TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Suwannee American Cement, LLC
5117 U.S. Highway 27
Branford, Florida 32008-2463

Branford Cement Plant
Facility ID No. 1210465

PROJECT

Draft Permit No. 1210465-024-AC
Application for Minor Source Air Construction (AC) Permit
Rehabilitation & Adjustments to the Existing Natural Gas Systems for Cement Kiln No. 1

COUNTY

Suwannee County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
Minerals & Metals - Key Industry Group
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

June 18, 2012

1. GENERAL PROJECT INFORMATION

Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control - General Provisions); 62-210 (Stationary Sources - General Requirements); 62-212 (Stationary Sources - Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources - Emissions Monitoring). Specifically, air construction permits are required pursuant to Rules 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations on a quarterly basis in Rule 62-204.800, F.A.C.

Facility Description and Location

This facility is an existing Portland cement manufacturing plant categorized under Standard Industrial Classification No. 3241. The existing Branford Cement Plant is located in Suwannee County at 5117 US Highway 27 in Branford, Florida. The UTM coordinates Zone 17, 321.4 km East and 3315.9 km North.

This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to state and federal Ambient Air Quality Standards (AAQS).

Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- This facility does not operate units subject to the acid rain provisions of the Clean Air Act.
- The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.

Project Description

The applicant applied on May 4, 2012, to the Department for a minor source air construction permit. The minor source air construction permit is for the rehabilitation and adjustments to the existing natural gas systems for Cement Kiln No. 1.

Application Processing Schedule

Application for Air Construction Permit received on May 4, 2012.

{Documents specifically related to this project are posted and available on the Department's world wide web site (Link to Air Projects - Division of Air Resource Management - FDEP).}

Relevant Documents

- Permit No. 1210465-011-AC/PSD-FL-259F (Cement Kiln No. 1).
- Permit No. 1210465-019-AV, Current Title V Air Operation Permit.

2. PSD APPLICABILITY

General PSD Applicability

For areas currently in attainment with the state and federal AAQS or areas otherwise designated as unclassifiable, the Department regulates major stationary sources of air pollution in accordance with Florida's PSD preconstruction review program as defined in Rule 62-212.400, F.A.C. Under preconstruction review, the Department first must determine if a project is subject to the PSD requirements ("PSD applicability review") and, if so, must conduct a PSD preconstruction review. A PSD applicability review is required for projects at new and existing major stationary sources. In addition, proposed projects at existing minor sources are subject to a PSD applicability review to determine whether potential emissions *from the proposed project itself* will exceed the PSD major stationary source thresholds. A facility is considered a major stationary source with respect to PSD if it emits or has the potential to emit:

- 5 tons per year or more of lead;
- 250 tons per year or more of any regulated air pollutant; or
- 100 tons per year or more of any regulated air pollutant and the facility belongs to one of the following 28 PSD-major facility categories: fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), Kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants and charcoal production plants.

Once it is determined that a project is subject to PSD preconstruction review, the project emissions are compared to the "significant emission rates" (SERs) defined in Rule 62-210.200, F.A.C. for the following pollutants: carbon monoxide (CO); nitrogen oxides (NO_X); sulfur dioxide (SO_2); particulate matter (PM); particulate matter with a mean particle diameter of 10 microns or less (PM_{10}); volatile organic compounds (VOC); lead (Pb); fluorides (F); sulfuric acid mist (SAM); hydrogen sulfide (H_2S); total reduced sulfur (TRS), including H_2S; reduced sulfur compounds, including H_2S; municipal waste combustor organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans; municipal waste combustor metals measured as PM; municipal waste combustor acid gases measured as SO_2 and hydrogen chloride (HCl); municipal solid waste landfills emissions measured as non-methane organic compounds (NMOC); and mercury (Hg). In addition, significant emissions rate also means any emissions rate or any net emissions increase associated with a major stationary source or major modification which would construct within 10 kilometers of a Class I area and have an impact on such area equal to or greater than 1 $\mu g/m^3$, 24-hour average.

If the potential emission exceeds the defined significant emissions rate of a PSD pollutant, the project is considered "significant" for the pollutant and the applicant must employ the Best Available Control Technology (BACT) to minimize the emissions and evaluate the air quality impacts. Although a facility or project may be *major* with respect to PSD for only one regulated pollutant, it may be required to install BACT controls for several "significant" regulated pollutants.

3. APPLICANT REVIEW

Background

Suwannee American Cement (SAC) originally installed the existing natural gas feed system for purposes of raw material drying, kiln warm ups, and as part of an overall fuel management strategy. The current Title V air operation permit, Permit No. 1210465-019-AV does not restrict consumption of natural gas, except for the overall fuel limit of 458 mmBTU/hr. Until recently the cost of natural gas was prohibitive for consideration as a replacement for coal. Therefore, its use was restricted to an as need basis. Some parts of the existing natural gas feed systems were disconnected and isolated for safety reasons. However, prices of natural gas are now in line with or lower than the price of coal. Therefore, SAC is planning to rehabilitate and reconnect the blanked off parts of the existing natural gas feed system and to make some minor adjustments to allow for greater natural gas usage.

SAC intends to rehabilitate and make adjustments to the existing natural gas feed systems to be able to achieve 100% coal replacement with natural gas as permitted by Permit No. 1210465-019-AV (limited to 458 mmBTU/hr). Assuming natural gas has a heating value of 1,050 mmBTU/million cubic feet (mmcf), the maximum amount of natural gas that can be burned is 0.436 mmcf/hour or 3,821 mmcf/year.

Natural gas is a cleaner burning fuel than coal and is likely to result in net emissions decreases of sulfur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2), particulate matter (PM) and volatile organic compounds (VOC).

Project's Effect on Air Pollutant Emissions

The applicant indicated that the project does not and will not result in an increase in either production or operation limits. Additionally, the applicant indicated that the project does not request and will not result in an increase in air pollutant emissions. To demonstrate that there will be no increase in air pollutant emissions, the applicant proposed to track and report air pollutant emissions for up to 5 (five) years from completion of the project in accordance with Rule 62-212.300(1)(e), F.A.C.

4. DEPARTMENT REVIEW

The applicant applied on May 4, 2012, to the Department for a minor source air construction permit. The minor source air construction permit is for the rehabilitation and adjustments to the existing natural gas systems for Cement Kiln No. 1.

Cement Kiln No. 1 was originally permitted in 2000 under Permit No. 1210465-001-AC/PSD-FL-259. Cement Kiln No. 1 started up in 2003. Permit No. 1210465-001-AC/PSD-FL-259F issued on March 15, 2005 allowed an increase in production, increasing the heat input of the pyroprocessing system (kiln and calciner) from 364 to 458 mmBTU/hr. Both AC/PSD permits authorized natural gas firing.

A new kiln, Cement Kiln No. 2, was permitted in 2006 under Permit No. 1210465-014-AC/PSD-FL-352. Cement Kiln No. 2 was not built.

Review of Cement Kiln No. 1: Operating Data and NOx Emissions Data

Cement Kiln No. 1's operating data and NOx emissions data were obtained from the annual operating reports (AORs) submitted to the Department from 2003 -2010. The calendar year 2010 data was the most recent data in the Department's ARMS database. Operating data and NOx emissions data is summarized in **Tables 1.** and **2.**

Table 1. Cement Kiln No. 1: Operating Data - Fuel Usage 2003 -2010

Calendar Year	Coal usage, tons [1]	Coke usage, tons [1]	Total solid fuel usage, tons	Natural gas usage, mmcf [1]
2003	24,765	0	24,765	99.500
2004	79,622	0	79,622	72.200
2005	91,443	0	91,443	24.000
2006	86,933	28	86,961	22.000
2007	85,875	244	86,119	8.110
2008	76,214	0	76,214	6.021
2009	45,892	0	45,892	6.774
2010	52,939	0	52,939	5.388

[1] Data reported in the AORs submitted to the Department.

Table 2. Cement Kiln No. 1: Operating Data and NOx Emissions Data 2003 -2010

Calendar Year	Hours of Operation [1]	NOx, tons [1]	Clinker Production, tons [1]	Calculated equivalent lb NOx/ton clinker produced [2]
2003	2,465	306.150	198,792	3.08
2004	7,372	866.450	749,409	2.31
2005	7,534	865.700	790,969	2.19
2006	7,812	849.170	844,314	2.01
2007	8,083	834.806	845,390	1.97
2008	7,171	683.605	673,808	2.03
2009	4,005	355.244	385,277	1.84
2010	4,546	469.411	441,701	2.13

[1] Data reported in the AORs submitted to the Department.
[2] A calendar year value calculated based on AOR data.

Table 1., shows a minimal usage of natural gas by Cement Kiln No. 1 from 2003 to 2010, confirming that natural gas has been used for minor operations like for the drying of raw materials, etc. Coal has been the predominant fuel fired in Cement Kiln No. 1 from 2003 to 2010.

Table 2. indicates that clinker production was highest in 2007. **Table 2.** shows a decline in the hours of operation of Cement Kiln No. 1 from 2007 to 2010. Clinker production from Cement Kiln No. 1 decreased from 845,390 tons in 2007 to 441,701 tons in 2010. The "Calculated equivalent lb NOx/ton clinker produced" values shown in **Table 2.** ranged from 1.84 to 2.13 lb NOx/ton clinker produced in calendar years 2007 to 2010. The short-term NOx emission standard for Cement Kiln No. 1 is 2.9 lb NOx/ton clinker produced based on a 24-hour rolling average. The long-

term NOx emission standard for Cement Kiln No. 1 is 2.4 lb NOx/ton clinker produced based on a 30 operating-day block average.

Project's Effect on Air Pollutant Emissions

In switching from firing coal to natural gas in the cement kiln, air pollutant emission changes can be evaluated.

SO_2. SO_2 emissions generated can vary depending upon the raw materials and the fuel fired in the kiln.[1] Assuming the raw materials are not changed, the fuel fired in the kiln could have an effect on SO_2 emissions. The sulfur content of natural gas compared to that of coal is much lower. SO_2 emissions while combusting natural gas are therefore expected to decrease. No SO_2 emissions monitoring is proposed as being required for this project under this permit.

PM. The majority of PM emissions are from the cement manufacturing process in the kiln.[2] Additional contributions to PM emissions are from the combustion of the fuel in the cement kiln. Coal, being a solid fuel, is expected to result in higher PM emission formation compared to a gaseous fuel like natural gas. PM emissions while combusting natural gas are therefore expected to decrease. No PM emissions monitoring is proposed for this project under this permit. VE can serve as a simple indicator of PM emissions. The plant is equipped with COMS. COMS data can serve as an initial compliance demonstration with the existing VE emission standards/limits.

VOC and CO. VOC and CO emissions are formed during the combustion process in the cement kiln. VOC and CO emissions are products of incomplete combustion. When burning natural gas, better combustion is expected to take place in the cement kiln, i.e., less products of incomplete combustion are expected. VOC and CO emissions while combusting natural gas are therefore expected to decrease. The U.S. EPA's AP-42, *Compilation of Air Pollutant Emission Factors,* does not provide fuel specific VOC and CO emission factors; emission factors are provided only for specific types of kilns. The actual emissions of VOC and CO when burning natural gas versus coal in the cement kiln and calciner are not known. VOC and CO are identified as potential air pollutant emissions of concern.

VOC emissions can be easily monitored with the plant's existing THC CEMS. The THC CEMS data can be used as an initial compliance demonstration with the existing THC emission standards/limits. The THC CEMS data can also be used to evaluate any emission changes against the PSD SER for VOC.

The plant does not have CO CEMS but, does have process monitors at select points in the cement manufacturing process/operations to measure and record carbon monoxide (CO). The CO process monitor data could serve as an indicator of CO emissions. THC emissions can easily serve as a simple indicator of CO emissions as the more complete combustion of hydrocarbons, i.e., lower VOC/THC emissions, is indicative of low CO emissions. No CO emissions monitoring is proposed for this project under this permit. Since the PSD SER level for CO emissions of 100 TPY is greater than the PSD SER for VOC emissions of 40 TPY, actual VOC emissions below the PSD SER for VOC provides reasonable assurances that CO levels are also below the PSD SER. CO is therefore not identified as an air pollutant emission of concern.

NOx. NOx emissions in the cement kiln can form from the conversion of the nitrogen found in the combustion air and in the fuel. Assuming thermal NOx (NOx formed from the combustion of air) remains the same, the nitrogen content of the fuel affects additional NOx formation. NOx emissions can vary depending upon the fuel nitrogen content. The nitrogen content in natural gas is in a gaseous phase already when combustion takes place compared to the nitrogen fixed in the solid fuel, coal. According to U.S. EPA, NOx emissions formed from natural gas combustion in a cement kiln are expected to be greater than when burning coal.[3] The U.S. EPA's AP-42, *Compilation of Air Pollutant Emission Factors,* does not provide fuel specific NOx emission factors; emission factors are provided only for specific types of kilns. NOx is therefore identified as an air pollutant emission of concern. NOx emissions can be easily monitored with the plant's existing NOx CEMS. The NOx CEMS data for NOx emissions can serve as an initial compliance demonstration with the existing NOx emission standards/limits. The NOx CEMS data can also be used to evaluate any emission changes against the PSD SER for NOx.

PSD Applicability for Project

The combustion of natural gas in the kiln and calciner versus coal should result in decreases in SO_2, PM, VOC and CO emissions. As previously mentioned NOx emissions may increase from switching from coal to natural gas combustion in the kiln and calciner. Since the plant is already equipped with COMS for VE, CEMS for NOx and

THC changes to these individual air pollutant emissions when burning natural gas versus coal can be easily evaluated.

Air pollutant emissions can be tracked to determine whether or not there were in fact any net emission increases resulting from this project. Specific requirements to track and report air pollutant emissions of concern associated with this project are placed in the AC permit.

Based on what the applicant has provided, there are no expected significant emission rate increases from the proposed project. The project therefore is not subject to PSD preconstruction review.

5. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state rules 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. No air quality modeling analysis is required because the project does not result in a significant increase in emissions.

Mr. Scott M. Sheplak, P.E. is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting him by telephone at 850/717-9074 or by e-mail at scott.sheplak@dep.state.fl.us in the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

References

[1] U.S. EPA's AP-42, *Compilation of Air Pollutant Emission Factors,* Section 11.6 Portland Cement Manufacturing, 11.6.2 Emissions and Controls. U.S. EPA World Wide Web Site: http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s06.pdf.

[2] Ibid.

[3] Ibid.