Potentially interacting sources were evaluated for inclusion based on the FDEP suggested 20D approach. Two sources were identified for inclusion in the modeling as PSD increment consuming sources: Gainesville Power and Florida Rock Cement. All other sources were beyond the 50 km range generally specified by the *Guideline on Air Quality Models* as the limitation of the short range dispersion models or screened out on a source-by-source basis in the 20D analysis.

4.2 Model Selection

For those pollutants requiring dispersion modeling, the Industrial Source Complex Model (ISC) was used for the modeling. The ISC Model, Version 3, in its short-term mode (ISCST3, Version 02035) was used to perform all preliminary modeling as well as the PSD and NAAQS related full impact modeling. The ISCST3 Model is a steady-state straight-line Gaussian plume model that is recommended by the *Guideline on Air Quality Models*. The ISCST3 Model has many features that make it the most representative model for this analysis including:

- Recommended and accepted by the U.S. EPA
- Multiple sources
- Point, area, and volume source capabilities
- Hour-by-hour meteorological data used in calculations
- User-specified grouped source concentration estimates
- Urban/rural classification
- Building downwash of effluent
- Variable receptor locations.

No other models were used because elevated terrain was not a concern (no terrain above stack height in the vicinity around the plant). Nonetheless, digitized terrain data derived from the 30m DEM data for each applicable USGS quadrangle was used in the ISCST3 modeling to allow the model to perform its full suite of analyses considering the gentle slope of the surrounding terrain. The use of the ISCST3 Model was implemented through the BEE-LINE software called BEEST (Version 9.40).

The selection of the ISCST3 model is consistent with the FDEP guidance provided by Mr. Cleve Holladay in an initial modeling meeting in December 2004. No other air dispersion model was used for this Class II analysis, although one other related model was used to calculate building downwash influence on the plumes. This model was the U.S. EPA *Building Profile*

Input Program (BPIP) (draft user's guide, October 1993). The BPIP Model is included in the BEEST program and was used throughout this analysis.

4.3 Source Identification and Location

Each source was identified in this modeling documentation in Section 3 for all stack, fugitive source, and roadway sources characterization and emissions. Each source has a unique identifier which was used throughout the modeling analysis both in the model and in any tables presenting the concentration estimates. A Cartesian coordinate system in UTM coordinates was assigned to all sources in this analysis. Any other sources that were considered in the modeling for PSD increment purposes or NAAQS impacts were also assigned a unique identification number and had coordinates in the same UTM system as the SAC sources. Only one source was considered for the CO, SO_2, and NO_x SIL and SIA modeling, namely, the new Line 2 Kiln/Raw Mill Baghouse Stack, E21-02. No other new or modified sources emitted these pollutants except the intermittently used emergency backup generator. For PM_{10}, all sources described in Tables 3-1 through 3-8 were considered as appropriate for SIL, PSD, and NAAQS analysis.

4.4 Receptor Locations

Modeling of the individual sources was performed using the ISCST3 Model to determine maximum impact locations. Past modeling for the SAC Line 1 PSD and NAAQS permitting activities was used to select the most representative set of receptors to provide the maximum concentration estimates at a grid resolution commensurate with that recommended by FDEP (at a 100 m resolution in the vicinity of the hot spots). The receptors that were used for the SIL, PSD, and NAAQS analysis included a fence line grid at approximately 50-m intervals and multiple Cartesian grids from the fence line out to about 10 km at grid spacings varying from 100 m near the fence line to 1000-m intervals at the perimeter of the grid. Intermediate spacings of 250, 500, and 1000 m were also used in the modeling. SIL modeling analyses indicated that all maximum impacts occurred within a kilometer of the facility boundaries. Receptors used in the modeling study are shown in Figures 4-1 and 4-2. Terrain elevations were included in all cases for each receptor as derived from the 7.5' USGS maps for the area.

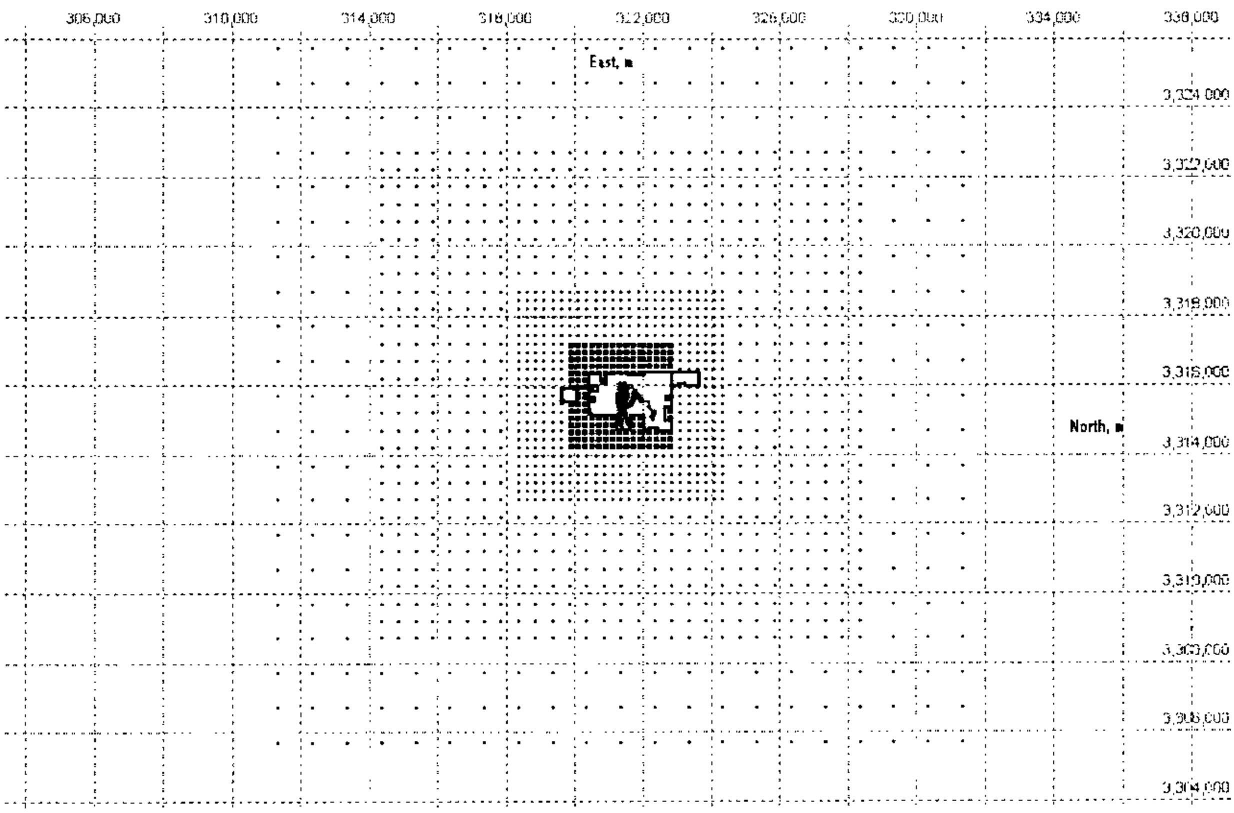


Figure 4-1. Overall Receptor Grid Used for the SAC Air Quality Modeling Analysis

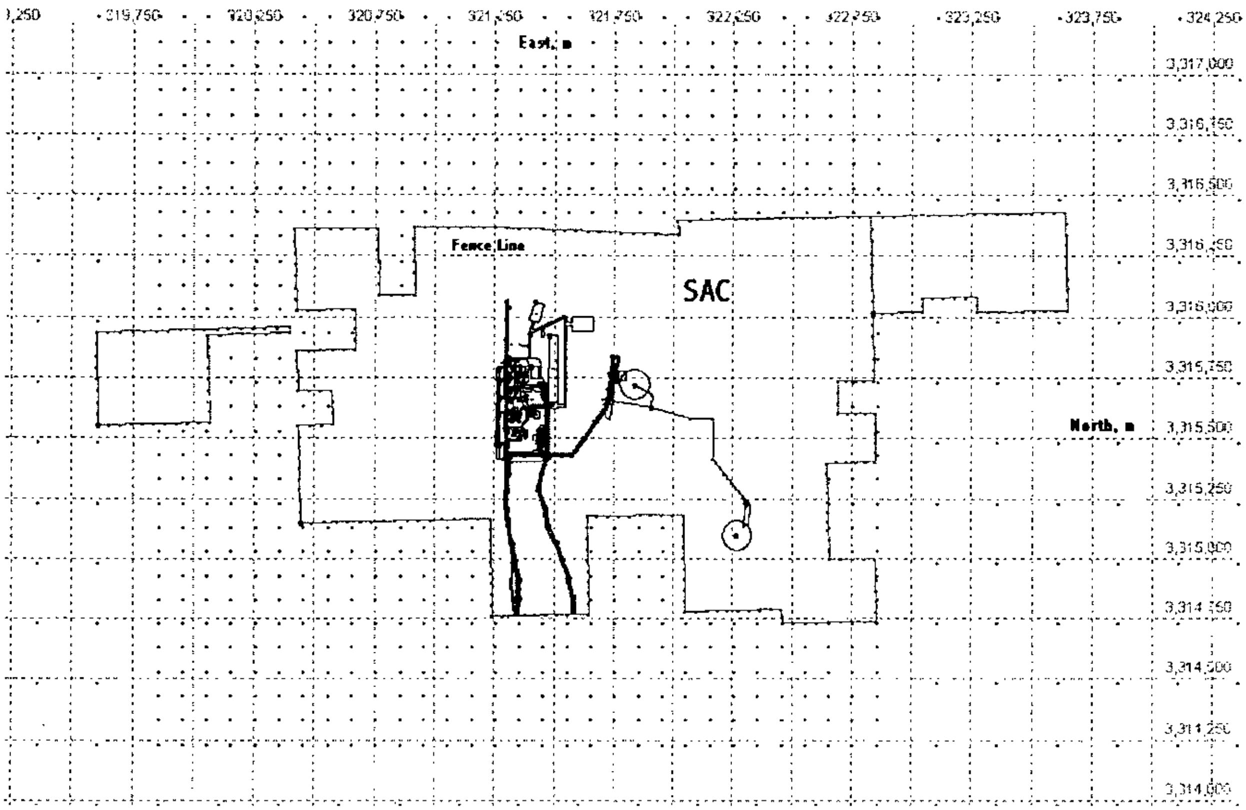


Figure 4-2. Near Field Receptor Grid Used for the SAC Air Quality Modeling Analysis

4.5 Meteorological Data

For the ISCST3 Model, preprocessed meteorological data are required. The *Guideline on Air Quality Models* specifies that five years of representative data be used for an analysis such as this. Data recommended by the FDEP were used to determine the most suitable meteorology for all modeling using the ISCST3 Model. As recommended, this data set consisted of surface meteorological observations for the airport located to the southeast in Gainesville (NWS No. 12816). This data consists of hourly observations of wind speed, wind direction, atmospheric stability class, and temperature. The upper air mixing heights associated with this surface file were obtained from the National Weather Service site in Jacksonville (NWS No. 13889). The most recent 5-year data set readily available from a combination of SCRAM web site data (U.S. EPA), Lakes Webmet site, and previously used data sets for other PSD analyses was for 1992-1996. All sites are similar in both geographical features and vegetative cover, and the combination of the two meteorological sites was deemed representative of the plant site.

4.6 Urban/Rural Classification

To determine whether the area surrounding the facility should be considered urban or rural, a qualitative land-use review was performed. As recommended by the EPA *Guideline on Air Quality Models*, the Auer land-use technique was used to determine if the area is better characterized as rural or urban. Specifically, the guidance recommends land-use analysis of an area within a 3.0-km radius of the site. To be classified "urban," either the population density must be greater than 750 persons per km^2 or, under the Auer technique, greater than 50 percent of the land within 3.0 km of the source must be characterized in one of the following five categories:

- I1 – Heavy Industrial – major chemical, steel, and fabrication industries; generally 3- to 5-story buildings – grass and tree growth extremely rare; <5 percent vegetation.

- I2 – Light Industrial – rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally 1- to 3-story buildings – very limited grass, trees almost totally absent; <5 percent vegetation.

- C1 – Commercial – office and apartment buildings, hotels; > 10-story heights – limited grass and trees; <15 percent vegetation.

- R1 – Compact Residential – single, some multiple, family dwellings with close spacing; generally <2-story buildings; garages, no driveway – limited lawn sizes and shade trees; <30 percent vegetation.

- R3 – Compact Residential – old multifamily dwellings with close lateral separation; generally <2-story buildings; garages, no driveway – limited lawn sizes, old established shade trees; <35 percent vegetation.

Based on an analysis of the 7.5-minute USGS topographic maps for the area and personal surveys by SAC employees, it was determined that greater than 50 percent of the land within the 3.0-km radius consisted of farms and forest lands with only scattered light industrial firms and residences. Therefore, the land-use classification of the area was selected as rural, and rural dispersion coefficients were used in the modeling analysis.

4.7 Model Inputs

The ISCST3 model is very versatile both in terms of the physical phenomena that it can represent and the options that are available for model control and calculations. The regulatory default options of ISCST3 were used throughout all applications of the ISCST3 Model except for the option to allow the use of meteorological data sets that contain missing values. When a missing value is encountered, that hour is skipped and no concentration estimates are made. Table 4-1 presents a summary of the features that are set by the regulatory default option as well as other options selected for this analysis.

4.8 Building Downwash

The effluent plumes from the proposed stacks at the site will be affected by nearby buildings and structures. Because the stacks and building dimensions are such that building downwash of released effluent may cause the plumes to be influenced (which will tend to bring the plume closer to the ground), these effects were included in the analysis.

TABLE 4-1. OPTIONS SELECTED IN THE MODELING OF SAC

Option description
Regulatory defaults except for the missing hour of meteorological data option.
Concentrations in micrograms/cubic meter.
UTM coordinates for fence line and all other receptor locations.
Terrain elevations were considered.
The Rural Mode option was selected.
Default wind profile exponent values were selected.
Default vertical potential temperature gradient values were selected.
The downwind distance plume rise option was used for all sources.
Buoyancy-induced dispersion was used.
The wind system measurement height was set to 7 meters (23 ft).
Building aerodynamic downwash was performed where applicable and will include building information for both Huber-Synder and Schulman-Scire correction.
Stack tip downwash was modeled.
Program control parameters, receptors, and source input data was output.
Concentrations during calm hours were set to zero.
Averaging times were selected consistent with those applicable to the PSD increments, NAAQS, and significant impact concentrations for SO_2, PM_{10}, NO_2, and CO.

The building and stack configuration of the SAC facility was shown in Figure 2-3 for all structures after completion of all modifications. According to the EPA guidance on considering the influence of a building stack, if the stack is less than a Good Engineering Practice (GEP) stack height, the effluent should be treated as if it were affected by the building. GEP stack height is defined as:

$$H_{GEP} = h_b + 1.5L$$

where:

H_{GEP} = Good Engineering Practice stack height (m)

h_b = Nearby structure height

L = The lesser of the nearby structure height or maximum projected width.

In this case, the height of each existing and modified stack was compared to the calculated GEP stack height for each building. A second criterion that was applied to determine if downwash was applicable for each source/building combination was whether the stacks are located downwind and within 5L of the building, upwind and within 2L of the building, or off to the side and within 0.5L of the building. The results of these comparisons for each stack and each building for each of 36 wind directions were tabulated and are presented in Appendix B.

To perform this analysis, the model recommended by the EPA called the Building Profile Input Program (BPIP) was used. The BeeLine version of the BPIP Model within the BEEST was used to generate all downwash calculations.

4.9 Background Concentrations

Background concentrations for each criteria pollutant of concern were available from actual monitored data available from the FDEP through the State's Quick Look report on the FDEP website. Such data was obtained from the State's report for PM_{10}. No other background concentrations were required as all other pollutants had impacts less than their applicable SILs. Review of the nearby sites indicated that the two sites in Gainesville at NW 53rd Avenue and NW 6th Street (shut down after 2000) would be appropriate monitors to use for this analysis. The highest PM_{10} 24-hour concentration was in 2004 at 48 $\mu g/m^3$ and 24 $\mu g/m^3$ in 2000. Discussions indicated that the nearby air monitors are representative of the area surrounding the facility and fulfill the role of preconstruction monitoring; thus, no new preconstruction monitoring was required. These values were used in subsequent NAAQS analysis.

4.10 Reporting

All modeling has been documented in this report, which is part of the permit application. An example printout from ISCST3 and spreadsheets of the 20D analysis are provided in Appendices B and C. Electronic copies of all input and output files of the modeling analysis will be provided to FDEP under a separate cover on a compact disk in ASCII or BEEST formats. One full copy of the model documentation including diskettes will be provided, with additional paper copies of the documentation made available as required.

SECTION 5

RESULTS OF THE CLASS II AMBIENT IMPACT ANALYSIS

5.1 Significant Impact Analysis

The emissions and source characteristics for sources included in the SIL analysis were presented and discussed earlier in this report. The dispersion modeling was performed over a 5-year period of meteorological data using the ISCST3 Model. The highest concentrations of each applicable averaging period (depending on pollutant) were used to determine the maximum significant concentration impacts and significant impact areas. Tables 5-1 through 5-4 present the significant impact analysis results for SO_2, CO, NO_x, and PM_{10}. No other criteria pollutants were required to be modeled.

As shown in Table 5-1 for SO_2 , the highest concentrations are less than the applicable significant levels for the 3-hour, 24-hour, and annual averaging periods for each of the five years of analysis. Thus, the maximum distance to the 3-hour significance level (25 $\mu g/m^3$), the 24-hour significance level (5 $\mu g/m^3$), and the annual significance level (1 $\mu g/m^3$) was within the fence line of the proposed property. No further modeling of SO_2 was required as per the U.S. EPA guidance for PSD modeling analysis.

As shown in Table 5-2 for CO, the highest concentrations are less than the applicable significant levels for both the 1-hour and 8-hour averaging periods for each of the five years of analysis. Thus, the maximum distance to the 1-hour significance level (2,000 $\mu g/m^3$) and the 8-hour significance level (500 $\mu g/m^3$) was within the fence line of the proposed property. No further modeling of CO was required as per the U.S. EPA guidance for PSD modeling analysis.

Significant impact concentrations for NO_2 are presented in Table 5-3. The significant impact concentrations were less than the annual averaging period concentration of 1.0 $\mu g/m^3$. All distances to the significant impact area were within the fence line and no further modeling analysis was required for NO_2.

TABLE 5-1. SUMMARY OF SULFUR DIOXIDE SIGNIFICANT IMPACTS FOR SAC

Year	Highest 3-hour Concentration ($\mu g/m^3$)	Distance to Significant 3-hour Impact (m)	Highest 24-hour Concentration ($\mu g/m^3$)	Distance to Significant 24-hour Impact (m)	Highest annual Concentration ($\mu g/m^3$)	Distance to Significant Annual Impact (m)
1992	3.9	< Fence line	0.97	< Fence line	0.06	< Fence line
1993	4.2	< Fence line	1.0	< Fence line	0.07	< Fence line
1994	3.8	< Fence line	1.0	< Fence line	0.06	< Fence line
1995	4.0	< Fence line	1.8	< Fence line	0.06	< Fence line
1996	5.6	< Fence line	1.6	< Fence line	0.06	< Fence line
Allowable Significant Level	25	Anywhere Offsite	5	Anywhere Offsite	1	Anywhere Offsite

TABLE 5-2. SUMMARY OF CARBON MONOXIDE SIGNIFICANT IMPACTS FOR SAC

Year	Highest 8-hour Concentration ($\mu g/m^3$)	Distance to Significant 8-hour Impact (m)	Highest 1-hour Concentration ($\mu g/m^3$)	Distance to Significant 1-hour Impact (m)
1992	35	< Fence line	120	< Fence line
1993	39	< Fence line	121	< Fence line
1994	34	< Fence line	156	< Fence line
1995	54	< Fence line	122	< Fence line
1996	52	< Fence line	189	< Fence line
Allowable Significant Level	500	Anywhere Offsite	2000	Anywhere Offsite

TABLE 5-3. SUMMARY OF NITROGEN OXIDES SIGNIFICANT IMPACTS FOR SAC

Year	Highest Annual Concentration ($\mu g/m^3$)	Distance to Significant Annual Impact (m)
1992	0.42	< Fence line
1993	0.50	< Fence line
1994	0.42	< Fence line
1995	0.42	< Fence line
1996	0.40	< Fence line
Allowable Significant Level	1.0	Anywhere Offsite

TABLE 5-4. SUMMARY OF PM_{10} SIGNIFICANT IMPACTS FOR SAC

Year	Highest Annual Concentration ($\mu g/m^3$)	Distance to Significant Annual Impact (m)	Highest 24-hour Concentration ($\mu g/m^3$)	Distance to Significant 24-hour Impact (m)
1992	3.4	1600	15.8	2200
1993	3.4	1700	17.6	3000
1994	3.5	1600	18.4	3400
1995	3.5	1700	17.9	2700
1996	3.6	1700	18.9	3100
Allowable Significant Level	1.0	Anywhere Offsite	5.0	Anywhere Offsite

Significant impact concentrations for PM_{10} are presented in Table 5-4. The significant impact concentrations were exceeded for both the annual (1.0 $\mu g/m^3$) and 24-hour (5.0 $\mu g/m^3$) averaging periods. The maximum distance of the significant impact area was 3400 m for the 24-hour period. Because the SIA was beyond the fence line, additional Class II area PSD and NAAQS modeling for PM_{10} was required and is presented in subsequent sections. No other sources or facilities specifically fell within the significant impact area of SAC. A map of the SIA for PM_{10} is shown in Appendix D.

5.2 PM_{10} Increment Consumption Analysis

This analysis included all existing proposed and modified sources at SAC, contemporaneous emission increases, two Gainesville Power boilers, and all Florida Rock sources (current and proposed). No other increment-consuming sources were considered due to distance, insignificance or non-applicability of emissions, or permit lapse.

The increment analysis was performed using the modeling techniques of the ISCST3 Model described earlier in this report. Table 5-5 presents the Class II PM_{10} increment analysis for each applicable averaging period at the highest annual and 24-hour concentrations and the highest second-highest 24-hour concentrations for each year of meteorological data. As can be seen in these tables, the PSD increment impacts do not vary significantly from year-to-year with the controlling value being the highest second highest concentration of 29.4 $\mu g/m^3$ for the year of meteorological data in 1996.

Table 5-6 summarizes the highest increment consumption for each averaging period and pollutant and compares the SAC PSD and all other PSD source impacts to the full PSD increments. As can be seen, the increment consumption is less than the full PSD increment on an annual basis and less than the 24-hour PSD increment when considering the highest second highest concentration.

TABLE 5-5. CLASS II PM_{10} INCREMENT RESULTS – 1992-1996

Year	SAC Highest Annual Concentration, $\mu g/m^3$	Receptor Location		All PSD Highest Annual Concentration, $\mu g/m^3$	Receptor Location	
		East, m	North, m		East, m	North, m
1992	6.5	321,234	3315168	6.6	321,234	3315168
1993	6.5	321,234	3315168	6.6	321,234	3315168
1994	6.7	321,234	3315168	6.8	321,234	3315168
1995	6.5	321,234	3315168	6.6	321,234	3315168
1996	6.4	321,639	3315177	6.5	321639	3315177

Year	SAC Highest 24-Hour Concentration, $\mu g/m^3$	Receptor Location		All PSD Highest 24-Hour Concentration, $\mu g/m^3$	Receptor Location	
		East, m	North, m		East, m	North, m
1992	31.5	321639	3315177	31.5	321639	3315177
1993	29.2	321684	3315178	29.2	321684	3315178
1994	39.6	321684	3315178	39.6	321684	3315178
1995	35.3	321774	3315180	35.3	321774	3315180
1996	36.9	321774	3315180	36.9	321774	3315180

Year	SAC Highest Second Highest 24-Hour Concentration, $\mu g/m^3$	Receptor Location		All PSD Highest Second Highest 24-Hour Concentration, $\mu g/m^3$	Receptor Location	
		East, m	North, m		East, m	North, m
1992	29.3	321,234	3315168	29.3	321,234	3315168
1993	26.1	321642	3315040	26.1	321,642	3315050
1994	28.5	321729	3315179	28.4	321729	3315179
1995	28.6	321639	3315177	28.6	321639	3315177
1996	29.4	321642	3315040	29.4	321642	3315040

TABLE 5-6. PM_{10} PSD INCREMENT CONSUMPTION- SUMMARY

Averaging Period	Combined SAC and Other Source PM_{10} Concentrations, $\mu g/m^3$					Highest Five-Year Concentration, $\mu g/m^3$	Allowable PSD Increment, $\mu g/m^3$
	1992	1993	1994	1995	1996		
Annual Maximum	6.6	6.6	6.8	6.6	6.5	6.8	17
24-hr Highest Second High	29.3	26.1	28.4	28.6	29.4	29.4	30

a Included Line 1 and 2 sources for all potential emissions. Also included the contributions from other nearby increment consuming sources.

5.3 PM_{10} NAAQS Analysis

The PSD rules require that a demonstration be provided showing that the proposed source emissions when modeled with other sources in the area and adding background do not exceed the NAAQS. Dispersion modeling for a NAAQS impact assessment was required for PM_{10}, which exceeded the SIL for the proposed SAC sources beyond the fence line. Other major sources existing in and near the significant impact area were included in the modeling. The criteria outlined in Section 3 were used whereby the FDEP selects the applicable sources to include in this NAAQS analysis. This included the comparison of the source emissions for each source within about 75 km to the 20D distance. These results are presented in Appendix B, with the sources failing the 20D screening being included in the analysis. The sources remaining after 20D were described and presented in Section 3.

A summary table of the maximum concentration impacts of PM_{10} for all sources included in the NAAQS modeling is presented in Table 5-7 for each year of meteorological data. The maximum annual, highest 24-hour, and highest second-highest 24-hour concentrations are shown in the tables as appropriate. Table 5-8 shows a summary of the highest year impacts (maximum for annual and highest second-high for short-term) combined with the background concentrations. Overall, the impacts for each year for each averaging period for PM_{10} are less than the applicable NAAQS.

TABLE 5-7. PM_{10} NAAQS ANALYSIS – 1992-1996

Year	Highest Annual Concentration	Receptor Location	
	$\mu g/m^3$	East, m	North, m
1992	6.6	321234	3315168
1993	6.6	321234	3315168
1994	6.8	321234	3315168
1995	6.6	321234	3315168
1996	6.5	321639	3315177

Year	Highest 24-Hour Concentration	Receptor Location	
	$\mu g/m^3$	East, m	North, m
1992	31.5	321639	3315177
1993	29.2	321684	3315178
1994	39.6	321684	3315178
1995	35.3	321774	3315180
1996	36.9	321774	3315180

Year	Highest Second Highest 24-Hour Concentration	Receptor Location	
	$\mu g/m^3$	East, m	North, m
1992	29.3	321234	3315168
1993	26.1	321642	3315040
1994	28.4	321729	3315179
1995	28.6	321639	3315177
1996	29.4	321642	3315040

TABLE 5-8. PM_{10} NAAQS IMPACT ANALYSIS - SUMMARY

Averaging Period	Total Baseline and PSD Source Impact, $\mu g/m^3$	Background Concentration, $\mu g/m^3$	Total PM_{10} Concentration, $\mu g/m^3$	NAAQS, $\mu g/m^3$	Percent of NAAQS
24-hour	29.4	48	77.4	150	52
Annual	6.8	24	30.8	50	60

5.4 Additional Impacts Analysis

PSD review requires an analysis of impairment to visibility, soils, and vegetation that will occur as a result of the proposed and modified SAC sources. The review also requires an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the expansion.

5.4.1 Soils and Vegetation

No sensitive soil types are known to exist within the significant impact area of the SAC facility. Moreover, the areas of maximum impact are generally cultivated or forested and demonstrate no obvious sensitivity to industrial air emissions.

The NAAQS for all criteria pollutants were designed to protect the public health (primary standards) and welfare (secondary standards) from known or anticipated adverse effects and include a margin of safety. Factors that were considered in designing the standards included vegetation effects, soil effects, and material damage effects. Modeling of all the proposed SAC and existing emissions for the PM_{10} NAAQS analysis indicated that the maximum concentrations for all averaging times were less than each applicable NAAQS. Also SO_2, CO, and NO_2 emission impacts were less than the SIL's for these pollutants. Thus, no adverse effects on soils or vegetation are expected.

5.4.2 Growth Since 1977

Rule 62-212.400(5)(h) 5, F.A.C. requires the applicant to provide information relating to the air quality impact of, and the nature and extent of, all general commercial, residential, industrial and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect.

For the purposes of this report, the area the modification would affect is defined as the area of significant impact. As shown in Tables 5-1 to 5-4, the greatest significant impact distance is 3400 meters around the plant. This SIA does not cover the nearest town of Branford. Using the Census Bureau's LandView program, the population within the SIA was 385 in 1990 and increased to 465 in 2000.

For Suwannee County as a whole, the population increased from 22,287 in 1980 to 36,695. During the same period, housing units increased from 8,765 to 16,005.

The construction and modification of SAC is not expected to cause or contribute to related industrial or commercial growth that would have an impact on local ambient air quality.

5.4.3 Visibility

Visibility impacts for the Class I areas were calculated using a long range transport model, i.e., CALPUFF, because all four Class I areas are greater than 50 km from SAC. For consistency of presentation, the visibility impacts are presented in the next section of this report along with other Class I area impacts.

SECTION 6

CLASS I IMPACTS ANALYSIS

Dispersion modeling was performed to demonstrate the impacts of the combined emissions from the operation of the existing and proposed lines at Suwannee American Cement on nearby Class I areas. These areas included Bradwell Bay Wilderness Area, Chassahowitzka Wilderness Area, Okefenokee Wilderness Area, and St. Marks Wilderness Area. The approximate distances from the center of operations of SAC to the nearest edge of each Class 1 area as well as the administrating agency for each area is shown in Table 6-1.

TABLE 6-1. CLASS I AREAS WITHIN 200 KM OF SAC

Class I Area	Federal Land Manager	Distance from SAC to Nearest Class I Receptor, km
Bradwell Bay Wilderness	Forest Service	161
Chassahowitzka Wilderness	Fish & Wildlife Service	133
Okefenokee Wilderness		82
St. Marks Wilderness		110

The modeling for the Class I areas included an analysis of increment consumption in the Class I areas and impacts of the proposed facility (or combined facilities) on other Air Quality Related Values (AQRVs) designated by the Federal Land Managers (FLMs). For the PSD Class I increment consumption analysis, two steps were performed. The first was a modeling analysis to determine if the Line 2 project air quality impacts were greater than the applicable Class I area SILs. For any pollutants resulting in greater than SIL impacts, a multi-source modeling analysis must be conducted to determine the cumulative impact on the Class I PSD increment consumption.

For the AQRVs analysis, the recommendations in the *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase II Summary Report and Recommendations for Modeling Long*

Range Transport Impacts (EPA-454/R-98-019, December 1998) and the *Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report* (U.S. Forest Service-Air Quality Program, the National Park Service – Air Resources Division, and the U.S. Fish & Wildlife Service – Air Quality Branch, December 2000) were followed. The AQRVs include those set for visibility impacts and for sulfate and nitrate deposition.

The Class I impacts analyses were combined in this section of the report because of the common application of the CALPUFF Model. CALPUFF was applied in its screening mode, the so-called CALPUFF-lite. The application of CALPUFF-lite was implemented following the guidance offered in *Guide for Applying the EPA Class I Screening Methodology with the CALPUFF Modeling System* (Earth Tech, Inc., September 2001). The methodology is referred to as CALPUFF-lite because it by-passes the need to generate a full three-dimensional wind field using the CALMET meteorological preprocessor. CALPUFF-lite instead uses meteorological data generated by the PCRAMMET Program which generates data for a single meteorological station in the format for the Industrial Source Complex Model (Version 3) in its short-term mode (ISCST3). This single-station generated data set along with the deposition and precipitation variables generated for each hour of the year were used to represent the meteorological field around the facility out to the Class I areas.

6.1 Class I Modeling Protocol

The CALPUFF-lite screening modeling procedure was followed in preparing the Class I impact assessment. A meteorological data set equivalent to that used in the Class II modeling analysis was used for this Class I modeling, namely, the 1992-1996 data for the surface meteorological observations for the airport located to the southeast in Gainesville (NWS No. 12816). This consisted of hourly observations of wind speed, wind direction, atmospheric stability class, and temperature and upper air mixing heights from the Jacksonville International Airport (NWS No. 13889). The meteorological data were prepared in the extended ISCST3 format, including the calculation of wind speed, wind flow direction, temperature, stability class, mixing height, friction velocity, Monin-Obukhov length, precipitation rate, short-wave radiation, and relative humidity.

Receptors for the Class I modeling were downloaded from the National Park Service, Air Resources Division (ARD) website for each of the four Class I areas of interest. The ARD has developed this database of receptors for such modeling analyses for each Class I area in the contiguous U.S. Figure 6-1 shows the four Class I areas with respect to each other as well as to the location of SAC.

For the purpose of determining the maximum potential impact of the existing and proposed SAC sources on the Class I areas, all emissions were assumed to emanate through a single source, namely, the existing kiln/raw mill baghouse stack. Emissions included all fugitives, roadways, storage piles, baghouses, and stacks. This is a very conservative approach for PM_{10}, considering that much of emissions are due to fugitive sources that are emitted near ground level and will have insignificant impacts at distant receptors.

6.2 Class I Increment Consumption

A Class I significant impact analysis was conducted using the CALPUFF-lite modeling technique described above. Tables 6-2 through 6-4 show the impacts on each Class I area for each year of analysis for SO_2, NO_x, and PM_{10}. As can be seen, the air quality impacts in each area are less than the Class I SILs proposed by EPA on July 23, 1996 at 61 FR 38292 (the current Class I SIL's in Florida rules are higher). As can be seen in these three tables, the impacts of the SAC sources are all less than the applicable proposed SILs and thus, no further Class I PSD increment modeling is required.

6.3 Visibility Analysis

The revised IWAQM guidance referenced above recommends the use of non-steady state dispersion modeling for both screening and refined dispersion modeling. The CALPUFF-lite modeling recommendations were used to calculate the visibility impacts of the combined existing and proposed SAC sources. Following the protocol for applying the CALPUFF-lite screening methodology, modeling was performed to evaluate the visibility impacts of the increased SAC emissions at each of the Class I areas. The modeling resulted in the calculation of ground-level air concentrations of visibility impairing pollutants which were subsequently converted to

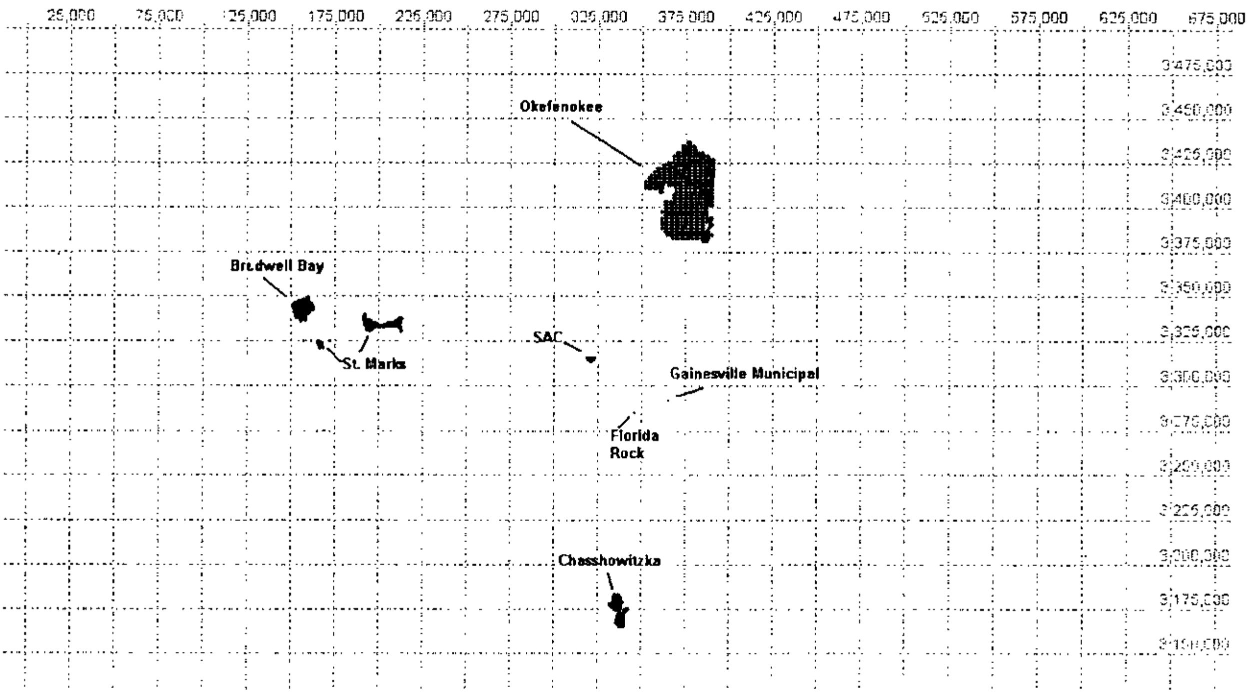


Figure 6-1. Location of Class I Areas Relative to SAC

TABLE 6-2. SUMMARY OF SULFUR DIOXIDE CLASS I SIGNIFICANT IMPACTS

Year	Highest 3-hour Concentration ($\mu g/m^3$)				Highest 24-hour Concentration ($\mu g/m^3$)				Highest Annual Concentration ($\mu g/m^3$)			
	Bradwell Bay	Chas	Oke	St Marks	Bradwell Bay	Chas	Oke	St. Mark	Bradwell Bay	Chas	Oke	St. Marks
1992	0.10	0.14	0.29	0.17	0.024	0.029	0.061	0.035	0.001	0.002	0.004	0.002
1993	0.11	0.12	0.33	0.18	0.034	0.044	0.089	0.053	0.001	0.002	0.004	0.002
1994	0.11	0.14	0.29	0.15	0.024	0.028	0.066	0.037	0.001	0.002	0.004	0.002
1995	0.10	0.17	0.32	0.16	0.025	0.034	0.082	0.049	0.001	0.002	0.004	0.002
1996	0.12	0.12	0.38	0.19	0.027	0.035	0.075	0.042	0.001	0.001	0.004	0.002
Proposed EPA SIL	1.0				0.2				0.1			

TABLE 6-3. SUMMARY OF NITROGEN OXIDES CLASS I SIGNIFICANT IMPACTS

Year	Highest Annual Concentration ($\mu g/m^3$)			
Class I Area	Bradwell Bay	Chas	Oke	St. Marks
1992	0.004	0.006	0.018	0.009
1993	0.004	0.006	0.018	0.009
1994	0.004	0.006	0.018	0.009
1995	0.004	0.007	0.018	0.010
1996	0.003	0.005	0.015	0.007
Proposed EPA SIL	0.1			

TABLE 6-4. SUMMARY OF PM_{10} CLASS I SIGNIFICANT IMPACTS

Year	Highest Annual Concentration ($\mu g/m^3$)				Highest 24-hour Concentration ($\mu g/m^3$)			
Class I Area	Bradwell Bay	Chas	Oke	St Marks	Bradwell Bay	Chas	Oke	St Marks
1992	0.003	0.004	0.006	0.004	0.070	0.080	0.101	0.058
1993	0.003	0.004	0.006	0.004	0.076	0.095	0.129	0.079
1994	0.003	0.004	0.006	0.004	0.058	0.081	0.093	0.056
1995	0.004	0.005	0.007	0.004	0.071	0.083	0.125	0.076
1996	0.003	0.004	0.006	0.003	0.068	0.087	0.108	0.064
Proposed EPA SIL	0.2				0.3			

light-extinction coefficients using the equations in the IWAQM guidance for individual constituents. The total atmospheric extinction was then calculated for all constituents in the modeling including sulfates and nitrates. The resultant extinction coefficient at each receptor at both the nearest and furthest Class I receptor distance to SAC for each Class I area (e.g., 82 km and 134 km for Okefenokee which were modeled every two degrees in all 360 degrees of the compass, regardless of where Okefenokee was located with respect to SAC) due to the increased SAC emissions was compared to the background extinction coefficient. The background extinction coefficient was calculated using the methodology in *Appendix 2.B – Estimate of Natural Conditions* (FLAG 2000 guidance) which was subsequently adjusted in CALPOST post-processing using the daily relative humidities from the meteorological data sets. The analysis was based on 24-hour averages of visibility as recommended by the FLAG guidance. The background extinction was calculated from the maximum 24-hour concentrations of ammonium sulfate and nitrate measured each month at the IMPROVE sites at Okefenoke, St. Marks, and Chassahowitzka. No data were available for Bradwell Bay but St. Marks was deemed representative due to the proximity of the two areas.

As per the FLAG and IWAQM guidance, if the percent change in extinction coefficient relative to background is below 5 percent, the FLMs are not likely to object to the project and a cumulative impact assessment would likely not be requested. Table 6-5 presents the results of the visibility calculations for the proposed sources on each Class I area considered. The increased SAC emissions have a visibility impairment less than 5 percent over a 24-hour period for each year of the modeling for each of the Class I areas. Thus, the visibility impact analysis for the Class I areas using the CALPUFF-lite modeling methodology demonstrated that the impacts to each Class I area were less than the FLAG recommended evaluation criteria of a 5 percent change over the background extinction.

TABLE 6-5. CLASS I AREA VISIBILITY IMPAIRMENT ANALYSIS – MAXIMUM PERCENT CHANGE IN EXTINCTION COEFFICIENT

Class I Area	Year of Meteorological Data				
	1992	1993	1994	1995	1996
Bradwell Bay	1.27 %	1.80 %	1.35 %	1.46 %	1.85 %
Chasshowitka	1.49 %	1.93 %	1.45 %	1.86 %	1.66 %
Okeefenokee	2.95 %	3.21 %	2.15 %	3.11 %	2.79 %
St. Marks	2.47 %	2.42 %	1.83 %	2.21 %	2.05 %
Recommended Maximum Extinction Change	5%	5%	5%	5%	5%

6.4 Class I Deposition Analysis

For the sulfate/nitrate deposition analysis, modeling was performed for the Class I areas following the CALPUFF-lite methodology outlined above. Table 6-6 presents the annual deposition values for each Class I area compared to the Deposition Analysis Threshold (DAT) for sulfur and nitrogen deposition as specified in a letter from the National Park Service and the U.S. Fish & Wildlife Service (to Mr. S. Becker, Executive Director of STAPPA/ALAPCO, January 2, 2002) and as presented in the associated *Guidance on Nitrogen And Sulfur Deposition*

Analysis Thresholds (downloaded from the FLM website at www2.nature.nps.gov/air/permits/flag/flaginfo.index.htm). The DAT that was proposed in the Guidance is 0.01kg/ha/yr for both sulfur and nitrogen. This DAT was presented as a "deposition threshold, not necessarily an adverse impact threshold." If all deposition from the increased SAC emissions is less than the applicable DAT, the FLM would likely determine that the SAC modification would not have an adverse impact on the Class I areas. The DAT was deemed applicable to all Class I areas east of the Mississippi River and thus, to each of the four Class I areas included in this analysis. As can be seen in Table 6-6, all deposition rates were less than the DAT for sulfur and nitrogen.

TABLE 6-6. SULFATE/NITRATE DEPOSITION DUE TO INCREASED SAC EMISSIONS

Class I Area	Pollutant	Deposition Rate by Year of Meteorological Data, kg/ha/yr					East U.S. DAT, kg/ha/yr
		1992	1993	1994	1995	1996	
Bradwell Bay	Sulfur	0.0012	0.0012	0.0012	0.0012	0.0009	0.01
	Nitrogen	0.0031	0.0031	0.0028	0.0028	0.0028	0.01
Chas	Sulfur	0.0016	0.0016	0.0016	0.0016	0.0012	0.01
	Nitrogen	0.0043	0.0043	0.0040	0.0043	0.0037	0.01
Oke	Sulfur	0.0031	0.0031	0.0031	0.0031	0.0031	0.01
	Nitrogen	0.0093	0.0093	0.0093	0.0093	0.0093	0.01
St. Marks	Sulfur	0.0031	0.0031	0.0031	0.0031	0.0031	0.01
	Nitrogen	0.0062	0.0062	0.0062	0.0062	0.0062	0.01

SECTION 7

MERCURY DEPOSITION

As discussed in a response to the Florida DEP by Florida Rock Industries on this issue, there are several forms of mercury detected in the emissions from cement kilns. Primarily, these include elemental mercury [Hg(O)] and reactive mercury [Hg(II)]. The two types of mercury species are expected to behave quite differently once emitted from the stack. Hg(O), due to its high vapor pressure and low water solubility, is not expected to deposit close to the facility. Hg(II), because of differences in these properties., is expected to deposit closer to the emission source. Most of the mercury an the atmosphere is elemental mercury vapor, which circulates in the atmosphere for up to a year, and hence can be widely dispersed and transported thousands of miles from likely sources of emission. The reactive form of mercury, when either bound to airborne particles or in a gaseous form, is removed from the atmosphere by precipitation and is also dry deposited.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a nationwide network of precipitation monitoring sites. The network is a cooperative effort, between many different groups, including the State Agricultural Experiment Stations, U.S. Geological Survey, U.S. Department of Agriculture, and numerous other governmental and private entities. The purpose of the network is to collect data on the chemistry of precipitation for monitoring of geographical and temporal long-term trends. The precipitation at each station is collected weekly according to strict clean-handling procedures. It is then sent to the Central Analytical Laboratory where it is analyzed.

The National Atmospheric Deposition Program has expanded its sampling to include the Mercury Deposition Network (MDN), which was formed in 1995 to collect weekly samples of precipitation which are analyzed by Frontier Geosciences for total mercury. The objective of the MDN is to monitor the amount of mercury in precipitation on a regional basis. The nearest NADP/MDN Monitoring Location is Station FLO5 at the Chassahowitzka National Wildlife Refuge in Citrus County, Florida. This station is approximately 82 miles from the SAC plant.

The monitoring station has been in operation from 7/1/1991- present (see http://nadp.sws.uniuc.edu/nadpoverview.asp).

Data from this station were used to estimate the background wet and dry deposition of mercury in the vicinity of the SAC site. The annualized weekly average total mercury deposition for the period of record is 20 $\mu g/m^2$.

The program used to model the transport and deposition of mercury was the ISCST3 Model, used in a similar manner to other Class II analyses in this report except that it considered deposition. The model has a gas dry deposition component as well as a gas wet deposition component and both wet and dry particle deposition components.

Hg(II) was considered in the air dispersion modeling. At the point of stack emission and during atmospheric transport, the contaminant is partitioned between two physical phases: vapor and particle-bound. These contaminants can be removed from the atmosphere by both wet deposition and dry deposition. For the present analysis, the speciation of emitted mercury was based on the Mercury Study Report to Congress RELMAP modeling. These data have speciation percentages for Portland cement manufacturing of 80 percent elemental mercury, and 10 percent each for vapor and particle Hg(II).

An aerosol particle size distribution based on data collected by Whitby (1978) was used. This distribution is split between two modes: accumulation and coarse particles. The geometric mean diameter of several hundred measurements indicates that the accumulation mode dominates particle size, and a representative particle diameter for this mode is 0.3 microns. The coarse particles are formed largely from mechanical processes that suspend dust and soil particles in the air. A representative diameter for coarse particles is 5.7 microns. The fraction of particle emissions assigned to each particle class is approximated based on the determination of the density of surface area of each representative particle size relative to total surface area of the aerosol mass. Using this method, approximately 93% and 7% of the total surface area is estimated to be in the 0.3 and 5.7 micron diameter particles, respectively. In this analysis, nitric acid vapor was used as a surrogate for Hg vapor based on their similar solubilities in water. In the ISCST3 Model, the dry deposition of divalent mercury vapor was modeled by calculating a dry deposition velocity for each hour using the assumptions made for nitric acid.

For wet deposition of vapor and particulate Hg(II), the ISCST3 wet deposition option was used. The same data on particle size distribution and particle density was used as in the dry particle deposition runs. For particles, the wet deposition scavenging ratios used were from Figure 4-4 in the EPA Mercury Report (0.8E-4 sec/mm/hr for the 0.3 micron size range and 3.8E-4 sec/mm/hr for the 5.7 micron size range). For vapor phase Hg(II) deposition, a scavenging coefficient of 1.6E-6 sec/mm/hr was also used (based on the nitric acid scavenging ratio as described in the EPA Mercury Report).

Based on the maximum proposed stack emissions of 122 pounds per year of mercury for the new kiln, the maximum annual wet and dry deposition of mercury vapor and particles is 9.76 $\mu g/m^3$, which is less than 50 percent of the background deposition rate.

APPENDIX A

STRUCTURE DIMENSIONS

Structure ID	Base Elevation (feet)	Building Height (feet)	Corner 1		Corner 2		Corner 3		Corner 4		Corner 5		Corner 6		Corner 7		Corner 8		Corner 9	
			Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)	Northing (meters)
106	56	88	321477	3315924	321476	3315652	321515	3315652	321517	3315924										
107	59	94	321421	3316060	321395	3315987	321432	3315974	321458	3316048										
8A	56	105	321356	3315798	321356	3315776	321378	3315776	321378	3315798										
8B	56	105	321321	3315799	321321	3315776	321343	3315776	321343	3315798										
17A	55	263	321346	3315748	321346	3315740	321353	3315740	321353	3315748										
17B	55	263	321318	3315748	321318	3315740	321325	3315740	321325	3315748										
19A	55	74	321342	3315697	321341	3315669	321360	3315669	321360	3315696										
19B	55	74	321316	3315697	321316	3315669	321335	3315669	321335	3315697										
110A	55	128	321353	3315664	321353	3315650	321363	3315650	321363	3315664										
110B	55	128	321320	3315661	321320	3315647	321330	3315647	321330	3315661										
29A	55	105	321368	3315538	321367	3315506	321384	3315506	321384	3315538										
29B	55	105	321341	3315538	321341	3315506	321358	3315506	321358	3315538										
100	55	35	321271	3315730	321271	3315675	321291	3315675	321291	3315706	321294	3315710	321295	3315714	321293	3315718	321291	3315722	321291	3315730
104	56	35	321405	3315795	321404	3315743	321435	3315743	321435	3315794										
37	55	40	321371	3315719	321371	3315694	321402	3315694	321402	3315719										
26	55	40	321413	3315613	321413	3315582	321438	3315582	321438	3315613										
105A	55	40	321375	3315759	321374	3315735	321393	3315735	321393	3315759										
105B	56	40	321313	3315822	321313	3315803	321337	3315803	321337	3315822										

Structure ID	Base Elevation (feet)	Center		Silo Height (feet)	Silo Diameter (feet)
		Easting (meters)	Northing (meters)		
25A	56	321323	3315602	187	74
25B	55	321350	3315602	187	74
25C	55	321350	3315576	187	74
25D	55	321323	3315576	187	74
15A	55	321318	3315766	252	46
15B	56	321345	3315766	252	46
109A	55	321432	3315493	190	46
109B	55	321446	3315493	190	46
109C	55	321461	3315492	190	46
109D	55	321461	3315478	190	46
109E	55	321446	3315478	190	46
109F	55	321432	3315478	190	46
SP2	59	321839	3315723	0	408
SP1	54	322267	3315097	0	408

APPENDIX B

20D ANALYSES FOR SAC -
FDEP INVENTORY AND 20D DISTANCES TO SAC

APPENDIX C

SAC GEP ANALYSIS FOR PSD AND NAAQS

C:\050430.0001\SAC_PSDPM10.bst BEESTWin GEP Files 2/9/2005 4:16:39 PM

BEE-Line Software Version: 9.30

Input File - SAC_PSDPM10.GPW

Input File - SAC_PSDPM10.PIP

Output File - SAC_PSDPM10.TAB

**** Output File - SAC_PSDPM10.SUM ****

Output File - SAC_PSDPM10.SO

BPIP (Dated: 04112)

DATE : 2/ 9/2005
TIME : 16:16:39
C:\050430.0001\SAC_PSDPM10.bst BEESTWin GEP Files 2/9/2005 4:16:39 PM

============================
BPIP PROCESSING INFORMATION:
============================

The ST flag has been set for preparing downwash data for an ISCST run.

Inputs entered in METERS will be converted to meters using a conversion factor of 1.0000. Output will be in meters.

The UTMP variable is set to UTMY. The input is assumed to be in UTM coordinates. BPIP will move the UTM origin to the first pair of UTM coordinates read. The UTM coordinates of the new origin will be subtracted from all the other UTM coordinates entered to form this new local coordinate system.

Plant north is set to 0.00 degrees with respect to True North.

C:\050430.0001\SAC_PSDPM10.bst BEESTWin GEP Files 2/9/2005 4:16:39 PM

PRELIMINARY* GEP STACK HEIGHT RESULTS TABLE
(Output Units: meters)

Stack Name	Stack Height	Stack-Building Base Elevation Differences	GEP** EQN1	Preliminary* GEP Stack Height Value
E21_01	96.01	0.00	144.26	144.26
E28_01	17.07	0.10	152.43	152.43
G07_01	73.76	0.00	152.53	152.53
H08_01	15.24	-0.10	152.63	152.63
L03_01	11.28	-0.10	142.47	142.47
L06_01	58.52	-0.10	142.34	142.34
M08_01	5.79	-0.20	142.44	142.44

S21_01	18.29	-0.10	144.12	144.12
K15_01	65.23	-0.10	142.34	142.34
E34_01	15.24	-0.10	152.63	152.63
H08A_01	10.67	-0.20	152.73	152.73
U05_01	36.58	0.20	144.06	144.06
N09_01	53.34	-0.20	142.44	142.44
N12_01	39.93	-0.20	142.44	142.44
N36_01	19.81	-0.20	142.44	142.44
N91_01	14.33	-0.20	142.44	142.44
P03_01	16.46	-0.20	142.44	142.44
P11_01	59.44	-0.20	142.44	142.44
Q14_01	8.84	-0.20	142.44	142.44
Q17_01	11.89	-0.20	142.44	142.44
Q24_01	17.37	-0.20	142.44	142.44
S17_01	30.48	0.00	143.66	143.66
E28_02	17.07	0.00	152.53	152.53
E34_02	15.24	-0.20	152.73	152.73
G07_02	73.76	-0.10	152.63	152.63
H08_02	15.24	-0.20	152.73	152.73
H08A_02	10.67	-0.20	152.73	152.73
U05_02	36.58	0.20	144.06	144.06
E21_02	96.01	0.10	151.81	151.81
L03_02	11.28	-0.20	151.90	151.90
L06_02	58.52	0.10	146.79	146.79
L25_02	24.99	-0.10	143.28	143.28
M08_02	5.79	0.00	145.68	145.68
M09_02	3.05	-0.10	143.42	143.42
N09_02	53.34	-0.20	142.44	142.44
N12_02	53.34	-0.20	142.44	142.44
N36_02	19.81	-0.20	142.44	142.44
N91_02	14.33	-0.20	142.44	142.44
P03_02	16.46	-0.20	142.44	142.44
P11_02	59.44	-0.20	142.44	142.44
Q17_02	11.89	-0.20	142.44	142.44
S17_02	30.48	0.00	144.26	144.26
S21_02	18.29	0.00	144.26	144.26

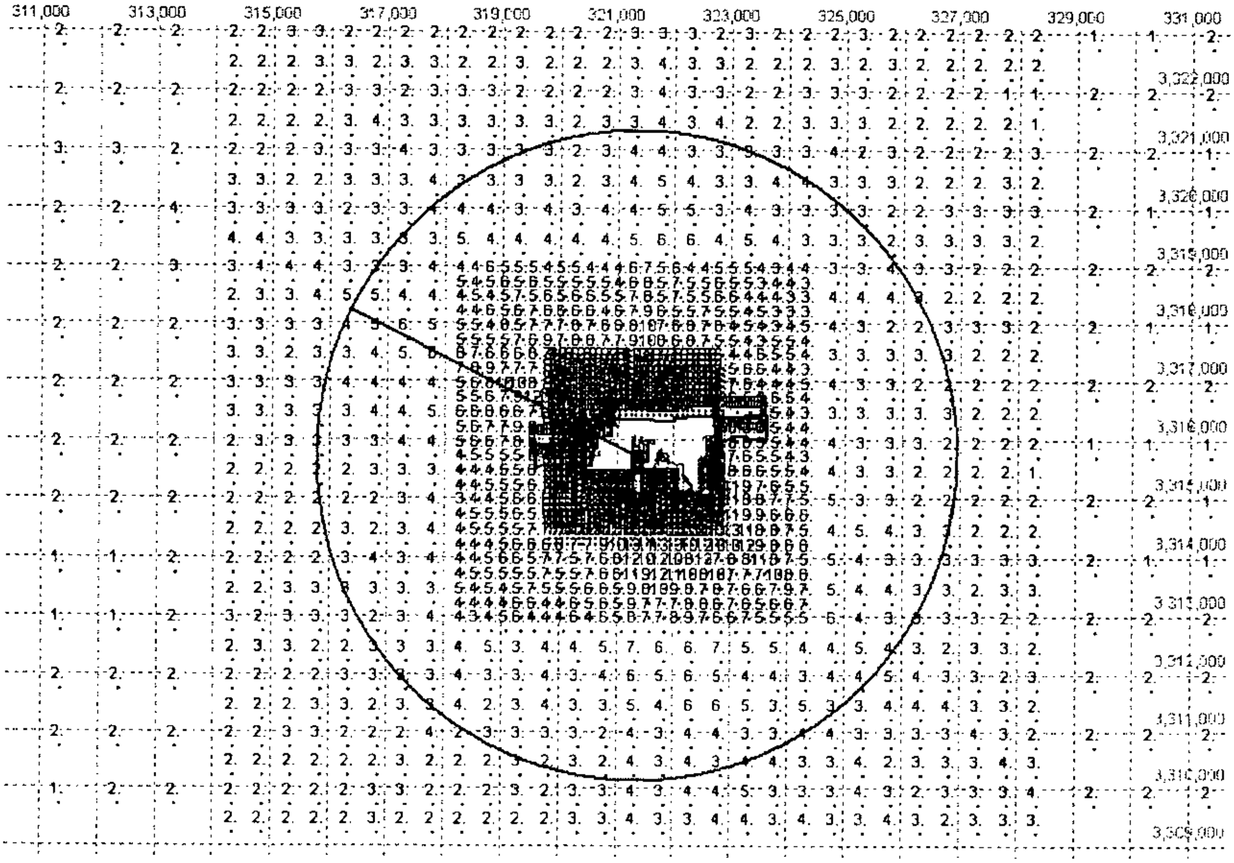
* Results are based on Determinants 1 & 2 on pages 1 & 2 of the GEP Technical Support Document. Determinant 3 may be investigated for additional stack height credit. Final values result after Determinant 3 has been taken into consideration.

** Results were derived from Equation 1 on page 6 of GEP Technical Support Document. Values have been adjusted for any stack-building base elevation differences.

Note: Criteria for determining stack heights for modeling emission limitations for a source can be found in Table 3.1 of the GEP Technical Support Document.

APPENDIX D

SIGNIFICANT IMPACT AREA FOR PM_{10}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