Prevention of Significant Air Quality Deterioration Review

Preliminary Determination

May 2008

Facility Name: C-E Minerals Plant 2
City: Andersonville
County: Sumter
AIRS Number: 04-13-261 00047
Application Number: 17595
Date Application Received: August 9, 2007

Review Conducted by:
State of Georgia - Department of Natural Resources
Environmental Protection Division - Air Protection Branch
Stationary Source Permitting Program

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SUMMARY

The Environmental Protection Division (EPD) has reviewed the application submitted by C-E Minerals Plant 2 for a permit to add a new direct coal-fired Rotary Kiln No. 6 and request particulate matter and visible emissions limits for Apron Dryer #3. The proposed project will consist of construction and operation of a new direct coal-fired kaolin processing Kiln (ID No. 6K) and Caustic Scrubber (ID No. SC06). Caustic Scrubber (ID No. SC06) will be used to control Particulate matter (PM), Particulate matter less than 10 microns (PM_{10}), Sulfur Dioxide (SO_2), hydrochloric acid (HCl), and hydrogen fluoride (HF) emissions.

The construction of a new direct coal-fired kaolin processing kiln result in an increase in emissions from the facility. The sources of these increases in emissions include the direct coal-fired kaolin-processing Kiln (ID No. 6K).

The modification of the C-E Minerals Plant 2 due to this project will result in an emissions increase in SO_2, PM, PM_{10}, Nitrogen Oxides (NO_X), Carbon Dioxide (CO), volatile organic compounds (VOC), HF, HCl, and other hazardous air pollutants (HAPs). A Prevention of Significant Deterioration (PSD) analysis was performed for the facility for all pollutants to determine if any increase was above the “significance” level. The NO_X, PM, and PM_{10} emissions increase were above the PSD significant level threshold.

The C-E Minerals Plant 2 is located in Sumter County, which is classified as “attainment” or “unclassifiable” for SO_2, $PM_{2.5}$ and PM_{10}, NO_X, CO, and VOC.

The EPD review of the data submitted by C-E Minerals Plant 2 related to the proposed modifications indicates that the project will be in compliance with all applicable state and federal air quality regulations.

It is the preliminary determination of the EPD that the proposal provides for the application of Best Available Control Technology (BACT) for the control of NO_X, PM, and PM_{10} (PM_{10} is also used as a surrogate for $PM_{2.5}$), as required by federal PSD regulation 40 CFR 52.21(j).

It has been determined through approved modeling techniques that the estimated emissions will not cause or contribute to a violation of any ambient air standard or allowable PSD increment in the area. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth should be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to C-E Minerals Plant 2 for the modifications necessary to add a new direct coal-fired kaolin processing Kiln (ID No. 6K) and Caustic Scrubber (ID No. SC06). Various conditions have been incorporated into the current Title V operating permit to ensure and confirm compliance with all applicable air quality regulations. A copy of the draft permit amendment is included in Appendix A. This preliminary Determination also acts as a narrative for the Title V Permit.

1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA

On August 9, 2007, C-E Minerals Plant 2 submitted an application for an air quality permit to construct and operate a new direct coal-fired kaolin processing Kiln (ID No. 6K) and Caustic Scrubber (ID No. SC06). The facility is located at Highway 195 in Andersonville, Sumter County.

Table 1-1: Title V Major Source Status

Pollutant	Is the Pollutant Emitted?	If emitted, what is the facility's Title V status for the Pollutant?		
		Major Source Status	Major Source Requesting SM Status	Non-Major Source Status
PM	Yes	Yes	No	No
PM_{10}	Yes	Yes	No	No
SO_2	Yes	Yes	No	No
VOC	Yes	Yes	No	No
NO_x	Yes	Yes	No	No
CO	Yes	Yes	No	No
TRS	N/a	No	No	Yes
H_2S	N/a	No	No	Yes
Individual HAP	Yes	Yes	No	No
Total HAPs	Yes	Yes	No	No

Table 1-2 below lists all current Title V permits, all amendments, 502(b)(10) changes, and off-permit changes, issued to the facility, based on a review of the "Permit" file(s) on the facility found in the Air Branch office.

Table 1-2: List of Current Permits, Amendments, and Off-Permit Changes

Permit Number and/or Off-Permit Change	Date of Issuance/ Effectiveness	Purpose of Issuance
3255-261-0047-V-04-8	July 30, 2007	502(b)(10) Install and operate a new Ball Mill system IC45 to increase production capacity and a Baghouse BH47 for controlling particulate matter emissions.
3255-261-0047-V-04-7	February 12, 2007	Operating hours limits are removed from RM3. RM3 is limited to 3.28 lb/hr PM and 0.5% by weight sulfur. Conditions 6.1.7.b.x and 6.1.7.d.i have been removed, and Conditions 6.2.3 and 3.2.9 have been modified to reflect these changes.
3255-261-0047-V-04-6	January 30, 2006	Increase of SO_2 emissions limitation in Condition 3.2.1 for Kilns 1K-5K from 80 lb/hr to 116 lb/hr. Modification of General Recordkeeping Requirements Condition 6.1.7. Changes to permit limits contingent upon completion of stack height modifications. (To date, this has not occurred.)
3255-261-0047-V-04-5	August 17, 2005	502(b)(10) Permit for Plant 2: Modification of 502(b)(10) Conditions 3.2.8 and 6.1.8 and removal of 502(b)(10) Condition 7.14.2.
3255-261-0047-V-04-4	May 16, 2005	Removal of hours of operation for I10, I12, I13, BD2, BD5 and increase of PM emissions for I12 from 0.40 lb/hr to 1.0 lb/hr. Condition 3.2.2 is amended to delete applicability of limitations on hours of operation for I10, I12, I13, BD2, and BD5 and increase PM emissions. Conditions 6.1.7 and 6.2.3 are amended as such. Condition 4.2.2 is added to require PM emission testing.

Table 1-2: List of Current Permits, Amendments, and Off-Permit Changes

Permit Number and/or Off-Permit Change	Date of Issuance/ Effectiveness	Purpose of Issuance
3255-261-0047-V-04-3	January 19, 2005	Construction of mixer B2, rotary dryer BD09, crusher BC14 and use of silane solution in Lancaster mixer A1M and in B2.
3255-261-0047-V-04-2	March 9, 2005	Removal of hours of operation limits on BC13 and IC40. Reference in Condition 3.2.2 to hours of operation for BC13, IC43 and IC40 as are limits. Conditions 6.1.7 and 6.2.3 are similarly modified. Condition 3.2.6 is added to limit PM emissions for BC13, IC43 and IC40.
3255-261-0047-V-04-1	October 20, 2004	Revokes permit # 3295-261-0047-E-03-1 from May 29, 2003
3255-261-0047-V-04-0	December 19, 2002	Part 70 Permit

Based on the proposed project description and data provided in the permit application, the estimated incremental increases of regulated pollutants from the facility are listed in Table 1-3 below:

Table 1-3: Emissions Increases from the Project

Pollutant	Baseline Years	Potential Emissions Increase (tpy)	PSD Significant Emission Rate (tpy)	Subject to PSD Review
PM	N/a	49.06	25	Yes
PM_{10}	N/a	49.06	15	Yes
VOC	N/a	0.49	40	No
NO_X	N/a	480.3	40	Yes
CO	N/a	49.28	100	No
SO_2	N/a	39.0	40	No
TRS	N/a	0.0	10	No
Pb	N/a	0.0	0.6	No
Fluorides	N/a	1.48	3	No
H_2S	N/a	0.0	10	No
SAM	N/a	0.0	7	No

The definition of baseline actual emissions is the average emission rate, in tons per year, at which the emission unit actually emitted the pollutant during any consecutive 24-month period selected by the facility within the 10-year period immediately proceeding the date a complete permit application was received by EPD. The net increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from 24-month time period) from the future actual emissions of the new direct coal-fired Rotary Kiln No. 6 and associated emission increases from non-modified equipment. Table 1-4 details this emissions summary. The emissions calculations for Tables 1-3 and 1-4 can be found in detail in the facility's PSD application (see Attachment C of Application No. 17595). These calculations have been reviewed by the Division.

Table 1-4: Net Change in Emissions Due to the Major PSD Modification

Pollutant	Increase from New Equipment		Associated Units Increase (tpy)	Total Increase (tpy)
	Past Actual	Future Actual		
PM/PM_{10}	0	49.06/49.06	0	49.06/49.06
VOC	0	0.49	0	0.49
NO_X	0	480.3	0	480.3
CO	0	49.28	0	49.28
SO_2	0	39.0	0	39.0
TRS	0	0.0	0	0.0
Pb	0	0.0	0	0.0
Fluorides	0	1.48	0	1.48
H_2S	0	0.0	0	0.0
SAM	0	0.0	0	0.0

Based on the information presented in Tables 1-3 and 1-4 above, C-E Minerals Plant 2's proposed modification, as specified per Georgia Air Quality Application No. 17959, is classified as a major modification under PSD because the potential emissions of Nitrogen Oxides (NO_X), Particulate matter (PM), and Particulate matter less than 10 microns (PM_{10}).

Through its new source review procedure, EPD has evaluated C-E Minerals Plant 2's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

2.0 PROCESS DESCRIPTION

C-E Minerals has requested to add a sixth coal-fired kaolin processing kiln (Kiln No. 6) to the C-E Minerals Plant 2 site located in Andersonville, Georgia. The potential emissions of NO_X and PM from the new kiln (Emission Unit ID No. 6K) will be above the significant modification thresholds of 40 tpy and 15 tpy, respectively. The SO_2 and PM emissions from the new kiln will be controlled by a caustic scrubber (APCD ID No. SC06). The facility has submitted a PSD application for the construction and operation of the new kiln. The Division has reviewed the PSD application with the appropriate BACT determination and has determined it to be complete. The facility has proposed the use of low NO_X process technology with an emissions limit of 110 pounds NO_X per hour and the use of a wet scrubber and an emissions limitation of 11.2 pounds per hour of PM as BACT for NO_X and PM, respectively. Kiln No. 6 will have a PSD avoidance limit of 39 tons of SO_2 per consecutive 12-month rolling total.

The C-E Minerals Plant 2 permit application and supporting documentation are included in Appendix A of this Preliminary Determination and can be found online at www.georgiaair.org/airpermit.

3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

State Rules

Georgia Rule for Air Quality Control (Georgia Rule) 391-3-1-.03(1) requires that any person prior to beginning the construction or modification of any facility which may result in an increase in air pollution shall obtain a permit for the construction or modification of such facility from the Director upon a determination by the Director that the facility can reasonably be expected to comply with all the provisions of the Act and the rules and regulations promulgated thereunder. Georgia Rule 391-3-1-.03(8)(b) continues that no permit to construct a new stationary source or modify an existing stationary source shall be issued unless such proposed source meets all the requirements for review and for obtaining a permit prescribed in Title I, Part C of the Federal Act [i.e., Prevention of Significant Deterioration of Air Quality (PSD)], and Section 391-3-1-.02(7) of the Georgia Rules (i.e., PSD).

Georgia Rule (b) "Visible Emissions"
Rule (b) is a general rule that limits the opacity of emissions from any air contaminant source to less that 40%. The facility will use a high efficiency caustic scrubber to control particulate matter emissions to demonstrate compliance with Georgia Rule (b). The facility will monitor scrubbant flow rates and pressure drop to ensure proper operation of the scrubber. This monitoring satisfies the visible emissions requirements per Georgia Rule 391-3-1-.02(2)(b). Georgia Rule (b) limits the opacity to 40%.

Georgia Rule (p) "Particulate emissions from Kaolin and Fuller's Earth Processes"
Georgia Rule (p), commonly known as the process weight rule, limits PM emissions from Kaolin and Fuller's Earth processes based on the equations below: The direct coal-fired rotary kiln No.6 is subject to Georgia Rule (p). Georgia Rule (p) limits the particulate matter emissions from each emission units based on the following equations. For sources constructed after January 1, 1972

$P < 30$ ton/hr,
$E = 3.59\ P^{0.62}$
For $P > 30$ ton/hr
$E = 17.31\ P^{0.16}$

Where,
P = Process input rate (tons/hour)
E = Allowable Emission Rate of Particulate Emissions (lbs/hour)

The facility will use a high efficiency caustic scrubber to control particulate matter emissions to demonstrate compliance with Georgia Rule (p). The facility will monitor scrubbant flow rate and pressure drop to ensure that the scrubber is functioning properly. This monitoring satisfies the requirements of periodic monitoring per 40 CFR 70.6(a)(3)(B). Compliance with NSPS Subpart UUU will subsume the requirements of Georgia Rule (p) [see Section 4.4].

Georgia Rule (g) "Sulfur Dioxide Emissions"
Georgia Rule (g) limits the sulfur dioxide emissions of the fuels consumed by the direct coal-fired rotary kiln No.6. The fuel fired in direct coal-fired rotary kiln No.6 will be limited to 2.5 percent sulfur, by weight, or below, by Georgia Rule (g). The direct coal-fired rotary kiln No.6 will comply with Georgia Rule (g) through the use of pulverized coal limited to 2.5 percent sulfur. The exclusive use of such fuels in the kiln will ensure compliance with the requirements of Georgia Rule (g).

Georgia Toxic Guidelines
The Georgia Air Toxics Guideline is a guide for estimating the environmental impact of sources of toxic air pollutants. A toxic air pollutant (TAP) is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. There are no applicable NAAQS or specific Georgia ambient air standards for the toxics (HCl and HF) emitted by the Kiln. A complete Toxic Impact Assessment was performed utilizing an AERMOD computer dispersion model to conservatively predict the maximum annual ground level concentration (referred to as MGLC) for each pollutant in question. The majority of the TAPs that will be emitted by the new direct coal-fired rotary kiln are HCl and HF. The MGLCs for these TAPs were compared to their respective acceptable ambient concentrations (referred to as AAC). The basis for calculation of the AAC is the pollutant toxicity rating systems described in the Georgia Air Toxics Guideline. Based on the modeling results, the direct coal fired rotary kiln No.6 is considered to be in full compliance with the Georgia Toxic guidelines as the MGLCs for all TAPs were below their respective AACs.

Federal Rule - PSD

The regulations for PSD in 40 CFR 52.21 require that any new major source or modification of an existing major source be reviewed to determine the potential emissions of all pollutants subject to regulations under the Clean Air Act. The PSD review requirements apply to any new or modified source, which belongs to one of 28 specific source categories having potential emissions of 100 tons per year or more of any regulated pollutant, or to all other sources having potential emissions of 250 tons per year or more of any regulated pollutant. They also apply to any modification of a major stationary source which results in a significant net emission increase of any regulated pollutant.

Georgia has adopted a regulatory program for PSD permits, which the Unites States Environmental Protection Agency (EPA) has approved as part of Georgia's State Implementation Plan (SIP). This regulatory program is located in the Georgia Rules at 391-3-1-.02(7). This means that Georgia EPD issues PSD permits for new major sources pursuant to the requirements of Georgia's regulations. It also means that Georgia EPD considers, but is not legally bound to accept, EPA comments or guidance. A commonly used source of EPA guidance on PSD permitting is EPA's Draft October 1990 New Source Review Workshop Manual for Prevention of Significant Deterioration and Nonattainment Area Permitting (NSR Workshop Manual). The NSR Workshop Manual is a comprehensive guidance document on the entire PSD permitting process.

The PSD regulations require that any major stationary source or major modification subject to the regulations meet the following requirements:

- Application of BACT for each regulated pollutant that would be emitted in significant amounts;
- Analysis of the ambient air impact;
- Analysis of the impact on soils, vegetation, and visibility;
- Analysis of the impact on Class I areas; and
- Public notification of the proposed plant in a newspaper of general circulation

Definition of BACT

The PSD regulation requires that BACT be applied to all regulated air pollutants emitted in significant amounts. Section 169 of the Clean Air Act defines BACT as an emission limitation reflecting the maximum degree of reduction that the permitting authority (in this case, EPD), on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a facility through application of production processes and available methods, systems, and techniques. In all cases BACT must establish emission limitations or specific design characteristics at least as stringent as applicable New Source Performance Standards (NSPS). In addition, if EPD determines that there is no economically reasonable or technologically feasible way to measure the emissions, and hence to impose and enforceable emissions standard, it may require the source to use a design, equipment, work practice or operations standard or combination thereof, to reduce emissions of the pollutant to the maximum extent practicable.

EPA's NSR Workshop Manual includes guidance on the 5-step top-down process for determining BACT. In general, Georgia EPD requires PSD permit applicants to use the top-down process in the BACT analysis, which EPA reviews. The five steps of a top-down BACT review procedure identified by EPA per BACT guidelines are listed below:

Step 1: Identification of all control technologies;
Step 2: Elimination of technically infeasible options;
Step 3: Ranking of remaining control technologies by control effectiveness;
Step 4: Evaluation of the most effective controls and documentation of results; and
Step 5: Selection of BACT.

The following is a discussion of the applicable federal rules and regulations pertaining to the equipment that is the subject of this preliminary determination, which is then followed by the top-down BACT analysis.

New Source Performance Standards

Federal Rule – 40 CFR 60 Subpart A

40 CFR 60 Subpart A, *General Provisions*, imposes generally applicable provisions for initial notifications, initial compliance testing, monitoring, and recordkeeping requirements for equipment at the facility subject to certain New Source Performance Standards, as indicated by pertinent NSPS Standards.

NSPS Subpart UUU

The New Source Performance Standards (NSPS) for Calciners and Dryers in Mineral Industries (40 CFR Part 60, Subpart UUU) were proposed on April 23, 1986, and promulgated on September 28, 1992. These standards apply to new, modified and reconstructed calciners and dryers at mineral processing plants that process or produce any of the following minerals and their concentrates or any mixture of which the majority is any of the following minerals or a combination of these minerals: Alumina, ball clay, bentonite, diatomite, feldspar, fire clay, fuller's earth, gypsum, industrial sand, kaolin, lightweight aggregate, magnesium compounds, perlite, roofing granules, talc, titanium dioxide, and vermiculite. Particulate matter is the pollutant regulated under this Subpart.

Direct coal-fired rotary kiln No.6 is subject to NSPS Subpart UUU since it is considered a calciner per the NSPS Subpart UUU [40 CFR 60.730(a)] and it has been constructed after April 23, 1986. Stack particulate emissions from calciner (kilns) are limited to 0.04 gr/dscf, which will be the basis of the PM BACT emission limitation of 11.2 lbs/hr. The NSPS Subpart UUU emission limitation has been considered BACT in recent PSD reviews for coal-fired kilns (see Carolina Stalite Company, PSD review in Table 5.2.2-1). The opacity limitation (10 %) of NSPS Subpart UUU for kilns is not applicable as the facility is using a wet control device. The facility will utilize a high efficiency wet caustic scrubber to comply with the PM emissions limitation of 0.04 gr/dscf for direct coal-fired rotary kiln No.6. The facility will continuously monitor pressure drop and scrubbant flow rate to ensure compliance with the 0.04 gr/dscf PM limitation. The facility will record the scrubbant pH of the caustic scrubbant in the scrubber to ensure compliance with the annual SO_2 PSD avoidance limit once per calendar day of operation of Kiln No. 6. The above periodic monitoring will ensure that direct coal-fired rotary kiln No.6 is in compliance with the PM BACT limit as well as the NSPS Subpart UUU limits.

National Emissions Standards For Hazardous Air Pollutants

NESHAP Subpart B

40 CFR 63.40 through 63.44 implements Section 112(g)(2)(b) of the Clean Air Act amendments of 1990 which requires a case-by-case maximum achievable control technology review of HAPs for new or reconstructed sources that have potential HAP emissions, in and of themselves of 10 tpy for any individual HAP and 25 tpy for combined HAP. In this regard, the new kiln is not exempt from the case-by-case MACT requirements per 40CFR 63.40(e) as this process is considered part of a source category (Clay Mineral processing) that was never officially listed and hence never de-listed. Thus, the installation of the Plant 2 Kiln No. 6 would constitute a new source and the potential HCl and HF emissions from the Kiln without the operation of the caustic scrubber will be 11.83 tpy and 1.48 tpy, respectively. Therefore, the new kiln will be subject to a case-by-case technology MACT review unless federally enforceable conditions are taken to limit the potential HAP emissions from the new kiln to below major source HAP thresholds. An HCl emission limitation of 9.9 tpy is being proposed for Kiln No. 6 as this would limit combined HAP emissions to 11.47 tpy and thus limiting combined HAPs to below 25 tpy. (See the calculations detailed in Table 1, Attachment C of application). The facility will maintain records of the coal combusted in the new kiln each month and utilize appropriate AP-42 emission factors of HCl for coal combustion and calculate HCl emissions from the kiln. A performance test will be conducted on the caustic scrubber in order to determine its control efficiency for use in the monthly HCl emission calculations. Attachment H details a proposed PSD permit and includes conditions that would limit the HCl emissions from the kiln to 9.9 tpy to avoid applicability to Section 112(g)(2)(B) of the clean air act amendments of 1990.

State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the new direct coal-fired Rotary Kiln No. 6 associated with the proposed project would most likely results from a malfunction of the associated control equipment. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction.

Federal Rule – 40 CFR 64 – Compliance Assurance Monitoring

Under 40 CFR 64, the *Compliance Assurance Monitoring* Regulations (CAM), facilities are required to prepare and submit monitoring plans for certain emission units with the Title V application. The CAM Plans provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation applies to units that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions levels exceed the major source thresholds under the Title V permitting program. Although other units may potentially be subject to CAM upon renewal of the Title V operating permit, such units are not being modified under the proposed project and need not be considered for CAM applicability at this time.

Applicability: The following items must be met to determine applicability in terms of Part 64 – CAM

- Unit is located at a major source that is required to obtain a Title V permit [§64.2(a)]
- Unit is subject to emission limitation or standard for the applicable pollutant [§64.2(a)(1)]
- Unit uses a control device to achieve compliance [§64.2(a)(2)]
- For Initial Title V Applications or Title V modifications: Potential controlled emissions of applicable pollutant from unit are at least 100 percent of major source threshold [§64.2(a)(3)]
- For Renewal Title V Applications: Potential pre-control emissions of applicable pollutant from unit are at least 100 percent of major source threshold [§64.2(a)(3)]
- Unit is not otherwise exempt [§64.2(b)]

Therefore, this applicability evaluation only addresses the Direct coal-fired rotary kiln No.6, which does employ an air pollution control device however, for Title V modifications, the potential controlled emissions of PM_{10} and SO_2 applicable pollutant from unit are **BELOW 100** percent of major source threshold and therefore, the CAM requirements **are not triggered** by the proposed modification. In the case of NO_X, this applicability evaluation only addresses the Direct coal-fired rotary kiln No.6, which does not employ any air pollution control device to control NO_X; therefore, the CAM requirements are not triggered by the proposed modification.

4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in increased emissions of a number of pollutants, including SO_2, PM, PM_{10}, NO_X, CO, VOC, HF, HCl, and other HAPs. However, only the increased emissions for NO_X, PM, and PM_{10} are significant enough to trigger PSD review. SO_2 is limited to avoid PSD review. HCl is limited to avoid case-by-case MACT reviews under 112(g).

Direct coal-fired Rotary Kiln No. 6- Background

C-E Minerals has requested to add a sixth coal-fired kaolin processing kiln (Kiln No. 6) to the C-E Minerals Plant 2 site located in Andersonville, Georgia. The potential emissions of NO_X and PM from the new kiln (Emission Unit ID No. 6K) will be above the significant modification thresholds of 40 tpy and 15 tpy, respectively. The SO_2 and PM emissions from the new kiln will be controlled by a caustic scrubber (APCD ID No. SC06). The facility has submitted a PSD application for the construction and operation of the new kiln. The Division has reviewed the PSD application with the appropriate BACT determination and has determined it to be complete. The facility has proposed the use of low NO_X process technology with an emissions limit of 110 pounds NO_X per hour and the use of a wet scrubber and an emissions limitation of 11.2 pounds per hour of PM as BACT for NO_X and PM, respectively. Kiln No. 6 will have a PSD avoidance limit of 39 tons of SO_2 per 12 consecutive months rolling total. Condition 3.2.13 limits HCl emissions to 9.9 tons per 12 consecutive months rolling total. Potential HF emissions are well below 9.9 tons/yr increase (1.48). Therefore, no conditions addressing HF are necessary.

Direct coal-fired kaolin processing Kiln (ID No. 6K) – PM/ PM_{10} Emissions

PM and PM_{10} emissions are generated from the combustion of coal and the calcining of kaolin ore. Particulate matter emissions from the direct coal-fired rotary kiln consist primarily of fine to medium clay particles. Control Technologies such as a high efficiency wet scrubber, an electrostatic precipitator (ESP), and a high efficiency baghouse were evaluated for control of PM emissions from the direct coal-fired rotary kiln at the facility.

Step 1: Identify all control technologies

In reviewing the BACT alternatives to control emissions of PM from the direct coal-fired rotary kiln, all applicable BACT determinations for non-metallic mineral processing plants have been reviewed, as summarized in Table 5.1 below.

Table No. 5.1 PM Control Technology Determinations for Kilns and Dryers

Facility Name	Location	Agency	Database	Permit Date	Process Type	Process Description	Controls / Type	Emission Limits / Description
Big River Industries, Inc.	Baton Rouge, LA	LA DEQ	RBLC	June-06	90.024	Direct coal-fired rotary Kilns, Nos. 1-4	Venturi Scrubber	0.9700 lb/hr
Eagle-Picher Filtration & Minerals, Inc.	Vale, OR	OR DEQ	RBLC	May-03	90.024	Calciner (1)	Pulse-Jet Baghouse	0.100 gr/dscf
Carolina Stalite Company	Gold Hill, NC	NC DEM	RBLC	Dec-01	90.024	Rotary Expanding Kiln	Bag filters	0.0400 gr/dscf

As a consequence of the review, a high efficiency baghouse, an electrostatic precipitator (ESP) and a wet scrubber were considered as a control option for PM/PM_{10} emissions as noted in Table No. 5.2 below:

Table 5.2: Evaluated Control Options for PM Emissions – Direct-coal fired Rotary Kiln

Option No.	Control Technology
1	High Efficiency Wet Scrubber
2	Electrostatic Precipitator
3	Baghouse

Step 2: Eliminate Technically infeasible options

All of the above control technologies were determined to be technically feasible for purposes of this BACT determination.

Step 3: Rank remaining technologies by control effectiveness

Table 5.3: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency[1]
1	High-Efficiency Wet Scrubber	99+ percent
2	Electrostatic Precipitator	99+ percent
3	Baghouse	99+ percent

1. Control Efficiencies are based upon Vendor Information.

Step 4: Evaluate most effective controls and document results

Option 1 – High-Efficiency Wet Scrubber

Wet scrubbers are primarily used to control PM, including PM_{10} and high solubility gases with collection/removal efficiencies in range from 70 percent to greater than 99+ percent, depending upon the application. Wet scrubbers have been applied to control PM emissions from non-metallic mineral processes.
Control efficiencies as high as 99+ % have been achieved when controlling PM/PM_{10} emissions.

Option 2 - Electrostatic Precipitator

Typical new ESPs can achieve design removal efficiencies for PM of up to 99+ percent. Older existing equipment typically has operating efficiencies of 90 to 99 percent. While several factors determine ESP collection efficiency, the size of the ESP is most important since size determines treatment time; the longer a particle spends in the ESP, the greater its chance of being collected. Maximizing electric field strength will maximize ESP collection efficiency. Collection efficiency is also affected by dust resistivity, gas temperature, chemical composition (of the dust and the gas), and particle size distribution.

ESPs generally have high capital costs with the discharge electrodes as high maintenance items. ESPs in general are not suited for use in processes that are highly variable as they are very sensitive to fluctuations in gas stream conditions (flow rates, temperatures, particulate and gas composition, and particulate loadings). ESPs are also difficult to install in sites that have limited space since ESPs must be relatively large to obtain the low gas velocities necessary for efficient PM collection. Certain particulates are difficult to collect due to extremely high or low resistivity characteristics. Relatively sophisticated maintenance personnel are required, as well as special precautions to safeguard personnel from the high voltage.

An ESP, although technically feasible for application to rotary kilns, would be no more as efficient in controlling PM/PM_{10} as the wet scrubber discussed above. Since wet scrubber systems have been used historically by C-E Minerals and their understanding of such systems is well developed, it is the preferred option. Therefore, ESPs are not given future consideration as BACT for PM emissions from direct coal-fired rotary kiln No.6.

Option 3 - Baghouse

Baghouses have been used extensively during the last twenty-five years in the non-metallic mineral industry because they are efficient at dust collection achieving collection/removal efficiencies above 99 percent.

Baghouses are based on the operating principle that particles and flue gas are separated in tube-shaped filter bags arranged in parallel flow paths. The particulates are collected either on the outside (dirty gas flow from outside-to-inside) or the inside (dirty gas flow from inside-to-outside) of the bag. The main differences among the various types of fabric filter technologies are related to the type of bag cleaning method: reverse-gas, shake-deflate, pulsed-jet, and sonic cleaning. The baghouse proposed as being implemented in this review is pulsejet.

A high efficiency baghouse, although technically feasible, would be no more efficient in controlling PM/PM_{10} as the wet scrubber discussed above. Since wet scrubber systems have been used historically by C-E Minerals as their understanding of such systems is well developed, it is the preferred option. Therefore, baghouses are not given future consideration as BACT for PM emissions from direct coal-fired rotary kilns.

Step 5: Select BACT

Conclusion – PM/PM_{10} Control – High-Efficiency Wet Scrubber

The utilization of a high-efficiency wet scrubber with emissions limitation of 11.2 lbs/hr (0.04gr/dscf) in order to effectively control PM emissions from rotary kiln (Emission Unit ID No. 6K) is proposed as BACT. Table 5.4 summarizes the BACT determination requirements being proposed for direct coal-fired rotary kiln No.6.

Summary – Control Technology Review PM/PM_{10} for Direct coal-fired rotary kiln

Table 5.4: BACT Summary for direct coal-fired rotary kiln No.6 (Emission Unit ID No. 6K)

Process Operation	Emission Unit ID Nos.	BACT Limit
Direct coal-fired rotary kiln	6K	The use of a high efficiency wet scrubber to control PM/PM10 emissions from the direct coal-fired rotary kiln to 11.2 lbs/hr.

EPD Review – PM/PM10 Control

I recommend C-E Minerals Plant 2 BACT determination for the use of a high-efficiency wet scrubber (Caustic Scrubber (ID No. SC06) to control PM/PM_{10} emissions from the new direct coal-fired rotary kiln ID 6K).

Table 5.5: BACT Summary for the Direct Coal-fired Rotary Kiln No. 6

Pollutant	Control Technology	Proposed BACT Limit	Averaging Time	Compliance Determination Method
PM/PM10	High efficiency wet scrubber	11.2 lbs/hr	Length of time to conduct stack test	Testing, EPA Method 5 plus EPA Method 202Testing

Direct coal-fired rotary kiln – Plant 2 (Emission Unit ID No. 6K) NO_X BACT Emissions

Nitrogen Oxides (NO_X) are formed during the combustion of the fuel and are generally classified as either thermal NO_X, prompt NO_X or fuel-related NO_X. Thermal NO_X results when atmospheric nitrogen is oxidized at high temperatures to yield NO, NO_2, and other oxides of nitrogen. Most thermal NO_X is formed in high temperature stoichiometric flame pockets downstream of the fuel injectors where combustion air has mixed sufficiently with the fuel to produce a peak temperature. Prompt NO_X forms within the combustion flame and is usually negligible when compared to the amount of thermal NO_X formed. Fuel-related NO_X is formed from the chemically bound nitrogen in the fuel.

NO_X emissions are emitted from the rotary kiln due to the combustion of pulverized coal. Pre-Combustion control technology such as low NO_X process technology as well as Post-Combustion technologies such as Selective catalytic reduction (SCR), Selective non-catalytic reduction (SNCR) and NO_X scrubbing technologies were evaluated for control of NO_X emissions from the direct coal-fired rotary kiln at the facility.

Step 1: Identify all control technologies

In reviewing the BACT alternatives to control emissions of NO_X from the direct coal-fired rotary kiln, all applicable BACT determinations for non-metallic mineral processing plants were reviewed, as summarized in Table 5.6.

Table 5.6: Summary of NOx Control Technology Determinations for Kilns and Calciners

Facility Name	Location	gency	Database	Process Type	Permi Date	Process escription	ontrols / Type	Emission Limits / escription	onsidered r BACT?	Comments
Akzo Nobel	Harris County, TX (Houston)	TX CEQ	RBLC	90.017	Jun-00	Indirect-fired Calciner - process exhaust routed to SCR	SCR / LAER	0.066 lb/MMBtu - estimated efficiency 99%	No	This is an indirect fired kiln unlike the kiln at C-E Minerals, which is a direct coal-fired kiln.
Wold Trona	Sweetwater, WY	WY DEQ	RBLC	90.017	Apr-00	Trona Ore Calciner - Natural Gas fired	Low NO_X Burner / PSD BACT	0.038 lb/MMBtu; and 8.1 lb/hr	No	This is a natural gas fired kiln and is not considered a similar source.
General Shale Products Corp	Little Rock, AR	AK DEQ	RBLC	90.017	May-99	N.G. fired Aggregate Kiln	Good Combustion / PSD BACT	8.5 lb/hr	No	This is a natural gas fired kiln and is not considered a similar source.
Solvay Soda Ash JV Trona Mine	Sweetwater, WY	WY DEQ	RBLC	90.017	Feb-98	N.G. fired Trona Calciner	Low NO_X Burner / PSD BACT	0.05 lb/MMBtu	No	This is a natural gas fired kiln and is not considered a similar source.
Texasgulf Soda Ash Plant	Sweetwater, WY	WY DEQ	RBLC	90.017	Oct-97	N.G. fired Trona Calciner	Low NO_X Burner / PSD BACT	0.05 lb/MMBtu	No	This is a natural gas fired kiln and is not considered a similar source.
Branford Cement Plant Coal Fired	Suwanee, FL	FL DEP	RBLC	90.028	Mar-06	Kiln with in line Raw Mill	SNCR with Baghouse / PSD BACT	1.95 lb/hr 30 day average with CEMs - 247.7 lb/hr	No	SNCR is technically infeasible for a direct coal-fired rotary kiln with temperatures below 1100°F near the outlet.
Brookville Cement Plant	Hernando, FL	FL DEP	RBLC	90.028	Dec-04	Coal Fired Clinker Kiln	SNCR / PSD BACT	1.95 lb/hr 30day average - 243.75 lb/hr	No	SNCR is technically infeasible for a direct coal-fired rotary kiln with temperatures below 1100°F near the outlet.
Thompson Baker Cement Plant	Alacua, FL	FL DEP	RBLC	90.028	Nov-04	Coal Fired Kiln with in line Raw Mill	SNCR with ESP / PSD BACT	1.95 lb/hr 30day average - 243.75 lb/hr	No	SNCR is technically infeasible for a direct coal-fired rotary kiln with temperatures below 1100°F near the outlet.
Lehigh Cement Company	Gordo, IA	IA DNR	RBLC	90.028	Dec-03	Coal fired Kiln/Calciner / Preheater	SNCR, low NO_X, Combustion controls, proper kiln design / PSD BACT	2.85 lb/ton; 1496 tpy	No	SNCR is technically infeasible for a direct coal-fired rotary kiln with temperatures below 1100°F near the outlet.
Roanoke Cement	Botetourt, VA	VA DEQ	RBLC	90.028	Oct-02	Coal fired lime kiln	Good Combustion Practices and CEMs / PSD BACT	982 lb/hr	Yes	Considered in this BACT analysis.
Holcim.	Mobile, AL	ADEM	RBLC	90.028	Feb-04	Coal fired Kiln/Calciner / Preheater	No controls / case-by-case	2998 tpy and CEMs	Yes	Considered in this BACT analysis

Facility Name	Location	Agency	Database	Process Type	Permi Date	Process Description	Controls / Type	Emission Limits / Description	Considered or BACT?	Comments
Continental Cement Company	Ralls, MO	MO DNR	RBLC	90.028	Sep-02	Coal fired rotary kiln	SNCR, Low NO_X, Top Air Duct /caseby-case	8 lb/ton 30 day rolling average	No	SNCR is technically infeasible for a direct coal-fired rotary kiln with temperatures below 1100°F near the outlet.
Lafarge	Scott, IA	IA DNR	RBLC	90.028	Jul-02	Coal fired preheater / preclaciner kiln	Good Combustion Practices / PSD BACT	2545 tpy; 4 lb/ton of clinker	Yes	Considered in this BACT analysis.
Ash Grove Cement	Washington state	WA DOE	RBLC	90.028	Oct-01	Kiln - no fuel listed	No controls indicated	650 ppm @ 10% O2 - 24 hr average; 1846 tpy	No	Fuel type not indicated.
Carolina Stalite Company	Gold Hill, NC	NC DEM	RBLC	90.024	Dec-01	Rotary Expanding Kiln	Good Combustion Techniques	43.7 lb/hr (Heat Input 52 MMBtu/hr)	Yes[1]	This kiln is fired at a temperature near 2100°F. The firing temperature of the proposed kiln at C-E Minerals is substantially higher than this due to the nature of the product. This results in substantially higher NO_X emissions (thermal and fuel bound NO_X).
Big River Industries, Inc.	Baton Rouge, LA	LA DEQ	RBLC	90.024	June-06	Direct coal-fired rotary kilns, Nos. 1-4	Good Combustion Practices	57.22 lb/hr Input 41 MMBtu/hr	Yes[1]	This kiln is fired at a temperature near 2100°F. The firing temperature of the proposed kiln at C-E Minerals is substantially higher than this due to the nature of the product. This results in substantially higher NO_x emissions (thermal and fuel bound NOX).

As a consequence of the review, selective catalytic reduction (SCR), NO_X wet scrubbing, selective non-catalytic reduction (SNCR) and low NO_X process technology were considered as control options for NO_X emissions as noted in Table No. 5.7:

Table 5.7: Evaluated Control Options for NO_X Emissions – Direct coal-fired rotary Kiln

Option No.	Control Technology
1	Selective Non-Catalytic Reduction (SNCR)
2	NO_X Wet Scrubbing
3	Selective Catalytic Reduction (SCR)
4	Low NO_X Process Technology

Step 2: Eliminate Technically infeasible options

Option 1 - Selective Non-Catalytic Reduction (SNCR)

SNCR is a post-combustion control technology similar to SCR except that no catalyst bed is used. While the process does not require the presence of a catalyst, the temperature requirement for the system is higher than for SCR. Typically, ammonia or urea is injected into the gas stream at a location where the temperature ranges from 1,600 to 2,200°F. The chemical reactions occurring are similar to the reactions shown for the SCR. In addition to strict control of temperature, this system requires sufficient residence time for the mixture of ammonia and exhaust gas to chemically react, resulting in NO_X reduction. When operated and maintained correctly, an SNCR system can achieve up to 30% control of NO_X emissions.

Application of SNCR to kilns is more complex, and we have found no evidence of its use in kaolin kiln processes. Its application to the direct coal-fired rotary kiln being proposed for installation at C-E Minerals would be considered experimental, and there could be negative effects on product quality due to unknown reactions between the reagent and constituents in the kaolin. Additionally, SNCR for this rotary kiln use is far more problematic as the flue gas leaving the kiln is approximately at a temperature of 1100°F, which is typically low for the SNCR reactions to proceed. Hence, the reagent would need to be injected into the middle of the kiln. Installing such a system to inject reagent continuously in the middle of a rotating kiln would require significant modifications of the kiln, which again at best would be experimental. Unfortunately, there is no evidence of this being done in the past and its effects on the process and product quality are unknown. Due to difficulties in continuous injection of reagent in a rotating kiln, SNCR technology is infeasible to efficiently implement.

Due to lack of evidence of use of such a system in a direct coal-fired rotary kiln process, technical difficulties, the possibility of effects on product quality and possible environmental impact due to ammonia (NH_3) emissions, SNCR is considered technically infeasible and is not considered as BACT to control NO_X.

<u>Step 3: Rank remaining control technologies by control effectiveness</u>

Table 5.8: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency[1]
1	NO_X Wet Scrubbing	90%
2	Selective Catalytic Reduction	80%
3	Low NO_X Process Technology[2]	N/a

1 Control Efficiencies are based upon Vendor Information.
2 The use of good combustion practices and custom designed burners to minimize NO_X emissions.

<u>Step 4: Evaluate most effective controls and document results</u>

Option 2 – NO_X Wet Scrubbing

NO_X Wet scrubbing involves passing the exhaust gas through direct contact with water causing the NO_X to absorb in the water creating insoluble NO, which will slowly reoxidize to NO_2. Because of this reverse reaction a wet scrubber will typically have an efficiency of 60% to 70%. Different specialty chemicals can be added to the water stream in the scrubber to facilitate the oxidation of NO to NO_2 (which is water soluble). Adding these chemicals will increase the cost of operation as well as the cost involved in wastewater treatment. Additionally the exhaust gas needs to be under 230^{O}F, typically the exhaust gas from the direct coal-fired rotary kiln is at temperatures near $1{,}100^{O}$F. In order to lower the exhaust stream to an appropriate temperature a gas pre-quencher will need to be installed. With a pre-quencher and appropriate chemicals added to the water stream residence time of the scrubber should be minimal and an efficiency of
90% should be achieved.

The wet scrubber was costed using a vendor quote for a similar kiln. The costs were scaled down using the ratio of gas flow rates of the two kilns. The reagent costs were adjusted according to the ratio of NO_X emissions of the two kilns. Table 5.2.1-4 of the application provides a summary of the cost effectiveness of control Option 2 for rotary kiln No.6. Detailed calculations for cost effectiveness are included in Attachment D of the application. The cost per ton NO_X reduced is approximately $12,361, which doest not take into account costs involved in cooling the flue gas stream before entering the scrubber. C-E Minerals proposes that the use of a NO_X wet scrubbing system should not be considered BACT for direct coal-fired rotary kiln No.6 at the facility for reasons of economic infeasibility.

Table 5.9: Cost Effectiveness of Control Option 1

Pollutant	Emission Unit	Control Technology	$/ton NOX Reduced	BACT
NO_X	Direct coal-fired rotary kiln 6K	NO_X Wet Scrubbing	$12,361/ton	No

Option 3 – Selective Catalytic Reduction (SCR)

SCR involves injection of ammonia or urea upstream of a catalyst bed, which must be maintained at a temperature of 575 to 750°F. The catalyst serves to lower the reaction energy needed. Nitrogen Oxides are typically reduced to nitrogen gas while passing through the catalyst bed, as shown in the following reactions:

$$4NO + 4\ NH_3 + O2 \rightarrow 4N_2 + 6H_2O$$

$$6NO_2 + 8NH_3 \rightarrow 7N_2 + 12H_2O$$

SCR has been primarily used in boilers. Based on the review of records in the RBLC database, SCR has not been applied to direct coal-fired rotary kilns processing kaolin. While it is conceivable that this technology could be applied to these units, there would be certain operational difficulties that must be overcome. Due to the high particulate matter emissions from the kiln, the SCR system would have to be located downstream to a caustic scrubber that controls the PM emissions, to prevent catalyst fouling and poisoning. Also, the gas from the kiln would have to be cooled down to below 350°F to prevent damage to the baghouse. The resulting stream will have to be reheated to the required temperature in order to accommodate an SCR at this location. Although this is feasible, the cost to reheat the stream would be substantial. Since there is no evidence of this technology being applied to a similar process, there is no empirical data regarding its control efficiency. However, literature predicts that if operated correctly, this system can control up to 80% of NO_X emissions.

The application of SCR on a process kiln (e.g cement kilns) is fundamentally different than utility boilers due to their differences in gas composition, dust loading, and chemistry. Even though a coal fired boiler has significant PM emissions from combustion, usually all the heavy particulates are collected at the. bottom in an Ash collector. In a process kiln such as a direct coal-fired Kaolin kiln, particulate matter from the processed material gets carried over into the exhaust gas stream and eventually onto the SCR catalyst bed thus potentially plugging it. Unlike an utility boiler, the concerns that the catalysts may befouled or deactivated by the high dust loading as well as contamination from the presence of alkalies and sulfur dioxide (e.g. in cement kilns) are well documented. An evaluation of the physical characteristics of cement dust particles to that of typical fly ash from coal-fired boilers shows that, while fly ash is typically spherical in nature and of relatively consistent size, cement dust particles are larger, very jagged, and irregular in shape and size. The plugging potential for the type of particle from a cement kiln would be higher. In addition, during kiln upset conditions, periods of unusually high dust loading can occur. These upset conditions may result in dust buildup on the catalyst beds, plugging and blanking off portions of the catalysts thus substantially reducing the amount of catalyst available for NOx reactions, or completely blocking gas flow and negating the operation of the SCR system and/or the kiln. Because of the fouling problems, a SCR system would need to be at least installed after the particulate control device otherwise fouling is imminent. Thus, in such a "low-dust" application of a SCR, the air stream would also have to be re-heated for it to be at an optimum temperature for NO_X control using an SCR. Please note, this significant cost has not been included in the cost estimated submitted to GAEPD (as detailed in the revised Table 1 enclosed as Attachment A).

Even though there are differences between rotary cement kilns and rotary kaolin processing kilns in terms of operating temperatures and their respective materials processed, both process units are very similar in terms of particulate dust carryover in the exhaust gas stream exacerbating the fouling issues associated with the installation of a SCR.

Since an SCR system has not been applied to direct coal-fired rotary kilns processing kaolin, there is no available cost or performance data specific to this potential application. However, the USEPA has published a study of possible NO_X controls on cement manufacturing rotary kilns, "*Alternative Control Techniques Document – NO_X Emissions from Cement Kilns,* EPA-453/R-94-004." Although not completely equivalent to a direct coal-fired rotary kiln processing kaolin, there is cost data for eight (8) model cement kilns published in this study .The study suggests using OAQPS's 0.6 power rule to estimate SCR Purchased Equipment Costs (PEC) for a different kiln. The model kiln used to estimate SCR costs for this project is a preheater kiln with 53,200 dscf exhaust gas flow rate. The purchased equipment costs for an SCR system for this kiln in 1992 dollars was $5,820,000. This was scaled using the 0.6 power rule to get the PEC for an SCR system for the new direct coal-fired rotary kiln at Plant 2, which was $3,887,037. Ammonia reagent costs were scaled down from a vendor quote for an SCR system for a similar project based on the amount of NO_X controlled by the unit. Catalyst costs were scaled according to the gas flow rate ratios of the kilns. Since the use of an SCR to control NO_X emissions would require a baghouse to control particulate matter, a pulse-jet baghouse was also included in the analysis and the calculated annualized costs were added to the cost of SCR system to yield a total project cost to control NO_X emissions.

The costs per ton of NO_X reduced, using an SCR system for the direct coal-fired rotary kiln was estimated to be approximately $7,211/ton based on an 80% reduction of NO_X. Table 5.10 provides a summary of the cost effectiveness of an SCR system for the rotary kiln. Please note that since the cost of the model kiln was in 1992 dollars, the total capital cost of the SCR system was extrapolated to 2007 dollars using the Marshall and Swift Cost Index. Detailed calculations for cost effectiveness are included in Attachment D of the application. This cost information was updated in a letter dated April 9, 2008. Based on these calculations, C-E Minerals proposes that it is not cost effective for the facility to control NO_X emissions from the kiln utilizing SCR technology and that it should not be considered BACT for direct coal-fired rotary kiln 6K.

Table 5.10: Cost Effectiveness of Control Option 2

Pollutant	Emission Unit	Control Technology	$/ton NOX Reduced	BACT
NO_X	Direct coal-fired rotary kiln 6K	SCR	$7,211/ton	No

Option 3 – Low NO_X Process Technology

This is a pre-combustion control technology that involves the reduction of NO_X emissions through the use of good combustion practices and burners that can be tuned to reduce the NO_X emitted by the direct coal-fired rotary kiln. This particular control is achieved by design features that regulate the aerodynamic distribution and mixing of the fuel and air thus minimizing NO_X emissions:

Low NO_X process technology will include kiln firing practices to minimize the possibility of formation of NO_X along with appropriate burner and kiln design, operation and maintenance. Using low NO_X process technology NO_X emissions from the direct coal-fired rotary kiln will be limited to 110 lbs/hr.

Due to lack of any evidence of other NO_X controls being used in a direct coal fired kaolin processing kiln, the proposed BACT for the rotary kiln 6K is the use of low NO_X process technology with a NO_X limitation of 110 lb/hr.

Step 5: Select BACT

Table 5.11 summarizes the Top-Down BACT analyses for NO_X including the incremental cost analysis and any associated environmental impacts.

Table 5.11: Top-Down BACT Impact Summary – NO_X -direct coal-fired rotary kiln 6K

Emissions			Economic Impacts				Environmental Impacts	
Control Alternative	**Emissions[1] (tpy)**	**Emission Reductions[2] (tpy)**	**Installed Capital Cost[3] ($)**	**Total Annualized Cost[4] ($/yr)**	**Cost Effectiveness[5] ($/ton)**	**Incremental Cost Effectiveness ($/ton)**	**Toxics Impact[6] (yes/no)**	**Environmental Energy Impacts (yes/no)**
NO_X Wet Scrubber[7]	24.09	457.71	$2,589,613	$5,657,712	$12,361	$24,256	No	No
Selective Catalytic Reduction (SCR)[8]	96.36	385.44	$7,890,686	$1,229,257	$7,211	N/A	Yes	No
Low NO_X Process Technology	481.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1. Resulting emissions calculated from baseline emissions using the control efficiency of the option.
2. As compared to the Baseline emissions, which is considered to be Low NO_X Process Technology.
3. Installed capital cost as specified in the cost spreadsheets (Attachment D, Tables 1,2, and 3).
4. As specified in Attachment D, Tables 1, 2, and 3. Including operating cost and capital recovery, SCR annualized cost includes annualized costs for a baghouse.

5. The total annualized cost divided by the emission reduction.
6. These are toxic environmental impacts resulting from the use of controls and not methods of production.
7. The cost for NO_X wet scrubber was calculated by scaling down from a vendor's quote for a similar project.
8. The cost for the SCR system was calculated using OAQPS's 0.6-power rule.

Conclusion – NO_X Control – direct coal-fired rotary kiln

C-E Minerals is proposing to use low NO_X process technology in order to effectively control NO_X emissions from the direct coal-fired rotary kiln (Emission Unit ID No. 6K) as BACT with a proposed limit of 110 lb NO_X/hr. Table 5.12 summarizes the BACT determination requirements being proposed for the kiln.

Summary – Control Technology Review NO_X - Direct coal-fired rotary kiln

Table 5.12: BACT Summary for direct coal-fired rotary kiln No. 8 (Emission Unit ID No. 6K)

Process Operation	Emission Unit ID Nos.	BACT Limit
Direct coal-fired rotary kiln	6K	The use of Low NO_X technology to control NO_X emissions from the direct coal-fired rotary kiln to no more than 110 lbs /hr (2.75 lbs/ton of product)

EPD Review – NO_X Control

I recommend C-E Minerals Plant 2 BACT determination for the use of a Low NO_X technology to control NO_X emissions from the direct coal-fired rotary kiln to no more than 110 lbs NO_X/hr.

5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

Condition 4.2.4 requires C-E Minerals to conduct performance tests to determine nitrogen oxide and particulate matter emissions in order to determine compliance with Condition Nos. 3.2.10 and 3.2.11, respectively. The tests shall be conducted within 180 days of startup of Kiln No. 6. The tests shall be conducted at the maximum anticipated production rate.

Condition 4.2.5 requires C-E Minerals to conduct performance tests to determine the SO_2 and HCl control efficiency of the caustic scrubber (APCD ID No. SC06). The tests shall be conducted within 180 days of startup of Kiln No. 6. The tests shall be conducted at the maximum anticipated production rate.

Monitoring Requirements:

Emission Unit ID/ APCD ID	Emission Unit/APCD Name	Monitor Parameter		Monitoring Frequency
		Parameter	Units	
SC06	Caustic Scrubber	Scrubbant Flow Rate	gpm	Continuous
SC06	Caustic Scrubber	Scrubbant pH	Standard Unit	Daily
SC06	Caustic Scrubber	Pressure drop	Inches water	Continuous
SC06	Caustic Scrubber	SO2 Concentration	ppm	Weekly

CAM Applicability:

Because C-E Minerals has a Title V permit and the potential controlled PM_{10} and SO_2 emissions from the proposed Kiln No. 6 are **BELOW 100** percent of major source threshold, the CAM requirements **are not triggered** by the proposed modification. CAM is not applicable and is not being triggered by the proposed modification. Therefore, no CAM provisions are being incorporated into the facility's permit.

6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required to determine the ambient impacts associated with the construction and operation of the proposed modifications. The main purpose of the air quality analysis is to demonstrate that emissions emitted from the proposed modifications, in conjunction with other applicable emissions from existing sources (including secondary emissions from growth associated with the new project), will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment in a Class I or Class II area. NAAQS exist for NO_2, CO, $PM_{2.5}$,, PM_{10}, SO_2, Ozone (O_3), and lead. PSD increments exist for SO_2, NO_2, and PM_{10}.

The proposed project at the C-E Minerals Plant 2 triggers PSD review for NO_X and PM/PM_{10}. An air quality analysis was conducted to demonstrate the facility's compliance with the NAAQS and PSD Increment standards for NO_X and PM/PM_{10}. An additional analysis was conducted to demonstrate compliance with the Georgia air toxics program. This section of the application discusses the air quality analysis requirements, methodologies, and results. Supporting documentation may be found in the Air Quality Dispersion Report of the application and in the additional information packages.

Modeling Requirements

The air quality modeling analysis was conducted in accordance with Appendix W of Title 40 of the Code of Federal Regulations (CFR) §51, *Guideline on Air Quality Models*, and Georgia EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised)*.

The proposed project will cause net emission increases of NO_X and PM/PM_{10} that are greater than the applicable PSD Significant Emission Rates. Therefore, air dispersion modeling analyses are required to demonstrate compliance with the NAAQS and PSD Increment.

Significance Analysis: Ambient Monitoring Requirements and Source Inventories

Initially, a Significance Analysis is conducted to determine if the NO_X and PM/PM_{10} emissions increases at the C-E Minerals Plant 2 would significantly impact the area surrounding the facility. Maximum ground-level concentrations are compared to the pollutant-specific U.S. EPA-established monitoring significant level (MSL). The MSL for the pollutants of concern are summarized in Table 6-1.

If a significant impact (i.e., an ambient impact above the MSL) does not result, no further modeling analyses would be conducted for that pollutant for NAAQS or PSD Increment. If a significant impact does result, further refined modeling would be completed to demonstrate that the proposed project would not cause or contribute to a violation of the NAAQS or consume more than the available Class II Increment.

Under current U.S. EPA policies, the maximum impacts due to the emissions increases from a project are also assessed against monitoring *de minimis* levels to determine whether pre-construction monitoring should be considered. These monitoring *de minimis* levels are also listed in Table 6-1. If either the predicted modeled impact from an emission increase or the existing ambient concentration is less than the monitoring *de minimis* concentration, the permitting agency has the discretionary authority to exempt an applicant from pre-construction ambient monitoring. This evaluation is required for NO_X and PM/PM_{10}.

If any off-site pollutant impacts calculated in the Significance Analysis exceed the MSL, a Significant Impact Area (SIA) would be determined. The SIA encompasses a circle centered on the facility with a radius extending out to (1) the farthest location where the emissions increase of a pollutant from the project causes a significant ambient impact, or (2) a distance of 50 km, whichever is less. All sources within a distance of 50 km of the edge of a SIA are assumed to potentially contribute to ground-level concentrations within the SIA and would be evaluated for possible inclusion in the NAAQS and PSD Increment analyses. $PM_{2.5}$ does not yet have established MSLs (3 options proposed on 9/12/07)

Table 6-1: Summary of Modeling Significance Levels

Pollutant	Averaging Period	PSD Significant Impact Level (ug/m^3)	PSD Monitoring Deminimis Concentration (ug/m^3)
PM_{10}	Annual	1	--
	24-Hour	5	10
NO_X	Annual	1	14

NAAQS Analysis

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of pollutant in the atmosphere, which define the "levels of air quality which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health." Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The primary and secondary NAAQS are listed in Table 6-2 below.

Table 6-2: Summary of National Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS	
		Primary / Secondary (ug/m^3)	Primary / Secondary (ppm)
PM_{10}	Annual	*Revoked 12/17/06	*Revoked 12/17/06
	24-Hour	150 / 150	--
$PM_{2.5}$	Annual	15 / 15	--
	24-Hour	35 / 35	--
NO_X	Annual	100 / 100	0.053 / 0.053

If the maximum pollutant impact calculated in the Significance Analysis exceeds the MSL at an off-property receptor, a NAAQS analysis is required. The NAAQS analysis would include the potential emissions from all emission units at the C-E Minerals Plant 2, except for units that are generally exempt from permitting requirements and are normally operated only in emergency situations. The emissions modeled for this analysis would reflect the results of the BACT analysis for the modified emission unit. Facility emissions would then be combined with the allowable emissions of sources included in the regional source inventory. The resulting impacts, added to appropriate background concentrations, would be assessed against the applicable NAAQS to demonstrate compliance. For an annual average NAAQS analysis, the highest modeled concentration among five consecutive years of meteorological data would be assessed, while the highest second-high impact would be assessed for the short-term averaging periods.

PSD Increment Analysis

The PSD Increments were established to "prevent deterioration" of air quality in certain areas of the country where air quality was better than the NAAQS. To achieve this goal, U.S. EPA established PSD Increments for certain pollutants. The sum of the PSD Increment concentration and a baseline concentration defines a "reduced" ambient standard, either lower than or equal to the NAAQS that must be met in an attainment area. Significant deterioration is said to have occurred if the change in emissions occurring since the baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions "consume" more that the available PSD Increment).

U.S. EPA has established PSD Increments for NO_X, SO_2, and PM_{10}; no increments have been established for CO or $PM_{2.5}$ (however, $PM_{2.5}$ increments are expected to be added soon). The PSD Increments are further broken into Class I, II, and III Increments. The C-E Minerals Plant 2 is located in a Class II area. The PSD Increments are listed in Table 6-3.

Table 6-3: Summary of PSD Increments

Pollutant	Averaging Period	PSD Increment	
		Class I (ug/m^3)	Class II (ug/m^3)
PM_{10}	Annual	4	17
	24-Hour	8	30
NO_X	Annual	2.5	25

To demonstrate compliance with the PSD Increments, the increment-affecting emissions (i.e., all emissions increases or decreases after the appropriate baseline date) from the facility and those sources in the regional inventory would be modeled to demonstrate compliance with the PSD Class II increment for any pollutant greater than the MSL in the Significance Analysis. For an annual average analysis, the highest incremental impact will be used. For a short-term average analysis, the highest second-high impact will be used.

The determination of whether an emissions change at a given source consumes or expands increment is based on the source classification (major or minor) and the time the change occurs in relation to baseline dates. The major source baseline date for NO_X is February 8, 1988, and the major source baseline for SO_2 and PM_{10} is January 5, 1976. Emission changes at major sources that occur after the major source baseline dates affect Increment. In contrast, emission changes at minor sources only affect Increment after the minor source baseline date, which is set at the time when the first PSD application is completed in a given area, usually arranged on a county-by-county basis. The minor source baseline dates have been set for PM_{10} and SO_2 as January 30, 1980, and for NO_2 as April 12, 1991.

Modeling Methodology

Details on the dispersion model, including meteorological data, source data receptors and modeling results can be found in EPD's PSD Dispersion Modeling and Air Toxics Assessment Review in Appendix C of this Preliminary Determination and in the Summary of the permit application.

Georgia Toxic Air Pollutant Modeling Analysis

Georgia EPD regulates the emissions of toxic air pollutant (TAP) emissions through a program covered by the provisions of *Georgia Rules for Air Quality Control*, 391-3-1-.02(2)(a)3.(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of TAP emissions as part of air permit reviews are contained in the agency's "*Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised)*."

Selection of Toxic Air Pollutants for Modeling

For projects with quantifiable increases in TAP emissions, an air dispersion modeling analysis is generally performed to demonstrate that off-property impacts are less than the established Acceptable Ambient Concentration (AAC) values. The TAP evaluated is restricted to those that may increase due to the proposed project. Thus, the TAP analysis would generally be an assessment of off-property impacts due to facility-wide emissions of any TAP emitted by a facility. To conduct a facility-wide TAP impact evaluation for any pollutant that could conceivably be emitted by the facility is impractical. A literature review would suggest that at least one molecule of hundreds of organic and inorganic chemical compounds could be emitted from the various combustion units. This is understandable given the nature of the pulverized coal fed to the combustion sources, and the fact that there are complex chemical reactions and combustion of fuel taking place in some. The vast majority of compounds potentially emitted however are emitted in only trace amounts that are not reasonably quantifiable.

Introduction and Assumptions:

CE-Minerals is requesting to install and operate a new direct coal fired Rotary Kiln (Emission Unit ID No. 6K). A toxic impact assessment is being performed to demonstrate that the emissions from the facility will not cause a violation of Georgia's Toxic Guidelines. The emissions from C-E Minerals will exit out of one uncapped vertical stack from Kiln No. 6. For the purposes of this assessment the Maximum Ground Level Concentration (MGLC) is considered to occur outside of the facility's property line.

Calculation of Toxic Air Pollutants:

For the purposes of the assessment, all of the TAP emissions will be assumed to be hydrochloric and hydrofluoric acids emitted due to the combustion of coal. The hydrochloric and hydrofluoric acid emissions from facility are calculated in Attachment C.

Hydrochloric Acid:
The hydrochloric acid emissions will originate from the combustion of coal in Kiln No. 6. AP-42 emission factors from chapter 1 table 1.1-15a are used to calculate hydrochloric acid emissions from combustion of coal.

Hydrochloric Acid Emissions = AP-42 Emission Factor lb/ton * Throughput of coal tons/hr
= 1.2 lb/ton * 2.25 tons/hr coal
= 2.7 lb/hr

Hydrofluoric Acid:
The hydrofluoric acid emissions will originate from the combustion of coal in the No. 6 Kiln. AP-42 emission factors from chapter 1 table 1.1-15a are used to calculate hydrofluoric acid emissions from combustion of coal.

Hydrofluoric Acid Emissions = AP-42 Emission Factor lb/ton * Throughput of coal tons/hr
= 0.15 lb/ton * 2.25 tons/hr coal
= 0.34 lb/hr

The above-calculated emissions are considered uncontrolled in order to demonstrate that the new No. 8 Kiln will be in compliance with the toxic guidelines even during periods of scrubber bypass. This toxic impact assessment is sufficient to demonstrate that the CE-Minerals No. 8 Kiln will not violate Georgia's Toxic Guidelines as HCl and HF represent over 95% of the total toxic compounds emitted from the kiln.

TABLE 1: Toxic Emissions Summary for CE-Minerals

Toxic Pollutant	Potential Emissions[1] (tpy)	Mass Emission Rate (lbs/hr)
Hydrochloric Acid	11.83	2.7
Hydrofluoric Acid	1.49	0.34

1. Kiln will have potential emission of HCl and HF below 10 tpy each when the scrubber is operating.

Calculation of AAC and MGLC
The following calculations scale the mass emissions rates to the appropriate mass emission rate for each TAP and calculate the actual maximum ground level concentration (MGLC). The one hour concentration (C-1hr), which is the concentration determined by the AERMOD model, is given at the distance of the maximum concentrations which is 632 m. Therefore, the MGLC is considered to occur outside of the facility's property line. The one-hour concentration as derived from AERMOD for the No. 8 Kiln is 2.255 µg/m^3 for 110 lbs/hr of pollutant. Therefore, the MGLC was determined for the appropriate emission rates of HCl and HF. The 24 Hour MGLC or annual MGLC is compared to the AAC (Acceptable Ambient Concentrations).
The one hour MGLC calculations are as follows:

Hydrochloric Acid - (110 lbs/hr modeled emission rate) / (2.7 lbs/hr calculated emission rate) = (2.255 µg/m^3 MGLC) / (HCl µg/m^3 MGLC)
→ HCl MGLC = 0.055 µg/m^3

Hydrofluoric Acid - (110 lbs/hr modeled emission rate) / (0.34 lbs/hr calculated emission rate) = (2.255 µg/m^3 MGLC) / (HF µg/m^3 MGLC)
→ HF MGLC = 0.0069 µg/m^3

The 24-hour 15 minute and annual AAC values are calculated as follows[1]:

Hydrochloric Acid Annual = RfC = 0.02 mg/m^3
15 minute = (Ceiling mg/m^3) / (Safety Factor) = 7.36 mg/m^3 / 10
→ 0.74 mg/m^3

Hydrofluoric Acid 24-hour = (PEL mg/m^3) * (40/168) / (Safety Factor)
= (2.45 mg/m^3) * (40/168) / (100)
→ 0.0058 mg/m^3

15 minute = (STEL mg/m^3) / (Safety Factor)

$= 4.91\ mg/m^3/\ 10$
$\rightarrow 0.49\ mg/m^3$

The combined MGLC (C-24hr/annual) for the facility are given below in Table 2.

TABLE 2: Toxic Impact Assessment for CE-Minerals

Toxic Pollutant MGLC	AAC1 (µg/m^3)	MGLC Kiln No. 6 (µg/m^3)	Background2 (µg/m^3)	MGLC/AAC Ratio	Pass/Fail
Hydrochloric Acid – Annual	20	0.055	0.385	0.003	Pass
Hydrofluoric Acid – 24 hour	5.83	0.0069	0.048	0.0013	Pass
Hydrochloric Acid – 15 minute	740	0.055	0.385	0.00008	Pass
Hydrofluoric Acid – 15 minute	490	0.0069 Pass	0.048	0.000015	Pass

1. Based on AAC value as calculated above.
2. Background is considered to be the seven other kilns at this site = (Kiln No. 6) * (7)

Conclusion:

The toxic substances in Table 2 pass the toxic impact assessment and all the pollutants are well below their respective AACs. The sum of the ratios of 24 hr or annual MGLC/AAC does not exceed 1.0 for any of the pollutants so the facility is not expected to pose a toxic risk to its surroundings and will not violate Georgia's Toxic Guidelines.

See Attachment I for details in application

For each TAP identified for further analysis, both the short-term and long-term AAC were calculated following the procedures given in Georgia EPD's *Guideline*. Figure 8-3 of Georgia EPD's *Guideline* contains a flow chart of the process for determining long-term and short-term ambient thresholds. C-E Minerals Plant 2 referenced the resources previously detailed to determine the long-term (i.e., annual average) and short-term AAC (i.e., 24-hour or 15-minute). The AACs were verified by the EPD.

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 3255-261-0047-V-04-9.

Section 1.0: Facility Description

C-E Minerals Plant 2 has proposed to construct and operate new direct coal-fired kaolin processing Kiln (ID No. 6K) and Caustic Scrubber (ID No. SC06).

Section 2.0: Requirements Pertaining to the Entire Facility

No conditions in Section 2.0 are being added, deleted or modified as part of this permit action.

Section 3.0: Requirements for Emission Units

3.1.1 Additional Emission Units

Emission Units		**Specific Limitations/Requirements**		**Air Pollution Control Devices**	
ID No.	**Description**	**Applicable Requirements / Standards**	**Corresponding Permit Conditions**	**ID No.**	**Description**
6K	Kiln No. 6	40 CFR Part 52.21 391-3-1-.02(2)(b) 391-3-1-.02(2)(p) 391-3-1-.02(2)(g)	3.3.2 3.2.10, 3.2.11, 3.2.12, 3.2.13, 3.4.1, 3.4.2, 3.4.3, 4.2.4, 4.2.5, 5.2.7, 5.2.8, 5.2.18, 5.2.19, 5.2.20, 6.1.4, 6.1.7, 6.2.5, 6.2.16, 6.2.17, 6.2.18, 6.2.19, 6.2.20	SC06	Caustic Scrubber

* Generally applicable requirements contained in this permit may also apply to emission units listed above.

3.2 Equipment Emission Caps and Operating Limits

Condition 3.2.10 is added to effect the PSD limitation and requires C-E Minerals must not discharge, or cause the discharge, into the atmosphere nitrogen oxide (NO_X) emissions in an amount exceeding 110 pounds per hour from Kiln No. 6 (Emission Unit ID No. 6K).

Condition 3.2.11 is added to reflect the PSD limitation and requires C-E Minerals must not discharge, or cause the discharge, into the atmosphere particulate matter (PM) emissions in an amount exceeding 11.2 pounds per hour from Kiln No. 6 (Emission Unit ID No. 6K).

Condition 3.2.12 is added to reflect the PSD limitation and requires C-E Minerals must not discharge, or cause the discharge, into the atmosphere sulfur dioxide (SO_2) emissions from Kiln No. 6 (Emission Unit ID No. 6K) in an amount exceeding 39.0 tons per any twelve-month rolling period.

Condition 3.2.13 is added to reflect the PSD limitation and requires C-E Minerals must not discharge, or cause the discharge, into the atmosphere hydrogen chloride (HCl) emissions from Kiln No.6 (Emission Unit ID No.6K) in an amount exceeding 9.9 tons per any twelve-month rolling period.

Condition Nos. 3.2.10, 3.2.11, 3.2.12 and 3.2.13 propose emission limits for NO_X, PM_{10}, SO_2 and HCl emissions from the new direct coal-fired rotary kiln.

Condition Nos. 3.2.14 and 3.2.15 are added to limit PM/ PM_{10} and visible emissions from the Apron Dryer #3 to 20 pounds per hour and 10% opacity as requested by C-E Minerals in order to demonstrate compliance with the 24-hour PM PSD increment of 30 ug/m^3.

Section 4.0: Requirements for Testing

Condition 4.2.4 is a testing requirement. C-E Minerals must conduct, or cause to be conducted a performance test to determine nitrogen oxide and particulate matter emissions in order to determine compliance with Condition Nos. 3.2.10 and 3.2.11, respectively. The tests shall be conducted with 180 days of startup of Kiln No. 6. The tests shall be conducted at the maximum anticipated production rate.

Condition 4.2.5 is a testing requirement. C-E Minerals must conduct, or cause to be conducted a performance test to determine the SO_2 and HCl control efficiency of the caustic scrubber (APCD ID No. SC06). The tests shall be conducted with 180 days of startup of Kiln No. 6. The tests shall be conducted at the maximum anticipated production rate.

Conditions 4.2.4 and 4.2.5 are new conditions that would require specific performance testing for NO_X and PM emissions and also would require testing the control efficiency of the new caustic scrubber for SO_2 and HCl.

Condition 4.2.6 has been added to require PM/ PM_{10} and visible emissions testing on the stack of the Apron Dryer #3. The test to be conducted at the same time the testing is conducted for the Kiln No. 6.

Section 5.0: Requirements for Monitoring

Condition 5.2.12 is a new condition that would require the facility to continuously record and monitor scrubbant flow rate and pressure drop across the new caustic scrubber. Condition 5.2.13 requires the facility to monitor and record at least once per calendar day, the pH of the scrubbant for the new caustic scrubber being installed.

Section 6.0: Other Recordkeeping and Reporting Requirements

Condition 6.1.7 is being modified to require the facility to report any exceedances of SO_2 emissions, scrubber pressure drop and scrubbant flow rate. This condition also includes a requirement to report 12-month rolling totals for SO_2 and HCl emissions. Condition 6.2.9 is added to include specific record keeping requirements for Kiln No.6 such as coal throughput, sulfur content of coal and hours of operation. Condition 6.2.10, 6.2.11, 6.2.12 and 6.2.13 are new conditions to demonstrate the method for calculating monthly SO_2 and HCl emissions and 12-month rolling totals.

Section 7.0: Other Specific Requirements

No conditions in Section 7.0 are being added, deleted or modified as part of this permit action

APPENDIX A

Draft Revised Title V Operating Permit Amendment
C-E Minerals Plant 2
Andersonville (Sumter County), Georgia

APPENDIX B

C-E Minerals Plant 2 PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. 17595, dated August 9, 2007
2. Additional Information Package Dated January 17, 2008

APPENDIX C

EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review