TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

PROJECT

Project No. 1210465-014-AC
Air Permit No. PSD-FL-352

Suwannee American Cement, L.L.C.
Portland Cement Manufacturing Plant
Proposed Kiln Line No. 2

APPLICANT

Suwannee American Cement, L.L.C.
Branford Cement Plant
5117 US Highway 27
Branford, FL 32008

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resources Management
Bureau of Air Regulation - Air Permitting North
2600 Blair Stone Road, MS #5505
Tallahassee, FL 32399-2400

November 8, 2005

1. GENERAL PROJECT INFORMATION

Facility Description and Location

Suwannee American Cement, LLC, owns and operates an existing portland cement manufacturing plant and associated quarry. The existing facility is located at U.S. Highway 27 and County Road 49 in Branford, Suwannee County, Florida. The UTM coordinates of the facility are Zone 17; 321.4 km East and 3315.9 km North. The following figures identify the map location.

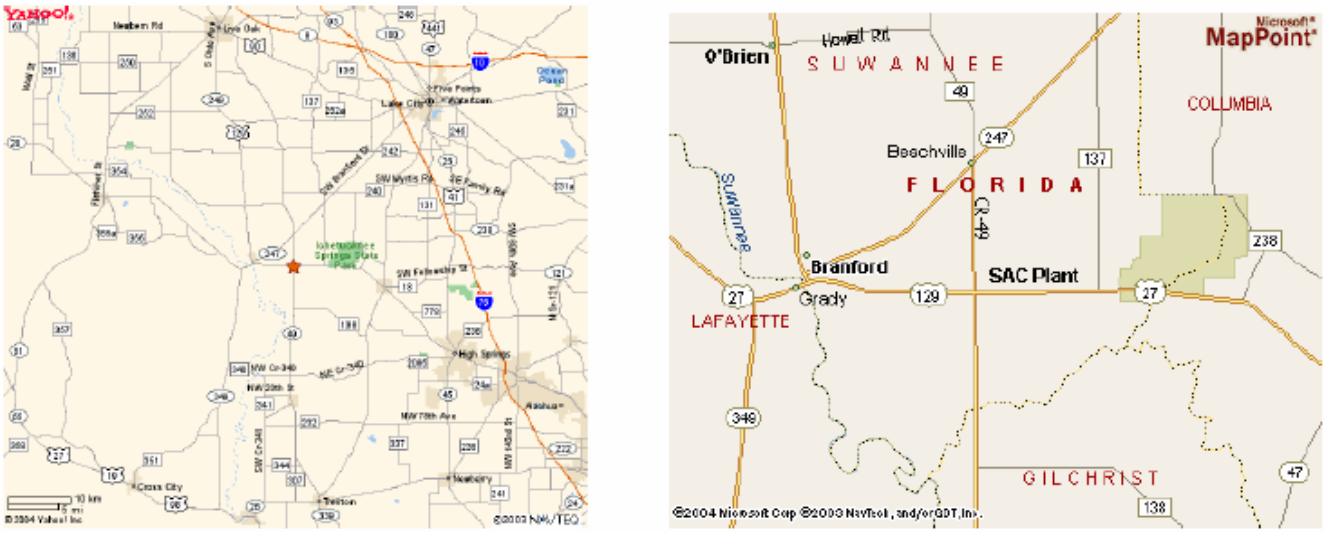

Figure 1A. Map Location of Existing Suwannee American Cement Plant (Yahoo and MapPoint)

The existing plant processes raw materials in a dry, preheater/precalciner rotary kiln system with an in-line raw mill to produce cement clinker, which is milled and combined with gypsum to produce portland cement. The existing plant has a capacity of 210 tons per hour of dry preheater feed materials, 120 tons per hour of clinker production, and 150 tons per hour of portland cement production. Annual production is limited to the following 12-month rolling totals: 1,648,578 tons per year of dry preheater feed materials; 965,425 tons per year of clinker production; and 1,191,360 tons per year of portland cement production. Fuels currently authorized for the existing pyroprocessing system include natural gas, coal, petroleum coke, tires, and fly ash. The plant also operates a coal processing operation to crush coal and/or petroleum coke with a total monthly processing capacity of 13,360 tons of coal and/or petroleum coke.

Regulatory Categories

Title III: The facility is a major source of hazardous air pollutants (HAP).

Title IV: The facility operates no units subject to the acid rain provisions of the Clean Air Act.

Title V: The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.

PSD: The facility is a PSD-major source of air pollution in accordance with Rule 62-212.400, F.A.C.

NSPS: Some units are subject to a New Source Performance Standard (NSPS) in 40 CFR 60.

NESHAP: Some units are subject to a National Emissions Standard for Hazardous Air Pollutants in 40 CFR 63.

Project Description

The applicant proposes to expand the existing portland cement plant by constructing a new cement manufacturing line. Kiln Line No. 2 will include a new dry process preheater/precalciner rotary kiln system with in-line raw mill and will have the following hourly capacities: 215 tons per hour of dry preheater feed materials; 127 tons per hour of clinker production; and 175 tons per hour of portland cement production. For the

Kiln Line No. 2 system, dry preheater feed material will be limited to 1,789,230 tons during any consecutive 12 months and clinker production from to no more than 1,055,500 tons during any consecutive 12 months. The proposed project will affect the following existing and new emissions units.

EU No.	Emissions Unit Description
001	(Existing) Primary crusher and associated belt conveyors
003	(Existing) Raw material processing with unenclosed conveyor transfer points - D conveyors
009	(Existing) Unenclosed coal conveying equipment - S Conveyors
011	(New) Clinker and cement handling and storage with baghouse controls for miscellaneous emissions points
012	(New) Coal mill and coal transfer system with baghouse controls for miscellaneous emissions points
013	(New) Dry process preheater/precalciner rotary kiln with in-line raw mill
014	(New) Raw material handling and storage with baghouse controls for miscellaneous emissions points
015	(New) Fugitive dust from storage piles, paved roads, and unpaved roads

Proposed fuels for the pyroprocessing system include natural gas, fuel oil, on-specification used oil fuel, coal, petroleum coke, and tires. Tires will be fired whole, chipped, or gasified. The combustion of fuels and processing of raw materials will result in emissions of carbon monoxide (CO), dioxins/furans (D/F), mercury (Hg), nitrogen oxides (NOx), particulate matter (PM/PM_{10}), sulfur dioxide (SO_2), and volatile organic compounds (VOC). The applicant proposes the following controls for the kiln system: Selective Non-Catalytic Reduction (SNCR) system to reduce NOx emissions; a single baghouse control system to remove particulate matter emissions from the rotary kiln, raw mill, and clinker cooler exhausts; use of low sulfur raw materials; hydrated lime injection as needed to control SO_2 emissions; and good combustion design and practices to reduce CO, D/F and VOC emissions. Potential mercury emissions will be restricted by limiting the maximum mercury throughput from raw materials and fuels.

The project includes a coal processing operation designed to crush coal and petroleum coke with an annual processing capacity of 150,000 tons per year of coal and/or petroleum coke. The project will add numerous silos, bins, and conveyors as well as increase demands on storage areas and plant roads. Raw materials will be mined, screened, and handled wet to prevent fugitive dust emissions. Enclosed bins and silos will be controlled with baghouse systems. Paved plant roads will be periodically swept with a vacuum truck to reduce dust and prevent fugitive emissions from truck traffic. Unpaved roads will be watered as necessary to reduce dust.

Application Processing Schedule

- Permit application and report received on February 25, 2005.
- Received Additional information from the applicant March 17, 2005 and March 21, 2005.
- Department's request for additional information on March 31, 2005.
- Department's request for additional information on April 15, 2005.
- Applicant's additional information received April 28, 2005.
- Applicant's additional information received May 11, 2005.
- Department's request for additional information on June 10, 2005.
- Department forwarded comments from the Fish and Wildlife Service on June 15, 2005.
- Applicant's additional information received June 24, 2005.
- Applicant submitted air quality modeling files on CD on July 8, 2005.
- Applicant's additional information received July 20, 2005 via email.
- Department's request for additional information on July 22, 2005.

- Department's request for additional information on August 5, 2005.
- Applicant's additional information (partial) received August 29, 2005.
- Applicant's additional information received September 2, 2005 (revised CD of modeling output files).
- Applicant's additional information received September 19, 2005 (revised CD of fence-line modeling output and updated pages for Attachment 1).
- Applicant's additional information received September 20, 2005 (corrected worksheets of potential emissions for sources FQ2_B40 and SP6_FR2).
- Applicant's additional information received September 22, 2005 (hardcopies of revised facility layout drawings).
- Applicant's additional information received September 23, 2005 (email of AutoCAD files of revised facility layout drawings); complete.
- Applicant's additional information received October 20, 2005 (email).

2. APPLICABLE REGULATIONS

State Regulations

This project is subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The Florida Statutes authorize the Department of Environmental Protection to establish rules and regulations regarding air quality as part of the Florida Administrative Code (F.A.C.). This project is subject to the applicable rules and regulations defined in the following Chapters of the Florida Administrative Code.

Chapter	Description
62-4	Permitting Requirements
62-204	Ambient Air Quality Requirements, PSD Increments, and Federal Regulations Adopted by Reference
62-210	Required Permits, Public Notice, Reports, Stack Height Policy, Circumvention, Excess Emissions, and Forms
62-212	Preconstruction Review, PSD Requirements, and BACT Determinations
62-213	Operation Permits for Major Sources of Air Pollution
62-296	Emission Limiting Standards Rule 62-296.407, F.A.C. – Portland Cement Processing Plant
62-297	Test Methods and Procedures, Continuous Monitoring Specifications, and Alternate Sampling Procedures

Federal Regulations

This project is also subject to the applicable federal provisions regarding air quality as established by the EPA in the following sections of the Code of Federal Regulations (CFR).

Title 40	Description
Part 60	Subpart A - General Provisions for NSPS Sources Subpart F - Portland Cement Plants Subpart Y - Coal Preparation Plants Subpart OOO - Non Metallic Mineral Processing Plants Applicable Appendices
Part 63	Subpart A – General Provisions for NESHAP Sources NESHAP Subpart LLL - Portland Cement Manufacturing Industry Applicable Appendices

PSD Applicability and Preconstruction Review

The Department regulates major air pollution facilities in accordance with Florida's Prevention of Significant Deterioration (PSD) program, as defined in Rule 62-212.400, F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal Ambient Air Quality Standards (AAQS) for each regulated pollutant or areas designated as "unclassifiable" for such pollutants. A facility is considered "major" with respect to PSD if it emits or has the potential to emit:

≥ 250 tons per year of any regulated pollutant, or

≥ 100 tons per year of any regulated pollutant and belonging to one of 28 "PSD major facility categories", or

≥ 5 tons per year of lead.

For new projects at existing PSD-major facilities, each regulated pollutant is reviewed for PSD applicability based on emissions thresholds known as the Significant Emission Rates specified in Table 62-212.400-2, F.A.C. Pollutant emissions from the project exceeding these rates are considered "significant" and subject to PSD preconstruction review. This means that the applicant must employ the Best Available Control Technology (BACT) to control emissions of each PSD-significant pollutant as well as evaluate the air quality impacts. Although a facility may be "major" with respect to PSD review for only one regulated pollutant, the project may be subject to preconstruction review for several PSD-significant pollutants.

The existing Suwannee American Cement Plant is a portland cement manufacturing plant, which is one of the 28 "PSD major facility categories" listed on Table 62-212.400-1, F.A.C. For listed PSD major categories, the threshold for classification as a PSD-major source is 100 tons per year. The existing plant is a PSD-major facility because the potential emissions of several pollutants are greater 100 tons per year. In addition, the plant is located in Suwannee County, which is in an area that is in attainment with, or designated as unclassifiable for, all air pollutants subject to the state and federal Ambient Air Quality Standards (AAQS). Therefore, each new project proposed for this facility must be reviewed for the applicability of PSD preconstruction review based on the PSD Significant Emission Rates specified in Table 62-212.400-2, F.A.C. The following table summarizes the applicant's PSD applicability analysis for just the potential emissions from the proposed new kiln system.

Table 2A. Summary of the PSD Applicability for New Kiln Line No. 2 System (Initial Application)

Pollutant	PSD Significant Emission Rates (TPY)	Project Emissions (TPY)	Subject to PSD?
Carbon Monoxide (CO)	100	2111	Yes
Nitrogen Oxides (NOx)	40	1056	Yes
Particulate Matter (PM/PM_{10})	25/15	116/98	Yes
Sulfur Dioxide (SO_2)	40	143	Yes
Volatile Organic Compounds (VOC)	40	63	Yes
Lead (Pb)	1200 lb/year	80 lb/year	No
Mercury (Hg)	200 lb/year	122 lb/year	No

Notes: "TPY" means tons per year. Additional PM/PM_{10} emissions from raw material processing, clinker and cement processing, and the coal mill system are estimated to be 81/69 TPY. Increases from fugitive PM/PM_{10} emissions sources such as roads are estimated to increase by approximately 26/7 TPY.

As shown in the table, the project is subject to PSD preconstruction review for emissions of carbon monoxide (CO), nitrogen oxides (NOx), particulate matter (PM/PM_{10}), sulfur dioxide (SO_2), and volatile organic compounds (VOC). Therefore, the applicant must provide a supporting air quality analysis and the Department must determine the Best Available Control Technology (BACT) for each PSD-significant pollutant.

The EPA currently directs that BACT should be determined using the "top-down" approach. In this approach, available control technologies are reviewed for technical feasibility and control effectiveness. The most

effective control option is selected as BACT unless it is determined to be technically infeasible or rejected due to adverse energy, environmental and/or economic impacts. If the top alternative is eliminated, the next most stringent alternative is considered. The top-down approach continues until BACT is determined.

The EPA has concluded that a BACT determination shall not result in a selection of a control technology which would not meet any applicable emission limitation under 40 CFR Part 60 (Standards of Performance for New Stationary Sources), 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants), or 40 CFR Part 63 (National Emission Standards for Hazardous Air Pollutants). In addition, the Department may consider the control or reduction of "non-regulated" air pollutants when determining BACT for regulated pollutants, and will weigh control of non-regulated air pollutants favorably when considering control technologies for regulated pollutants. The Department will also favorably consider control technologies that utilize pollution prevention strategies. These approaches are consistent with EPA's consideration of environmental impacts.

The remainder of this technical evaluation reviews available control technologies and work practices to establish a preliminary BACT determination for each PSD-significant pollutant. It identifies applicable state and federal air pollution regulations as well as production and process restrictions. In addition, it includes a review of the applicant's air quality modeling analysis.

3. PROCESS DESCRIPTION - PORTLAND CEMENT MANUFACTURING

Note: In addition to the application, much of the following discussion comes from the section on portland cement manufacturing in Chapter 15 of the Air Pollution Engineering Manual (1999). [10]

Portland cement is a fine powder that is usually gray in color. It consists of a mixture of dicalcium silicate, tricalcium silicate, tricalcium aluminate, and tetracalcium aluminoferrate as well as small amounts of magnesium oxide, sodium, potassium and sulfur (to which one or more forms of gypsum have been added). The production of portland cement is generally a four-step process including raw materials acquisition, kiln feed preparation, pyroprocessing, and finish grinding. The following figure is a process flow diagram for a typical dry process preheater/precalciner cement plant. [4]

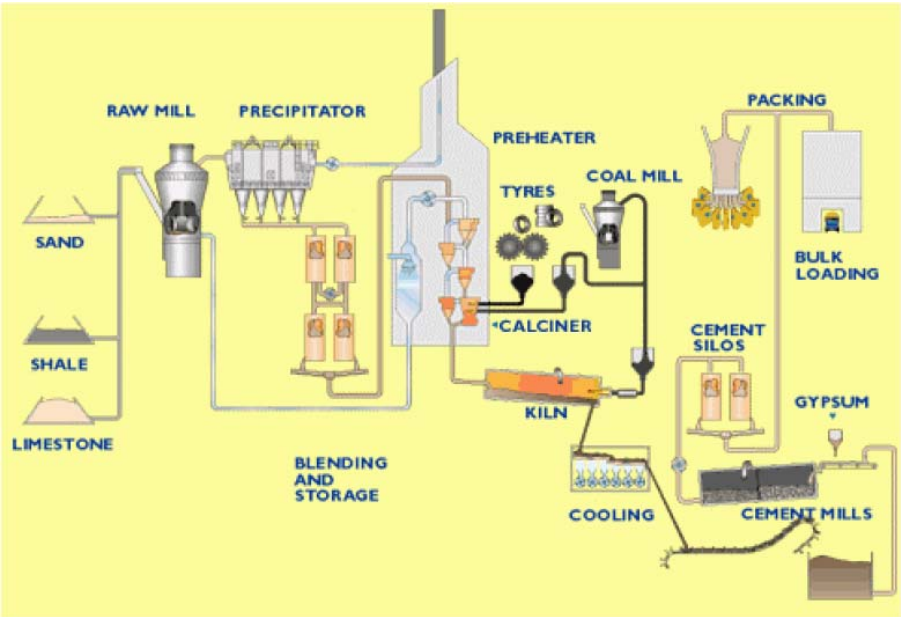

Figure 3A. Process Flow Diagram - Dry Process Preheater/Precalciner Cement Plant [4]

Raw Materials Acquisition

Raw materials are mined below the water table, crushed near the quarry, and transferred by long conveyors to storage near the pyroprocessing kiln. The raw materials are predominantly limestone, but also include sand,

clay, iron ore, and coal ash. The overburden (sand and clay) is removed from the limestone surface and stockpiled in the vicinity of the crusher. The crusher is portable and will be relocated periodically in accordance with the mining plan. Front end loaders or other material conveyors feed the overburden and limestone into the crusher in the ratios dictated by the target chemical composition of the desired raw mix. A conveyor belt system and haul trucks transfer the quarry mix to a covered storage area near the pyroprocessing kiln system. The quarry mix has a moisture content in the range of 10% to 20%. In addition to the quarry mix, the covered storage area also stores mill scale and fly ash. These other materials are transported to the facility by truck.

Kiln Feed Preparation

The quarry mix is conveyed to the raw mill feed bin, which stores the material prior to feeding the raw mill. The raw mill grinds and blends the quarry mix as well as other materials including sand, clay, iron ore, and coal ash. Hot gases from the pyroprocessing system are used to dry the blended materials. Particulate matter emissions from the raw mill will be controlled by the same baghouse used to control the main kiln and clinker cooler exhausts. Raw mill product and dust collected in the baghouse are conveyed to the homogenization silo, which is controlled by a separate baghouse. Captured dust will be recycled back to the process. Ground materials from the raw mill (raw meal) will be delivered to the kiln for processing into cement.

Pyroprocessing

The primary component of the portland cement manufacturing process is the pyroprocessing system, which transforms raw meal into cement clinker. The applicant proposes to construct a dry process preheater/precalciner kiln with in-line raw mill as shown schematically in the following figure. Fuel is fired in the main kiln burner and the calciner to produce the necessary high temperatures. Kiln temperatures are greater than 1200° C and calciner temperatures are in the range of 1000° C. Raw meal is introduced into the top of the preheater tower, passes through the preheater into the calciner and enters the feed end of the kiln opposite the main kiln burner in a direction countercurrent to the hot exhaust gases. Rotation of the slightly inclined kiln causes the solid materials to be slowly transported to the discharge end. The high temperatures and raw meal mix allow complex chemical and physical reactions to form cement clinker, which is cooled in the clinker cooler and stored in large storage silos.

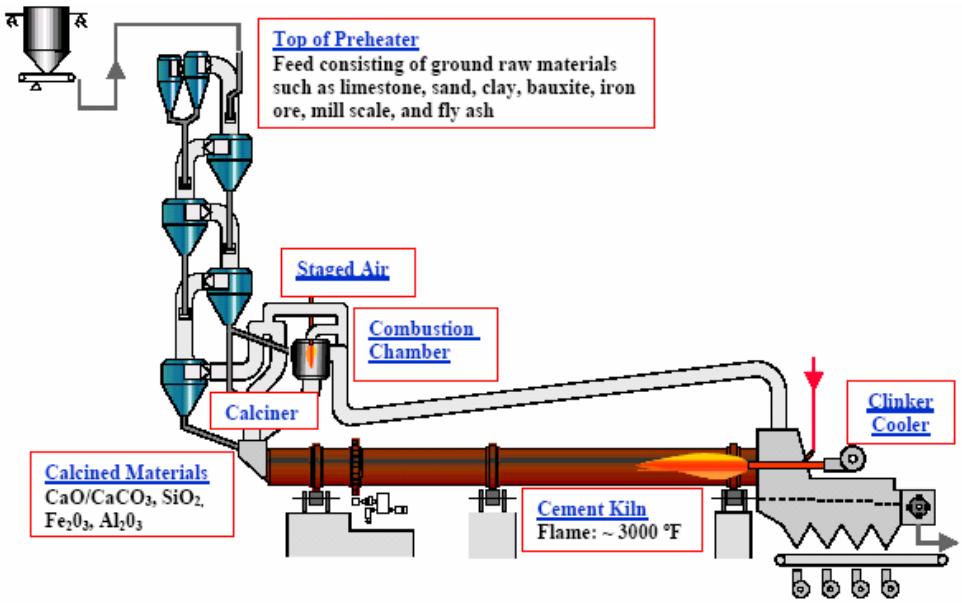

Figure 3B: Dry Process Preheater/Precalciner Pyroprocessing Kiln System [1]

Heat for pyroprocessing is typically provided by combusting coal, petroleum coke, and fly ash. Other fuels may also be fired such as natural gas, propane, distillate oil, on-specification used oil fuel, and tires. Whole or chipped tires would be introduced in the transition section between the preheater and the kiln inlet. It is also possible to gasify tires and combust the resulting gas as a fuel. For the proposed preheater/precalciner kiln system, fuel combustion is divided between the main kiln burner located at the kiln discharge and the calciner burner (~ 45%/55%). The calciner burner is located in a separate combustion chamber to the side of the preheater tower. This is in contrast with an in-line calciner where the burner is mounted horizontally within the calcination vessel. Combustion air for the calciner is provided by a tertiary air duct with hot exhaust from the clinker cooler.

Prepared raw meal from the homogenization silo is fed into the top stage of the preheater tower. The preheater vessels are arranged vertically in front of the kiln feed end. Exhaust gases from the pyroprocessing system flow countercurrent to the feed material direction, which provides intimate contact and efficient heat transfer from the hot exhaust gas to the feed materials. The hot exhaust gases exit the preheater tower and pass through the particulate control device before exiting the stack. A portion of the hot exhaust gases are used to dry raw materials in the raw mill.

The chemical reactions and physical processes that transform raw materials in the kiln to cement clinker are quite complex. Pyroprocessing may be divided into four stages, depending on location and temperature of the materials in the system: evaporation of uncombined water from raw materials; dehydration of combined water to form oxides of silicon, aluminum, and iron; calcination (liberation of carbon dioxide); and reaction and sintering of the oxides in the kiln to form cement clinker. The clinker exits the kiln and enters the clinker cooler where it is quickly cooled by ambient air to halt the formation chemistry and "freeze" material properties of the clinker. Cooled clinker is transferred to large storage silos.

Typically, a portion of the exhaust from the clinker cooler will be recovered and returned to the pyroprocessing system as combustion air and to the coal mill for drying coal and petroleum coke. Exhaust returned as combustion air to the calciner will pass through the main baghouse for the kiln system. Exhaust provided to the coal mill will pass through the coal mill baghouse control system. For this particular project, the clinker cooler exhaust is combined with the main kiln exhaust and controlled by a common baghouse control system.

Finish Grinding

The clinker will be withdrawn from the silos by vibrating feeders and discharged onto the finish mill feed belt. Clinker is mixed with gypsum and limestone and ground in a ball mill in the finish milling operation to produce portland cement. Portland cement will be stored in large concrete silos. Each material will be transferred by a front end loader to feed hoppers and conveyed to the finish mill. Portland cement will be withdrawn from the silos and loaded into tanker trailers for bulk shipment.

Raw Material and Solid Fuel Handling and Storage

The raw materials at this site are generally mined below the water table. The inherent moisture content of the materials inhibits fugitive dust during mining, crushing, handling and storage. The following reasonable precautions will be taken as necessary to prevent fugitive dust emissions at the plant. Primary access roadways, the manufacture area, and parking areas are already paved. Accumulated dust will be removed as necessary from paved roads by a vacuum sweeper truck. Water will be applied as needed to unpaved roads by water truck. Material stockpiles will be covered to inhibit dust from wind erosion. Raw material handling and conveying will be minimized by the inherent moisture content of the wet materials and by the application of water if necessary.

Coal and petroleum coke will be received by truck and stored in separate bins. Coal and petroleum coke will be metered from the bins to a vertical mill for milling and drying with hot gases from the clinker cooler. The milled fuels will be stored in a pulverized fuel storage bin for pneumatic conveyance to the main kiln burner and the calciner burner. All enclosed sources associated with the coal and petroleum coke handling and milling operation will be controlled with baghouses. Fugitive emissions from coal and petroleum coke handling and

conveying will be minimized by the inherent moisture of the materials, containment of coal and petroleum coke within the containment area, storage of pulverized coal and petroleum coke in storage bin, and by the application of water as necessary to suppress fugitive dust.

All enclosed sources associated with the finish milling operation will be controlled with baghouses. Gypsum and limestone will be received by truck and stored under cover in stockpiles. Fugitive emissions from gypsum and limestone handling and conveying associated with the finish milling operation will be minimized by the inherent moisture content and applying water as necessary to suppress fugitive dust.

4. BACT REVIEW – KILN SYSTEM (EU-013)

Over the last six years, the Department has issued air construction permit applications for three of the newest cement pyroprocessing kilns in the United States including Suwannee American Cement (Kiln Line No. 1), Florida Rock Industries (Kiln Line No. 2), and Florida Crushed Stone (Kiln Line No. 2). Each project was subject to PSD preconstruction review for emissions of carbon monoxide (CO), nitrogen oxides (NOx), particulate matter (PM/PM_{10}), sulfur dioxide (SO_2), and volatile organic compounds (VOC). The Department has gathered a substantial body of information related to the Best Available Control Technology (BACT) for modern cement kilns. In addition, the Department worked with these existing plants to support performance tests for the application of Selective Non-Catalytic Reduction (SNCR) to further reduce NOx emissions from the kiln exhaust. These recent PSD permits provide operational flexibility while representing some of the most stringent emissions standards in the United States while requiring emissions monitoring to verify compliance on a continuous basis.

Particulate Matter (PM/PM_{10})

Particulate matter is be emitted from the kiln system due to the pyroprocessing of raw materials as well as the combustion of fuels. Nearly all of the particulate matter emitted after control will be much less than 10 microns in size (PM_{10}). Particulate matter was one of the early concerns regarding air emissions from portland cement manufacturing plants. The following table summarizes specific state and federal regulations for limiting particulate matter emissions from a variety of sources at these plants.

Table 4A. Summary of State and Federal Particulate Matter Emissions Standards

Source	NSPS Subpart F [40 CFR 60.62]		NESHAP Subpart LLL [40 CFR 63.1342 – 63.1348]		Rule 62-296.407, F.A.C.	
	lb PM/ton DPFM	Opacity	lb PM/ton DPFM	Opacity	lb PM/ton DPFM	Opacity
Kiln	0.30	20%	0.30	20%	0.30	---
Raw Mill	---	10%	0.30	20%	---	---
Clinker Cooler	0.10	10%	0.10	10%	0.10	---
Finish Mill	---	10%	---	10%	---	---
Material Handling	---	10%	---	10%	---	---

Note: "DPFM" means dry preheater feed material.

Applicant's PM/PM_{10} Review

The applicant recognizes a baghouse control system or an electrostatic precipitator as the top-level controls for cement kilns. The applicant proposes to control particulate matter emissions from the kiln exhaust, raw mill, and clinker cooler with a common baghouse control system. In general, a baghouse control system consists of a series of hanging filter bags through which the exhaust stream passes. Particulate matter collects on the surface of the bag. As the dust layer builds up, the control efficiency actually increases as does the pressure drop across the baghouse compartment. Baghouses can effectively control particulate matter much less than 10 microns in size with removal efficiencies greater than 99.9%. Periodically, the filter cake is removed during a cleaning

cycle by mechanical shaking or pulsed air. Sonic horns can also be used to enhance the cleaning mechanism. The following table identifies the key parameters for the applicant's proposed baghouse control system.

Table 4B. Baghouse Parameters for Kiln/Clinker Cooler Exhaust (EU-013)

Point No.	Baghouse Point Description	acfm	° F	Moisture	dscfm	grains/dscfm
Emissions Unit 013 – Dry Process Preheater/Precalciner Rotary Kiln with In-Line Raw Mill						
E21-02	Exhaust from kiln, raw mill and clinker cooler	333,000	215°	15%	221,408	0.01

The applicant proposes the following particulate matter emissions standards for this equipment:

PM $\leq$ 0.13 lb/ton of dry preheater feed material based on an EPA Method 5 stack test

PM_{10} $\leq$ 0.11 lb/ton of dry preheater feed material based on an EPA Method 201 stack test

Opacity $\leq$ 10% based on COMS data

A continuous opacity monitoring system (COMS) will be installed to monitor the stack exhaust.

Department's PM/PM_{10} Review

A baghouse control system is generally recognized as the top level of control for particulate matter emissions. The applicant proposes a single baghouse control system to remove particulate matter from the combined main kiln exhaust and the clinker cooler. The following table identifies some of the most recent BACT determinations made for cement kilns. It is not a comprehensive list, but is representative of recent determinations. It does not include modifications to existing kilns or "non-BACT" limits for new kilns.

Table 4C. Summary of Recent PM/PM_{10} BACT Determinations – New Kilns

Permit	RBLC ID	Company	Location	Controls and Comments	lb/ton DPFM
03/99	TX-0279	North Texas Cement	Whitewright, TX	BH+WS	0.22
09/00	CO-0043	Rio Grande Portland Cement	Pueblo, CO	BH	0.105
06/00	FL-0139	Suwannee American Cement – Kiln 1	Branford, FL	BH	0.11
		04/01 - Production Increase for Kiln 1	Branford, FL	BH	0.093
12/03	IA-0070	Lehigh Cement	Mason City, IA	ESP	0.516
07/05	---	Florida Rock Industries – Kiln 2	Newberry, FL	ESP	0.136
07/05	---	Florida Crushed Stone – Kiln 2	Brooksville, FL	BH	0.136
Review	---	Suwannee American Cement – Kiln 2	Branford, FL	BH; as proposed	0.11

Notes: "BH" means baghouse. "WS" means wet scrubber. "ESP" means electrostatic precipitator.

As shown in the above table, previous BACT determinations have relied mostly on baghouse control systems. The main kiln exhaust has a much higher particulate loading than the clinker cooler exhaust. Typically, these two exhaust streams are controlled by separate devices. The proposed design to combine the exhaust streams should result in lower overall particulate matter emissions. The Department's draft BACT determination for particulate matter is:

PM $\leq$ 0.10 lb/ton of dry preheater feed material based on an EPA Method 5 stack test

Opacity $\leq$ 10% based on COMS data

Based on the design exhaust flow rate, the particulate matter emissions standard is equivalent to:

$$PM = \frac{(0.10 \text{ lb PM/ton DPHFM})\ (215 \text{ tons DPHFM/hour})\ (\text{hour}/60 \text{ min})\ (7000 \text{ grains/lb})}{(221{,}400 \text{ DSCF/min})} = \mathbf{0.01\ grains/dscf}$$

The draft standards are based on a baghouse control system as well as the maximum operating conditions, maximum fuel consumption rates, and maximum production rates. In addition, NSPS Subpart F specifies a clinker cooler standard of 0.10 lb/ton of dry preheater feed materials. The combined exhausts must demonstrate compliance with this standard.

Nitrogen Oxides (NOx)

Historically, emissions of nitrogen oxides (NOx) have been a primary pollutant of concern with regard to cement kilns. The high temperature processes in the kiln systems have the potential to generate substantial amounts of NOx. There are three primary mechanisms for producing NOx emissions: fuel NOx, thermal NOx, and prompt NOx. Approximately 60% of the nitrogen in the fuels will be oxidized during combustion and form fuel NOx. The majority NOx emissions produced in the kiln will be thermal NOx, which is generated from oxidizing nitrogen available in the combustion air with very high kiln temperatures. The smallest contributor to NOx emissions is prompt NOx, which occurs instantaneously on the flame surface and independently of flame temperature or excess air.

Applicant's NOx Review

The applicant identifies the following technically feasible controls: selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), indirect firing, low-NOx burners, and staged combustion. The project will utilize indirect firing, low-NOx burners, and staged combustion in the calciner. The applicant also recognizes an SCR system as potentially offering the highest level of control. However, based on 32% control efficiency presumed by the applicant, the applicant estimates an SCR system would incur $4.6 million in capital costs and $9.1 million in annual operating costs. The applicant estimates cost-effectiveness for an SCR system of $21,599 per ton of NOx removed. Therefore, the applicant rejects SCR primarily due to excessive costs.

An SNCR system offers the next highest control alternative. In the SNCR process, an ammonia solution is injected at high temperatures (850° C to 1000° C) without a catalyst to reduce NOx emissions to nitrogen and water vapor. The applicant currently operates a modern kiln system at this plant with NOx emissions controlled by SNCR to achieve a BACT emission standard of 2.4 lb/ton of clinker (30-day rolling CEMS average). For the new Kiln Line No. 2 system, the applicant proposes the following standard:

NOx $\leq$ 2.0 lb/ton of clinker (30-day rolling CEMS average)

This standard is based on low-NOx burners, staged combustion, indirect firing, and SNCR. The SNCR system will be used alone or in conjunction with staged combustion for maximum operational flexibility. This level of control is among the lowest in the country.

Department's NOx Review

Without proper design and control, the high operating temperatures in the pyroprocessing system will result in substantial NOx emissions. Modern designs offer reduced kiln temperatures and sophisticated control systems to minimize process upsets. In Europe, most plants install and operate ammonia-based Selective Non-Catalytic Reduction (SNCR) systems to reduce NOx emissions. The only known commercial installation of a Selective Catalytic Reduction (SCR) system for a cement plant is at the Solnhofer Portland Cement Plant in Germany. Unlike the raw materials mined in Florida, the raw materials at that site contain significant amounts of ammonia, organics, and sulfur. The SCR system combined with scrubbers helps reduce higher emissions of ammonia, volatile organic compounds, and sulfur dioxide.

The following figures demonstrate relative magnitude of an SCR system compared to an SNCR system. As the figures show, there is a tremendous difference in size and scale between the two systems. The SCR system requires a large tower framework to support the catalyst structure, which requires careful design of the catalyst formulation to prevent premature fouling and poisoning. In comparison, the SNCR installation is much less intrusive consisting of an ammonia tank, pumps, piping, compressed air delivery, injectors, and a control system.

Figure 4A. Solnhofer Portland Cement Plant [2]
(SCR system is adjacent to preheater tower.)

Ammonia Truck

Compressed Air

1 of 4 Injection Ports

Ammonia Injector

Figure 4B. Suwannee American Cement Plant [2]
(Temporary SNCR test rig.)

In the United States, plants have typically relied on low-NOx burners and staged combustion to inhibit NOx emissions. The following table identifies some of the most recent BACT determinations made for cement kilns. It is not a comprehensive list, but is representative of recent determinations. It does not include modifications to existing kilns or "non-BACT" emissions limits for new kilns.

Table 4D. Summary of Recent NOx BACT Determinations – New Kilns

Permit	RBLC ID	Company	Location	Controls and Comments	lb/ton clinker
03/99	TX-0279	North Texas Cement	Whitewright, TX	LNB+SCC	3.87
09/00	CO-0043	Rio Grande Portland Cement	Pueblo, CO	LNB+SCC; 12-month avg.	2.32
12/99	---	Holcim	Holly Hill, SC	LNB+SCC	4.33
06/00	FL-0139	Suwannee American Cement – Kiln 1	Branford, FL	GCPs; 24-hour avg.	2.9
		04/01 - Production Increase for Kiln 1	Branford, FL	GCPs; 30-day avg.	2.4
12/03	IA-0070	Lehigh Cement	Mason City, IA	LNB+SCC+SNCR	2.85
06/04	---	Holcim	Lee Island, MO	LNB+SC	2.4
07/05	---	Florida Rock Industries – Kiln 2	Newberry, FL	SCC+SNCR; 30-day avg.	1.95
07/05	---	Florida Crushed Stone – Kiln 2	Brooksville, FL	SCC+SNCR; 30-day avg.	1.95
Proposed	---	Suwannee American Cement – Kiln 2	Branford, FL	SCC+SNCR; 30-day avg.	2.0
Draft	---	St. Lawrence Cement	Hudson, NY	LNB+SCC	3.6

Notes: LNB means low-NOx burner. SC means staged combustion in calciner. GCPs means good combustion practices. SNCR means selective non-catalytic reduction.

As shown in the above table, recent BACT determinations have ranged from 1.95 to 4.3 lb/ton of clinker. The most recent permit issued outside the state of Florida is for the Holcim's Lee Island Cement Plant in Missouri, which will have the largest cement kiln in the United States. The state of Missouri permitted the new kiln with an eventual NOx standard of 2.4 lb/ton of clinker. The plant will use staged combustion in the calciner and SNCR to comply with the emissions limit.

Titan America operates an existing cement plant in Medley, Florida. Based on recent testing, the plant indicates that it can achieve an *actual* NOx emissions rate of 2.0 lb/ton of clinker based on a version of staged combustion in the calciner with raw meal catalysis in a high temperature reducing atmosphere. The design is different than that for Suwannee American Cement's existing kiln system. Titan America plans to increase the current production rate while complying with a new NOx standard of 2.17 lb/ton of clinker (12-month rolling average) to avoid PSD review.

The lowest permitted NOx BACT standard for an operating cement plant in Florida is 2.4 lb/ton of clinker for Suwannee American Cement's Kiln Line No. 1 system. This plant was originally permitted with a NOx BACT standard of 2.9 lb/ton of clinker (24-hour average) based on staged combustion in the calciner to produce a reducing atmosphere. However, the plant operators experienced difficulties in manipulating kiln operating conditions to continuously achieve the NOx standard. Under certain circumstances, operating the kiln to comply with the NOx standard had adverse affects on cement production.

To alleviate the NOx issue at Suwannee American Cement's Kiln Line No. 1 system, the plant recently installed an ammonia-based SNCR system to control NOx emissions. At the same time, it was possible to increase the production capacity of the existing kiln. A full technical discussion of SNCR as an available and technically viable control technique for cement kilns is presented in the Department's Technical Evaluation and Preliminary Determination" for Project No. 1210465-011-AC (February 16, 2005). [1] The SNCR system basically consists of an ammonia tank, pumps, piping, compressed air delivery, four injectors, and a control system. Performance tests on this unit indicate that an SNCR system can reliably reduce NOx emissions to less than 2.0 lb/ton of clinker from the kiln system processing the raw materials available at this site. The permit was modified to include a lower NOx standard of 2.4 lb/ton of clinker based on a 30-day rolling average. Actual operation indicates that the system is effective even when delivering all of the ammonia through a single injector. The plant is able to use both staged combustion in the calciner and/or the SNCR system to comply with the new standard.

Finally, to support their recent application for a second kiln, Florida Rock Industries tested SNCR on their existing kiln system. The tests indicated that a NOx emission rate of less than 2.0 lb/ton of clinker could be achieved with SNCR. Despite previous concerns expressed by the cement industry, the injection of ammonia did not result in a visible plume of fine particles consisting of ammonium sulfates and chlorides. The raw materials mined in Florida are typically low in sulfur and chloride content so the potential to form ammoniated particulate compounds is minimal. Virtually no ammonia slip was seen with the raw mill on. Some Ammonia slip occurred with the raw mill off. As a result, the Department determined BACT for nitrogen oxides to be 1.95 lb/ton of clinker (30-day rolling average) based on a combination of staged combustion in the calciner and SNCR. The same determination was made for a new second kiln at the Florida Crushed Stone plant in Brooksville, Florida. To date, these are the most stringent BACT determinations in the country.

The Department does not adopt the applicant's estimates regarding costs for an SCR system and rejects the applicant's presumption of 32% control efficiency. However, it is clear that costs would be substantial simply due to the considerable structure itself. The Department does not consider SCR necessary to achieve a BACT-level of control and believes it is sufficient to ensure that the proposed BACT standard represents the current "top level" of control for this industry. SCR makes the most sense in cases where it is necessary to minimize ammonia use to avoid the formation of a detached plume. In Florida, the potential for forming a detached plume is minimal because the raw materials are low in sulfur. Low NOx levels can be achieved by simple ammonia injection without the catalyst. Therefore, the Department's draft BACT determination is:

NOx $\leq$ 1.95 lb/ton of clinker based on a 30-day rolling CEMS average

This determination is based on staged combustion in the calciner and an SNCR system. Good combustion and operating practices will be used to minimize NOx emissions and the SNCR system will be used as necessary to ensure compliance with the standard. Continuous monitoring and recording of the NOx emissions will be required to demonstrate compliance.

Carbon Monoxide (CO)

Emissions of carbon monoxide (CO) are formed by two primary methods. First, CO may occur as a product of incomplete fuel combustion in the kiln and calciner. Second, CO may evolve from organic matter in the kiln feed materials when exposed to lower temperatures in the preheater.[6] The organic matter content is a function of the raw materials mined on site as well as mill scale and fly ash. The current kiln design includes the option of injecting fly ash directly into the calciner at high temperatures to avoid generating additional CO by exposing the organic matter in the fly ash to low temperatures in the upper region of the preheater tower.

Applicant's CO Review

The applicant reviewed over 45 recent permits in EPA's RACT/BACT/LAER Clearinghouse for cement plants. With the exception of two facilities, the review indicated that the control of CO emissions was based on "good combustion practices". The CO standards for these projects ranged from 1.03 to 15.83 lb/ton of clinker.

TXI Operations in Midlothian, Texas installed regenerative thermal oxidizers (RTOs) to control CO and VOC emissions below the thresholds for PSD preconstruction review. The uncontrolled CO emission rate is between 5 - 8 lb/ton of clinker. Based on an assumption of 80% reduction, CO emissions would be 1 – 1.6 lb/ton of clinker. The plant reports technical difficulties in maintaining continuous operation of the RTOs and substantial operating costs from combustion auxiliary fuel. The Holcim Plant in Dundee, Michigan also installed an RTO to control odors and condensable hydrocarbons resulting from the specific raw materials on site, but has since discontinued operating the control system due to system failures, high maintenance, and operating costs. It should be noted that each of these plants were "wet" process plants with much higher pre-control emissions.

Based on an RTO system designed to remove approximately 80% of the CO emissions, the applicant estimates the capital cost of an RTO at $23.7 million, the annualized cost to be $10 million, and the cost effectiveness at approximately $6000 per ton of CO removed. The applicant rejects an RTO system due to excessive costs and technical applicability. Instead, the applicant proposes the following CO standard based on an efficient combustion design and implementing good combustion practices.

CO $\leq$ 3.0 lb/ton of clinker (30-day rolling CEMS average)

Department's CO Review

Modern kiln burners can minimize the initial formation of CO generated due to incomplete combustion. Remaining CO from the combustion process can be significantly reduced if sufficient retention time, mixing, and temperatures (~ 800° C to 1000° C) are provided in the ductwork loop between the kiln and lower stage preheater cyclone. See figure below.

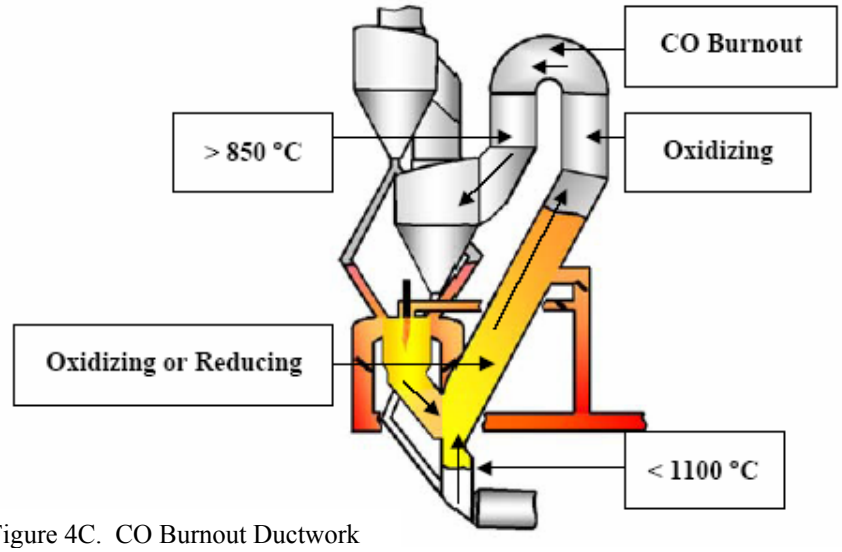

Figure 4C. CO Burnout Ductwork

Efficient transfer of heat from the exhaust gases to raw materials means longer residence time in the preheater tower. In turn, this can mean substantial amounts of CO will evolve from organic matter in the kiln feed materials due to reduced preheater temperatures. As a general rule, about 15% of the organic carbon entering the preheater tower will form CO and about 2% will form VOC.[5]

The following table identifies some of the most recent BACT determinations made for cement kilns. It is not a comprehensive list, but is representative of recent determinations. It does not include modifications to existing kilns or "non-BACT" emissions limits for new kilns.

Table 4E. Summary of Recent CO BACT Determinations – New Kilns

Permit	RBLC ID	Company	Location	Controls and Comments	lb/ton clinker
03/99	TX-0279	North Texas Cement	Whitewright, TX	GCPs	2.0
04/99	---	Lone Star Industries	Cape Giradeau, MO	GCPs	3.0
09/00	CO-0043	Rio Grande Portland Cement	Pueblo, CO	GCPs; 12-month avg.	2.1
12/99	---	Holcim	Holly Hill, SC	GCPs	6.0
06/00	FL-0139	Suwannee American Cement – Kiln 1	Branford, FL	GCPs; test	3.6
		04/01 - Production Increase for Kiln 1	Branford, FL	GCPs; test	3.3
06/03	---	Roanoke Cement	Daleville, VA	GCPs	3.0
12/03	IA-0070	Lehigh Cement	Mason City, IA	GCPs; test	3.7
06/04	---	Holcim	Lee Island, MO	GCPs	6.0
07/05	---	Florida Rock Industries – Kiln 2	Newberry, FL	GCPs; 24-hour CEMS avg.	3.6
07/05	---	Florida Crushed Stone – Kiln 2	Brooksville, FL	GCPs; 24-hour CEMS avg.	3.6
Review	----	Suwannee American Cement – Kiln 2	Branford, FL	GCPs; 30-day CEMS	3.0 (proposed)
Review	---	St. Lawrence Cement	Hudson, NY	GCPs	2.8
Review	---	ESSROC	Nazareth, PA	GCPs	4.5
Review	---	RC Cement – Hercules Cement	Stockertown, PA	GCPs	2.1

As shown in the above table, previous BACT determinations for carbon monoxide have relied on good combustion design and good operating practices to minimize emissions. In general, these plants rely on a combination of the following:

- Relatively low carbonaceous matter in the raw materials;
- Good combustion at the main kiln burner and calciner;
- The addition of tertiary air from the kiln hood and clinker cooler; and
- Varying degrees of calciner sizes and duct lengths to complete burnout.

Titan America Cement Plant in Medley, Florida operates a modern cement kiln that has achieved actual CO emissions of less than 0.5 lb/ton of clinker. The new kiln was a replacement of an old kiln and a BACT determination was not required. The plant is only able to achieve this low rate due to the very large calciner that was constructed, which includes a long loop of ductwork from the kiln to the lower stage preheater cyclone. See figure below. The large calciner and long loop provide considerable residence time at high temperatures to complete oxidation of CO emissions. However, it also requires a very large preheater tower to support the massive structure. Each foot of preheater tower adds substantial costs to the installation. Titan also limits its raw material options to achieve such low CO values. The permit limit was recently adjusted to 2.0 lb/ton of clinker to reflect the likely long term raw materials and fuel scenarios given the inherently low CO characteristics of their calciner.

Figure D. Calciner Ductwork at Titan

It is believed that the lowest CO limit in a permit for a cement kiln is approximately 0.37 lb/ton of clinker for the TXI Midlothian Plant in Texas. This plant installed approximately ten regenerative thermal oxidizers (RTOs) to handle the inherently high carbonaceous matter

in the mined raw material. Covering the area of a football field, the RTOs allowed the project to net out of PSD preconstruction review and obtain a permit quickly. The capital cost of the RTOs was $17.5 million. The oxidizers rely on natural gas firing to maintain the necessary temperatures to oxidize CO emissions, which has resulted in very high operating costs. TXI requested authorization to discontinue use of the RTOs due to the operating problems and high costs. As a result of a settlement agreement to resolve a petition by local residents, the CO limit was adjusted to an equivalent of 1.56 lb/ton of clinker.

Many states have specified relatively low CO BACT standards based on initial and perhaps annual stack tests. In the Department's most recent PSD permits for cement kilns, it established a 24-hour CO BACT standard based on continuous monitoring requirements. In addition to demonstrating compliance, the monitoring data can provide valuable information to the plant regarding operational problems and emissions changes due to new raw material feeds. European cement plants typically do not regulate CO, but are more generally concerned with VOC emissions and complete combustion. Continuous monitoring data collected from Florida cement plants indicates relatively low VOC emission rates with the available raw materials.

For this project, the Department does not believe it is cost effective to install several regenerative thermal oxidizers. Without add-on controls, a modern cement kiln can be designed to achieve a CO emissions level of approximately 1.5 to 2.5 lb/ton of clinker based on good operating practices during periods of optimum cement production, a design allowing sufficient time/temperature to oxidize CO, and a raw material mix without unusually high concentrations of organic matter.[5, 6] However, normal fluctuations in cement manufacturing can result in higher CO emissions for brief periods. In addition, it is possible that CO emissions may increase by 5% to 15% when ammonia is injected with an SNCR system to reduce NOx emissions.[5] Therefore, the Department's draft BACT determination is:

CO $\leq$ 2.90 lb/ton of clinker based on a 30-day rolling CEMS average

The above standard is achievable with a design providing sufficient time/temperature to oxidize CO, good operating practices, and careful attention to the raw material mix. The 30-day standard is a production-based emissions standard that considers fluctuations in raw materials, operating conditions, and production levels. It applies during all periods of operation including startup and shutdown, but excludes unavoidable equipment malfunctions. The long-term averaging period recognizes the capability of operating a cement kiln at a high, steady production level for long periods of time and is able to accommodate brief periods of low production or operational upsets.

Volatile Organic Compounds (VOC)

VOC emissions may occur as products of incomplete fuel combustion in the kiln and calciner. In addition, organic compounds may be generated from organic matter in the kiln feed when it is exposed to lower temperatures in the upper stages of the preheater tower. The organic matter of the kiln feed depends on the raw materials mined on site as well as mill scale and fly ash in use.

Applicant's VOC Review

The applicant reviewed over 45 recent permits in EPA's RACT/BACT/LAER Clearinghouse for cement plants. With the exception of two facilities, the review indicated that the control of VOC emissions has been based primarily on "good combustion practices". The VOC emissions standards ranged from 0.06 to 2.0 lb/ton of clinker. TXI Operations in Midlothian, Texas and the Holcim Plant in Dundee, Michigan installed regenerative thermal oxidizers (RTOs) to control CO and VOC emissions. These projects are briefly discussed under the review for CO emissions. Both plants processed raw materials with unusually high organic matter. Operational problems and high costs have caused the Holcim Plant in Dundee, Michigan to discontinue use of the installed control equipment.

Based on 95% control efficiency for an RTO system, the applicant estimates a capital cost of $23.7 million, annualized costs of $10 million, and a cost effectiveness of $165,747 per ton of VOC removed. The applicant rejects an RTO system based on excessive costs and technical applicability. The applicant proposes the

following VOC standard based on an efficient combustion design and good combustion practices.

VOC ≤ 0.12 lb/ton of clinker (15.2 lb/hour) based on a 30-day block average of CEMS data

Department's VOC Review

The following table identifies some of the most recent BACT determinations made for cement kilns. It is not a comprehensive list, but is representative of recent determinations. It does not include modifications to existing kilns or "non-BACT" emissions limits for new kilns.

Table 4F. Summary of Recent VOC BACT Determinations – New Kilns

Permit	RBLC ID	Company	Location	Controls and Comments	lb/ton clinker
06/00	FL-0139	Suwannee American Cement – Kiln 1	Branford, FL	GCPs and raw materials	0.12
		04/01 - Production Increase for Kiln 1	Branford, FL	GCPs and raw materials	0.12
06/04	---	Holcim	Lee Island, MO	GCPs and raw materials	0.33
07/05	---	Florida Rock Industries – Kiln 2	Newberry, FL	GCPs and raw materials	0.12
07/05	---	Florida Crushed Stone – Kiln 2	Brooksville, FL	GCPs and raw materials	0.12
Review	---	Suwannee American Cement – Kiln 2	Branford, FL	GCPs and raw materials	0.12

"GCP" means good combustion practices.

As shown above, recent BACT determinations have relied on an efficient combustion design and good operating practices to minimize VOC emissions. NESHAP Subpart LLL now requires continuous monitoring and recording of total hydrocarbons (THC) from new cement plants. Based on Suwannee American Cement's existing kiln system, VOC emissions have been low based on the continuous monitoring data collected. This is primarily due to the modern kiln design and relatively low organic matter in the raw materials. It is noted that fly ash should be carefully monitored when used as a supplemental fuel and/or raw material. Poor quality fly ash may result in both increased CO and VOC emissions.

Potential annual VOC emissions based on the applicant's proposal are approximately 60 tons per year. The addition of an add-on control device to reduce VOC emissions from this level would be cost prohibitive. The NEHSAP Subpart LLL standard for total hydrocarbons is 50 ppmvd (as propane) corrected to 7% oxygen, which is roughly equivalent to 0.3 to 0.4 lb/ton of clinker. The Department's draft BACT determination is:

VOC ≤ 0.12 lb/ton of clinker based on a 30-day block average of CEMS data

The averaging period and monitoring requirements are intended to be consistent with the NESHAP Subpart LLL requirements for THC emissions. All THC emissions are assumed to be VOC emissions. The emissions concentration will be expressed as propane.

Sulfur Dioxide (SO_2)

Emissions of sulfur dioxide will be emitted due to sulfur in the fuels combusted as well as in the raw materials being processed. However, the raw materials mined at this site contain relatively low levels of sulfur (pyrites). In addition, conditions in the proposed kiln system offer a calciner temperature of approximately 1650° F and a substantial amount of free CaO, which readily absorbs SO_2.

Applicant's SO_2 Review

With the raw mill on, the applicant believes an SO_2 emission rate of 0.27 lb/ton of clinker can be achieved due to the inherently low emitting process coupled with the use of low-sulfur raw materials. With the raw mill off, the SO_2 emission rate may be higher. The applicant identified wet scrubbing, wet absorbent addition, and dry absorbent addition as available control alternatives. Based on the applicant's analysis, the cost effectiveness of these technologies is estimated to be: $86,887/ton of SO_2 removed for wet scrubbing; $124,518/ton of SO_2 removed for wet absorbent injection; $7271/ton of SO_2 removed for dry absorbent injection. The applicant

rejects wet scrubbing and wet absorbent addition based on excessive costs.

The applicant proposes the following SO_2 standard based on the current raw materials available at this site, the plant's experience with operating the existing Kiln Line No. 1 system, and using hydrated lime injection as necessary to control potential spikes.

$SO_2 \leq 0.27$ lb/ton of clinker

At this maximum rate, potential annual SO_2 emissions would be approximately 143 tons per year.

Department's SO_2 Review

The following table identifies some of the most recent BACT determinations made for cement kilns. It is not a comprehensive list, but is representative of recent determinations. It does not include modifications to existing kilns or "non-BACT" emissions limits for new kilns.

Table 4G. Summary of Recent SO_2 BACT Determinations – New Kilns

Permit	RBLC ID	Company	Location	Controls and Comments	lb/ton clinker
03/99	TX-0279	North Texas Cement	Whitewright, TX	WS; 85% removal	2.75
09/00	CO-0043	Rio Grande Portland Cement	Pueblo, CO	LSM; 12-month avg.	1.99
12/99	---	Holcim	Holly Hill, SC	LSM + WS?	3.26
06/00	FL-0139	Suwannee American Cement – Kiln 1	Branford, FL	LSM; 3-hour CEMS avg.	0.27
		04/01 - Production Increase for Kiln 1	Branford, FL	LSM; 3-hour CEMS avg.	0.20
12/03	IA-0070	Lehigh Cement	Mason City, IA	WS; 30-day CEMS avg.	1.01
06/04	---	Holcim	Lee Island, MO	LI w/raw mill off	1.26
07/05	---	Florida Rock Industries – Kiln 2	Newberry, FL	LSM; 24-hour CEMS avg.	0.28
07/05	---	Florida Crushed Stone – Kiln 2	Brooksville, FL	LSM; 24-hour CEMS avg.	0.23
Review	---	Suwannee American Cement – Kiln 2	Branford, FL	LSM; 30-day CEMS avg. (as proposed)	0.27
Review	---	St. Lawrence Cement	Hudson, NY	DS/WS	0.65

"LSM" means low sulfur materials. "WS" means wet scrubber. "LI" means lime injection. "DS" means dry scrubber.

The figures in the above table show that scrubbers can be necessary and cost effective in areas with very high sulfur concentrations. This is not the case for this project. For the existing plant, the naturally low sulfur characteristics of the raw materials as well as the absorption mechanism described above are evidenced by the low SO_2 continuous emissions data collected (actual day-to-day levels ranging from ~ 0.04 to ~ 0.13 lb/ton clinker). The Department does not agree with the applicant's cost estimates for scrubbers. However, scrubbers are not necessary to achieve BACT-level emissions at this site. The Department's draft BACT determination for sulfur dioxide is:

$SO_2 \leq 0.20$ lb/ton of clinker based on a 24-hour rolling CEMS average

This determination is based on the expected emissions from the new kiln and injecting hydrated lime as necessary to comply with the standard as demonstrated by continuous emissions monitoring. It is consistent with the recent permit modification to increase the production of Kiln Line No. 1.

Mercury

Mercury may only be emitted from the cement kiln if present in the raw materials and fuels used. Actual mercury air emissions are expected to be less than the amount of mercury in the raw materials and fuels because some mercury may be bound in solid form to the cement clinker produced. However, when establishing limits and reporting results, it is conservatively assumed that *all* mercury in the raw materials and fuels will exhaust through the stack as air emissions (i.e., that no mercury is bound up in the clinker). The applicant proposes a mercury throughput limit of 117.5 pounds per consecutive 12 months based on the highest expected mercury levels in the proposed fuels and raw materials and the requested maximum production rates. This is less than

the PSD significant emission rate of 200 pounds per year. To ensure compliance with the limit, the Department will require the following sampling, analysis, calculation, and record keeping requirements.

> Mercury Compliance Demonstration: The owner or operator shall demonstrate compliance with the mercury throughput limitation by material balance and maintaining records of the monthly and rolling 12-month mercury throughput. Samples of the raw mill feed, fly ash and all fuels shall be collected each day. A single composite daily sample shall be made from all samples collected during a day. A monthly composite sample shall be made from each of the daily composite samples. Each monthly composite sample shall be analyzed to determine the representative mercury concentration for the month. The analytical methods used to determine mercury concentration shall be EPA or ASTM methods such as EPA Method 7471A (Mercury in Solid or Semisolid Waste). No other methods may be used unless prior written approval is received from the Department. For samples with levels below the detection limit, the permittee shall report the detection limit as the corresponding level. For each composite sample, the mercury throughput rate (pounds per month) shall be the product of the mercury concentration from the monthly composite sample and the corresponding monthly processing rate. For each month, the mass of mercury introduced into the pyroprocessing system (pounds per month) shall be the sum of the monthly mercury throughput rates for the raw mill feed, fly ash and fuel. The consecutive 12-month mercury throughput rate shall be the sum of the individual monthly records for the current month and the preceding eleven months (pounds of mercury per consecutive 12-months). Such records, including calculations and data, shall be completed no later than 25 days following the month of the records. [Rules 62-4.070(3) and 62-212.400(2)(g), F.A.C.]

The above methodology will ensure the conservative reporting of mercury emissions from the kiln system and compliance with the mercury throughput limit.

Other Considerations

Ammonia Slip: The following discussion is from the Department's "Technical Evaluation and Preliminary Determination" for Suwannee American Cement's project to increase production capacity. [1]

> "Use of SNCR to control NOx can cause NH_3 emissions. NH_3 is not listed as a PSD pollutant or as a hazardous air pollutant (HAP). It is regulated under the Clean Air Act Section 112r when it is stored in concentrated form (20% or more by weight). NH_3 can contribute to formation of particulate emissions emitted from processes and to particulate formation in the environment. Therefore, the Department typically limits emissions of NH_3 in PSD permits.
>
> NH_3 emissions are normally low when used to control NH_3 under the proper conditions (e.g. temperature, oxygen, CO, reaction time, etc.) as long as no more NH_3 is injected than the theoretical amount needed to react with all NOx. The complete reaction is theoretically possible when one mole of ammonia is used for every mole of NOx in the exhaust gas stream (molar ratio (NH_3/NOx = 1).
>
> According to the curve for SAC, the molar ratio required to reduce uncontrolled NOx emissions from 4 lb/ton to 2.4 lb/ton (40%) is roughly 0.25. SAC and the Department are evaluating the reasons why such a low molar ratio is required to achieve such a high reduction. There may be some synergistic effects related to CO increases when NH_3 solutions are used.
>
> Because SO_2 emissions are minimal from cement kilns in Florida, very little particulate matter can be formed by reaction with excess NH_3 emissions (slip). Although there is no reason to inject as much NH_3 as it takes to react with all NOx, the Department will limit the maximum NH3 injection rate to that level. Therefore NH_3 use will be limited to a molar ratio of 1.0. This equates to 450 liters per hour (L/hr) of 19% ammonia solution although typical rates will be closer to 100 L/hr."

The concept of ammonia slip becoming significant when the molar ratio is greater than 1.0 is also discussed in paper titled "BACT: What is Achievable with Today's Technologies" by Mark. S Terry of the Krupp Polysius Corporation, a cement kiln manufacturer. [5] The draft permit for the Kiln No. 2 system will use this same approach to ensure ammonia slip is minimized with the following permit condition.

> To prevent excessive ammonia slip, the ammonia injection rate shall not exceed a NH3/NOx molar ratio of 1.0. The Title V air operation permit shall specify a maximum ammonia injection rate (gph) that represents a NH3/NOx molar ratio of less than 1.0. SCC and/or SNCR shall be used to achieve the NOx emissions standards specified in this permit.

The draft permit also requires continuous monitoring of the ammonia injection rate to demonstrate compliance.

Initial Startup and Shakedown: Although two cement kilns may be constructed based on identical designs, the initial shakedown and operation of each new kiln is unique. The kiln itself must be "burned in". Raw materials, fuels, process equipment, automated control systems, and pollution control devices must be continually adjusted for a period of time to achieve steady production of quality cement. For this reason, the Department will establish the following emissions standards for the initial startup period.

> For an "initial startup" period, NOx emissions shall not exceed 3.0 lb/ton of clinker (380.5 lb/hour) based on a 30-day rolling average. The "initial startup" period shall begin after initial certification of the NOx CEMS and shall end when any of the following conditions are met:
>
> a. The Kiln Line No. 2 system produces 75,000 tons of clinker or more in any 30-day rolling period.
> b. The Kiln Line No. 2 system produces 150,000 tons of clinker.
> c. 365 calendar days elapse after initial certification of the NOx CEMS.
>
> After the "initial startup" period ends, NOx emissions shall not exceed 1.95 lb/ton of clinker (247.7 lb/hour) based on a 30-day rolling average.

The higher NOx emission standards provide a period of time to evaluate the full production capacity and operations of the kiln as well as the potential NOx reduction capability of the SNCR system. These requirements do not waive or vary any applicable NSPS or NESHAP monitoring or record keeping requirements.

Excess Emissions: The draft permit requires continuous monitoring for emissions of CO, NOx, SO_2, and VOC as well as stack opacity. The draft permit allows limited amounts of monitoring data to be excluded from the compliance demonstration due to equipment malfunctions as follows.

> Continuous monitoring data collected during periods of startup, shutdown, and malfunction may be excluded from the compliance demonstrations only in accordance with the following requirements, provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions are minimized. As provided by the authority in Rule 62-210.700(5), F.A.C., the following conditions replace the provisions in Rule 62-210.700(1), F.A.C.
>
> a. *Definitions*: "Startup" means the commencement of operation of any emissions unit which has shut down or ceased operation for a period of time sufficient to cause temperature, pressure, chemical or pollution control device imbalances, which result in excess emissions. "Shutdown" means the cessation of the operation of an emissions unit for any purpose. "Malfunction" means any unavoidable mechanical and/or electrical failure of air pollution control equipment or process equipment or of a process resulting in operation in an abnormal or unusual manner.
>
> b. *CO Data*: Each 30-day rolling average shall include all periods of operation (including startup, shutdown, and malfunction), but may exclude limited periods due to equipment malfunctions. No more than 30 hours in any calendar month shall be excluded from the compliance determinations due to equipment malfunctions. Malfunctions do not include process upsets that occur as a normal part of cement production.
>
> c. *NOx Data*: Each 30-day rolling average shall include all periods of operation (including startup, shutdown, and malfunction), but may exclude limited periods due to malfunctions of the SNCR system. "Malfunctions of the SNCR system" are defined as any unavoidable mechanical and/or electrical failure that prevents introduction of ammonia-based solutions into the kiln system. No more than 30 hours in any calendar month shall be excluded from the compliance determinations due to malfunctions of the SNCR system.
>
> d. *SO_2 Data*: Each 24-hour rolling average shall include all periods of operation (including startup, shutdown, and malfunction), but may exclude limited periods due to malfunctions of the hydrated lime system, which are defined as any unavoidable mechanical and/or electrical failure that prevents introduction of lime into the kiln system. No more than 30 hours of data in any calendar month shall be excluded from the compliance determinations due to malfunctions of the hydrated lime system.
>
> e. *Other Data*: All opacity and VOC data shall be included in the compliance determination.

Within one working day of occurrence, the owner or operator shall notify the Compliance Authority of any malfunction resulting in the exclusion of CEMS data. Excess emissions caused entirely or in part by poor maintenance, poor operation or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction shall be prohibited. All such reasonably preventable emissions shall be included in any CEMS compliance determinations. All valid emissions data (including data collected during startup, shutdown and malfunction) shall be used to report emissions for the Annual Operating Report.

Telemetry: When the Kiln Line No. 1 system was originally permitted in 1999, the company agreed to provide the equipment and software necessary to transmit emissions monitoring data to the Department's Northeast District Office. The information is periodically updated and shows information regarding stack opacity and emissions of NOx, SO_2, and VOC. In addition, a summary of this data is periodically updated on an Internet Web Site available to the public. The draft permit will require similar telemetry requirements for the new kiln.

On-Specification Used Oil: The applicant requests authorization to fire used oil meeting EPA's "on-specification" requirements for arsenic, cadmium, chromium, lead, and total halogens (a group of five electronegative elements including fluorine, chlorine, iodine, bromine, or astatine). Initially, the applicant plans to fire used oil generated on site from a variety of equipment for purposes of energy recovery. Eventually, a fuel vendor may be selected to supply on-specification used oil also for this purpose.

Based on a variety of tests conducted on rotary cement kilns with a preheater tower, these pollutants will be emitted at much less (<< 0.005%) than the stoichiometric quantity available in the fuel. [11] Arsenic is almost completely bound in the clinker. Lead and cadmium react with excess chlorides and sulfates in the section between the kiln and preheater to form low-volatile compounds, which then condense on kiln feed particles to be bound in the clinker. Almost 90-95% of the fluorine is bound to the clinker and the remainder reacts with excess calcium to form calcium fluoride, which is bound to the kiln dust. Chlorine from the fuel reacts with alkalis in the kiln feed to form alkali chlorides, which condense on kiln feed or kiln dust and then re-renter the kiln system to evaporate again; however, hydrogen chloride will not be emitted due to the alkaline nature of the kiln exhaust. Plants with high chloride levels in the raw materials often install a bypass to avoid coating formations causing operating problems. This is not the case for this project. The draft permit allows the annual firing of up to 1.5 million gallons of on-specification used oil fuel.

Summary of Kiln Emissions Standards

The following table summarizes the emissions standards for the new kiln including: proposed BACT standards; state standards for cement plants; NSPS Subpart F standards; and NESHAP Subpart LLL standards.

Table 4G. Summary of Kiln Emissions Standards

Pollutant	Emissions Standards		Averaging Time
Best Available Control Technology (BACT) - Rule 62-212.400(6), F.A.C.			
CO [a]	2.90 lb/ton of clinker	368.3 lb/hour	30-day rolling CEMS average
NOx [b]	1.95 lb/ton of clinker	247.7 lb/hour	30-day rolling CEMS average
NOx (Initial Startup)	(3.0 lb/ton of clinker)	(381.0 lb/hour)	(30-day rolling CEMS average)
PM/PM_{10} [c, d]	0.10 lb/ton of dry PHFM	21.5 lb/hour	Average of three, 1-hour test runs
	10% opacity		6-minute block average w/COMS
SO_2 [e]	0.20 lb/ton of clinker	25.4 lb/hour	24-hour rolling CEMS average
VOC [f]	0.12 lb/ton of clinker	15.2 lb/hour	30-day block CEMS average
PSD Preconstruction Review Avoidance – Rule 62-212.400(2)(g), F.A.C.			
Mercury [g]	117.5 pounds per consecutive 12 months		Material Balance
State Rule for Portland Cement Plants – Rule 62-296.407, F.A.C.			
PM (Kiln) [d]	0.3 lb/ton of dry PHFM		Average of three, 1-hour test runs

Pollutant	Emissions Standards	Averaging Time
PM (Clinker Cooler) [d]	0.1 lb/ton of dry PHFM	Average of three, 1-hour test runs
NSPS Subpart F – 40 CFR 60.62 (See Appendix G in Section 4 of this permit for full requirements.)		
PM (Kiln) [c, d]	0.30 lb/ton of dry PHFM	Average of three, 1-hour test runs
	20% opacity	6-minute block average w/COMS
PM (Clinker Cooler) [c, d]	0.10 lb/ton of dry PHFM	Average of three, 1-hour test runs
	10% opacity	6-minute block average
NESHAP Subpart LLL – 40 CFR 63.1343 (See Appendix J in Section 4 of this permit for full requirements.)		
PM [d]	0.30 lb/ton of dry PHFM	Average of three, 1-hour test runs
Opacity [c]	20% opacity	6-minute block average w/COMS
Dioxin/Furan [h]	0.20 ng/dscm (TEQ) @ 7% oxygen	Average of three test runs
THC	50 ppmvd (as propane) @ 7% oxygen	30-day block CEMS average

a. Compliance shall be demonstrated by CO CEMS.

b. Compliance shall be demonstrated by NOx CEMS.

c. Compliance opacity standard shall be demonstrated by COMS and/or EPA Method 9. Opacity shall be based on a 6-minute block average computed from at least one observation (measurement) every 15 seconds. For the COMS, the 6-minute block averages shall begin at the top of each hour.

d. "PHFM" means preheater feed material. Compliance with the particulate matter standard shall be demonstrated based on stack testing conducted in accordance with EPA Method 5. All PM emitted from baghouse exhaust is assumed to be PM_{10}. *{Permitting Note: The BACT standard is equivalent to approximately 0.17 lb of PM per ton of clinker and includes the clinker cooler emissions. The emissions limits for particulate matter and visible emissions imposed by Rule 62-212.400(BACT) are as stringent as or more stringent than the limits imposed by the applicable NSPS or NESHAP provisions. Nevertheless, the BACT requirements do not waive or vary any applicable NSPS or NESHAP monitoring or record keeping requirements.}*

e. Compliance shall be demonstrated by SO_2 CEMS.

f. Compliance shall be demonstrated by THC CEMS. VOC emissions shall be measured as total hydrocarbons (THC) and expressed as "propane" for the mass emissions rate. The 30-day block CEMS average shall be consistent with the averaging period specified in 40 CFR 63.1350(h).

g. The total mass of mercury compounds (expressed as Hg) introduced into the pyroprocessing system of the raw mill feed and fuels shall not exceed 117.5 pounds during any consecutive 12-month period. Compliance shall be demonstrated by material balance using the sampling, analysis, and calculation methods.

h. Alternatively, dioxin/furans shall not exceed 0.40 ng/dscm (TEQ) @ 7% oxygen when the average of the performance test run average temperatures at the inlet to the particulate matter control device is 204° C (400° F) or less.

In combination with the annual raw material process rate limitation of 1,789,230 tons/year and annual clinker production limitation of 1,055,500 tons/year, the above emissions standards effectively limit annual potential emissions in tons/year (TPY) to: 89 TPY of PM/PM_{10}; 106 TPY of SO_2; 1029 TPY of NOx (after year one); 1530 TPY of CO; and 63 TPY of VOC. First year annual NOx emissions could be as high as 1583 TPY.

5. BACT REVIEW – MISCELLANEOUS SOURCES OF PARTICULATE MATTER (PM/PM_{10})

Primary Crusher

The existing primary crusher (EU-001) and associated conveyors process wet raw materials mined below the water table. This emissions unit is subject to the following applicable requirements: NSPS Subpart A (General Provisions) and NSPS Subpart OOO (Nonmetallic Mineral Processing Plants) in 40 CFR 60. It was originally constructed in accordance with Permit No. PSD-FL-259. The proposed new Kiln No. 2 system will result in an

increase in processing rate and particulate matter emissions. The Department's draft BACT determination for particulate matter emissions is:

- Visible emissions from any crusher, at which a capture system is not used, shall not exceed 15% opacity.
- Visible emissions from any transfer point on belt conveyors or from any other affected facility shall not exceed 10% opacity.

These opacity standards do not apply to truck dumping of nonmetallic minerals into any screening operation, feed hopper, or crusher. This is consistent with NSPS Subpart OOO requirements.

Miscellaneous PM Sources – Handling/Storage of Raw Materials and Clinker

The proposed project affects the following emissions units: existing raw material processing points (EU-003); new clinker and cement storage and handling points (EU-011); and new raw material processing points (EU-014). These emissions units are subject to the following applicable requirements: NSPS Subpart A (General Provisions) and NSPS Subpart F (Portland Cement Plants) in 40 CFR 60; NESHAP Subpart A (General Provisions) and NESHAP Subpart LLL (Portland Cement Manufacturing Industry) in 40 CFR 63. EU-003 was originally constructed in accordance with Permit No. PSD-FL-259. Each of the emissions points for Emissions Units 011 and 012 will be controlled by a baghouse. The following table summarizes the design parameters for each of the new proposed baghouses.

Table 5A. Baghouse Parameters for Miscellaneous PM Sources

Point No.	Baghouse Point Description	acfm	° F	Moisture	dscfm	grains/dscfm
Emissions Unit 011 – Clinker and Cement Processing						
L-03-02	Clinker pan conveyor	3000	300	2%	2043	0.0085
L-06-02	Clinker silo inlet	11,390	300	2%	7755	0.0085
L-25-02	Gypsum/off-spec. clinker transport	6000	90	2%	5645	0.0085
M-08-02	Clinker silo outlet conveyor	6000	212	2%	4620	0.0085
M-09-02	Gypsum/off-specification clinker silo outlet	4500	90	2%	4234	0.0085
N-09-02	Finish mill separator (1)	128,600	198	3%	100,097	0.0085
N-12-02	Finish mill (2)	35,000	198	4.6%	26,793	0.0085
N-36-02	Fringe cement bin	4000	130	2%	3508	0.0085
N-91-02	Finish mill (3)	6000	200	2%	4704	0.0085
P-03-02	Cement transport conveyor	3000	130	2%	2631	0.0085
P-11-02	Cement silos	10,000	130	2%	8770	0.0085
Q-17-02	Cement truck load out No. 3	3000	130	2%	2631	0.0085
Emissions Unit 014 – Raw Material Processing						
E28-02	Raw mill	3000	300	2%	2043	0.0085
E34-02	Off-spec. feed handling	2000	300	2%	1362	0.0085
G07-02	Homogenizing silo	15,000	200	2%	11,760	0.0085
H08-02	Poldos homogenizing silo	2000	200	2%	1568	0.0085
H08A-02	Hydrated lime silo	2700	140	2%	2328	0.0085
U-05-02	Fly ash silo	2700	140	2%	2323	0.0085

The application indicates that PM_{10} emissions will not exceed 0.0085 grains per dscf of exhaust from each baghouse. The draft permit will include this as a design specification to ensure proper maintenance and replacement of bags. The Department's draft BACT determination for particulate matter emissions is:

Opacity Standards: The following standards apply to each emissions point of Emissions Units 003, 011, and 014 including the finish mill system, raw mill dryer, raw material storage, clinker storage, finished product storage, conveyor transfer points, bagging and bulk loading and unloading systems. As determined in accordance with EPA Method 9 observations:

a. Visible emissions from each baghouse exhaust point shall not exceed 5% opacity, and

b. Visible emissions from any emissions point not controlled by a baghouse (i.e., conveyors) shall not exceed 10% opacity.

[Rule 62-212.400(BACT), F.A.C.]

Particulate Matter Standard: For Emissions Point N-09-02 of Emissions Unit 011, particulate matter emissions shall not exceed 0.0085 grains/dscf based on a performance test conducted in accordance with EPA Method 5.

A particulate matter emissions standard is being established for Point N-09-02 of Emissions Unit 011 because this emissions point is controlled by the largest baghouse of the group with a design flow rate of nearly 130,000 acfm. The "0.0085 grains/dscf" standard is based on the application and baghouse design specifications. All particulate matter emissions are assumed to be PM_{10}.

Coal Mill and Transfer System

The new coal mill and coal transfer systems (EU-014) are subject to the applicable requirements of NSPS Subpart Y (Coal Preparation Plants) in 40 CFR 60. The following table summarizes the baghouse control systems the applicant proposes to install to reduce particulate matter emissions from these points.

Table 5B. Baghouse Parameters for Coal Mill and Coal Bin

Point No.	Baghouse Point Description	acfm	° F	Moisture	dscfm	grains/dscfm
Emissions Unit 012 – Coal Mill and Coal Transfer System						
S17-02	Coal mill (1 and 2)	25,000	150	6.5%	20,223	0.0085
S21-02	Pulverized coal bin	2000	150	2%	1697	0.0085

The application indicates that PM_{10} emissions will not exceed 0.0085 grains per dscf of exhaust from each baghouse. The draft permit will include this as a design specification to ensure proper maintenance and replacement of bags. The Department's draft BACT determination for particulate matter emissions is:

Particulate Matter Standards: As determined by EPA Method 5, particulate matter emissions from any thermal dryer shall not exceed 0.0085 grains per dscf of exhaust. [Rules 62-212.400(BACT), F.A.C.]

Opacity Standards: As determined by EPA Method 9:

a. Visible emissions shall not exceed 5% opacity from any emissions point controlled by a baghouse.

b. Visible emissions shall not exceed 20% opacity from any coal processing and conveying equipment or coal storage system.

Storage Piles, Paved Roads and Unpaved Roads

The process of manufacturing cement has the potential to emit significant amounts of particulate matter in the form of fugitive dust from sources such as raw materials, coal, petcoke, fly ash, and road dust. Activities that generate fugitive dust include mining, crushing, grinding, dumping, conveying, silo loading/unloading, truck traffic, wind erosion from storage piles, and dusty roads. The applicant mines below the water table, so the raw materials are inherently wet and fugitive dust is greatly minimized throughout the entire process. As previously discussed, crushing, grinding, dumping, conveying, and silo loading/unloading are activities that are confined and controlled by equipment or minimized by work practice standards in accordance with specific regulations. More generally, state regulations (Rule 62-296.320(4)(c), F.A.C.) require operators to take reasonable

precautions to prevent sources of fugitive dust that could be emitted from sources such as stockpiles and roads. The state regulation requires the Department to consider the cost of the control technique or work practice, the environmental impacts of the technique or practice, and the degree of reduction of emissions expected from a particular technique or practice.

The following list identifies reasonable precautions that will be taken at the plant to prevent fugitive dust emissions during construction of the new kiln system as well as normal operations.

- Paving and maintenance of access roadways, manufacturing area, parking areas and yards.
- Landscaping or planting of vegetation.
- Confining abrasive blasting where possible.
- Applications of water to control emissions from activities such as demolition of buildings, grading roads, construction, and land clearing.
- Applications of asphalt, water, or dust suppressants to unpaved roads, yards, open stockpiles, and similar activities.
- Storage of all materials at the plant under roof on compacted clay or concrete, or in enclosed vessels.
- Maintaining water supply lines, hoses and sprinklers near all stockpiles of raw materials, coal, and petroleum coke.
- Removal of particulate matter from buildings, roads, and other paved areas under the control of the owner or operator of the facility to prevent particulate from becoming airborne.
- Periodic sweeping with a vacuum sweeper truck to remove dust from paved roads, parking, and other work areas.

The above techniques are commonly used for this industry [7, 8, 9]. The existing plant has already paved the access roadways, manufacturing area, parking areas and yards. Landscaping is planted and water supply lines are available for wetting fugitive dust sources. A vacuum sweeper periodically removes dust from paved roads and areas. The figure shows the existing Kiln No. 1 system, enclosed conveyors, paved manufacture area, paved roadways, roadway curbs, and grass planted along roadway edges. Based on site visits, the existing facility is well maintained and fugitive dust is minimal.

Figure 5A. Grounds at Suwannee American Cement's Existing Plant.

In general, it is difficult to specify the frequency with which to wet materials or sweep roadways. Nearly all of prescribed techniques are most effective when applied as necessary, just before a fugitive dust problem is caused. For example, vacuum sweeping is necessary to remove dust buildup on paved roads. If the sweeping is not conducted often enough, traffic and winds can cause dust emissions. However, the act of vacuum sweeping can also cause particulate matter to become airborne. If performed too frequently, vacuum sweeping is actually less effective and generates dust emissions. Therefore, most of the reasonable precautions listed should be taken as necessary.

6. AIR QUALITY ANALYSIS REVIEW

Introduction

The proposed project is a major modification to an existing facility and will increase PM_{10}, SO_2, NOx, CO and VOC emissions at levels in excess of PSD significant amounts. PM_{10}, SO_2, and NO_X are criteria pollutants and have national and state ambient air quality standards (AAQS), PSD increments and significant impact levels defined for them. CO is a criteria pollutant and has only AAQS and significant impact levels defined for it. Emissions of VOC are related to the formation of ozone and are not generally modeled for individual stationary sources. The air quality impact analyses required by the PSD regulations for these pollutants include:

- An analysis of existing air quality for PM_{10}, SO_2, NO_X, CO and VOC;
- A significant impact analysis for PM_{10}, SO_2, NO_X and CO;
- A PSD increment analysis for PM_{10};
- An Ambient Air Quality Standards (AAQS) analysis for PM_{10}; and
- An analysis of impacts on soils, vegetation, and visibility and growth-related air quality modeling impacts.

The analysis of existing air quality generally relies on preconstruction monitoring data collected with EPA-approved methods. The significant impact, PSD increment, and AAQS analyses depend on air quality dispersion modeling carried out in accordance with EPA guidelines. Based on the required analyses, the Department has reasonable assurance that the proposed project, as described in this report and subject to the conditions of approval proposed herein, will not cause or significantly contribute to a violation of any AAQS or PSD increment. A discussion of the required analyses follows.

Analysis of Existing Air Quality in the Vicinity of the Project

Preconstruction ambient air quality monitoring is required for all pollutants subject to PSD review unless otherwise exempted or satisfied. This monitoring requirement may be satisfied by using previously existing representative monitoring data, if available. An exemption to the monitoring requirement shall be granted by rule if either of the following conditions is met: the maximum predicted air quality impact resulting from the projected emissions increase, as determined by air quality modeling, is less than a pollutant-specific de minimis ambient concentration; or the existing ambient concentrations are less than a pollutant-specific de minimis ambient concentration. If preconstruction ambient monitoring is exempted, determination of background concentrations for PSD significant pollutants with established AAQS may still be necessary for use in any required AAQS analysis. These concentrations may be established from the required preconstruction ambient air quality monitoring analysis or from the existing representative monitoring data. The background ambient air quality concentrations are added to pollutant impacts predicted by modeling and represent the air quality impacts of sources not included in the modeling. No de minimis ambient concentration is provided for ozone. Instead the net emissions increase of VOC is compared to a de minimis monitoring emission rate of 100 tons per year.

The table below shows project air quality impacts for comparison to de minimis ambient concentrations.

Air Quality Impacts Compared to De Minimis Levels

Pollutant	Averaging Time	Modeled Concentration ($\mu g/m^3$)	Impact Greater than De Minimis?	De Minimis Level ($\mu g/m^3$)
SO_2	24-hr	2	No	13
PM_{10}	24-hr	19	Yes	10
CO	8-hr	54	No	575
NO_2	Annual	0.5	No	14
Ozone	Annual Rate	63 TPY of VOC	No	100 TPY of VOC

As shown in the table SO_2, NO_2 and CO impacts from the project are predicted to be less than the de minimis levels; therefore, preconstruction monitoring is not required for these pollutants. VOC emissions are predicted to be less than the de minimis emission rate; therefore preconstruction monitoring is not required for ozone. As will be shown in the significant impacts section of this evaluation, SO_2 and NO_2 emissions are not predicted to have significant impacts; therefore no further modeling for these pollutants is required, and no background concentrations need to be determined.

However, the table shows that PM_{10} impacts from the project are predicted to be greater than the corresponding de minimis level. Therefore, the applicant is not exempt from preconstruction monitoring for PM_{10}. The applicant may, instead, satisfy this requirement using previously existing representative data. Previously existing representative monitoring data do exist from PM_{10} monitors located near the western fence line of the facility in Suwannee County and near Ichetuknee Springs State Park about 6 kilometers away in Columbia County. These monitors were required as part of Suwannee's Kiln 1 construction permit. The following table summarizes the monitoring data.

PM_{10} **Monitor Data for Background Concentrations**			
Years	**Monitor Locations**	**Concentration (ug/m^3) High 2nd high 24-hour average**	**Arithmetic Mean Concentration (ug/m^3) Annual Average**
2003 - 2004	Suwannee and Columbia Counties	61	24

The above data is appropriate for fulfilling the monitoring requirement for this pollutant. It will be used as the background concentration in the PM_{10} analysis with respect to the Ambient Air Quality Standards.

Models and Meteorological Data Used in Significant Impact, PSD Increment and AAQS Analyses

The air quality models used are those listed in the "Guideline on Air Quality Models" in Appendix W of 40 CFR Part 51.

PSD Class II Area

The EPA-approved Industrial Source Complex Short-Term (ISCST3) dispersion model was used to evaluate the pollutant emissions from the proposed project and other existing facilities in the surrounding Class II area. This model determines ground-level concentrations of inert gases or small particles emitted into the atmosphere by point, area, and volume sources. It incorporates elements for plume rise, transport by the mean wind, Gaussian dispersion, and pollutant removal mechanisms such as deposition. The ISCST3 model allows for the separation of sources, building wake downwash, and various other input and output features.

A series of specific model features, recommended by the EPA, are referred to as the regulatory options. The applicant used the EPA recommended regulatory options. Direction-specific downwash parameters were used for all sources for which downwash was considered. The stacks associated with this project all satisfied the good engineering practice (GEP) stack height criteria. Elevated terrain was not a concern since most of the terrain within 10 kilometers of the site is at about the same elevation as the plant, i.e., in the 55 to 90 feet range above sea level. However, digitized terrain data derived from 30 m DEM data for each applicable USGS quadrangle were used in the ISCST3 modeling.

Modeling was performed by both the applicant and the Department. Meteorological data used in the ISCST3 model consisted of a concurrent 5-year period of hourly surface weather observations from the National Weather Service (NWS) stations at Gainesville, Florida and twice-daily upper air soundings from Waycross, Georgia (1992-1994)/Jacksonville, Florida (1995-1996). The 5-year period of meteorological data was from 1992 through 1996. These NWS stations were selected for use in the study because they are the closest primary weather stations to the study area and are most representative of the project site. The surface observations included wind direction, wind speed, temperature, cloud cover, and cloud ceiling.

PSD Class I Area

The nearest distances of this site from the Okefenokee National Wilderness Area (ONWA), St. Marks National Wilderness Area, Chassahowitzka National Wilderness Area and Bradwell Bay National Wilderness Areas are 82, 110, 133 and 161 kilometers, respectively. Since the PSD Class I areas evaluated for impacts are greater than 50 km from the proposed facility, long-range transport modeling was required for the Class I impact assessments. The California Puff (CALPUFF) dispersion model was used to evaluate the potential impact of the proposed pollutant emissions on the PSD Class I increments and the Air Quality Related Values (AQRVs), regional haze and sulfur/nitrate deposition, in the four nearby Class I areas.

CALPUFF is a non-steady state, Lagrangian, long-range transport model that incorporates Gaussian puff dispersion algorithms. This model determines ground-level concentrations of inert gases or small particles emitted into the atmosphere by point, line, area, and volume sources. The CALPUFF model has the capability to treat time-varying sources. It is also suitable for modeling domains from tens of meters to hundreds of kilometers, and has mechanisms to handle rough or complex terrain situations. Finally, the CALPUFF model is applicable for inert pollutants as well as pollutants that are subject to linear removal and chemical conversion mechanisms.

CALPUFF was run in screen mode using extended ISCST3 meteorological input data, which includes precipitation data. The same five years of representative data that were used in the Class II analysis were used as input. These were hourly surface weather observations from the National Weather Service (NWS) stations at Gainesville, Florida and twice-daily upper air soundings from Waycross, Georgia (1992-1994)/Jacksonville, Florida (1995-1996).

Characterization of Sources and Buildings

The proposed major modification consists of a new Kiln No. 2 cement production line 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 load out 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 Significant Impact Analysis. In addition, existing Kiln No. 1 sources at the facility were considered in the PM_{10} AAQS analysis and the PM_{10} PSD Class II analysis.

The modeling source inputs consisted of point, volume and area sources. Stack, baghouse vents and other point sources include the existing and proposed main kiln stacks, finish mill stacks, and stacks associated with silos, conveyors, coal bins and truck and rail load out. The roadway sources, which include both paved and unpaved roads, were subdivided into 68 area source segments for the whole facility. Characterization of road sources as area sources is generally more conservative than characterizing them as volume sources. The process-related fugitive sources were characterized as 25 volume sources for the whole facility in the modeling inputs and included stockpiles, quarry conveyors and limestone, sand, iron, ash, gypsum, coal storage sources.

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 lying 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. The dimensions of these buildings and structures were used in the modeling to determine downwash impacts.

The applicant provided the Department with oversized plot plans and electronic files representing the property and all sources, buildings, and fence lines used in the modeling. These plans were overlaid onto a modeling source map showing the spatial coordinates of each point, volume and area source, building and fence line. Using the physical and electronic layouts, the Department was able to verify the accuracy of the modeling input information.

Significant Impact Analysis

Determination of the Significant Impact Area (SIA) was based on modeling of the proposed major modification only. Where predicted concentrations are below the significance levels for a given pollutant, no further modeling is required for that pollutant. A rectangular grid was used with this modeling to evaluate the distance to where highest (high-first-high) short term and long term ambient concentrations fall below the appropriate pollutant significance levels.

Modeling to determine significance in the PSD Class II area in the vicinity of the project was conducted using facility fence line receptors with 50-meter spacing, and multiple Cartesian grids from the fence line out to 10 kilometers at grid spacing varying from 100 meters near the fence line to 1000 meters at the outer extent of the grid. There are over 2000 receptors in the Class II SIA modeling. In the Class II area, the significant impact distance is the critical distance and determines the SIA over which any additional multi-source modeling is required. The SIA is defined as a circular area centered on the proposed source with a radius equal to the critical distance. The SIA, if any, was established for every averaging period of every applicable pollutant for every year of meteorological data. The SIA, for each applicable pollutant, over which NAAQS and increment compliance modeling is performed, is the largest of these areas. The following table shows maximum predicted impacts and the SIA in the Class II area for each applicable averaging period for each pollutant.

Maximum Project Air Quality Impacts for Comparison to the PSD Class II Significant Impact Levels in the Vicinity of the Facility

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	Significant Impact? (Yes/No)	SIA (km)
SO_2	Annual	0.1	1	No	None
	24-hr	2	5	No	None
	3-hr	6	25	No	None
PM_{10}	Annual	4	1	Yes	2
	24-hr	19	5	Yes	4
CO	8-hr	54	500	No	None
	1-hr	189	2,000	No	None
NO_2	Annual	0.5	1	No	None

SO_2, NO_2 and CO emissions were determined to have less than significant impacts in the Class II area. Under New Source Review modeling guidance, no further air quality modeling is required for these air pollutants and it is reasonable to conclude that ambient air quality standards and PSD increments for these pollutants will be attained. PM_{10} was determined to have greater than significant impacts in the Class II area. The SIA based on maximum predicted ambient air concentrations of PM_{10} for all periods was 4 km with the maximum predicted impacts located along the southern facility boundary. Therefore, refined dispersion modeling including other sources in the area was required and conducted for PM_{10} to demonstrate compliance with the PSD increments and the AAQS.

Significant impact modeling was also done in the four PSD Class I areas mentioned above. More than 1400 discrete rectangular receptors were placed in these Class I areas for evaluation. Concentrations were predicted using the CALPUFF model in a screening mode. According to federal land manager policy for the use of CALPUFF in the screening mode, receptors were spaced every two degrees in all 360 degrees of the compass regardless of where each Class I area was located with respect to the facility. The receptors were placed at two radii, one of which covered the distance from the facility to the nearest boundary of each Class I area and one at a distance, which is inside the Class I area. If a predicted pollutant concentration or Air Quality Related Values analysis shows impacts greater than the applicable significance level, then further modeling may be requested by

the federal land manager using a fully developed CALMET and CALPUFF analysis containing mesoscale meteorological data, and by using federal land manager specified Class I area receptors in any Class I area of concern.

The following table shows the predicted impacts in the Class I area for each applicable averaging period for each pollutant. The table shows that there is no predicted significant impact due to any pollutant at any of the four nearby Class I areas.

Maximum Project Air Quality Impacts for Comparison to PSD Class I Significant Impact Levels in All Nearby PSD Class I Areas				
Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Significant Impact Level (µg/m^3)	Significant Impact? (Yes/No)
SO_2	Annual	0.004	0.1	No
	24-hr	0.1	0.2	No
	3-hr	0.4	1.0	No
PM_{10}	Annual	0.01	0.2	No
	24-hr	0.12	0.3	No
NO_2	Annual	0.02	0.1	No

PSD Increment Analysis

The PSD increment represents the amount that new sources in an area may increase ambient ground level concentrations of a pollutant over a baseline level set in 1977. Refined Class I and II Increment compliance modeling is performed only if the SIA determination modeling indicates that the project would have a significant impact on air quality. The purpose of this increment compliance modeling is to demonstrate that the new sources will not significantly cause or contribute to a violation of a PSD increment.

This modeling involved the sources under review as well as sources from within and near the SIA in the inventory prepared by the Department and the applicant using approved screening techniques for determining the sources to be included in the modeling analysis. These runs were to identify regulatory high receptors, high-first-high for each year for PM_{10} annual average, and high-second-highest over the five years for the 24-hour average.

The applicant originally submitted a PSD Class II increment analysis based on 50 meter receptor spacing along the fence line. However, the Department requested an updated analysis with receptor spacing of 25 meters along the fence line and an additional requirement that there be receptors no further than 25 meters from either edge of the two proposed haul roads into and out of the facility. The entrance roads were flared at the exit of the property onto Highway 27 to better reflect the configuration of the existing and future roads. Off fence line receptors were located out to 10 km and in the same locations as those in the significant impact analysis, even though the PM_{10} significant impact area was only 4 kilometers. The results of the PM_{10} Class II increment analysis are given below and show that the maximum predicted impacts are less than the respective allowable increments.

PSD Class II Increment Analysis				
Pollutant	**Averaging Time**	**Maximum Predicted Impact (µg/m^3)**	**Impact > Allowable Increment? (Yes/No)**	**Allowable Increment (µg/m^3)**
PM_{10}	Annual	6.7	No	17
	24-hr	29.8	No	30

The predicted long-term maximum annual impact is well below the allowable increment. The predicted short-term maximum 24-hour impact is just below the allowable increment, and is located on the fence line. This impact is due to stack/point sources in combination with modeled fugitive PM_{10} emissions impacts from haul roads on the property. Stack/point sources contribute slightly more than one-half of the total impact. All of the highest predicted increment impacts are along the fence line. In general, predicted impacts due to the stack/point sources dominate the highest predicted impacts and contribute over 80% of the concentration value in some cases. However, the maximum predicted road impacts at any time are less than 15 ug/m^3, or less than one-half of the allowable increment of 30 ug/m^3. The maximum predicted PM_{10} increment consumption values drop off rapidly with distance from the fence line. The maximum predicted impacts are less than half the 24-hour increment within 700 meters of the fence line.

The Department believes the modeling analysis presented by the applicant is conservative in nature. Roadways were characterized as area sources, which is a generally more conservative approach than characterization as volume sources. Modeled roadway emission rates were based on the maximum vehicular traffic expected to support the maximum potential of the plant to operate at capacity. Stack/point source emission rates were based on the maximum equipment design rates and potential emissions. The main kiln stack was modeled at the applicant's proposed emission rate, which turned out to be approximately 10% higher than the Department's draft BACT determination for PM_{10} emissions.

The capacity of a cement plant is limited by the processing and production capabilities of the pyroprocessing kiln systems. Establishing maximum process and production rates for the kiln systems effectively limits the maximum activities and potential emissions from sources throughout the plant. In addition to the process and production restrictions established for the facility and existing Kiln No. 1 system, the draft permit will contain the following limitations:

- The facility shall (Kiln Line Nos. 1 and 2) not produce more than 2,382,720 tons of portland cement during any consecutive 12 months.
- The process rate of dry preheater feed material (including dry fly ash) to Kiln No. 2 shall not exceed 1,789,230 tons during any consecutive 12 months.
- The clinker production rate of Kiln No. 2 shall not exceed 127 tons per hour (24-hour average) and 1,055,500 tons during any consecutive 12-months.
- The primary raw material crusher shall not process more than 3,450,000 tons of raw materials during any consecutive 12 months.
- For the Kiln No. 2 system, the maximum annual coal processing rate shall not exceed 150,000 tons per consecutive 12 months.

The raw materials are mined below the water table and are processed wet. The inherent moisture content suppresses much of the potential dust emissions during processing. As discussed in the previous section regarding BACT determinations, the existing plant is currently taking numerous reasonable precautions to prevent fugitive dust emissions such as: paving the manufacture and parking areas and most frequently used roads; confining and enclosing conveyors where practicable; storing all materials under roof on compacted clay or concrete, or in enclosed vessels; maintaining water supply lines near all stockpiles of raw materials, coal, and petroleum coke and using as necessary; and periodic sweeping of paved roads with a vacuum sweeper to remove accumulated dust. On site inspections of the plant have shown these mitigation techniques to be effective in controlling fugitive dust at this plant.

Ambient Air Quality Standards (AAQS) Analysis

AAQS compliance modeling was performed for PM_{10} because the SIA determination modeling indicated that the new sources would have a significant impact on air quality. The purpose of AAQS compliance modeling is to demonstrate that the new sources will not cause or contribute to a violation of an AAQS. AAQS compliance

modeling addressed all areas within the SIA. These runs identify regulatory high receptors; high-first-high for each year for PM_{10} annual average, and high-second-highest over the five years for the 24-hour average.

The applicant originally submitted an AAQS analysis based on 50 meter receptor spacing along the fence line. However, the Department requested an updated analysis with receptor spacing of 25 meters along the fence line and an additional requirement that there be receptors no further than 25 meters from either edge of the two proposed haul roads into and out of the facility. The entrance roads were flared at the exit of the property onto Highway 27 to better reflect the configuration of the existing and future roads. Off fence line receptors were located out to 10 km and in the same locations as those in the significant impact analysis, even though the PM_{10} SIA was only 4 kilometers.

AAQS compliance modeling involved the sources under review as well as sources from within and near the SIA in the inventory prepared by the Department and the applicant using approved screening techniques. The background concentrations developed from the existing monitoring data discussed earlier were added to the modeled concentrations to determine compliance with the AAQS. The table below gives the results and shows that maximum predicted impacts are less than the AAQS.

Ambient Air Quality Impacts						
Pollutant	**Averaging Time**	**Major Sources Impact ($\mu g/m^3$)**	**Background Concentration ($\mu g/m^3$)**	**Total Impact ($\mu g/m^3$)**	**Total Impact Greater than AAQS**	**Florida AAQS ($\mu g/m^3$)**
PM10	Annual	7.2	24	31.2	No	50
	24-hr	30.6	61	91.6	No	150

Additional Impacts Analysis

Federal Secondary Ambient Air Quality Standards were established to protect the public welfare including the protection of animal and plant life, property, visibility and atmospheric clarity, and the enjoyment of life and property. The U. S. Environmental Protection Agency was directed by Congress to develop primary and secondary ambient air quality standards. The primary standards were to protect human health and the secondary standards were to, "… protect the public welfare from any known or anticipated adverse effects of a pollutant." The public welfare was to include soils, vegetation and visibility.

As a basis for promulgating the air quality standards, EPA undertook studies related to the effects of all major air pollutants and published criteria documents summarizing the results of the studies. The studies included in the criteria documents were related to both acute and chronic effects of air pollutants. Based on the results of these studies, the criteria documents recommended air pollutant concentration limits for various periods of time that would protect against both chronic and acute effects of air pollutants with a reasonable margin of safety.

The facility will not cause or contribute to any exceedance of established ambient air quality standards. The emissions from the facility will result in ambient impacts that are less than significant and are considered to be de minimis, for all regulated pollutants except for PM_{10}.

Impacts on Soils, Vegetation, and Wildlife

The impacts to ambient air resulting from emissions of PM_{10} are well below the applicable Federal Secondary Ambient Air Quality Standards. Compliance with PSD Class II increments establishes an effective ambient air quality standard that is much more stringent than the ambient air quality standards. It is concluded that there will be no adverse effect to the soils or vegetation of the area. Maximum predicted impacts are less than the critical values established by the federal land manager.

Impact on Visibility

A regional haze analysis was used to assess the potential for a significant increase in regional haze in the four

nearby Class I areas due to this source's projected increase in emissions. A regional haze analysis to determine visibility impacts in these Class I area was required by the Fish and Wildlife Service. The maximum change in background extinction coefficient using CALPUFF in the screening mode is 5.16 percent, which is slightly higher than the criteria value of 5 percent. However, the use of CALPUFF in the screening mode using the 360 degree ring of receptors is conservative. The Department received comments from the U.S. Fish and Wildlife Service (FWS) regarding this project on June 14, 2005 and again and on September 26, 2005. Ultimately, the FWS concluded the following, "Upon examining the information presented, including the amount and type of emissions from this project, the distance to the Class I area, the magnitude of visibility impact, in this specific case, FWS does not anticipate this project will have a significant impact on the three Class I refuges." Predicted regional haze impacts due to a fully developed CALPUFF run would result in a regional haze impact less than the critical value. Therefore, the screening results indicate that the impact of this project on visibility in the Class I area is insignificant.

Class I Deposition Impacts

The applicant did a sulfate/nitrate deposition analysis in the four nearby PSD Class I areas using CALPUFF in the screening mode. The deposition values given by this analysis are compared to a Deposition Analysis Threshold (DAT), which has been developed by the federal land manager. For this project, the predicted deposition values for sulfate and nitrate are less than the DAT and no adverse impacts due to deposition are expected.

Growth-Related Air Quality Impacts

No quantifiable air quality impacts are projected for the area as a result of general commercial, residential, industrial and other growth associated with the facility. The proposed construction will require an increase in personnel at the cement plant. No increase in residential or commercial construction is expected in the area surrounding the plant as a result of this modification. Therefore, no additional growth impacts are expected as a result of the proposed project.

The area the facility will affect is the area of significant impact described in the air quality analysis section of this report. This area is within a radius of 4 kilometers from the proposed facility. The applicant owns a substantial amount of this area. General commercial, residential, and other growth within the radius is expected to continue at approximately the current rate.

Good Engineering Practice Stack Height Determination

A Good Engineering Practice (GEP) review was conducted for each proposed new source to determine if building downwash effects needed to be included in the modeling and to determine the appropriate stack heights to be used with the models. The new stacks will be lower than GEP height; therefore building downwash effects were included in the modeling analyses.

Conclusion

The applicant conducted the required modeling analysis in accordance with EPA-approved regulatory models and methods and Department protocols. Based on the required analyses, the Department has reasonable assurance that the proposed project, as described in this report and subject to the conditions of approval proposed in the draft permit, will not cause or significantly contribute to a violation of any AAQS or PSD increment. The Department's consultant on this project, Enviroplan Consulting, reviewed the applicant's air quality modeling analysis and concurred with the Department's conclusion.

7. AVAILABLE INFORMATION

In addition to information provided and referenced in the application, the Department also relied on the following information.

1. "Technical Evaluation and Preliminary Determination" for Suwannee American Cement's project to

increase production capacity; Florida Department of Environmental Protection, Bureau of Air Regulation; February 16, 2005; Project No. 1210465-011-AC (PSD-FL-259F).

2. "SNCR: NOx at U.S. Cement Plant. Is SCR Close Behind?"; Al Linero, P.E.; Florida Department of Environmental Protection; June 2005; Paper #638 Presented at National AWMA Conference in Minneapolis, MN.
3. "What's Up with Cement Permitting?"; Al Linero, P.E.; Florida Department of Environmental Protection; June 2005; Paper #884 Presented at National AWMA Conference in Minneapolis, MN.
4. Blue Circle Home Page. http:/www.cement.bluecircle.co.uk; Teleconference between A.A. Linero (Florida DEP) and W. McLendon (Blue Circle); March 19, 2001; Permission to use modified version of Blue Circle cement process diagram.
5. "BACT: What is Achievable with Today's Technologies"; Mark S. Terry, Krupp Polysius Corporation 2000; Paper in the Conference Proceedings for the International Cement Seminar 2000.
6. "Roanoke Cement PSD Permit"; Heather Jackson (Roanoke Cement Company); June 12, 2003; Engineering Analysis in Support Increasing CO Emission Level
7. "Control of Open Fugitive Dust Sources"; United State Environmental Protection Agency; September 1988; EPA. Document No. EPA-450-3-88-008.
8. "Identification, Assessment, and Control of Fugitive Particulate Emissions"; Prepared for United State Environmental Protection Agency; Midwest Research Institute, Kansas City, MO; August 1986; Document No. PB86-230083.
9. "Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries"; European Commission, Directorate-General Joint Research Centre; March 2000.
10. *Air Pollution Engineering Manual*; AWMA, Edited by Anthony J. Bunicore and Wayne T. Davis; Van Nostrand Reinhold, 1992; New York, NY.
11. "Heavy Metals in Cement and Concrete Resulting from Co-incineration of Waste in Cement Kilns with Regard to the Legitimacy of Waste Utilisation"; M. Achternbasch, K.-R. Brautigam, N. Hartlieb, C. Kupsch, U. Richers, P. Stemmermann; Institut fur Technikfolgenabschatung und Sytemanalyse, Institut fur Technische Chemie; October 2003; Forschungszentrum Karlsruhe GmbH, Karlruhe.

8. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the draft permit. Cleve Holladay is the project meteorologist responsible for reviewing the air quality modeling analysis. Bobby Bull and Jeff Koerner are the project engineers responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting the Department's Bureau of Air Regulation at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. *{Filename: TEPD - PSD-FL-352}*