Prevention of Significant Air Quality Deterioration Review

Preliminary Determination

February 2012

Facility Name: CARBO Ceramics, Inc.
City: Millen
County: Jenkins County
AIRS Number: 04-13-16500012
Application Number: 20615
Date Application Received: August 15, 2011

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 CARBO Ceramics for a permit to construct and operate a kaolin clay processing (proppant manufacturing) facility. The proposed project will consist of four processing lines, each with two spray dryers and one calciner. This will be an entirely new “green field” facility.

The construction of the CARBO facility will result in emissions of particulate matter, PM_{10}, $PM_{2.5}$, SO_2, NO_x, VOCs, CO and 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 PM, PM_{10}, CO, SO_2, NO_x, and VOC emissions were above the PSD significance level threshold.

CARBO Ceramics will be located in Jenkins County, which is classified as “attainment” or “unclassifiable” for SO_2, $PM_{2.5}$ and PM_{10}, NO_X, CO, and ozone (VOC).

The EPD review of the data submitted by CARBO 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 particulate matter, NO_x, and SO_2, 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 surrounding the facility or in Class I areas located within 200 km of the facility. 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 CARBO Ceramics for the construction and operation of this new facility. Various conditions have been incorporated into the PSD 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.

1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA

On August 15, 2011, CARBO Ceramics (hereafter CARBO) submitted an application for an air quality permit to construct a kaolin clay processing facility. The facility is located on Route 17 at Clayton Road in Millen, Jenkins 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	✓		
PM_{10}	Yes	✓		
SO_2	Yes	✓		
VOC	Yes			✓
NO_x	Yes	✓		
CO	Yes	✓		
TRS	No			✓
H_2S	No			✓
Individual HAP	Yes	✓		
Total HAPs	Yes	✓		

Based on the proposed project description and data provided in the permit application, the estimated emissions of regulated pollutants from the facility are listed in Table 1-2 below:

Table 1-2: Emissions from the Project

Pollutant	Potential Emissions (tpy)	PSD Major Source Emission Threshold (tpy)	PSD Significant Emission Rate (tpy)	Subject to PSD Review
PM	249	250	25	Yes
PM_{10}	249[1]	250	15	Yes
$PM_{2.5}$	129.3	250	10	Yes
VOC	66.9	250	40	Yes
NO_X	2446	250	40	Yes
CO	1046	250	100	Yes
SO_2	618	250	40	Yes
TRS	0	250	10	No
Pb	0	250	0.6	No
Fluorides	<3	250	3	No
H_2S	0	250	10	No
SAM	6.83	250	7	No
GHG	404,304	100,000/250[2]	75,000[3]	Yes

[1] All PM were assumed as PM_{10}.
[2] 100,000 tpy on a CO_2e basis and 250 tpy on a mass basis.
[3] CO_2e basis.

The emissions calculations for Table 1-2 can be found in detail in the facility's PSD application (see Volume I, Appendix B of Application No. 20615). These calculations have been reviewed and approved by the Division. Based on the information presented in Table 1-2 above, CARBO's proposed construction, as specified per Georgia Air Quality Application No. 20615, is classified as a major new source under PSD because the potential emissions of SO_2, NO_x, GHG and CO.

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

This facility will be a major source for HAPs, having emissions of more than 10 tons per year of a single HAP and 25 tons per year of a combination of HAPs. Therefore, it is subject to a case-by-case MACT evaluation because there is no NESHAP Part 63 MACT standard for the ceramic proppant manufacturing facilities. A "Notice of MACT Approval" is included with this Preliminary Determination as Appendix A.

2.0 PROCESS DESCRIPTION

According to Application No. 20615, CARBO has proposed to construct a new kaolin clay processing (ceramic proppant manufacturing) facility, to be located near the city of Millen, Georgia. The facility will have four identical processing lines, each equipped with two spray dryers and one calciner (kiln). The four lines can be operated independently. In addition to the dryers and kilns, the facility will have material handling equipment, such as, conveyors, screens, bucket elevators, process bins, silos and railcar loading operations. Emissions of particulate matter sources will be controlled by baghouses. Additionally, the four calciners will have scrubbers for SO_2 control. Each spray dryer and calciner will have a continuous opacity monitor (COM).

The CARBO permit application and supporting documentation are included with 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 percent. CARBO will use baghouses to control particulate matter emissions and to comply with Rule (b). The facility will monitor pressure drop and check for visible emissions on a daily basis on the main baghouses to ensure proper operation of the baghouses. This monitoring satisfies the visible emissions requirements per Georgia Rule 391-3-1-.02(2)(b).

Georgia Rule (d) “Fuel Burning Equipment”
Rule (d) will limit the PM emissions (lbs/MMBtu) from each 9.8 MMBtu/hr natural gas-fired boiler according to boiler’s heat input and construction date. In addition, Georgia Rule (d) limits the opacity of such PM emissions to less than 20 percent opacity except for one 6-minute period per hour of not more than 27 percent opacity. Firing the boilers with only “clean fuels”, i.e., natural gas and propane, CARBO will comply with these limits. Direct-heating fuel burning units such as the spray dryers and calciners where combustion gases contact the materials being processed are not subject to this rule.

Georgia Rule (e) “Particulate Matter Emissions from Manufacturing Processes”
Rule (e) limits the emissions from the processing equipment at this proposed facility. Since CARBO will be handling kaolin clay, these emissions are more specifically covered by Rule (p), discussed below.

Georgia Rule (g) “Sulfur Dioxide Emissions”
Rule (g) limits the sulfur dioxide emissions of the fuels consumed by the fuel burning equipment at this facility. Since all of the new equipment will combust only natural gas, which inherently has a very low sulfur content, it will automatically comply with the 2.5 percent sulfur, by weight, limit of Rule (g).

Georgia Rule (n) “Fugitive Dust”
Rule (n) requires CARBO to take all reasonable precautions to prevent fugitive dust emissions from any operation, process, handling, transportation or storage facility prone to such emissions. Rule (n) limits the opacity of fugitive emissions to less than 20 percent. Condition 3.2.3 has been added to the proposed permit to ensure compliance with this rule.

Georgia Rule (p) “Particulate Emissions from Kaolin and Fuller’s Earth Processes”
Georgia Rule (p), is a process weight rule and limits PM emissions from Kaolin and Fuller’s Earth processes based on the equations below:

For Process inputs of less than or equal to 30 ton/hr,
$E = 3.59\ P^{0.62}$
For Process inputs in excess of 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)

These equations apply to sources constructed after 1972, which include all of the equipment in this project. CARBO will use baghouses to control particulate matter emissions to demonstrate compliance with rule (p). Compliance with NSPS Subpart OOO will subsume the requirements of Georgia Rule (p) and the emissions limits of Conditions 3.3.9 are even lower. Compliance with these limits effectively ensures compliance with rule (p).

Because the emission standards/limits under pertinent New Source Performance Standard (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP)/ MACT or PSD/NSR rules are more stringent than those in the aforementioned rules, these SIP rules are subsumed by the pertinent federal rules.

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 United 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

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.

40 CFR 60 Subpart OOO, "Nonmetallic Mineral Processing Plants," applies to most of the new equipment associated with this facility, as shown in Table 3.1 of the permit. Subpart OOO applies to crushers, grinders, screening operations, bucket elevators, belt conveyors, bagging operations, storage bins and enclosed truck or railcar loading stations at nonmetallic mineral processing plants. Kaolin is defined by this regulation as being a nonmetallic mineral. The emission standards from this regulation are contained in condition 3.3.2 of the permit and apply only to all sources constructed or modified after April 22, 2008. The filterable particulate matter limit in condition 3.3.9 is stricter than Subpart OOO and subsumes it.

40 CFR Part 60, Subpart UUU – "Standards of Performance for Calciners and Dryers in Mineral Industries" applies to each of the spray dryers and calciners. Subpart UUU establishes particulate matter and visible emissions limits and also has certain record keeping, testing, and reporting requirements for each of the affected sources. Subpart UUU limits are given in condition 3.3.3 of the permit. The particulate matter limits in condition 3.3.9 are stricter than Subpart UUU and subsume them.

40 CFR Part 60, Subpart IIII – "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" applies to each of the new emergency diesel generators, since they will commence construction after July 11, 2005. These diesel generators must meet the applicable Tier III emissions limits (as certified by EPA) for the same model year and capacity and burn fuel oil that meets the specifications under NSPS Subpart IIII. Subpart IIII also limits the maintenance check and readiness testing time for each emergency diesel generator to 100 hours per year. The requirements for this subpart are found in condition 3.3.4 of the permit.

For each established limit under the above NSPS standards, please refer to conditions in Section 3.0 of the proposed permit No. 3295-163-0035-P-01-0 which is included in Appendix B.

The four new natural gas-fired boilers are rated less than 10 MMBtu/hr each, and therefore exempt from all requirements under 40 CFR 60, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.

National Emissions Standards For Hazardous Air Pollutants

40 CFR Part 63, Subpart A, *General Provisions*, imposes general requirements for initial notifications, initial compliance testing, monitoring, and recordkeeping. CARBO's four new emergency stationary diesel generators are considered as "new stationary sources" by 40 CFR Part 63, Subpart ZZZZ - *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines,* and subject to the MACT standard. As emergency stationary diesel generators rated greater 500 brake horsepower located at a major stationary source for HAPs emissions, these diesel generators are not subject to the requirements of Subpart ZZZZ. The Permittee is only required to submit an initial notification and a statement that the generators are for emergency use only. This permit establishes conditions to limit the use of the diesel generators to emergency situations only.

Section of 112(g)(2)(B) of the Clean Air Act (CAA) Amendment of 1990

CARBO Ceramics will use an additive chemical compound as a disperser during the clay slurry preparation. This additive contains a small percentage of methanol (an EPA listed HAP) as an impurity which will eventually evaporate into the air during spray drying of the clay slurry, resulting in approximately 40 tons per year of methanol emissions, which exceed the 10 ton per year major source threshold for a single HAP emissions under 40 CFR Part 63 Subpart B. In addition, HF and HCl are emitted from calciners as naturally occurring fluorides and chlorides in clay are converted into gaseous HF and HCl at high temperature. These HAP emissions will exceed the 25 ton per year major source threshold for combined HAP emissions under 40 CFR Part 63 Subpart B. Because there is no NESHAP Part 63 MACT standard for the ceramic proppant manufacturing facilities, these HAP emissions are subject to a Case-by-Case MACT Determination under 112(g) of CAA Amendment of 1990.

A "Notice of MACT" Approval per 112(g) of 1990 CAA for the HAP emissions from this facility is included with this Preliminary Determination as Appendix A.

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 various process units along the proposed new ceramic proppant manufacturing lines, as listed in Section 3.1 of Air Quality Permit No. 3295-165-0012-P-01-0, would most likely result 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

As a new green-field source, CARBO Ceramics is required to prepare and submit monitoring plans for emission units subject to the CAM requirements with the initial Title V operating permit application within 12 months of the startup of this new source. This PSD construction permit, as issued under the authority of Georgia Rules 391-3-1-.02(7), *"Prevention of Significant Deterioration of Air Quality"* and 391-3-1-.03(1), *"Construction (SIP) Permit"*, is not required to incorporate the applicable CAM requirements.

4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in emissions that are significant enough to trigger PSD review for the following pollutants: PM, PM_{10}, $PM_{2.5}$, VOC, NO_x, CO, SO_2 and GHG. A BACT review was performed by the applicant and reviewed by the Division. The review was conducted using the top-down analysis and five-step process recommended by EPA in their *Draft New Source Review Workshop Manual* dated October 1990. This review is contained in section 5-1 of PSD application 20615, submitted by CARBO.

Background

CARBO's application for an air quality permit includes the construction of a new proppant manufacturing facility with four processing lines. Each line will have two spray dryers and a calciner. The facility will also have screens, conveyors, feed bins, bucket elevators, silos and railcar loading operations. Additionally, there are to be four small boilers and four emergency generators. Most of the processing equipment will emit particulate matter. From the fuel burning equipment there will also be significant emissions of CO, NO_x, VOC, SO_2 and GHG. Methanol will be emitted from the use of a processing additive and HCl and HF will be emitted from the clay being processed. For the purposes of the review it was assumed that all particulate matter emitted is $PM_{10.}$

PM/PM_{10} /$PM_{2.5}$ Emissions

Applicant's Proposal

CARBO followed the five-step process recommended by EPA. Emissions were evaluated for five separate groups, the calciners, the spray dryers, the boilers, the emergency generators and all of the silos, baggers and loading operations were considered as a single group. For the calciners, three methods of control were identified, high efficiency baghouses, electrostatic precipitators (ESPs) and wet scrubbers. All of the technologies were considered feasible and each was rated at over 99 percent control, with baghouses being the highest rated by CARBO. Baghouse were selected by the applicant with an emission limit of 0.010 grains per dry standard cubic feet.

For the spray dryers, CARBO identified the same three control technologies. Each of these three control devices would have efficiencies of over 99 percent control. However, ESPs and scrubbers were not found to be used by any other similar sources. High efficiency baghouses with an emission limit of 0.020 grains per dry standard cubic feet were selected as BACT for PM and PM_{10} and a limit of 0.0075 grains per dry standard cubic feet for $PM_{2.5}$ emissions.

For the material handling and storage operations, CARBO identified the same three control technologies. However, in step 2 of their analysis only baghouses were considered to be a feasible option. High efficiency baghouses with an emission limit of 0.010 and 0.005 grains per dry standard cubic feet were selected as BACT for these operations, for PM/PM_{10} and $PM_{2.5}$, respectively.

For the gas-fired boilers CARBO identified four control technologies, high efficiency baghouses, ESPs, wet scrubbers and limiting fuel usage to natural gas or propane. With no evidence of the first three technologies ever having been used on boilers of the proposed size for this project, CARBO adopted the use of gas and propane only as BACT.

Finally, for the emergency generators, baghouses, ESPs and scrubbers were again named as potential control systems along with good combustion practices. No sources were found by CARBO to have used the first three technologies. CARBO adopted exclusive use of natural gas and propane as fuels along with a limit for PM/PM_{10} /$PM_{2.5}$ of 0.055 g/bhp-hr as the BACT limit.

EPD Review – $PM/PM_{10}/PM_{2.5}$ Control

The BACT/RACT/LAER Clearinghouse was checked for calciners and dryers. Similar results were found to what is listing in the applicant's review. Almost every source is controlled by fabric filtration with no sources using ESPs. No sources were identified that could control better than a baghouse. The emission limits proposed are stricter than the NSPS standards. A limit for filterable PM/PM_{10} was added to be consistent with another similar source.

For the material handling equipment, no controls other than baghouses were identified. This is consistent with the controls used on sources of this type in Georgia. Baghouses have the highest control efficiency and do well with the variable flowrates that material handling equipment often experience. Scrubbers would also add a complicating factor in an operation of this type where the particulate matter captured is recycled into the process.

The boilers are to be fired on natural gas, which has an inherently low emission rate for PM. A search of the BACT database consistently shows a restriction to natural gas as a fuel or the use of good combustion practices as BACT. Emissions of PM from the boilers are only expected to be 1.3 tons per year, making add-on controls cost prohibitive. This is also true for the emergency generators, which are estimated to only emit 0.4 tons per year of PM. The hours of operation of the generators are limited to 500 hours per year, which also restricts emissions. The limit of 0.055 g/bhp-hr is consistent with a December 2009 BACT determination on an identical source.

Conclusion – PM/PM_{10} Control

The 0.010 gr/dscf emission limit recommended for the calciners and 0.020 gr/dscf for spray dryers are actually lower than the NSPS Subpart UUU limit, which is 0.04 gr/dscf (0.05 gm/m^3). The NSPS limit represents an emission rate that the best-controlled sources in each source category are capable of meeting. The 0.010 gr/dscf limit for the material handling equipment is only about 2/3 of the Subpart OOO allowable limit. The Division concurs that these emission limits with the baghouse controls represent BACT. The BACT selection for the particulate matter emitting equipment are summarized in Tables 4-1 through Table 4-4.

Table 4-1: BACT Summary for the Calciners

Pollutant	Control Technology	Proposed BACT Limit	Compliance Determination Method
$PM/PM_{10}/PM_{2.5}$	Baghouse	0.010 gr/dscf	Method 5 (in conjunction with 202)

Table 4-2: BACT Summary for the Spray Dryers

Pollutant	Control Technology	Proposed BACT Limit	Compliance Determination Method
PM/PM_{10}	Baghouse	0.014 gr/dscf	Method 201, 201A or 202
PM/PM_{10} (filterable)	Baghouse	0.010 gr/dscf	Method 5 and Method 201 or 201A as applicable
$PM_{2.5}$	Baghouse	0.0075 gr/dscf	Method 201 or 201A in conjunction with Method 202

Table 4-3: BACT Summary for the Units with Baghouse Controls (not calciner or spray dryers)

Pollutant	Control Technology	Proposed BACT Limit	Compliance Determination Method
PM/PM_{10}	Baghouse	0.010 gr/dscf	Method 201 or 201A in conjunction with Method 202
$PM_{2.5}$	Baghouse	0.005 gr/dscf	Method 201 or 201A in conjunction with Method 202

Table 4-4: BACT Summary for the Diesel Generators

Pollutant	Control Technology	Proposed BACT Limit	Compliance Determination Method
$PM/PM_{10}/PM_{2.5}$	Design Specs.	0.055 g/bhp-hr	Operation according to Mfr's Specs.

VOC Emissions

Applicant's Proposal

CARBO followed the five-step process recommended by EPA and divided their review among four emission source categories, the calciners, the spray dryers, the boilers and the generators. VOC emissions from the calciners are the result of products of combustion. The calciners combined are estimated to be a 9-ton per year source. CARBO identified five different control technologies, carbon adsorbtion, regenerative thermal oxidation, catalytic oxidation, biofiltration and good combustion techniques, all of which were found to be technically feasible. However, due to the low emission rates of VOC from the calciners, the first four options were considered to be economically infeasible and good combustion techniques was adopted as BACT.

For the spray dryers the same five control technologies were identified as with calciners. All of the techniques were again considered technically feasible, however even though the spray dryers will emit about 55 tons per year of VOCs, the high costs of the add-on controls still made them economically infeasible. Therefore, CARBO adopted good combustion techniques with the dedicated use of propane or natural gas as fuel as BACT. A VOC limit of 13.64 tons/year per processing line (pair of spray dryers) was also proposed.

VOC emissions from the gas-fired boilers are also due to the incomplete combustion of the fuel. The four boilers combined have a potential annual emission rate of about 1.5 tons. The control technologies considered by CARBO were carbon adsorbtion, recuperative thermal oxidation, catalytic oxidation, biofiltration and good combustion techniques. While all techniques were considered to be technically feasible, the add-on controls were found to be economically infeasible, due to the small amount of emissions to be controlled. Dedicated use of natural gas and propane and good combustion techniques were determined to be BACT.

The same five control techniques found for the boilers were also considered in evaluating the emergency generators. The generators also have a small amount of emissions, only 1.65 tons per year combined. All of the control techniques except for good combustion practices were not surprisingly found to be economically infeasible. BACT was determined to be good combustion techniques with a 500 hour per year limit on the operating time for each generator.

EPD Review – VOC Control

Review of the BACT clearinghouse confirmed CARBO's findings. For calciners, spray dryers, boilers and generators, no source was using add-on controls. Sources were using natural gas as a fuel and good combustion techniques as BACT. The design of the equipment for the boilers and generators to be efficient fuel combustors was also considered to be BACT by some sources. Due to the comparatively low amount of VOC emissions and the cost of add-on controls, it was not expected to find them to be economically feasible.

Conclusion – VOC Control

The Division agrees with the findings of the applicant that the use of good combustion techniques a restriction to using natural gas and propane will be BACT for this facility.

The BACT selection for the control of VOC emissions is summarized below in Table 4-5:

Table 4-5 BACT Summary for the VOC Controls

Source	Control Technology	Proposed BACT Limit	Averaging Time
Calciners	Use of natural gas and propane	---	---
Spray Dryers	Use of natural gas and propane	6.82 tons/year/spray dryer	Daily
Boilers	Use of natural gas and propane	---	---
Generators	Use of natural gas and propane	500 hours/year	---

NO_x Emissions

Applicant's Proposal

CARBO again followed the five-step process recommended by EPA and divided their review among four emission source categories, the calciners, the spray dryers, the boilers and the generators. NO_x emissions from the calciners are formed due to the high temperatures, causing the nitrogen present in air to combine with oxygen (thermal NO_x). The calciners combined are a significant source of NO_x emissions and will produce over 2100 ton per year. CARBO identified six different potential control technologies, Selective non-catalytic reduction (SCNR), Wet Scrubbing, Selective Catalytic Reduction (SCR), Catalytic Baghouse, Regenerative Selective Catalytic Reduction (RSCR) and Low NO_x Process Technology. SCNR was eliminated as an option for being technically infeasible since no sources were found to be using this control method temperature of the calciner exhaust was found to be too low to make it effective. Of the remaining five options, CARBO initially rejected wet scrubbing, SCR, catalytic baghouses and RSCR as being cost prohibitive. CARBO proposed the use of low NO_x technology and a limit for each calciner of 121 lbs/hr.

The spray dryers were the second NO_x source reviewed with annual estimated emissions of about 291 tons. CARBO identified SNCR, wet scrubbing, SCR and good combustion techniques as the four possible control methods. SNCR was again rejected as a possible control as the dryer temperatures are too low for this process to work. CARBO rejected wet scrubbing and SCR as not being cost effective. CARBO proposed the use of good combustion techniques with a limit for each spray dryer of 8.3 lbs/hr.

CARBO's research of the BACT database for boiler NO_x control showed exclusive use of good combustion practices or low NO_x burners as the adopted control technique. Nevertheless they also evaluated wet scrubbing, SCR and SNCR as control possibilities. However as the boilers only emit 2.45 tons per year of NO_x, the expense of these add-on controls made them all economically infeasible. CARBO proposed the use of ultra-low NO_x burners with an emission limit of 12ppm @ 3 percent oxygen.

A similar review was made for the generators. The ranking of the controls was SNCR, wet scrubbing, SCR and good combustion techniques. No sources were found in the BACT report using the first three techniques. SNCR was also rejected as being not technically feasible due to the low temperatures of the generator's flue gas. Wet scrubbing and SCR were rejected due to their high cost making the amount of emissions controlled too expensive on a cost per ton basis. Good combustion techniques, with an emission limit of 4.77g/bhp-hr were proposed as BACT for NO_x control for the generators.

EPD Review – NO_x Control

A review of the BACT Clearinghouse for NO_x controls for each of the sources yielded similar results to what CARBO found. EPA requested additional evaluation of the NO_x control technologies due to the high amounts of emissions. CARBO submitted additional information on October 3, 2011. CARBO's letter clarified the technical infeasibility of SNCR for NO_x control, using EPA documents. The use of catalytic baghouses was also addressed. Another proposed proppant manufacturing facility in Georgia is using this technology to reduce NO_x emissions. However, the catalytic baghouse supplier they are using, Tri-Mer, provided a letter to CARBO stating that they have provided CARBO's competitor with exclusive rights to their services into the year 2013. The Division suggested a Maguin, a French

Company that also manufactures catalytic baghouses as another possible supplier. In a memorandum dated October 21, CARBO was able to show that this company was unwilling to supply a customer in the United States at this time. No other suppliers of this technology were found and catalytic baghouses were determined to be unavailable to CARBO. EPA submitted another letter on October 25 asking for information about the sulfur content of the clay interfering with the use of SNCR. CARBO provided additional information about the sulfur content November 3 and also in a separate memo on received on the same date, a justification for the contingency factors used in making their cost analyses for SCR and RSCR calculations.

EPD agrees with the determination that catalytic baghouses are unavailable to CARBO and that there are several sources that have adopted good combustion practices as BACT for NO_x emissions from their kilns or calciners. The emission limit of 121 pounds per hour is the same as CARBO's Toomsboro facility, which went through a BACT determination in December of 2009. For the spray dryers only sources using good combustion techniques as BACT were found. The economic feasibility was as expected not as good as with the calciners, since the spray dryers emit 291 tons of NO_x, compared to the calciners 2,120. For the boilers, low NO_x burners were frequently found to be BACT. The limit of 12 ppm @ 3 percent oxygen limit is identical to another proppant manufacturer currently going through a PSD review as well as the BACT determination made at the Toomsboro plant two years ago. A BACT review of NO_x controls for generators found that they frequently had no controls at all or used pollution prevention. The restriction in hours of operation limits emissions from the generators and makes add-on controls cost prohibitive.

Conclusion – NO_x Control

After receiving several additional information submittals regarding the availability of catalytic baghouses, the technical infeasibility of SNCR and cost factor justification, the Division agrees with the findings of the applicant's proposed NO_x controls. The proposed limits for the calciners and spray dryers were converted to a pounds per ton of calciner clay input limit. This will prevent the facility from having a higher emission rate when operating at less than capacity. The proposed hourly limits by CARBO assume the equipment is being operated at the maximum production rates. The BACT selection for the control of NO_x emissions is summarized below in Table 4-6:

Table 4-6 BACT Summary for the VOC Controls

Source	Control Technology	Proposed BACT Limit	Compliance Determination Method	Averaging Time
Calciners	Low NO_x technology	5.79 lbs/ton input not to exceed 121.0 lbs/hr	Method 7 or 7E	3 hours
Spray Dryers	Good Combustion Techniques	0.79 lbs/ton of calciner input, not to exceed 8.3 lbs/hr	Method 7 or 7E	3 hours
Boilers	Ultra Low NO_x burners	12 ppmv@ 3 % O_2	Mfger guarantee	N/A
Generators	Good Combustion Techniques	4.77g/bhp-hr	Specs of Equip.	N/A

CO Emissions

Applicant's Proposal

CARBO properly used the five-step process recommended by EPA and again divided their review among four emission source categories, the calciners, the spray dryers, the boilers and the generators. In all cases CO emissions are the result of the incomplete combustion of fuel. For both the calciners and the spray dryers a review of BACT at other facilities good combustion techniques as the only method adopted as BACT. For the calciners however, using the top-down approach, CARBO also evaluated RSCR with a CO catalyst, regenerative thermal oxidation (RTO), catalytic oxidation and then good combustion techniques. RSCR with the CO catalyst was found to be too experimental and therefore infeasible. RTOs and catalytic oxidation were both found to be economically infeasible. Good combustion techniques with an emission limit of 24.7 lbs of CO/hr from each calciner was found to be BACT. RTOs and catalytic oxidation were also evaluated for the spray dryers and again were found to be too expensive. The use of good combustion techniques and a 16.6 lbs/hr limit were proposed as BACT for the spray dryers.

The four boilers and the four generators are only expected to have 14.1 and 17.5 tons of CO emissions per year, respectively. CARBO evaluated RTOs and catalytic oxidation as possible controls for each. These controls were not found to be cost effective for either the boilers or the generators. In both cases the use of good combustion techniques was adopted as BACT. This proposal is consistent with what was found in the BACT Clearinghouse for similar sources.

EPD Review – CO Control

EPD agrees with the BACT Clearinghouse findings presented by the applicant. Good combustion practices were found to be the accepted method of control four all four source types, even the calciners and spray dryers, which have more emissions.

Conclusion – CO Control

The proposed emission limits are consistent with other recent BACT determinations. The Division agrees with the findings of the applicant's proposed CO controls. As with the NOx limits, CARBO's proposed limit was converted into a pounds per ton of clay input limit as well as an hourly maximum. The BACT selection for the control of CO emissions is summarized below in Table 4-7:

Table 4-7 BACT Summary for the CO Controls

Source	Control Technology	Proposed BACT Limit	Compliance Determination Method	Averaging Time
Calciners	Good Combustion Techniques	1.18 lbs/ton input not to exceed 24.7lbs/hr.	Method 10	3 hours
Spray Dryers	Good Combustion Techniques	1.59 lbs/ton of calciner input, not to exceed 16.6 lbs/hr	Method 10	3 hours
Boilers	Good Combustion Techniques	N/A	N/A	N/A
Generators	Good Combustion Techniques	2.6 g/bhp-hr and a 500 hr per year operating limit	Specs of Equip.	N/A

SO_2 Emissions

Applicant's Proposal

As with the other pollutants, CARBO followed the recommended five-step approach and divided the sources into four categories, calciners, spray dryers, boilers and emergency generators. The calciners are by far the biggest source, accounting for 601 of the estimated 618 tons of potential emissions from this facility. Most of the SO_2 emissions come from the oxidation of sulfur naturally occurring in the clay. Five control technologies were evaluated for the calciners, raw material pretreatment, wet scrubbers, dry scrubbing (spray dryer), dry scrubbing (injection system) and use of natural gas and propane as fuels. CARBO eliminated pretreatment of the clay as there were no known methods for doing this. The second method in the top-down approach was using wet scrubbers to control SO_2 emissions. CARBO adopted this as their recommended BACT with a proposed limit of 34.25 lbs/hr of SO_2 as an emission limit.

For the calciners the same five control technologies were identified as with the calciners. Pretreatment of the clay was again eliminated as being infeasible. Wet scrubbers and the two dry scrubbing options were ruled out by CARBO as being too expensive. Exclusive use of natural gas and propane as fuels was proposed as BACT.

CARBO again looked at fuel pretreatment and various scrubbing options for the boilers and the generators. However, SO_2 emissions from these sources are negligible (0.13 tons/year combined). Add-on controls were found to be too expensive and use of natural gas or propane as fuel was again to be found BACT for the boilers. Additionally for the generators w fuel sulfur limit of 0.0015 weight percent was proposed, along with the 500 hours of operating time restriction.

EPD Review – SO_2 Control

Since practically all of the SO_2 emissions come from sulfur in the clay being driven off in the calciners, this was the primary area of concern. A review of the control technologies listed in the BACT Clearinghouse show, either good combustion techniques or restrictions to using low sulfur clay. Both EPD and EPA requested additional information on the sulfur content of the clay to be processed at this facility, which is listed in the application as having an average sulfur content of 0.82 percent. CARBO submitted additionally sulfur analyses showing a wide range of sulfur content, from negligible to over two percent. The sulfur data was taken from the mine that supplies their Toomsboro facility and will also be supplying this facility. The Toomsboro facility uses low sulfur clay, but CARBO wishes to process higher sulfur clay at this new Millen plant. The Millen will have wet scrubbers to reduce SO_2 emissions to the same level as the Toomsboro facility, which uses no add-on controls. The maximum hourly emission rate of SO_2 was however, correlated to the calciner input so that the allowable SO_2 emissions will be lower when the clay feed rate is lower.

A review of the BACT Clearinghouse for spray dryers found similar information to what was found by CARBO. Sources are not being required to use add-on controls and are being restricted to low sulfur clay and/or low sulfur fuel. Most of the sulfur in the clay will be released from the calciners, not the spray dryers, due to the higher temperatures. With only 17 tons of emissions coming from the spray dryers, it was expected that add-on controls would be found to be not cost effective. The boilers will be using natural gas or propane as fuels and which have negligible emissions of sulfur dioxide. Additional controls are not necessary. A review of diesel generators in the Clearinghouse, shows that they are almost universally limited in SO_2 emissions by having a fuel sulfur limit and a restriction in the hours of their operation. EPD concurs that a limit of 15ppm sulfur in the fuel is BACT for the generators.

Conclusion – SO_2 Control

The proposed emission limits are consistent with other recent BACT determinations and the calciner limit is the same as the Toomsboro facility which went thorough a BACT analysis two years ago. The Division agrees with the findings of the applicant's proposed SO_2 controls. CARBO's proposed hourly limit for the calciners was converted into a pounds per ton of clay input. A 90 percent control requirement was also added by the Division. This is less than the 95 percent control rate used in the applicant's emission calculations. The BACT selection for the control of SO_2 emissions is summarized below in Table 4-8:

Table 4-8 BACT Summary for the SO_2 Controls

Source	Control Technology	Proposed BACT Limit	Compliance Determination Method	Averaging Time
Calciners	Wet Scrubbers	1.64 lbs/ton input, not to exceed 34.25 lbs/hr and no less than 90% control, by weight	Method 6 or 6C	3 hours
Spray Dryers	Use of natural gas and propane	N/A	N/A	N/A

Source	Control Technology	Proposed BACT Limit	Compliance Determination Method	Averaging Time
Boilers	Use of natural gas and propane	N/A	N/A	N/A
Generators	Low sulfur fuel	15 ppm sulfur in fuel	Verify fuel shipments	N/A

GHG Emissions

Applicant's Proposal

The analysis performed by CARBO for Greenhouse Gases (GHG) is found in attachment F of volume II of their PSD application. CARBO used EPA's 2010 Guidance document in evaluating GHG and followed the recommended five-step top-down approach. The four groups of combustion sources calciners, spray dryers, boilers and emergency generators were each evaluated.

Five control technologies were evaluated for the calciners, fluxes to reduce kiln temperature, raw material substitution, carbon capture and sequestration (CCS), fuel switching and baseline control measures. Reducing kiln temperature was not found to be practical in proppant manufacturing. Raw material substitution was also not a viable solution since the CO_2 emissions come from fuel combustion not the feedstocks of clay. CARBO found CCS to be used in very large CO2 emitting facilities such as power plants. Fuel switching was found to be not practical since CARBO already plans to use only natural gas and propane as fuels and they are the least carbon-intensive fuels. Since CARBO rejected the other options for minimizing GHG emissions as not being technically feasible, they proposed baseline control measures as being BACT for the calciners. This includes reject heat recovery, efficient process design, good combustion practices and a limit of 36,715 tons per year of CO_2e.

CARBO's analysis for the spray dryers was similar to the calciners. Raw material substitution, CCS and fuel switching were again rejected as being technically infeasible. Baseline Control measure with a limit of 28,760 tons per year of CO_2e was proposed as BACT.

Five possible control options were evaluated for the boilers in top-down order being, CCS, biomass firing, fuel switching, firetube turbulators and baseline control measures. Again since the boilers already only fire natural gas or propane, the first four measures listed were found to be infeasible and baseline control measures was recommended as BACT. CARBO recommended a limit of 5,997 tons per year of CO_2e as BACT along with exclusive use of natural gas and propane as fuels.

For the generators, the same five control options were considered as with the boilers. Again the first four options were rejected as being technically infeasible and efficient design and operation practices was recommended as BACT. The generators will be limited to 500 hours per year of operation each, and CARBO recommended a limit of 844 tons per year of CO_2e.

EPD Review – GHG Control

A review was made of the proposals made by CARBO and it was found that they had properly followed the top down approach and EPA's *PSD and Title V Permitting Guidance for Greenhouse Gases*. Since the major sources of GHG emissions are restricted to using natural gas and propane as fuels, there is not much that can be done fuel-wise to further reduce emissions. Efficient design of the equipment is expected the best way to minimize GHG emissions.

Conclusion – GHG Control

The Division agrees with the findings of the applicant's proposed GHG controls. The BACT selection for the control of GHG emissions is summarized below in Table 4-9:

Table 4-9 BACT Summary for the GHG Controls

Source	Control Technology	Proposed BACT Limit	Compliance Determination Method	Averaging Time
Calciners	Efficient Design, good combustion practices	36,715 tons/yr of CO_2e	Fuel Usage records	12 month rolling total
Spray Dryers	Efficient Design, good combustion practices	28,760 tons/yr of CO_2e	Fuel Usage records	12 month rolling total
Boilers	Efficient Design, insulation of heated surfaces	5,997 tons/yr of CO_2e	Fuel Usage records	12 month rolling total
Generators	Efficient Design, good maintenance practices	844 tons/yr of CO_2e	Fuel Usage and operating hours records	12 month rolling total

5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

The calciners and spray dryers are all subject to 40 CFR 60, Subpart UUU. Initial performance testing for particulate matter and visible emissions is required by Condition 4.2.1. The tests must be conducted within 60 days of achieving maximum production rates, but no later than 180 days after startup. The required testing methods are listed in condition 4.1.3 of the existing permit. All of the other particulate matter sources, such as conveyors, screens and silos, are subject to 40 CFR 60, Subpart OOO. Initial testing for visible emissions is required by Condition 4.2.2. Fugitive sources of emissions will be tested according to Condition 4.2.3.

Condition 4.2.6 requires initial testing of the calciners and spray dryers to comply with the BACT and MACT limits of Conditions 3.3.9 and 3.3.12. In addition to the initial testing required by Condition 4.2.6, Condition 4.2.8 requires annual testing for HCl and HF. Annual testing for NO_x, SO_2, CO and H_2SO_4 is also required by Conditions 4.2.9, 4.2.11 and 4.2.12. Testing for PM/PM_{10} emissions will be made every three years, as per Condition 4.2.10.

During the testing of the calciners for SO_2 and PM_{10}, the Permittee will have to record the scrubber operating parameters to establish their proper operating ranges. Visible emissions will also be established using COMs for the spray dryers and calciners during PM testing. Visible emissions will also be established using COMs for the spray dryers and calciners during PM testing.

CARBO Ceramics, when required by EPD, must also conduct performance tests to determine the PM_{10} emissions from each stack/point source of particulate matter emissions. Testing for PM 2.5 can also be required.

Monitoring Requirements:

The monitoring requirements for CARBO are found in section 5.2 of the permit. Each calciner has a scrubber and Condition 5.2.1 requires monitoring of pressure drop, flow rate and pH. Proper operating values for these monitors will be established during performance testing. Condition 5.2.1 also requires continuous opacity monitors on each of the spray dryer baghouse exhausts. In addition to this, any baghouse, which receives gases at higher than ambient temperature is required to monitor temperature by Condition 5.2.2. Daily checks of baghouses will also be made by using the procedures specified in Condition 5.2.3 to check for visible emissions. The submittal of a preventive maintenance plan has also been required to ensure the proper operation of the control equipment.

A non-resettable meter to track operating time has been required for the diesel generators, as required by NSPS Subpart IIII. This requirement is found in Condition 5.2.6. Condition 5.2.7 contains additional Subpart OOO requirements, quarterly testing for visible emissions.

NO_x emissions will be monitored by making weekly measurements of NO_x and oxygen from the calciner exhaust. These values will enable the emission rate to be calculated. In order for emission rates to be calculated on a feed rate basis, Condition 5.2.10 requires that records be kept on an hourly basis of slurry input to each spray dryer and calciner input rates. This condition also requires that records be kept of the boilers' and generators' fuel consumption on a monthly basis.

CARBO is required to perform daily operation and maintenance inspections on the dust/fugitive emissions suppression and cleanup systems, and keep records of the inspection. Monitoring for compliance with the GHG BACT emission limits consist of mass balance calculations of the GHC emissions from boilers, sprays dryers and calciners based on EPD-approved emission factors and production records.

CAM Applicability:

This is a new facility; therefore CAM will not apply until the facility applies for a Title V permit, one year after the startup of the facility.

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 by CARBO triggers PSD review for PM/$PM_{10,}$ $PM_{2.5}$, NO_x, $SO_{2,}$ VOC (ozone), GHG and CO. An air quality analysis was conducted to demonstrate the facility's compliance with the NAAQS and PSD Increment standards for PM_{10}, NO_x and SO_2. 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 emission increases of $PM_{10,}$ $PM_{2.5}$, NO_x, $SO_{2,}$ CO and VOC 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 of $PM_{10,}$ $PM_{2.5}$, NO_x, $SO_{2,}$ and CO emissions increases at the CARBO would significantly impact the area surrounding the facility. Maximum ground-level concentrations are compared to the pollutant-specific U.S. EPA-established Significant Impact Level (SIL). The SIL for the pollutants of concern are summarized in Table 6-1.

If a significant impact (i.e., an ambient impact above the SIL) 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 of $PM_{10,}$ $PM_{2.5}$, NO_x, $SO_{2,}$ and CO.

If any off-site pollutant impacts calculated in the Significance Analysis exceed the SIL, 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 SILs (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
SO_2	Annual	1	--
	24-Hour	5	13
	3-Hour	25	--
NO_X	Annual	1	14
CO	8-Hour	500	575
	1-Hour	2000	--

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	--
SO_2	Annual	80 / None	0.03 / None
	24-Hour	365 / None	0.14 / None
	3-Hour	None/1300	None / 0.5
NO_X	Annual	100 / 100	0.053 / 0.053
CO	8-Hour	10,000 / None	9 / None
	1-Hour	40,000 / None	35 / None

If the maximum pollutant impact calculated in the Significance Analysis exceeds the SIL at an off-property receptor, a NAAQS analysis is required. The NAAQS analysis would include the potential emissions from all emission units at the CARBO, 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. CARBO 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 II (ug/m^3)
PM_{10}	Annual	17
	24-Hour	30
SO_2	Annual	20
	24-Hour	91
	3-Hour	512
NO_X	Annual	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 SIL 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, and receptors can be found in EPD's PSD Dispersion Modeling and Air Toxics Assessment Review in Appendix C of this Preliminary Determination and in Volume III of the permit application.

Modeling Results

Table 6-4 show that the proposed project will not cause ambient impacts of CO above the appropriate SIL. Because the emissions increases from the proposed project result in ambient impacts less than the SIL, no further PSD analyses were conducted for this pollutant.

However, ambient impacts above the SILs were predicted for NO_X, PM_{10}, $PM_{2.5}$ and SO_2 for the all averaging periods as shown in Table 6-4, requiring NAAQS and Increment analyses be performed for these pollutants.

Table 6-4: Class II Significance Analysis Results – Comparison to SILs

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	SIL (ug/m^3)	Significant?
NO_2	Annual	2010	416249	3625567	8.30	1	**Yes**
PM_{10}	24-hour	2008	415050	3625513	26.57	5	**Yes**
	Annual	2010	416168	3625735	3.293	1	**Yes**
$PM_{2.5}$	24-hour	5 yr	415113	3625579	9.76	1.2	**Yes**
	Annual	5 yr	416168	3625735	1.5	0.3	**Yes**

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	SIL (ug/m^3)	Significant?
SO_2	1-hour	5 yr	416400	3626300	58.5	7.8	**Yes**
	3-hour	2006	416200	3626300	46.1	25	**Yes**
	24-hour	2009	415115	3625026	18.2	5	**Yes**
	Annual	2010	416249	3625567	2.54	1	**Yes**
CO	1-hour	2010	415100	3625600	170.4	2000	No
	8-hour	2008	415100	3625600	116.4	500	No

Data for worst year provided only.

As indicated in the tables above, maximum modeled impacts were below the corresponding SILs for CO. However, maximum modeled impacts were above the SILs for NO_2, PM_{10}, $PM_{2.5}$ and SO_2. Therefore, a Full Impact Analysis was conducted for these pollutants.

Significant Impact Area

For any off-site pollutant impact calculated in the Significance Analysis that exceeds the SIL, a Significant Impact Area (SIA) must be determined. The SIA encompasses a circle centered on the facility being modeled with a radius extending out to the lesser of either: 1) the farthest location where the emissions increase of a pollutant from the proposed project causes a significant ambient impact, or 2) a distance of 50 kilometers. All sources of the pollutants in question within the SIA plus an additional 50 kilometers are assumed to potentially contribute to ground-level concentrations and must be evaluated for possible inclusion in the NAAQS and Increment Analysis.

Based on the results of the Significance Analysis, the distance between the facility and the furthest receptor from the facility that showed a modeled concentration exceeding the corresponding SIL was determined to be 6.5 kilometers for NO_2. To be conservative, regional source inventories for both of these pollutants were prepared for sources located within 60 kilometers of the facility.

NAAQS and Increment Modeling

The next step in completing the NAAQS and Increment analyses was the development of a regional source inventory. Nearby sources that have the potential to contribute significantly within the facility's SIA are ideally included in this regional inventory. CARBO requested and received an inventory of NAAQS and PSD Increment sources from Georgia EPD. CARBO reviewed the data received and calculated the distance from the mill to each facility in the inventory. All sources in counties that were more than 60 km outside the SIA were excluded. For sources in South Carolina, CARBO obtained the NAAQS and PSD increment inventory for Aiken, Allendale, Barnwell and Hampton counties from the South Carolina Department of Health and Environmental Control.

The distance from the facility of each source listed in the regional inventories was calculated, and all sources located more than 60 kilometers from the mill were excluded from the analysis. Additionally, pursuant to the "20D Rule," facilities outside the SIA were also excluded from the inventory if the entire facility's emissions (expressed in tons per year) were less than 20 times the distance (expressed in kilometers) from the facility to the edge of the SIA. In applying the 20D Rule, facilities in close proximity to each other (within approximately 5 kilometers of each other) were considered as one source. Then, any Increment consumers from the provided inventory were added to the permit application forms or other readily available permitting information.

The regional source inventory used in the analysis is included in the permit application and the attached modeling report.

NAAQS Analysis

In the NAAQS analysis, impacts within the facility's SIA due to the potential emissions from all sources at the facility and those sources included in the regional inventory were calculated. Since the modeled ambient air concentrations only reflect impacts from industrial sources, a "background" concentration was added to the modeled concentrations prior to assessing compliance with the NAAQS.

The results of the NAAQS analysis are shown in Table 6-5. For the short-term averaging periods, the impacts are the highest second-high impacts. For the annual averaging period, the impacts are the highest impact. When the total impact at all significant receptors within the SIA are below the corresponding NAAQS, compliance is demonstrated.

Table 6-5: NAAQS Analysis Results

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	Background (ug/m^3)	Total Impact (ug/m^3)	NAAQS (ug/m^3)	Exceed NAAQS?
NO_2	1-hour	5 yr	428000	3660500	97.4	33.2	130.64	188	No
	Annual	2010	416249	3625567	9.64	5.2	14.84	100	No
PM_{10}	24-hour	2006	415113	3625580	20.3	38	58.35	150	No
$PM_{2.5}$	24-hour	5 yr	415050	3625513	9.46	25	34.46	35	No
	Annual	5 yr	416128	3625820	1.47	12.7	14.17	15	No
SO_2	1-hour	5 yr	416200	3626500	45.81	67.2	112.99	196	No
	3-hour	2010	418400	3628200	59.84	51.5	111.32	1300	No
	24-hour	2008	414923	3625381	16.27	16.8	33.02	365	No
	Annual	2010	416300	3625600	3.6	3.9	7.49	80	No

Data for worst year provided only.

As indicated in Table 6-5 above, the total modeled impact for the 24-hour averaging period for all of the total modeled impacts at all significant receptors within the SIA are below the corresponding NAAQS.

Increment Analysis

The modeled impacts from the NAAQS run were evaluated to determine whether compliance with the Increment was demonstrated. The results are presented in Table 6-6.

Table 6-6: Increment Analysis Results

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	Increment (ug/m^3)	Exceed Increment?
NO_2	Annual	2010	416249	3625567	8.07	25	No
PM_{10}	24-hour	2010	415050	3625513	16.78	30	No
	Annual	2010	416168	3625736	3.33	17	No
SO_2	3-hour	2010	418400	3628200	52.22	512	No
	24-hour	2008	414923	3625381	16.24	91	No
	Annual	2010	416300	3625600	2.77	20	No

Data for worst year provided only

Table 6-6 demonstrates that the impacts are below the corresponding increments for all pollutants and averaging times, even with the conservative modeling assumption that all NAAQS sources were Increment sources.

Ambient Monitoring Requirements

Table 6-7: Significance Analysis Results – Comparison to Monitoring *De Minimis* Levels

Pollutant	Averaging Period	Year*	UTM East (km)	UTM North (km)	Monitoring De Minimis Level (ug/m^3)	Modeled Maximum Impact (ug/m^3)	Significant?
NO_2	Annual	2010	416249	3625567	14	8.30	No
PM_{10}	24-hour	2008	415050	3625513	10	26.57	**Yes**
$PM_{2.5}$	24-hour	2008	415050	3625513	4	11.97	**Yes**
SO_2	24-hour	2009	415115	3265026	13	18.2	**Yes**
CO	8-hour	2008	415100	3625600	575	116.4	No

Data for worst year provided only

The impacts for NO_X, CO, SO_2, $PM_{2.5}$ and PM_{10} quantified in Table 6-4 of the Class I Significance Analysis are compared to the Monitoring *de minimis* concentrations, shown in Table 6-1, to determine if ambient monitoring requirements need to be considered as part of this permit action. Although the maximum modeled impacts are above the corresponding de minimis concentrations, no pre-construction monitoring is required for $PM_{2.5}$, PM_{10}, or SO_2 because Georgia has an ambient monitoring network that provides all of the necessary data.

As noted previously, the VOC *de minimis* concentration is mass-based (100 tpy) rather than ambient concentration-based (ppm or $\mu g/m^3$). Projected VOC emissions increases resulting from the proposed modification do not exceed 100 tpy; however, even if emissions were over 100 tons, the current Georgia EPD ozone monitoring network will provide sufficient ozone data such that no pre-construction or post-construction ozone monitoring is necessary.

Class I Area Analysis

Federal Class I areas are regions of special national or regional value from a natural, scenic, recreational, or historic perspective. Class I areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations. U.S. EPA has established policies and procedures that generally restrict consideration of impacts of a PSD source on Class I Increments to facilities that are located near a federal Class I area. Historically, a distance of 100 km has been used to define "near", but more recently, a distance of 200 kilometers has been used for all facilities that do not combust coal. Also the Federal Land Manager has requested that sources within 300 kilometers be reviewed.

The four Class I areas within approximately 300 kilometers of the CARBO are the Cape Romain, Shining Rock, Wolf Island and Okefenokee areas, located approximately 210, 296, 164 and 192 kilometers from of the facility. As shown in Table 6-8 the modeled maximum impacts for all pollutants were below their respective significance levels for the Class I areas.

Table 6-8: Significance Analysis Results – Comparison to Monitoring *De Minimis* Levels

Pollutant	Averaging Period	Year/Area	UTM East (km)	UTM North (km)	Significance Level (ug/m^3)	Modeled Maximum Impact (ug/m^3)
NO_2	Annual	2002/Wolf Island	469490	3470560	0.1	0.0400
PM_{10}	Annual	2001/Cape Romain	625889	3639427	0.2	0.00134
	24-hour	2003 Cape Romain	628875	3649631	0.3	0.0327
SO_2	Annual	2001/Cape Romain	625889	3639427	0.1	0.0022
	24-hour	2002/Wolf Island	472657	346928	0.2	0.0542
	3-hour	2002/Cape Romain	625889	3639427	1.0	0.173

Data for worst year provided only

7.0 ADDITIONAL IMPACT ANALYSES

PSD requires an analysis of impairment to visibility, soils, and vegetation that will occur as a result of a modification to the facility and an analysis of the air quality impact projected for the area as a result of the general commercial, residential, and other growth associated with the proposed project.

Soils and Vegetation

Table 7-1: Project Impacts to Soils and Vegetation

Pollutant	Averaging Period	Maximum Modeled Impact (µg/m³)	Background Concentration (µg/m³)	Total Potential Impact (µg/m³)	Screening Level (µg/m³)	Exceed Screening Level?
NO_2^+	1-hour	97.4	33.2	130.6	188	No
	4-hour	*	*	*	3,760	No
	8-hour	*	*	*	3,760	No
	1-month	*	*	*	564	No
	Annual	9.64	5.2	14.84	94	No
CO	1-hour	Exempt (emission rate < significant)				
	1-week	Exempt (emission rate < significant)				
SO_2	1-hour	45.81	67.2	113.01	196	No
	3-hour	59.84	51.5	111.34	786	No
	Annual	3.6	3.9	7.5	18	No
PM	No particulate matter assessment is prescribed in the guidance document.					
Flurorides	10-day	Exempt (emission rate < significant)				

* Compliance with the 4-hour, 8-hour and 1-month NO_2 thresholds is assured based on compliance with the 1-hour impact threshold.

Growth

The purpose of a growth analysis is to predict how much new growth is likely to occur as a result of the project and the resulting air quality impacts from this growth. No adverse impacts on growth are anticipated from the project since any workforce growth and residential and commercial growth that would be associated with the proposed project (expected to be minimal) would not cause a quantifiable impact on the air quality of the area surrounding the facility.

Visibility

Visibility impairment is any perceptible change in visibility (visual range, contrast, atmospheric color, etc.) from that which would have existed under natural conditions. Poor visibility is caused when fine solid or liquid particles, usually in the form of volatile organics, nitrogen oxides, or sulfur oxides, absorb or scatter light. This light scattering or absorption actually reduces the amount of light received from viewed objects and scatters ambient light in the line of sight. This scattered ambient light appears as haze.

Another form of visibility impairment in the form of plume blight occurs when particles and light-absorbing gases are confined to a single elevated haze layer or coherent plume. Plume blight, a white, gray, or brown plume clearly visible against a background sky or other dark object, usually can be traced to a single source such as a smoke stack.

Georgia's SIP and Georgia *Rules for Air Quality Control* provide no specific prohibitions against visibility impairment other than regulations limiting source opacity and protecting visibility at federally protected Class I areas. To otherwise demonstrate that visibility impairment will not result from continued operation of the mill, the VISCREEN model was used to assess potential impacts on ambient visibility at so-called "sensitive receptors" within the SIA of the CARBO facility. This included the Okefenokee National Wildlife Refuge, Wolf Island National Wildlife Refuge, Shining Rock Wilderness Area and Cape Romain National Wildlife Refuge. Since there is no ambient visibility protection standard for Class II areas, this analysis is presented for informational purposes only and predicted impacts in excess of screening criteria are not considered "adverse impacts" nor cause further refined analyses to be conducted.

The primary variables that affect whether a plume is visible or not at a certain location are (1) quantity of emissions, (2) types of emissions, (3) relative location of source and observer, and (4) the background visibility range. For this exhaust plume visibility analysis, a Level-1 visibility analysis was performed using the latest version of the EPA VISCREEN model according to the guidelines published in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA-450/4-88-015). The VISCREEN model is designed specifically to determine whether a plume from a facility may be visible from a given vantage point. VISCREEN performs visibility calculations for two assumed plume- viewing backgrounds (horizon sky and a dark terrain object). The model assumes that the terrain object is perfectly black and located adjacent to the plume on the side of the centerline opposite the observer.

In the visibility analysis, the total project NO_X and PM_{10} emissions increases were modeled using the VISCREEN plume visibility model to determine the impacts. For both views inside and outside the Class II area, calculations are performed by the model for the two assumed plume-viewing backgrounds. The VISCREEN model output shows separate tables for inside and outside the Class II area. Each table contains several variables: theta, azi, distance, alpha, critical and actual plume delta E, and critical and actual plume contrast. These variables are defined as:

1. *Theta* – Scattering angle (the angle between direction solar radiation and the line of sight). If the observer is looking directly at the sun, theta equals zero degrees. If the observer is looking away from the sun, theta equals 180 degrees.

2. *Azi* – The azimuthal angle between the line connecting the observer and the line of sight.

3. *Alpha* – The vertical angle between the line of sight and the plume centerline.

4. *delta E* – Used to characterize the perceptibility of a plume on the basis of the color difference between the plume and a viewing background. A delta E of less than 2.0 signifies that the plume is not perceptible.

5. *Contrast* – The contrast at a given wavelength of two colored objects such as plume/sky or plume/terrain.

The analysis is generally considered satisfactory if *delta E* and *Contrast* are less than critical values of 2.0 and 0.05, respectively, both of which are Class I, not Class II, area thresholds. The Division has reviewed the VISCREEN results presented in the permit application and have determined that the visual impact criteria (*delta E* and *Contrast*) at the affected sensitive receptors are not exceeded as a result of the proposed project. Since the project passes the Level-1 analysis for a Class I area for the Class II area of interest, no further analysis of exhaust plume visibility is required as part of this air quality analysis.

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 are 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 natural gas and propane 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.

The toxic impact assessment performed by CARBO can be found in section 4.0 of Volume III of their PSD 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. CARBO 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.

Determination of Toxic Air Pollutant Impact

The Georgia EPD *Guideline* recommends a tiered approach to model TAP impacts, beginning with screening analyses using SCREEN3, followed by refined modeling, if necessary, with ISCST3 or ISCLT3. For the refined modeling completed, the infrastructure setup for the SIA analyses was relied upon with appropriate sources added for the TAP modeling. Note that per the Georgia EPD's *Guideline*, downwash was not considered in the TAP assessment.

Initial Screening Analysis Technique

Generally, an initial screening analysis is performed in which the total TAP emission rate is modeled from the stack with the lowest effective release height to obtain the maximum ground level concentration (MGLC). Note the MGLC could occur within the facility boundary for this evaluation method. The individual MGLC is obtained and compared to the smallest AAC. Due to the likelihood that this screening would result in the need for further analysis for most TAP, the analyses were initiated with the secondary screening technique.

EPD conducted toxics modeling for HCl (annual averaging period), HF (24-hour), H2SO4 (24-hour), Hexane (annual), Methanol (24-hour) and ammonia (annual). For all these pollutants, the predicted concentrations were well below the acceptable ambient concentrations. The exact results may be found in Part VII of the attached modeling memorandum.

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 3295-165-0012-P-01-0.

Section 1.0: Facility Description

The proposed facility will be a kaolin clay processing (ceramic proppant manufacturing) facility, to be located near the city of Millen, Georgia. The facility will have four identical processing lines, each equipped with two spray dryers and one calciner (kiln). The four lines can be operated independently and each can handle a kiln input of 20.9 tons per hour. In addition to the dryers and kilns, the facility will have material handling equipment, such as, conveyors, screens, bucket elevators, process bins, silos and railcar loading operations.

Section 2.0: Requirements Pertaining to the Entire Facility

Conditions 2.1.1 through 2.1.6 are standard SIP facility-wide general requirement permit conditions for good work practice to minimize emissions, prevention of emission dilution, application submittal, record keeping and conflict of conditions.

Condition 2.1.7 requires the Permittee to apply a Title V operation permit within 12 calendar months after commencing operation of this facility. Condition 2.1.8 makes this permit invalid if construction is not started within 18 months of its issuance or there is a break in construction of 18 months or more. Condition 2.1.9 requires CARBO to comply with any limits subsequently revised by EPA or the Division. Condition 2.2.1 requires that reasonable measures be taken to prevent public access to the plant boundaries, to match the area used in computer modeling of emissions.

Section 3.0: Requirements for Emission Units

Table 3.1 lists all the emission sources and associated air pollution control devices along with applicable rules and regulations and applicable permit conditions.

Section 3.2 contains any operating caps or limits. The restriction to only using gas and propane is contained in Condition 3.2.1 (except for the diesel generators). Condition 3.2.2 has the general requirements for minimizing emissions for each pollutant. Fugitive emission reduction is addressed by Condition 3.2.3. The restriction in operating hours for the diesel generators is 500 hours as per Condition 3.2.4. Finally, Condition 3.2.5 restricts each calciner to 0.39 pounds per hour of sulfuric acid emissions. This equates to an annual emission rate of 6.83 tons, which is just below the significance level of 7 tons.

Federal standards such as NSPS requirements are contained in Section 3.3 of the permit. No changes have been made from the federal requirements and NSPS Subparts A, OOO, UUU, IIII and NESHAP Subpart ZZZZ, which are contained in Conditions 3.3.1, 3.3.2, 3.3.3, 3.3.4 and 3.3.7, respectively. Since the final requirements of Part 63, Subpart DDDDD are not known, Condition 3.3.8 requires CARBO to comply with any applicable provisions.

The BACT and MACT limits, which have previously been discussed, are found in tables in Conditions 3.3.9 and 3.3.12. Limits on the generators operation including hours, installation and design, fuel sulfur content are found in Conditions 3.3.5, 3.3.6 and 3.3.10. Condition 3.3.11 requires CARBO to comply with the Section 112(g) of the NESHAP regulation.

Parts 3.4 and 3.5 of the permit contain standard permitting requirements, such as minimizing fugitive dust, performing routine maintenance and keep a supply of spare bags available.

Section 4.0: Requirements for Testing

Condition 4.1.1 lists applicable methods for performance testing and monitoring of the emissions from this facility. Conditions 4.1.2 through 4.1.6 contain standard general requirements with regard to the continuous monitoring systems to be used during the testing, the production rate during the testing, the notification of the testing, and the reporting of the testing results.

Condition 4.2.1 incorporates initial performance testing requirements applicable to sources subject to NSPS Subpart UUU, i.e., all the spray dryers and calciners at this facility.

Conditions 4.2.2 through 4.2.4 incorporate applicable testing and reporting requirements for the PM, visible and fugitive emissions from the sources subject to 40 CFR Part 60, Subpart OOO. Condition 4.2.2 allows the duration of the Method 9 testing to be reduced to 30 minutes when testing reveals that the source meets certain conditions. Condition 4.2.3 allows an alternative testing procedure when the fugitive emissions from two or more sources continuously interfere with each other and use of Method 5I instead of Method 5.

Condition 4.2.6 requires initial performance testing for all the sources with BACT and/or MACT emission standards. No such testing is required when a testing pursuant to NSPS Subpart UUU or Subpart OOO has already been conducted on the same sources for same emissions and under the same operating conditions. CARBO shall record all operating parameters, production information and other parameters affecting the emissions and/or required in the emission calculations. To reduce redundant testing, Condition 4.2.6 allows the Permittee to use appropriate results from NSPS performance testing to demonstrate initial compliance with the applicable BACT emission limits for the same affected sources, provided that the testing condition and methodology used in the NSPS testing meet the requirements of this condition. In lieu of the testing required by this condition, the appropriate BACT performance testing results may be used to demonstrate initial compliance with the PM and visible emission limits for the same affected sources subject to NSPS Subpart UUU or OOO, provided that the testing condition and methodology meet the requirements of the relevant NSPS standards. This will reduce redundant testing.

Condition 4.2.7 that the amount of visible emissions be determined using the COMS during Method 5 performance tests.

Condition 4.2.8 requires annual testing of HCl and HF emissions from calciners to ensure compliance with the case-by case MACT limitations.

Condition 4.2.9 requires annual testing of CO emissions from calciners/kilns to ensure compliance with the BACT limit.

Condition 4.2.10 requires the Permittee to repeat testing every 36 months for specified particulate matter emissions from the spray dryer and calciners/kilns after the initial performance test.

Condition 4.2.11 requires the Permittee to conduct annual testing for NO_x and SO_2 emissions from each calciner to ensure compliance with the BACT limits.

Condition 4.2.12 requires annual testing for sulfuric acid, since projected emissions are so close to the significance level.

Condition 4.2.13 requires that the control efficiency for SO_2, HCl and HF be determined during the required annual testing.

Section 5.0: Requirements for Monitoring

Condition 5.1.1 contains general requirements for the operation of continuous monitoring system. The COMS monitoring requirements in Condition 5.2.1 is incorporated from NSPS Subpart UUU, and will ensure spray dryers and calciners comply with the appropriate PM and visible emissions limits.

To prevent thermal damage to the fabric filtration bags, Condition 5.2.2 requires continuous monitoring of inlet temperature or surrogate temperature for baghouses working at elevated temperature. Condition 5.2.2 also requires that scrubber operating parameters be monitored.

Conditions 5.2.3 and 5.2.5 establish daily visible emission (VE) check requirements for point/stack sources with visible emissions and for sources with fugitive emissions. The daily VE check is a common requirement for mineral processing industries such as ceramic proppant manufacturing facilities. Representing a BACT requirement, Condition 5.2.5 is more stringent that the similar VE daily check condition in the standard condition vault.

To ensure proper function of the baghouses and thus minimize emissions, Condition 5.2.4 requires the Permittee to perform routine operation and maintenance check according a Preventive Maintenance Program approved by EPD.

To ensure compliance with the fugitive emission limits, and minimize the fugitive emissions, Conditions 5.2.5 establishes the monitoring requirements for fugitive emission control measures employed at the facility.

Condition 5.2.6 establishes the monitoring requirements under NSPS Subpart IIII for using a non-resettable hour meter to track the number of hours operated for each of the stationary emergency diesel generators during any type of operation. This condition allows the diesel generators to remain as emergency units and therefore be exempt from certain regulations.

Condition 5.2.7 requires quarterly Method 22 visible emission inspections on affected facilities that use baghouse to control PM emissions. This is a new monitoring requirement under 40 CFR Part 60, Subpart OOO as amended on April 28, 2009. When the quarterly 30-minute visible emissions inspection has been conducted on any affected baghouse during the day, no daily VE check on the same baghouse is necessary for that day.

Condition 5.2.8 establishes detailed procedures for routine monitoring of the NO_x emissions from each calciner using a portable NO_x analyzer. The NO_x emission data from the monitoring will be used to determine compliance with permit emission limits.

The flow monitor specified in Condition 5.2.9 would provide instant exhaust flow rate data required in the NO_x emission determination specified in Condition 5.2.8.

Condition 5.2.10 requires the Permittee to monitor and record specified operating parameters and production data to ensure and demonstrate emission compliance.

Section 6.0: Other Recordkeeping and Reporting Requirements

Conditions 6.1.1 through 6.1.6 contain respectively general requirements for the record keeping type and duration, reporting of deviations, excess emissions, exceedances, or excursions, quarterly report, sampling records, and record keeping of measurements for monitoring systems (monitoring, calibration, adjustment and maintenance) and performance testing.

Condition 6.1.7 incorporates the applicable reporting requirements for excess emissions, exceedances, excursions or additional information to be included in the PSD/BACT quarterly reports required by Condition 6.1.4.

Condition 6.2.1 incorporates the applicable notification requirements under NSPS Subpart OOO. These requirements establish time frames for milestones such as record keeping, reporting, performance testing, maintenance and emission/compliance calculation.

Condition 6.2.2 ensures the compliance with the fugitive emission limits and minimization of such emissions. Conditions 6.2.4 and 6.2.5 establish the record keeping, emission calculation/compliance demonstration and reporting requirements for compliance with the case-by-case MACT emission limits.

Condition 6.2.3 requires usage records be kept as well as operating hours and feed input rates for the calciners. This data will be used in other conditions to calculate emissions and determine compliance with the various emission limits.

Condition 6.2.6 establishes the applicable the record keeping, emission calculation/compliance demonstration and reporting requirements for compliance with the BACT VOC emission limit

Condition 6.2.7 incorporate the requirements for submitting testing results a specified by NSPS Subpart OOO. Condition 6.2.8 specifies how to submit the written notification of the actual date of initial startup of each affected facility/source in case of phased construction or modification.

Conditions 6.2.9 through 6.2.13 establish the applicable record keeping, compliance demonstration, notifications and reporting requirement necessary for demonstrating compliance with the operating and fuel usage limitations under NSPS Subpart IIII for the emergency diesel generators.

Conditions 6.2.14 and 6.2.15 establish detailed requirements and procedures showing how to calculate daily SO_2 emission rate. Similarly, Conditions 6.2.16 and 6.2.17 establish the procedures for calculating HCl and HF emission rates. Condition 6.2.19 requires emissions calculations for CO_2 to be used in determining compliance with the GHG emission limits.

Conditions 6.2.17 and 6.2.18 establish the record keeping, emission calculation/compliance demonstration and reporting requirements for compliance with the case-by-case MACT emission limits for emissions of HCl and HF. Condition 6.2.19 ensures the reduction of fugitive emissions and compliance with the BACT requirements by requiring relevant operating records. The methodology given Conditions 6.2.22 and 6.2.23 will be used to determine compliance with the BACT VOC emission limits. Records of fuel usage necessary to make these calculations are required to be kept by Condition 6.2.21. Condition 6.2.20 requires start up notification for each of the stationary diesel engines as per 40 CFR 63.6645(d).

Finally the requirement to pay an annual emissions fee found in Condition 6.2.24 is a standard requirement.

APPENDIX A

Draft PSD Permit
CARBO Ceramics
Millen (Jenkins County), Georgia

APPENDIX B

CARBO Ceramics PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. 20615, dated August 15, 2011
2. Additional Information Package Dated October 18, 2011

APPENDIX C

EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review