TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Suwannee American Cement, LLC
5117 US Highway 27
Branford, Florida

Branford Cement Plant
Facility ID No. 1210465

PROJECT

Project No. 1210465-034-AC
Application for Minor Source Air Construction Permit
SO_2 Emission Standard

COUNTY

Suwannee County, Florida

PERMITTING AUTHORITY

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

March 12, 2015

1. GENERAL PROJECT INFORMATION

1.1. Facility Description and Location

Suwannee American Cement, LLC (SAC), operates the Branford Cement Plant. It is an existing portland cement manufacturing plant, which is categorized under Standard Industrial Classification Code No. 3241. The Branford Cement Plant is located in Suwannee County at 5117 US Highway 27 near Branford, Florida (**Figure 1**). The UTM coordinates of the existing facility are Zone 17, 321.4 kilometers (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). **Figure 1** is an aerial photograph of the plant while **Figure 3** is a satellite view of the facility.

Figure 1. Branford Cement Plant Site. **Figure 2. Aerial View of Branford Cement Plant from Northwest.**

Figure 3. Satellite View of the Branford Cement Plant.

The plant combines raw materials and utilizes a preheater/precalciner kiln with in-line raw mill to produce clinker. The clinker is milled and combined with gypsum to produce portland cement. The plant has a capacity of 210 tons/hour of dry preheater feed materials, 120 tons/hour of clinker production, and 150 tons/hour of portland cement production. Annual (12-month rolling) production is limited to 1,648,578 tons of dry preheater feed materials; 965,425 tons of clinker production; and 1,191,360 tons of portland cement production (after addition of gypsum and limestone to clinker).

The plant employs the modern dry process technology. The major equipment at the plant includes an indirect-fired kiln with a separate preheater and calciner (PH/C kiln), an in-line raw mill, a clinker cooler, finish mill, silos, conveyers, and particulate control/dust collection and recycling equipment. The cement product is stored in silos and is shipped by truck. **Figure 4** is a diagram of a PH/C kiln similar to the one at the plant.

The raw materials include limestone, sand, clay, bauxite, iron ore, mill scale, and coal ash that contain calcium, silica, iron and aluminum. These materials are metered to and ground within the raw mill to make finely divided raw meal. Raw meal is stored and then continuously weighed on feed scales and fed at the top of the preheater tower as shown in the diagram. As it falls through the preheater it is contacted and progressively heated by exhaust gases from the calciner and kiln. The calciner has a burner in a separate combustion chamber that provides the necessary heat to drive off carbon dioxide from the limestone converting it to free lime ($CaCO_3 = CaO + CO_2$). The calciner operates at a temperature of approximately 2,000 degrees Fahrenheit (^oF) and burns coal.

The calcined materials enter the kiln where they are further heated and transformed into nodules of clinker. These exit the kiln near the main kiln coal burner that operates at approximately 3,000^{o}F. The clinker falls into the cooler where it is cooled by ambient air. The heated air from the clinker cooler is used as secondary air to support combustion at the kiln burner and is also conveyed along a tertiary air duct to support combustion in and near the calciner combustion chamber.

Figure 4. Diagram of Dry Process Cement Kiln with Preheater and Staged Air Calciner.

Cooled exhaust gases leaving the preheater go through the raw mill (not shown) where the remaining heat is used to dry incoming coarse raw materials. As the raw materials are ground they are lifted by the exhaust gas flow and conveyed to the main baghouse (not shown) that also serves the purpose of a particulate control device. The finely divided dry material in the baghouse is conveyed to storage silos and then weighed and introduced into the process at the top of the preheater as discussed above. **Figure 5** are photographs of the PH/C kiln and the coal ash (a raw material) handling area.

Figure 5. Kiln and Lower Preheater/Calciner **Figure 6. View of Coal Ash Handling Area.**

The cement produced by SAC is typically distributed to ready-mix facilities within 100 miles of the facility and is used in many different construction projects throughout North Florida. SAC's cement is locally produced and locally consumed.

1.2. Air Pollution Control Equipment

Process cyclones and a baghouse collect raw meal swept from the raw mill for return to the process. The baghouse further controls emissions of particulate matter (PM) from the PH/C kiln exhaust. Judicious selection of raw materials and combustion design are the key to control of all other pollutants. These are the specific controls for CO, VOC/THC and organic hazardous air pollutants (HAP) such as dioxin and furan. NO_X emissions are further controlled by indirect firing, multiple burn points, air staging in the calciner and ammonia-based selective non-catalytic reduction (SNCR). The permitted emissions units (EU's) are listed in **Table 1**.

TABLE 1 - LIST OF EMISSIONS UNITS AT THE SAC BRANFORD CEMENT PLANT.

EU NO.	Emissions Unit Description
001	1,000 TPH primary crusher and associated unenclosed belt conveyors to raw material storage – fugitive emissions
002	Raw material processing operations controlled by baghouses
003	Raw material processing – unenclosed conveyor transfer points – D conveyors
004	In line kiln/raw mill controlled by baghouse – main stack
005	Clinker cooler controlled by Electrostatic Precipitator (ESP)
006	Clinker and cement processing operations controlled by baghouses
007	Clinker and cement processing – unenclosed conveyor transfer points – M conveyors
008	Coal mill and coal transfer system controlled by baghouses
009	Unenclosed coal conveying equipment – S conveyors
010	Natural gas fired emergency generator set

Acid gases such as SO_2 and hydrochloric acid (HCl) are further controlled by limestone scrubbing by raw materials, finely divided lime in the calciner or supplementary hydrated lime injection. Mercury (Hg) is controlled by dust shuttling and judicious selection and sampling of Hg content in raw materials and fuels.

1.3. SO_2 Control at SAC

The role of the project is better understood by first reviewing the existing SO_2 control system. Limestone ($CaCO_3$) in the feed is converted into finely divided dry lime (CaO) in the calciner by the reaction:

$CaCO_3 = CaO + CO_2$

Refer to **Figure 7.** CaO in the calciner serves as an excellent scrubbing reagent and binds sulfur dioxide formed by combustion of fuel in the kiln and calciner. The product consists of calcium sulfite ($CaSO_3$) and calcium sulfate ($CaSO_4$).

$CaO + SO_2 + \text{oxygen} = CaSO_3 + CaSO_4$ (unbalanced equation)

While $CaSO_4$ is stable within the temperature regime of the calciner, it is volatilized at the temperatures encountered in the kiln. SO_2 is revolatilized and then is tied up by excess sodium (Na) and potassium (K) in the exhaust gas to form K_2SO_4 and Na_2SO_4. Ultimately, these species combine with $CaSO_4$ within the kiln to form more stable complex K-Na-SO_4–$CaSO_4$ species that are incorporated into the clinker.

Figure 7. Simplified Diagram of SO_2 Generation and Removal within Cement Pyroprocessing.

Generally speaking, fuel sulfur leaves the process with the product, thus avoiding emissions into the atmosphere. The process is so efficient that ***almost no SO_2 of fuel origin*** is emitted from a modern cement kiln.

There exists the possibility of SO_2 emissions resulting from "roasting" of feed material as it travels down the preheater. This occurs when occasional pockets of sulfide impurities (iron pyrite, i.e. FeS_2) in the limestone are encountered. The pyritic sulfur is released as the raw meal is heated under oxidizing conditions during its downward path through the preheater according to the following overall equation.

$4FeS_2 + 11O_2 = 2Fe_2O_3 + 8SO_2$ (pyritic SO_2)

By and large, this phenomenon occurs in raw materials encountered outside of Florida such as in Texas and South Carolina. Because pyritic SO_2 does not reach the calciner, it does not react with the finely divided hot lime in the calciner and is not incorporated into the product clinker as described above. Much of the pyritic SO_2 is abated when exhaust gases are used to dry incoming raw materials in the raw mill. Much of the pyritic SO_2 is absorbed by the finely ground limestone under the moist conditions that occur in the raw mill environment. SAC intermittently adds purchased hydrated lime as needed to remove SO_2 under such conditions.

1.4. Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- The facility is a Title V major source of air pollution in accordance with Chapter 62-213, 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.

1.5. General Project Description

The request does not involve a physical project. Link to Application. The applicant requests changes to the SO_2 emission limit and averaging time that are applicable to Emission Unit 004 - In-Line Kiln/Raw Mill. The applicant requests a ***lower*** SO_2 emission limit from 0.20 to 0.183 pounds per ton of clinker produced (lb/ton). The applicant also requests a ***longer*** averaging period that is used for compliance of SO_2 emissions from 3 hours to 24 hours, rolling basis, measured by a continuous emission monitoring system (CEMS). The changes will allow the company to improve plant operations and product by more careful management of a hydrated lime injection system that is infrequently used to manage occasional spikes in SO_2 concentrations.

The request requires revision of earlier air construction permit(s) issued pursuant to Department Rule 62-212.400, Florida Administrative Code (F.A.C.), Prevention of Significant Deterioration (PSD), including Best Available Control Technology (BACT). The changes will eventually be incorporated into the facility Title V air operation permit. The plant operates under Title V permit 1210465-019-AV that includes the present SO_2 limit (page 18).

1.6. Processing Schedule

01/09/2015 Received the application for a minor source air pollution construction permit. Application complete.

03/12/2015 Draft permit issued.

2. PSD APPLICABILITY REVIEW

2.1. General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program. PSD preconstruction review is required in areas that are currently in attainment with the state and federal ambient air quality standards (AAQS) or areas designated as "unclassifiable" for these regulated pollutants. The project is located in Suwannee County, which is in an area that is currently designated in attainment with each State AAQS and NAAQS or not classified.

The key requirements of a PSD review include: employment of BACT; a demonstration that the project will not cause or contribute to a violation of a state of federal AAQS or increment; and a demonstration that the project will not cause adverse impacts to Air Quality Related Values (AQRVs) such as visibility, soils and vegetation.

Commonly addressed PSD pollutants include: carbon monoxide (CO), nitrogen oxides (NO_X) PM, PM with a

mean diameter of 10 microns or less (PM_{10}), PM with a mean diameter of 2.5 microns or less ($PM_{2.5}$), sulfuric acid mist (SAM), sulfur dioxide (SO_2), volatile organic compounds (VOC), lead (Pb), fluorides (F), and mercury (Hg). Additional PSD pollutants that are more common to certain other industries include: hydrogen sulfide (H_2S), TRS including H_2S, reduced sulfur compounds (RSC) including H_2S, municipal waste combustor (MWC) organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (dioxin/furan), MWC metals measured as PM, MWC acid gases measured as SO_2 and HCl, and municipal solid waste (MSW) landfill emissions as non-methane organic compounds (NMOC).

Greenhouse gases (GHGs) is another PSD pollutant. GHGs is defined at section 40 CFR 86.1818-12(a) as the aggregate group of gases including carbon dioxide (CO_2) nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). GHGs is expressed as CO_2-equivalent (CO_2e). In making the CO_2e calculation, the values listed in 40 CFR 98, Subpart A, Table A-1 is used.

2.2. Definition of a Major Stationary Source

As defined in Rule 62-210.200(Definitions), F.A.C., a stationary source is a "major stationary source" (major PSD source) if it emits or has the potential to emit (PTE):

- 250 tons per year (tons/year) or more of any PSD pollutant; or
- 100 tons/year or more of any PSD pollutant and the facility belongs to one of the 28 listed PSD major facility categories.

According to a recent Supreme Court Opinion and EPA Implementation Guidance, a stationary source is not a major stationary source subject to PSD if only its GHGs emissions exceed the values listed above. [1]

The listed PSD major facility categories includes "portland cement plants". The given category applies to the SAC Plant. The SAC Plant is a major stationary source based on actual emissions of and potential to emit 100 tons/year or more of several individual PSD pollutants.

Once a new facility is considered a major stationary source based on one PSD pollutant, then other PSD pollutants are reviewed for PSD applicability based on the respective Significant Emission Rate (SER) defined and specified in Rule 62-210.200, F.A.C. Each pollutant projected to be emitted at a rate equal to or greater than its respective SER is also considered to be "*significant*" and subject to PSD preconstruction review, including a BACT determination. Although a new stationary source may be "major" for a single PSD pollutant, the project must include BACT controls for any PSD pollutant that exceeds the corresponding SERs listed in **Table 2**.

TABLE 2. LIST OF SIGNIFICANT EMISSION RATES (SERS) BY PSD-POLLUTANT. [1]

Pollutant	SER (tons/year)	Pollutant	SER (tons/year) [4]
CO	100	NO_X	40
$PM/PM_{10}/PM_{2.5}$	25/15/10	Ozone (VOC) [2]	40
$PM_{2.5}$ (NO_X)	40	$PM_{2.5}$ (SO_2)	40
Ozone (NO_X) [2]	40	SAM	7
SO_2	40	Pb	0.6
Hg	0.1	GHGs	> 75,000 (CO_2e) and > 0 (mass) [3]

1. Excluding fluoride and pollutants specific to the Pulp and Paper industry, MWCs, MSW landfills.
2. Ozone (O_3) is regulated by its precursors (VOC and NO_X). PSD for $PM_{2.5}$ can be triggered by its precursors (NO_X and SO_2).
3. Pursuant to 40 CFR 52.21(b)(23)(ii), pollutants with no SER listed at 40 CFR 52.21(b)(23)(i) have a SER of zero (0) tons/year.
4. SER also means any emissions rate or any net emissions increase associated with a major stationary source or major modification which would construct within 10 km 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.

[1] U.S. Supreme Court opinion dated June 23, 2014. Link to Supreme Court Opinion EPA guidance dated July 24, 2014. Link to EPA Guidance

2.3. Definition of Major Modification

"Major modifications" at major stationary sources are also subject to PSD review. According to Rule 62-210.200(Definitions), F.A.C., Major Modification (of a Major Stationary Source) is defined as follows:

(a) Any physical change in or change in the method of operation of a major stationary source that would result in a significant emissions increase of a PSD pollutant ***and*** a significant net emissions increase of that pollutant from the major stationary source. (Refer to SERs in **Table 2** above)

(b) Any significant emissions increase from any emissions units or net emissions increase at a major stationary source that is significant for volatile organic compounds or nitrogen oxides shall be considered significant for ozone. (Refer to SERs in **Table 2**)

(c) through (d). These paragraphs are not relevant to this review.

For a major modification of an existing major stationary source, the review must include a BACT determination for any PSD pollutant that exceeds the respective SER. The review must include demonstrations that the project will not cause or contribute to a violation of an AAQS or increment and that the project will not adversely affect AQRVs.

GHGs becomes subject to regulation at a major modification if project emissions as CO_2e are greater than 75,000 tons/year and mass GHGs exceed zero tons/year. Consistent with the previously mentioned Supreme Court Opinion and EPA Implementation Guidance, if a project does not trigger PSD for pollutants other than GHGs then PSD is not triggered by GHGs regardless of emissions or emission increases.

2.4. Definitions of Baseline Actual Emissions and Projected Actual Emissions

To determine whether the project causes net emissions increases equal to or greater than the respective SER (triggering PSD) requires a comparison of recent "baseline actual emissions" with future "projected actual emissions". According to Rule 62-210.200(Definitions), F.A.C., as applicable to an existing cement plant:

"Baseline Actual Emissions" means, for an existing emissions unit (other than an electric utility steam generating unit), baseline actual emissions means the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 10-year period immediately preceding the date a complete permit application is received by the Department, except that the 10-year period shall not include any period earlier than November 15, 1990.

*"Projected Actual Emissions" means the maximum annual rate, in tons/year, at which an existing emissions unit is projected to emit a PSD pollutant in **any one** of the 5 years following the date the unit resumes regular operation after the project, or in **any one** of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that PSD pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source. One year is one 12-month period. In determining the projected actual emissions, the Department:*

(a) Shall consider all relevant information, including historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans or orders, including consent orders; and

(b) Shall include fugitive emissions to the extent quantifiable and emissions associated with startups and shutdowns; and

(c) Shall exclude that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions and that are also unrelated to the particular project including any increased utilization due to product demand growth; or

(d) In lieu of using the method set out in paragraphs (a) through (c) above, may be directed by the owner or operator to use the emissions unit's potential to emit, in tons per year.

2.5. Applicant's Adjustment of SO_2 Averaging Period (lb/ton-clinker) for EU 004

The currently SO_2 emission limit of 0.20 lb/ton-clinker on a 3-hour rolling average for EU 004 was adjusted to a 24-hour rolling averaging generally following a methodology given by a EPA Memorandum.[2] This guidance is useful in determining equivalency between two emissions standards with different numerical limits and averaging periods. To calculate an equivalent emission rate, a ratio was calculated using valid SO_2 measurements from the certified SO_2 CEMS for the period of November 1, 2009 to December 16, 2014. In total, there were 24,639 valid data points of 1-hour average values for SO_2 emissions over this time period. Using the guidance, a conversion factor was determined based on the 99th percentile of the 1-hour SO_2 concentrations as collected and recorded by the CEMS.

Using the 99th percentile values, the 246th highest value from the past 5-years, using only valid data, was 8.65 lb/hr, based on a 1-hour average. In addition, the 246th highest value from the past 5-years, using only valid data, was 8.44 lb/hr and 7.71 lb/hr, based on a 3-hour and a 24-hour averaging period, respectively. The ratio used in the equivalent conversion of a 3-hour average to a 24-hour average was calculated by using the following method:

Since the current SO_2 limit for SAC is 0.20 lb/ton-clinker, based on a 3-hour average, the equivalent 24-hour average using the 99th percentile methodology outlined in the EPA memorandum would be:

While the Department does not necessarily agree with this approach, for the reasons given below, the Department does agree that the change in SO_2 emissions rate and averaging period are justified for SAC.

2.6. Historical Operational Data and Highest Projections of Business Activity

Table 3, includes the historical clinker production and SO_2 emission data for the period 2004-2013. Soon after the facility began operation in 2003, it reached its original permitted production limit of 839,500 tons/year of clinker. The limit was increased to 965,425 tons/year by a permit modification in 2005.

TABLE 3 - YEARLY SO_2 EMISSIONS AT SAC.

Year	Clinker Production (Tons)	SO_2 (Tons)
2004	757,157	3.3
2005	790,968	13.9
2006	844,314	14.2
2007	845,390	7.8
2008	673,808	7.6
2009	385,277	5.45
2010	441,701	2.38
2011	345,089	3.23
2012	399,696	5.53
2013	477,127	6.82

[2] Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions April 23, 2014: Link to Guidance

Thereafter, the plant was able to achieve 91% capacity utilization in an environment of very high demand in Florida, which was so great that much of the demand was satisfied by importation from overseas operations. Demand greatly slackened in 2008 and stabilized at about half of the plant capacity.

Recovery in utilization at the Branford Cement Plant and other Florida cement plants was further suppressed by the startup of new kilns in Newberry, Sumterville and Brooksville during the period 2008-2010. During 2013 there was a noticeable bump upwards in utilization of more than 38% relative to 2011.

Because cement kilns operate most efficiently near their design capacities, the Branford Cement Plant is operated for a period of time relatively close to full short term capacity followed by a shutdown of roughly equal time.

Figure 8 is a historical summary and future projection of U.S. portland cement consumption and annual rates of increase based on Ed Sullivan's (Portland Cement Association) "World of Concrete Forecast" as of January 2014. Link to Cement Outlook According to the PCA Fall 2014 forecast:

PCA's cement volume forecast remains essentially unchanged since the fall forecast of 2013. The United States' cement market is expected to grow 8.2% in 2014, followed by similar rates of growth in 2015 and 2016.
Link to PCA Forecasts

Figure 8. Historical and Projected U.S. Portland Cement Consumption Millions of Metric Tonnes/Year.

The Department also notes that there has been a decline in fossil fuel prices (including coal) and greater use of alternative fuels by the industry, including SAC. These factors provide further stimulus to economic growth and cement production.

Using PCA's nation-wide projected consumption growth and assuming that SAC will maintain its present market share the Department believes that by 2017, cement production from SAC will have recovered to the levels achieved in 2006-2007. These values are close to the practical production limits given reasonable downtime. In 2018, it is likely that production from the plant will be effectively "sold out". With best operation and effort, the plant may actually be capable of producing about 900,000 tons/year of clinker compared with the permitted production limit of 965,425 tons/year.

2.7. Baseline Actual SO_2 Emissions from SAC

Refer to **Table 3.** The baseline SO_2 period for the SAC plant selected by FDEP and accepted by SAC is 2006-2007 (highlighted in **Table 3**) when production was at its greatest. Although the period 2005-2006 indicated greater average SO_2 emissions than 2006-2007, the Department is recommending that the more recent period be used to establish the baseline. The reason is that 2006 was the first year following implementation of a 15% production increase authorized on March 15, 2005 by Department; Permit No. 1210465-011-AC

The same permit authorized installation of a permanent hydrated lime [$Ca(OH)_2$] injection system for added SO_2 control and a selective non-catalytic reduction (SNCR) system for nitrogen oxides (NO_X) control. The SNCR ammonia-based system also made it possible to achieve greater production because it made it easier to comply with the NO_X limits using injection of a reagent rather than relying strictly on more difficult staged combustion techniques.

SO_2 emissions were 14.2 and 7.8 tons during 2006 and 2007, respectively. The selected 24-month period is January 1, 2006 thought December 31, 2007. The average, and therefore, the baseline actual SO_2 emissions were 11.0 tons/year at an average production rate of 844,852 tons/year of clinker.

2.8. Projected Actual SO_2 Emissions from SAC

Projected actual emissions should be based on the future year during which production and SO_2 emissions will be the greatest in the 5-year period (2016-2020) after implementation of the requested emission limit and averaging period. As stated above, plant production will likely be "sold out" in the foreseeable future and realistically may reach 900,000 tons within the period 2016-2020, considering realistic downtimes and outages.

To calculate an initial emission factor that might be used to project future emissions, the Department added all emissions measured by the SO_2 CEMS (in pounds) between 2006 and 2013 and divided by the clinker production from the same period. The resulting emission factor is 0.024 lb SO_2/ton clinker. The permitted emission limit is 0.20 lb/ton clinker on a 3-hour basis. It is noted that since the first year of operation of the kiln (2003), annual emissions have always been substantially less than 40 tons/year, which is the SER for SO_2.

Table 4 contains estimates of projected actual emissions ***prior to corrections*** (deductions) for demand growth and (additions) due to possible decreased (or more efficient) use of hydrated lime. Assuming a linear future relationship between SO_2 emissions and production and an emission factor of 0.024 lb/ton of clinker, uncorrected projected actual emissions will actually be reduced by 0.2 tons/year compared with the baseline years (despite an increase in production). This apparent reduction is simply the result of the manner by which these specific rules operate. The correction for demand growth would subtract a further 0.7 tons/year from the projection in Table 4.

TABLE 4 - ESTIMATES OF BASELINE, UNCORRECTED FUTURE EMISSIONS AND EMISSIONS INCREASES AT SAC.

Parameter	Baseline Actual Emissions [1] tons/year	Projected Actual Emissions [2] tons/year	Emissions Increase tons/year
SO_2	11.0	10.8	-0.2
Production	844,852 (clinker)	900,000 (clinker)	

1. Baseline Actual Emissions (BAEs) for SO2 based on 1/2006 to 12/2007.
2. Uncorrected future emissions based on historical emission factors and highest projections of generation for SAC.

Refer to **Table 5**, which contains the SO_2 emission limits, averaging periods and highest annual emissions during recent years from all operating cement kilns in Florida.

TABLE 5 - SO_2 EMISSION STANDARDS AND HIGHEST REPORTED ANNUAL EMISSIONS FOR OPERATING KILNS IN FLORIDA.

Facility ID	Site Name		SO_2 Limits			Highest annual SO_2 Emissions during 2009-2013 (tons/year)
			lb/ton-C	lb/hr	Averaging Period	
0010087	Argos Newberry Cement	Kiln 1	0.16	17.7	24 hours	2.9
		Kiln 2	0.28	35	24 hours	10.9
0250014	Miami Cement Plant		0.5	81	24 hours Block	29.5
0250020	Tarmac-Pennsuco Complex		0.5	320	24 hours	10.0
0530021	Cemex South Brooksville	Kiln 1	~0.96	50.0	3-hour test/year	26.6
		Kiln 2	0.185	28.8	24 hours	10.0
1190042	Sumterville Cement Plant		0.20	25	24 hours	17.8
New Kilns	NSPS - kilns constructed 6/16/2008		0.4		30 days	
1210465	SAC Branford	Present	0.20	24	3 hours	6.8
		Proposed	0.183	22	24 hours (proposed)	

It is noteworthy that no kiln in Florida even emits SO_2 at a level equal to or greater than the applicable SER of 40 tons/year. All but one kiln have a greater SO_2 emission limit and all have a longer averaging time than the SAC kiln. The greatest annual emissions measured at any Florida kiln during the most recent 5-year period (2009-2013) were from the (Titan America) Tarmac Pennsuco kiln, which is more than twice the size of the SAC kiln.

The Department also included the latest SO_2 emission standards applicable to newly constructed cement kilns. The SO_2 standard was promulgated by EPA in 2010 and is found within 40 Code of Federal Regulation (CFR), part 60, Subpart F – Standards of Performance for Portland Cement Plants. Link to Subpart F Most Florida kilns, including the SAC kiln, have BACT-based SO_2 emissions standards that are much stricter than recent Subpart F.

According to the company, the approval of request for a lower emission rate coupled with a longer averaging time will not result in substantial changes in their methods of operation. The company states that they intend to keep all of the hydrated lime injection equipment in place and use it whenever a spike in SO_2 is detected to continuously comply with SO_2 limits. The advantages of the revised SO_2 limit would be, more efficient use of hydrated lime and fewer kiln system shut downs and startups. This would not only reduce overall emissions by SAC due to fewer system shut down and startups but also improve the quality of the product. A reasonable and still conservative estimate is that ***elimination*** of hydrated lime injection would increase emissions by 5 tons/year. Continuing its use (as planned), but with a longer averaging period and lower limit will imperceptibly change annual emissions. All estimates of emission increases are much less than the SER of 40 tons/year.

Refer to the Attachment-A for a further discussion of SO_2 emissions from SAC and the role of the existing hydrated lime injection system.

Table 6 contains estimates of projected emissions ***post corrections*** (deductions) for demand growth and (additions) due to possible decreased use of hydrated lime.

TABLE 6 - ESTIMATES OF BASELINE, PROJECTED ACTUAL EMISSIONS AND EMISSIONS INCREASES AT SAC.

Parameter	Baseline Actual Emissions [1] tons/year	Projected Actual Emissions [2,3] tons/year	Emissions Increase tons/year
SO_2	11.0	15.1[4]	4.1
Production	844,852 (clinker)	900,000 (clinker)	

1. Baseline Actual Emissions (BAEs) for SO_2 based on 1/2006 to 12/2007.
2. Corrected future emissions based on historical emission factors and highest projections of generation for SAC.
3. 0.7 tons/year subtracted because they are accounted for by demand growth.
4. 5 tons/year were added as the conservative effect of a possible reduction in hydrated lime injection.

According to **Table 6** the project does not constitute a Major Modification as defined in Rule 62-210.200 (Definitions), F.A.C. and does not trigger PSD.

2.9. Department Conclusion

Annual SO_2 emissions from SAC will remain less than 40 tons/year. If such low emissions could have been projected prior to construction of the project, it would not have been necessary to conduct a PSD review or BACT determination for SO_2.

By establishing a 24-hour averaging period for SO_2 emissions, SAC will have the same averaging time as all of the kilns built in Florida during the last 20 years (before and after SAC) and will also have a more stringent SO_2 limit than required at new cement plants by the 2010 federal cement SO_2 rule contained in 40 CFR 60, Subpart F.

For reference, SAC will be subject to a very low hydrogen chloride (HCl) emission concentration standard of 3 parts per million, by volume, dry on a 30-day basis. The requirement is in 40 CFR 63, Subpart LLL - National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry (Cement NESHAP). Link to Cement NESHAP Adherence to the HCl standard will likely further suppress SO_2 emissions.

The BACT limit of SO_2 will be revised from 0.20 lb/ton of clinker (equivalent to 24 lb/hr) with a 3-hour averaging time, to 0.183 lb/ton of clinker (equivalent to 22 lb/hr) with a 24-hour averaging time.

3. 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. No air quality modeling analysis is required because the project does not result in a significant increase in emissions. Pawan Kumar Subramaniam is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting the project engineer by e-mail at Pawan.Subramaniam@dep.state.fl.us or at the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

Continuous emission monitoring systems (CEMS) located in the main kiln/raw mill stack measure and record emissions of carbon monoxide (CO), nitrogen oxides (NO_X), sulfur dioxide (SO_2) and total hydrocarbons (THC). A continuous opacity monitoring system (COMS) measures and records the opacity of the flue gas exhaust in the in-line raw mill/kiln stack. The baghouse inlet temperature is maintained at a level less than that of the most recent compliance stack test to prevent de-novo dioxin/furan formation.

The present limit on the SAC kiln is very low and has a very short averaging period of 3 hours. **Table 7** is a summary of the current and proposed SO_2 emission limits for the SAC kiln.

TABLE 7 - BREAKDOWN OF SO_2 LIMITS (CURRENT AND PROPOSED).

SO_2 Limits	Emission Factor (lb/ton clinker)	Mass Rate (lb/hour)	Averaging Period (hours)	Potential to Emit (tons/year)
Current	0.20	24	3	96.5
Proposed	0.183	22	24	88.3

Refer to **Figure 9**. During normal operations and with typical raw materials, SO_2 emissions are very low. This scenario represents almost all of the operating time for the kiln.

Figure 9. SO_2 Emissions from the SAC Kiln under Normal Operation (a little higher than typical).

Typical emissions during normal operation are usually less than 5 pounds per hour (lb/hour) and less than 0.04 lb/ton clinker compared with the permit limits of 24 lb/hour and 0.20 lb/ton clinker, respectively. Real time summaries of the most recent emission data from the kiln are available at the company web link at: http://www.suwanneecement.com/liveemissions.html When accessed on February 3, 2015, SO_2 emissions were effectively zero (time stamp: 8:31 a.m.).

Occasionally the sulfide impurities in the limestone are present, but are not detected until SO_2 emissions increase as detected by the SO_2 CEMS. Even then, the raw mill typically scrubs out the SO_2 generated within the preheater from roasting of pyrite. However, if the raw mill is concurrently down, then SO_2 emissions can approach or exceed the 3-hour limit unless hydrated lime is introduced.

Figure 10 represents one of the occasional periods when SO_2 emissions increase.

Figure 10. Spike in SO_2 Emissions Believed to be caused by Sulfides in Raw Materials.

SO_2 emissions are nearly zero for prolonged periods of time, including the time before and after that represented by the graph. There is a sudden increase in SO_2 that is then promptly suppressed by use of purchased hydrated lime that is introduced at the top of the preheater. The emissions soon return to near zero and remain at very low levels even after ceasing of hydrated lime injection.

If hydrated lime were not injected, FDEP estimates that emissions would peak at about 100 lb/hour. At a duration of about 5 hours, a reasonable estimate is that less than 500 more pounds of SO_2 would escape compared with emissions when using the hydrated lime injection system. Assuming no more than 10 incidents per year, then the addition SO_2 escaping would be on the order of 500 pounds or 0.25 tons. As a conservative estimate, the Department assumes that SO_2 emissions will increase by 5 tons/year if the emission limit is lower, the averaging time is increased, and SAC no longer activates the hydrated lime injection system.

In fact, SAC will continue to use the hydrated lime system to comply with the 24-hour standard that is lower than the present standard. Most likely there will be an imperceptible increase in annual SO_2 emissions.