Prevention of Significant Air Quality Deterioration Review

Final Determination

April 2012

Facility Name: CARBO Ceramics Inc.
City: Millen
County: Jenkins County
AIRS Number: 04-13-165-00012
Application Number: 20615
Date Application Received: August 15, 2011, updated October 18, 2011

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BACKGROUND

On August 15, 2011, CARBO Ceramics, Inc. (hereafter CARBO) submitted an application for an air quality permit to construct and operate a proppant manufacturing facility. The facility is located at 3949 Highway 17 South in Millen, Jenkins County. The facility will have four processing lines, which will each have two spray dryers and a calciner to process kaolin clay.

On February 15, 2012, the Division issued a Preliminary Determination stating that the construction described in Application No. 20615 should be approved. The Preliminary Determination contained a draft Air Quality Permit for the construction and operation of the equipment.

The Division requested that CARBO place a public notice in a newspaper of general circulation in the area of the existing facility notifying the public of the proposed construction and providing the opportunity for written public comment. Such public notice was placed in *The Millen News* (legal organ for Jenkins County) on February 22, 2012. The public comment period expired on March 23, 2012.

During the comment period, comments were received from the facility. There were no comments received from the U.S. EPA, Region IV or the general public.

A copy of the final permit is included in Appendix A. A copy of written comments received during the public comment period is provided in Appendix B.

CARBO Ceramics' COMMENTS

Comments were received from Jason Goodwin, Director of Environmental, Health and Safety, by e-mail on March 13, 2012 and by letter on March 15, 2012.

Comment 1

- Cover Page: Delete comma after "Ceramics" on both the cover page and document header – company name should be "CARBO Ceramics Inc."

EPD Response.

The changes were made.

Comment 2

- Condition 1.3: The condition states that the Millen facility will have "four identical processing lines." Although the engineering plan for Millen currently includes four production lines with the same capacity and design, the lines may be constructed in a phased approach, and changes or improvements that do not impact air quality emissions or affect fuel or raw material throughput may be implemented. CARBO requests that EPD eliminate the word "identical" from the condition.

EPD Response.

The change was made.

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 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.

Comment 3

- Condition 2.1.9: Revise the next to last word in the condition to "effective."

EPD Response.

The change was made.

2.1.9 If any of the emission standards or requirements in this permit is revised by EPA or the Division after the issuance of this permit, the Permittee shall comply with the revised standard(s) or requirement(s) on and after its effective date.

Comment 4

- Condition 2.2.1: Add the words "and where fencing is not provided" to the end of the second sentence.

EPD Response.

The change was made.

> 2.2.1 The Permittee shall implement measures, including fencing, sign postings, or routine patrols to restrict public access along the entire Source Boundary utilized in the ambient impact assessment/modeling. Signs shall be posted along the property boundary no further than 100 feet apart, and patrols shall be conducted at least once weekly on boundaries that have public access and where fencing is not provided. The Permittee shall maintain a written plan outlining such measures, and shall be updated as required. The Division reserves the right to require enhancement of the plan.

Comment 5

- Condition 3.1: The Emission Units table indicates that only four product storage silos have been included in the table for each production line. For example, Page 5 shows that there are only four Bulk Product Silos (Nos. 1-1, 1-2, 1-3 and 1-4, with ID Nos. BS01, BS02, BS03 and BS04, respectively). Comparable references are found on Pages 6, 7 and 8 for Lines 2-4.

  Although CARBO's initial permit application from August 2011 included only four product silos per line (a total of 16 silos), the application was updated in October 2011 to add a fifth silo to each line to match the silos already included. This request was included in the October 28, 2011 letter to Peter Courtney of EPD and was incorporated in the updated air dispersion modeling results that were included with that correspondence.

  Accordingly, the Emission Units table in Condition 3.1 should be revised to include a fifth Bulk Product Silo for each line, for a total of 20 Bulk Product Silos.

EPD Response.

The changes were made.

Comment 6

- Condition 3.2.2.b.i: This condition specifies the use of "fabric filters, baghouses or bin vents" to comply with Best Available Control Technology (BACT) limits for PM emissions. CARBO notes that the Millen plant's calciners will be equipped with scrubbers, although these control devices were not specifically listed as a PM control device in previous application documents and correspondence.

Other conditions contained in this draft permit require collection of certain parametric data related to scrubber operation, as specified by New Source Performance Standard (NSPS) Subpart UUU, for units that use a wet scrubber to control PM emissions. Further, certain other conditions in the draft permit specify the use of continuous opacity monitoring systems (COMS) – this also derives from Subpart UUU, but only for units that use dry methods of PM control to comply with the subpart.

CARBO requests EPD to clarify the intent of this requirement and either confirm this condition as proposed, or modify it consistent with the final PM BACT determination contained in the draft permit.

EPD Response.

The particulate matter emissions from the calciners were to be controlled by baghouses. Sulfur dioxide emissions from the calciners are to be reduced by the use of scrubbers. Although installed for sulfur dioxide control, the scrubbers will also naturally further reduce particulate matter emissions. Conflicting information in the application made it unclear whether both the calciners and spray dryers would have COMS or just the spray dryers. COMS if installed would have to be positioned after the baghouses, but before the scrubbers. A discussion was made with CARBO to clarify the issue. CARBO believes the reduction of condensable PM emissions by the scrubbers will be necessary for them to comply with their PM/PM_{10} limit. Therefore, the scrubbers will be listed in 3.2.2 b. i. as part of BACT control for PM stack emissions. Subpart UUU monitoring for wet control devices (scrubbers) are also being added to the permit.

3.2.2 The Permittee shall use the following technologies and/or procedures to comply with the BACT emission limits:
[40 CFR 52.21-PSD/BACT]

a. NO_x emissions:

i. Good Combustion Techniques, such as equipment design, maintenance, and combustion process control such as appropriate combustion temperature, air to fuel ratio, staged and/or controlled combustion that can lower the NO_x emissions;

ii. Low NO_x burners;

iii. Use of only “clean fuels”, i.e., natural gas and propane and low-sulfur diesel.

b. Stack PM emissions:

i. Fabric filters, scrubbers, baghouses or bin vents.

c. Fugitive Emissions:

i. Wet suppression or timely cleanup, or

ii. Enclosure of working spaces if necessary, or

iii. Covering of storage piles and trucks, if necessary.

d. SO_2 Emissions:

i. Use of only "clean fuels", i.e., natural gas, propane and low-sulfur diesel.

ii. The use of wet scrubbers (SC01, SC02, SC03 and SC04), for calciners (KLN1, KLN2, KLN3 and KLN4) to control SO_2 emissions

e. CO Emissions

i. Equipment design, maintenance and combustion process control with good operating practices (i.e., adequate combustion temperature, residence time and/or excess air, etc.) that can lower the CO emissions.

f. GHG Emissions

i. Use of low carbon-density fuel (natural gas and propane).

ii. Good Combustion Techniques (equipment design, maintenance, and combustion process control such as appropriate combustion temperature, air to fuel ratio, and air/fuel mixing that can reduce fuel usage by increasing combustion efficiency thus fuel efficiency).

iii. Good equipment thermal/heat insulation.

iv. Heat/thermal energy recovery when feasible.

The Permittee shall develop and submit written operation, inspection and maintenance procedures and work practice plans with regard to subparagraphs a, b, c, d, e and f of this condition. These procedures and plans shall be developed and implemented to ensure the satisfaction of the applicable operating requirements in this condition. All inspection and maintenance activities shall be recorded in a permanent form suitable for inspection and submission to the Division.

Comment 7

- Condition 3.2.2.d.i.: This condition is missing a reference to diesel fuel used to power the emergency diesel generators. Revise the condition to the following:

"Use of only "clean fuels," i.e. natural gas, propane and low-sulfur diesel."

EPD Response.

The change was made. The revised condition is shown in the response to comment 6.

Comment 8

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- Condition 3.3.4: This condition's reference does not match the underlying NSPS requirement. Revise the reference to 40 CFR 60.4211(f).

EPD Response.

The change was made.

> 3.3.4 The Permittee shall comply with all the applicable provisions of 40 CFR, Part 60, Subpart IIII, *"Standards of Performance for Stationary Compression Ignition Internal Combustion Engines."* In particular, the Permittee shall limit the accumulated maintenance check and readiness testing time for each emergency stationary diesel generator (Emissions Unit ID Nos. EDG1, EDG2, EDG3 and EDG4) to 100 hours per year. The Permittee may petition the Division for approval of additional hours for maintenance checks and readiness testing, but a petition is not required if the Permittee maintains records indicating that Federal, State, or local standards require maintenance and testing of the emergency stationary diesel generators beyond 100 hours per year. Any operation other than emergency power generation, and maintenance check and readiness testing is prohibited.
> [40 CFR 60.4211(f)]

Comment 9

- Condition 3.3.6: This condition does not take into account certain provisions available under NSPS for alternative installation, configuration, operation and/or maintenance of diesel generator engines and their associated emission control equipment/devices. Revise the condition to the following:

"Except as provided under 40 CFR 60.4211(g)(3), each emergency stationary diesel generator (Emissions Unit ID Nos. EDG1, EDG2, EDG3 and EDG4) and any associated emissions-related control devices shall be installed and configured according to manufacturer's written instructions."

EPD Response.

The change was made.

> 3.3.6 Except as provided under 40 CFR 60.4211 (g)(3), each emergency stationary diesel generator (Emissions Unit ID Nos. EDG1, EDG2, EDG3 and EDG4) and any associated control devices shall be installed and

configured according to the manufacturer's written instructions. [40 CFR 60.4211(c)]

Comment 10

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- Condition 3.3.9: The following comments refer to Table 3.3.9-1: BACT Emission Limits and are organized by process unit.

  Calciners:

  - PM/PM10/PM2.5
  - Under the Emission Limit column of the BACT Table, include the hourly emission limit of 2.76 lb/hr. CARBO believes this will improve the awareness of the hourly applicable emission limit for these units.
  - Under the Compliance Method column of the BACT Table, revise the condition to read as follows:

    "Method 5 or 201/201A in conjunction with Method 202, as necessary."

    This revision will provide for a flexible testing condition that can be applied to all potential PM testing situations and will minimize the need to request alternative testing requirements or provisions.

  - Visible Emissions
  - As noted under the comment for Condition 3.2.2.b, a COMS would not be required under the requirements of NSPS Subpart UUU should a wet scrubber be specified as PM BACT. At the same time, installation of a COMS to measure opacity downstream of the calciner baghouse – but upstream of the scrubber, and within the contained exhaust ductwork – would provide no environmental benefit and would not indicate exhaust opacity. CARBO requests that EPD evaluate this condition and confirm or delete the reference to COMS.

  - GHG
  - Under the Emission Limit column of the BACT Table, delete the 401.1 lb/ton of clay feed input condition for GHG emissions.

    GHG – and specifically CO2 – emissions are not meaningfully affected by clay feed rates; rather, they are nearly completely a function of the firing rate of the calciner burner. Also, because burner firing rate is not directly correlated with clay feed rate (i.e. 50% clay feed rate does not necessarily equate to 50% burner firing rate), a permit condition that restricts short-term GHG emissions should not be tied to clay feed rate. Therefore, CARBO requests that EPD eliminate this condition or choose an alternative form of this condition that is tied to burner operating rate and not clay feed rate.

  - Sulfuric Acid Mist
  - Under the Emission Limit column of the BACT Table, add a table row outlining the applicable emission limit, compliance method and averaging time for sulfuric acid mist from the calciners. Initial and annual stack testing already is required under Condition

3.2.5, and CARBO prefers to consolidate all emission limit and testing requirements in the same table.

- Pollutant: Sulfuric acid mist (SAM)
- Emission Limit: Not to exceed 0.39 lb/hr
- Compliance Method: Method 8 or 8A
- Averaging Time: 3 hours

- SO2
- Under the Emission Limit column of the BACT Table, CARBO notes two problematic aspects of the proposed calciner SO2 emission limit:

1) The condition applies a 90 percent control efficiency at all operating conditions and fails to consider the variable nature of sulfur content in kaolin clay and the fact that high levels of removal efficiency is not achievable when inlet pollutant loading is reduced.
2) The 1.64 lb/ton clay input limit, which is applied at the calciner inlet, already factors the effect of post-calcining emission control of the scrubbers at a rate of 90 percent.

In effect, the combination of these conditions would prohibit anything other than very low sulfur clay to be used, and then scrubbers would be required to operate at 90 percent efficiency and capture/control a very low level of emissions in the exhaust gas.

CARBO notes that the Millen permit application contemplates the use of high-sulfur clay supplies, which may not feasibly be processed at our other facilities. This is one of the primary reasons that we proposed the use of scrubbers to control the expected higher emission rates of SO2. However, it has never been the intention of CARBO to restrict Millen to processing *only* high-sulfur ores, and it is possible that lower sulfur clay reserves may be used if and when available.

Also, while emission limits for SO2 frequently contain limits on feedstock composition as well as actual emissions, the proposed SO2 limit for Millen imposes restrictions in three respects: clay sulfur content (lb/ton), SO2 removal efficiency (percent), and stack emission rate (lb/hr).

CARBO believes this requirement – especially where the control efficiency is concerned – is particularly onerous given the fundamental difficulty in maintaining stable removal efficiencies as the incoming pollutant rate is reduced. In short, while reducing 90 percent of SO2 emissions is feasible when incoming SO2 levels are high, maintaining that same level of reduction is impossible as incoming SO2 is reduced, such as when lower-sulfur clay is processed.

Therefore, CARBO proposes two alternative emission limits for EPD's consideration.

A) "No more than 16.4 lb SO2/ton clay; not to exceed 34.25 lb SO2/hour."

This is CARBO's preferred structure since it imposes an explicit limit on both clay sulfur content and stack emissions, along with an implicit control efficiency that is

necessary to meet the stack limit of 34.25 lb/hr irrespective of clay sulfur content. The implied control efficiency works in direct response to the sulfur in the clay AND the operating rate of the calciner, both of which are critical factors in scrubber removal efficiency, and eliminates the need to determine control efficiency independently. The table below illustrates this point.

Calciner Clay Feed Rate (tons/hr)	SO2 Emissions, Uncontrolled @ 16.4 lb/ton (lb/hr)	Implied Scrubber Control Efficiency @ 34.25 lb/hr (percent)
20.9	342.5	90.0
15.0	246.0	86.1
10.0	164.0	79.1
5.0	82.0	58.2

B) "Not to exceed 34.25 lb SO2/hour; no less than 90 percent control when SO2 is equal to or greater than 4.0 lb/ton of clay; no less than 60 percent control when SO2 is less than 4.0 lb/ton of clay."

Tiered control efficiency requirements acknowledge the fact that high control efficiencies cannot be maintained when inlet pollutant loading is significantly reduced. With this approach, Millen will be allowed to continue processing a wide range of clays with varying sulfur content. This concept is similar to that applied to coal-fired electric power generating units subject to NSPS Subpart Da, which includes both a control efficiency and emission limit to control SO2.

Should EPD choose this approach, CARBO requests that alternative means of determining scrubber efficiency should be considered in addition to the current approach of initial and annual reference method testing. One alternative would involve the measurement of SO2 emissions at the scrubber inlet and outlet using a portable analyzer, according to the methodology provided in New Condition 5.2.X (see forgoing discussion). Such monitoring should be considered a viable means of determining scrubber control efficiency on an ongoing basis in lieu of parametric monitoring, as described in subsequent sections of this permit.

- NOx
- Under the Emission Limit column of the BACT Table, delete the 5.79 lb/ton of clay feed input condition for NOx emissions.

As with GHG, emissions of NOx are not meaningfully affected by clay feed rates; rather, they are nearly completely a function of the firing rate and combustion dynamics of the calciner kiln burner. Also, because burner firing rate is not directly correlated with clay feed rate (i.e. 50% clay feed rate does not necessarily equate to 50% burner firing rate), a permit condition that restricts short-term NOx emissions should not be tied to clay feed. Therefore, CARBO requests that EPD eliminate this condition or choose an alternative form of this condition that is tied to burner operating rate and not clay feed rate.

- CO
- Under the Emission Limit column of the BACT Table, delete the 1.18 lb/ton of clay feed input condition for CO emissions.

  As with GHG and NOx, emissions of CO are not meaningfully affected by clay feed rates; rather, they are nearly completely a function of the firing rate and combustion dynamics of the calciner kiln burner. Also, because burner firing rate is not directly correlated with clay feed rate (i.e. 50% clay feed rate does not necessarily equate to 50% burner firing rate), a permit condition that restricts short-term CO emissions should not be tied to clay feed. Therefore, CARBO requests that EPD eliminate this condition or choose an alternative form of this condition that is tied to burner operating rate and not clay feed rate.

Spray Dryers:

- PM/PM10
- Under the Emission Limit column of the BACT Table, include the hourly emission limit of 4.54 lb/hr. CARBO believes this will improve the awareness of the hourly applicable emission limit for these units.
- Under the Compliance Method column of the BACT Table, revise the condition to read as follows:

  "Method 5 or 201/201A in conjunction with Method 202, as necessary."

  This revision will provide for a flexible testing condition that can be applied to all potential PM testing situations and will minimize the need to request alternative testing requirements or provisions.

- PM2.5
- Under the Emission Limit column of the BACT Table, include the hourly emission limit of 1.704 lb/hr. CARBO believes this will improve the awareness of the hourly applicable emission limit for these units.
- Under the Compliance Method column of the BACT Table, revise the condition to read as follows:

  "Method 5 or 201/201A in conjunction with Method 202, as necessary."

  This revision will provide for a flexible testing condition that can be applied to all potential PM testing situations and will minimize the need to request alternative testing requirements or provisions.

- Filterable PM/PM10
- This condition should be deleted. The combination of discrete limits on PM/PM10 and PM2.5, both of which include filterable and condensable portions, is sufficient to adequately characterize PM emissions from this source. Further, while CARBO has proposed and modeled emission limits for both PM/PM10 and PM2.5, which are reflected in the draft permit, we have made no representation or supplied any information about the portion of PM/PM10 emissions that are filterable. The testing

requirement for filterable PM/PM10 is a redundant test that provides limited meaningful information while constituting an additional compliance burden.

- GHG
- Under the Emission Limit column of the BACT Table, delete the 628.3 lb/ton of clay feed input condition for GHG emissions.

  As with the calciners, GHG – and specifically CO2 – emissions from spray dryers are not meaningfully affected by clay feed rates; rather, they are nearly completely a function of the firing rate of the burners. Also, because burner firing rate is not directly correlated with clay feed rate (i.e. 50% clay feed rate does not necessarily equate to 50% burner firing rate), a permit condition that restricts short-term GHG emissions should not be tied to clay feed. Therefore, CARBO requests that EPD eliminate this condition or choose an alternative form of this condition that is tied to burner operating rate and not clay feed rate.

- NOx
- Under the Emission Limit column of the BACT Table, delete the 0.79 lb/ton of clay feed input condition for NOx emissions.

  As with the calciners, emissions of NOx from the spray dryers are not meaningfully affected by clay feed rates; rather, they are nearly completely a function of the firing rate and combustion dynamics of the burners. Also, because burner firing rate is not directly correlated with clay feed rate (i.e. 50% clay feed rate does not necessarily equate to 50% burner firing rate), a permit condition that restricts short-term CO emissions should not be tied to clay feed. Therefore, CARBO requests that EPD eliminate this condition or choose an alternative form of this condition that is tied to burner operating rate and not clay feed rate.

- CO
- Under the Emission Limit column of the BACT Table, delete the 1.59 lb/ton of clay feed input condition for CO emissions.

  As with GHG, emissions of CO from the spray dryers are not meaningfully affected by clay feed rates; rather, they are nearly completely a function of the firing rate and combustion dynamics of the burners. Also, because burner firing rate is not directly correlated with clay feed rate (i.e. 50% clay feed rate does not necessarily equate to 50% burner firing rate), a permit condition that restricts short-term NOx emissions should not be tied to clay feed. Therefore, CARBO requests that EPD eliminate this condition or choose an alternative form of this condition that is tied to burner operating rate and not clay feed rate.

Baghouses (non-calciner/spray dryer):

- PM/PM10 and PM2.5
- Under the Compliance Method column of the BACT Table, revise the condition to read as follows: "Method 5 or 201/201A in conjunction with Method 202, as necessary." This revision will provide for a flexible testing condition that can be applied to all

potential PM testing situations and will minimize the need to request alternative testing requirements or provisions.

Boilers:

- Under the Process Unit column of the BACT Table, revise the condition to add the word "each" so that it clearly applies the conditions to the boiler units individually (not collectively).

EPD Response.

The calciner emission limit was added as requested along with the alternative test methods to provide testing flexibility. Method 9 was added for visible emissions testing since scrubbers have been added as a PM control device.

In addition to the BACT emission limits set for each pollutant, which were based on maximum production rates, the permit had also included limits based on clay feed rates and also 90 percent control for sulfur dioxide emissions. The limits based on clay input have been deleted from the permit. The control device maintenance and parameter monitoring required should be sufficient to ensure emissions are minimized. The 90 percent control requirement has been kept in the permit. This has previously been established as BACT for other similar sources and is less than the 95 percent control estimated in the permit application. The filterable PM/PM_{10} limit has also been kept as this has also been established previously as BACT for this type of source.

3.3.9 Emissions from each of the listed process units shall comply with the following pertinent BACT limits:
[40 CFR 52.21 - PSD/BACT]

TABLE 3.3.9-1: BACT Emission Limits

Process Unit	Pollutant	Emission Limit	Compliance Method	Averaging Time
Each calciner	$PM/PM_{10}/PM_{2.5}$	0.010 gr./dscf not to exceed 2.76 lb/hr	Method 5 and Method 202 or Method 201/201A and Method 202, as necessary.	3 hours
Each calciner	GHG	36,715 tpy CO_2e	Natural gas/LPG usage records and Division approved emission factors	12 month rolling total
Each spray dryer	PM/PM_{10}	0.020 gr./dscf, not to exceed 4.54 lb/hr	Method 5 and Method 202 or Method 201/201A and Method 202, as necessary.	3 hours
	Filterable PM/PM_{10}	0.010 gr./dscf	Method 5 and Method 201 or 201A, as applicable	
	$PM_{2.5}$	0.0075 gr./dscf`, not to exceed 1.70 lb/hr	Method 5 and Method 202 or Method 201/201A and Method 202, as necessary.	

Process Unit	Pollutant	Emission Limit	Compliance Method	Averaging Time
Each spray dryer	GHG	28,760 tpy CO_2e	Natural gas/LPG usage records and Division approved emission factors	12 month rolling total
Each spray dryer and calciner	Visible Emissions	10% opacity	COMS or Method 9	6-minute average
All of the emission units with baghouse controls excluding spray dryers and calciners	PM/PM_{10}	0.010 gr./dscf	Method 5 or Method 201/201A and Method 202, as necessary.	3 hours
	$PM_{2.5}$	0.005 gr./dscf		
	Visible Emissions	7% opacity	Method 9	6-minute average
All fugitive sources	Visible Emissions	10% opacity	Method 9	Per Method 9
Each calciner	SO_2	No less than 90% overall control, by weight	Method 6 or 6C	3 hours
		Not to exceed 34.25 lbs/hr		
	NO_x	Not to exceed 121.0 lbs/hr	Method 7 or 7E	3 hours
	CO	Not to exceed 24.7lbs/hr.	Method 10	3 hours
Each spray dryer	NO_x	Not to exceed 8.3 lbs/hr.	Method 7 or 7E	3 hours
	CO	Not to exceed 16.6 lbs/hr.	Method 10	3 hours
	VOC	Not to exceed. 6.82 tons/year	Mass balance calculation	Daily average
Each 9.8 MMBtu/hr natural gas fired boilers Nos. 1, 2, 3 and 4	NO_x	12 ppmv@ 3% O_2 at dry standard conditions	Manufacturer's written guarantee	N/A
Each 9.8 MMBtu/hr natural gas fired boilers Nos. 1, 2, 3 and 4	GHG	5,997 tpy CO_2e	Natural gas/LPG usage records and Division approved emission factors	12 month rolling total
Emergency diesel generators/engines Nos. 1, 2, 3 and 4	$PM/PM_{10}/PM_{2.5}$	0.055 g/bhp-hr	Operation and maintenance according to manufacturer's written specifications	N/A
	GHG	844 tpy CO_2e	Monthly operating records and Division approved emission factors	12 month rolling total
	SO_2	15 ppm sulfur in fuel	Verification of sulfur limit for each fuel shipment received	N/A

Process Unit	Pollutant	Emission Limit	Compliance Method	Averaging Time
	NO_x	4.77g/bhp-hr	Operation and maintenance according to manufacturer's written specifications	N/A
	CO	2.6 g/bhp-hr	Operation and maintenance according to manufacturer's written specifications	N/A

The following applicable State rules or emission limits are subsumed by the applicable and more stringent BACT or NSPS emission limits:

- Georgia Air Quality Rule 391-3-1-.02(2)(b): *"Visible Emissions"*
- Georgia Air Quality Rule 391-3-1-.02(2)(p): *"Particulate Emission from Kaolin and Fuller's Earth Processes"*
- Georgia Rule 391-3-1-.02(2)(g): *"Sulfur Dioxide"*
- Georgia Air Quality Rule 391-3-1-.02(2)(n)2: *"Fugitive Dust"*

Comment 11

- Condition 3.3.12: The following comments refer to Table 3.3.12-1: 112(g) Case-by-Case MACT Emission Limit as applied to Calciner Units 1-4.
    - HCl
    - Under the Emission Limit column of the MACT Table, CARBO notes two problematic aspects of the proposed calciner HCl emission limit:

        1) The condition applies a 90 percent control efficiency at all operating conditions and fails to consider the variable nature of chlorine content in kaolin clay and the fact that high levels of removal efficiency is not achievable when inlet pollutant loading is reduced.
        2) The 0.095 lb/ton clay input limit, which is applied at the calciner inlet, already factors the effect of post-calcining emission control of the scrubbers at a rate of 90 percent.

        As stated above with regard to SO2, the combination of these conditions would prohibit Millen from processing anything other than clay containing very low levels of chlorine, and then scrubbers would be required to operate at 90 percent efficiency and capture/control a very low level of emissions in the exhaust gas.

        While emission limits for HCl frequently contain limits on feedstock composition as well as actual emissions, the proposed HCl limit for Millen imposes restrictions in three respects: clay HCl content (lb/ton), HCl removal efficiency (percent), and stack emission rate (lb/hr).

CARBO believes this requirement – especially where the control efficiency is concerned – is particularly onerous given the fundamental difficulty in maintaining stable removal efficiencies as the incoming pollutant rate is reduced. In short, while reducing 90 percent of HCl emissions is feasible when incoming pollutant levels are high, maintaining that same level of reduction is impossible as incoming HCl is reduced through processing of clay with lower chlorine content.

Therefore, CARBO proposes the following alternative emission limit for EPD's consideration.

> "No more than 0.95 lb HCl/ton clay; not to exceed 1.98 lb HCl/hour."

This is CARBO's preferred structure since, as with SO2, this approach imposes an explicit limit on both clay chlorine content and stack emissions, along with an implicit control efficiency that is necessary to meet the stack limit of 1.98 lb/hr irrespective of clay chlorine content. The implied control efficiency works in direct response to the chlorine in the clay AND the operating rate of the calciner, both of which are critical factors in scrubber removal efficiency, and eliminates the need to determine control efficiency independently.

- HF
- Under the Emission Limit column of the MACT Table, CARBO notes two problematic aspects of the proposed calciner HF emission limit:

1) The condition applies a 90 percent control efficiency at all operating conditions and fails to consider the variable nature of fluorine content in kaolin clay and the fact that high levels of removal efficiency is not achievable when inlet pollutant loading is reduced.
2) The 0.414 lb/ton clay input limit, which is applied at the calciner inlet, already factors the effect of post-calcining emission control of the scrubbers at a rate of 90 percent.

As stated above with regard to SO2 and HF, the combination of these conditions would prohibit Millen from processing anything other than clay containing very low levels of fluorine, and then scrubbers would be required to operate at 90 percent efficiency and capture/control a very low level of emissions in the exhaust gas.

While emission limits for HF frequently contain limits on feedstock composition as well as actual emissions, the proposed HF limit for Millen imposes restrictions in three respects: clay HF content (lb/ton), HF removal efficiency (percent), and stack emission rate (lb/hr).

CARBO believes this requirement – especially where the control efficiency is concerned – is particularly onerous given the fundamental difficulty in maintaining stable removal efficiencies as the incoming pollutant rate is reduced. In short, while reducing 90 percent of HF emissions is feasible when incoming pollutant levels are high, maintaining that same level of reduction is impossible as incoming HF is reduced through processing of clay with lower fluorine content.

Therefore, CARBO proposes the following alternative emission limit for EPD's consideration.

"No more than 4.14 lb HF/ton clay; not to exceed 8.70 lb HF/hour."

This is CARBO's preferred structure since, as with SO2 and HCl, this approach imposes an explicit limit on both clay fluorine content and stack emissions, along with an implicit control efficiency that is necessary to meet the stack limit of 1.98 lb/hr irrespective of clay fluorine content. The implied control efficiency works in direct response to the chlorine in the clay AND the operating rate of the calciner, both of which are critical factors in scrubber removal efficiency, and eliminates the need to determine control efficiency independently.

EPD Response.

The 90 percent control requirement has been kept in the permit. These limits have previously been established as BACT for other similar sources and are less than the 95 percent control estimated in the permit application.

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3.3.12 Emissions of hazardous air pollutants (HAPs) shall not exceed the following 112(g) case-by-case MACT emission standards: [40 CFR 63.40 through 63.44/112(g) case-by-case MACT]

Table 3.3-1: 112(g) Case-By-Case MACT Emission Limit

Affected Source	HAP	Emission Limit	Averaging Time	Compliance Method
Spray Dryers Nos. 1 & 2	Methanol	0.48 lbs/ton of kiln feed Not to exceed 10.04 tons per year	Monthly for the kiln feed limit and 12-month rolling total for the annual limit	Mass balance based on kiln feed and methanol-containing additive input records and MSDS
Spray Dryers Nos. 3 & 4		0.48 lbs/ton of kiln feed Not to exceed 10.04 tons per year		
Spray Dryers Nos. 5 & 6		0.48 lbs/ton of kiln feed Not to exceed 10.04 tons per year		
Spray Dryers Nos. 7 & 8		0.48 lbs/ton of kiln feed Not to exceed 10.04 tons per year		
Each Calciner	HCl	Not to exceed 1.98 lbs/hr and no less than 90 % reduction by weight	3 hours	Method 26 or 26A
		Not to exceed 8.70 tons per year	12-month rolling total	Calculation based on annual testing result & production records
	HF	Not to exceed 8.70 lbs/hr and no less than 90 % reduction by weight	3 hours	Method 26 or 26A
		37.92 tons per year	12-month rolling total	Calculation based on annual testing result & production records

Comment 12

- Condition 3.5.2: Revise by adding the following to the end of the condition: "…and raw clay is being fed into the process."

  This revision accounts for operating conditions, such as startup or shutdown, where cooler exhaust gas temperatures can result in condensation of moisture on fabric filter media in the baghouses. Moisture, combined with a high-dust environment in a baghouse, can result in significant caking / plugging of the bags, which could lead to ineffective baghouse performance and possible require shutdown of a kiln. The proposed change, or alternative language from EPD, is intended to provide an opportunity to adequately warm the exhaust gas to avoid such situations.

  Such a provision also would allow CARBO a means of addressing problems with control equipment without removing a calciner from service. This is a critical factor for calciners because of the extensive use of refractory materials, which require extended periods of time to warm or cool the kilns in a controlled manner during startup or shutdown, respectively. Limiting the shutdown or bypass of emission control units for brief periods when raw clay feed is stopped is an appropriate operational accommodation since raw clay is the primary source of all pollutants for which the controls are actually required.

  EPD Response.

  The changes were made.

  3.5.2 The Permittee shall operate all of the particulate matter controlling baghouses including the at all times that associated processing equipment is being operated and raw clay is being fed into the process. [40 CFR 52.21 - PSD/BACT]

Comment 13

- Condition 4.1.1:
  - Add "Method 8A" to the approved list of test methods, as an alternate for Method 8 when testing sulfuric acid mist (SAM). Method 8A (or CTM-013) is a method developed for use in the paper industry for testing of kraft recovery furnaces and is intended to avoid interference (and false positive bias) from SO2 emissions when SAM emissions are low. Such a situation could be present at the Millen facility, and we request that EPD authorize this test method as an acceptable alternative to Method 8.
  - Correct typo (subscript) in the description of Method 9
  - Add "Method 202" as its own specified test method for the purposes of measuring condensable particulate matter
  - Method 18 – add semicolon at the end of the statement
  - Correct typo (subscript) in the description of Method 19; add semicolon at the end of the statement
  - Add Method 25/25A for testing of non-methane hydrocarbons

EPD Response.

The changes were made, with the exception of adding Method 8A. However, if necessary, this method could be approved when a testing protocol for an actual test is submitted.

4.1.1 Performance and compliance tests shall be conducted and data reduced in accordance with applicable procedures and methods specified in the Division's Procedures for Testing and Monitoring Sources of Air Pollutants. The methods for the determination of compliance with emission limits listed under Sections 3.3 and 3.4 of this permit which pertain to the emission units listed in Section 3.1 are as follows:

Method 1 or 1A for the determination of sample point locations;

Method 2 for the determination of flow rate;

Method 3 or 3A for the determination of stack gas molecular weight;

Method 3B for the determination of the emissions rate correction factor or excess air and the Carbon Dioxide concentration. Method 3A may be used as an alternative.

Method 4 for the determination of stack gas moisture;

Method 5 for the determination of PM emissions;

Method 6 or 6C for the determination of SO_2 concentration;

Method 7 or 7E for the determination of NO_x concentration;

Method 8 for the determination of sulfuric acid mists emissions;

Method 9 and the procedures contained in Section 1.3 of the above reference document for the determination of opacity;

Method 10 for the determination of CO concentration;

Method 18 for the determination of methane emissions,

Method 22 for the visual determination of fugitive visible emissions;

Method 201 or 201A in conjunction with Method 202 (if required) for the determination of PM_{10} or $PM_{2.5}$ emissions. As an alternative, Method 5 in conjunction with 202 may be used;

Method 19, when applicable, to convert if necessary PM, CO, SO2 and NOx concentrations (e.g., gr./dscf for PM, ppm for gaseous pollutants), as determined using other methods specified in this section, to emission rates (e.g., lb/MMBtu).

Method 25 or 25A for the determination of non-methane hydrocarbon emissions;

Method 26 or 26A for the determination of HCl and/or HF emissions;

Method 5I of 40 CFR Part 60, Appendix A for the determination of Particulate Matter concentration for sources operating less than 1 hour as allowed by NSPS 40 CFR 60 Subpart OOO.

Minor changes in methodology may be specified or approved by the Director or his designee when necessitated by process variables, changes in facility design, or improvement or corrections that, in his opinion, render those methods or procedures, or portions thereof, more reliable. [391-3-1-.02(3)(a)]

Comment 14

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- Condition 4.1.6: Delete introduction of the shortened term for EPD – already included elsewhere in document.

EPD Response.

The change was made.

4.1.6 The Permittee shall cause to be conducted a performance test at any specified emission unit when so directed by the Division. The test results shall be submitted to the Division within 60 days of the completion of the testing. Any tests shall be performed and conducted using methods and procedures that have been previously specified or approved by the Division.
[391-3-1-.02(6)(b)1(i)]

Comment 15

- Condition 4.2.1.a: Delete reference to Method 17, or relocate to Condition 4.1.1.

EPD Response.

The reference was removed.

4.2.1 Within 60 days after achieving the maximum production rate at which each of the spray dryers (Emission Unit ID Nos. SD01 through SD08) and each of the calciners (Emission Unit ID Nos. KLN1 through KLN4) will be operated, but no later than 180 days of the initial startup of the sources, the Permittee shall determine compliance with the NSPS Subpart UUU PM and visible emission limits in Condition 3.3.3 under 40 CFR 60.732 as follows:
[40 CFR 60.736]

a. Method 5 shall be used to determine the PM concentration. The sampling time and volume for each test run shall be at least 2 hours and 1.70 dscm (60 dscf).

b. Method 9 and the procedures in 40 CFR 60.11, including the use of COMS in lieu of Method 9 if preferred, shall be used to determine opacity from stack emissions.

During the initial performance test of a wet scrubber, the Permittee shall use the monitoring devices of Condition 5.2.1 to determine the average change in pressure of the gas stream across the scrubber and the average flowrate of the scrubber liquid during each of the particulate matter runs. The arithmetic averages of the three runs shall be used as the baseline average values for the purposes of Condition 6.1.7 b. xiv and xv.

Comment 16

- Condition 4.2.3.c: Capitalize "Method" on the second line (two instances).

EPD Response.

The changes were made.

4.2.3 The Permittee may use the following as alternatives to the reference methods and procedures specified in Condition 4.2.2:
[40 CFR 60.675(e)]

a. If the fugitive emissions from two or more facilities continuously interfere so that the opacity from an individual affected facility cannot be read, the Permittee may use either the following as alternatives to the reference methods and procedures specified in Condition 4.2.2.

i. Use for the combined emission stream the highest fugitive opacity standard applicable to any of the individual affected facilities contributing to the emissions stream.

ii. Separate the emissions so that the opacity of emissions from each affected facility can be read.

b. A single visible emission observer may conduct visible emission observations for up to three fugitive, stack, or vent emission points within a 15-second interval if the following conditions are met:

i. No more than three emission points may be read concurrently.

ii. All three emission points shall be within a 70 degree viewing sector or angle in front of the observer such that the proper sun position can be maintained for all three points.

iii. If an opacity reading for any one of the three emission points equals or exceeds the applicable standard, then the observer shall stop taking readings for the other two points and continue reading just that single point.

c. Method 5I may be used to determine the PM concentration as an alternative to Method 5 or Method 17 for affected facilities that operate for less than 1 hour at a time such as (but not limited to) storage bins or enclosed truck or railcar loading stations.

d. In case velocities of exhaust gases from building vents may be too low to measure accurately with the type S pitot tube specified in EPA Method 2 [i.e., velocity head <1.3 mm H_2O (0.05 in. H_2O)] and referred to in Method 5, the Permittee may determine the average gas flow rate produced by the power fans (e.g., from vendor-supplied fan curves) to the building vent. The Permittee may calculate the average gas velocity at the building vent measurement site using the following and use this average velocity in determining and maintaining isokinetic sampling rates.

$$V_e = Q_f/A_e$$

Where:

V_e = average building vent velocity (feet per minute);

Q_f = average fan flow rate (cubic feet per minute); and

A_e = area of building vent and measurement location (square feet).

Comment 17

- Condition 4.2.6: Table 4.2.6-1: Revise PM-related entries under the "Emissions" column, as they are inconsistent with the limits provided in Table 3.3.9-1.
  - *Calciners*: Entries under the "Emissions" column do not mention Visible Emissions. Review this condition and confirm as correct or update to include Visible Emissions (per the comment on Condition 3.2.2.b.
  - *Spray Dryers*: Entries under the "Emissions" column should be specified as PM/PM10 and PM2.5.
  - *Other Baghouses*: Entries under the "Emissions" column should be specified as PM/PM10 and PM2.5.

EPD Response.

The changes were made.

4.2.6 Within 60 days after achieving the maximum production rate at which Process Line Nos. 1, 2, 3 and 4 will be operated, but no later than 180 days of the initial startup of the affected source(s), the Permittee shall conduct performance tests as specified in the following table, to demonstrate initial compliance with the BACT, MACT and SIP emissions limits using applicable test methods and/or procedures specified in Condition 4.1.1 through 4.1.5. The tests shall be conducted under the conditions that exist when the affected source(s) is operating at the representative performance conditions. In lieu of the testing required by this condition, the appropriate testing results from Conditions 4.2.1 and 4.2.2, can be used to demonstrate initial compliance with the PM and visible emission limits for the same affected sources under the pertinent PSD/BACT and State rules in Sections 3.3 and 3.4 of this permit provided that the testing methodology meet the requirement of this condition.
[391-3-1-.02(3) and 3-1-3-1-.03(2)(c)]

Table 4.2.6-1: Initial BACT & Case-By-Case MACT Performance Test For Process Lines

Emission Unit	Emission Unit ID	Emissions
Calciner No. 1 Calciner No. 2 Calciner No. 3 Calciner No. 4	KLN1 KLN2 KLN3 KLN4	CO
		NO_X
		SO_2
		PM
		PM_{10}, $PM_{2.5}$
		HCl, HF
		H_2SO_4

Emission Unit	Emission Unit ID	Emissions
		Visible Emissions
Spray Dryer No. 1 Spray Dryer No. 2 Spray Dryer No. 3 Spray Dryer No. 4 Spray Dryer No. 5 Spray Dryer No. 6 Spray Dryer No. 7 Spray Dryer No. 8	SD01 SD02 SD03 SD04 SD05 SD06 SD07 SD08	CO
		NO_X
		PM/ PM_{10}, Filterable PM
		$PM_{2.5}$
Stack emission sources excluding calciners, and silos with dedicated bin vents	(refer to Table 3.3.9-1)	Visible Emissions
		PM/ PM_{10}
		$PM_{2.5}$
Silos with dedicated bin vents	(refer to Table 3.3.9-1)	Visible emissions
All fugitive emission sources	(refer to Table 3.3.9-1)	Visible emissions

a. Suitable methods shall be used to determine the calciner feed rate for each run.

b. The visible emissions from each spray dryer and calciner during the Method 5 performance tests shall be determined using COMS following the requirements of 40 CFR 60.11(e) or of relevant State rules.

c. The duration of the Method 9 test shall be 3 hours (thirty 6-minute averages), except that the duration of the test for sources subject to 40 CFR Part 60, Subpart OOO as amended on April 28, 2009:

   i. shall be 1 hour (ten 6-minute averages) for stack visible emissions from any baghouse that controls PM emissions only from an individual enclosed storage bin per 40 CFR 60.675(c)(2)(i).

   ii. may be reduced to the duration the affected facilities operates (but no less than 30 minutes) for baghouses controlling storage bins or enclosed truck or railcar loading stations that operate for less than 1 hour at a time per 40 CFR 60.675((c)(2)(ii).

   iii. shall be 30 minutes (five 6-minute averages) for fugitive PM emissions from any affected facilities subject to the opacity limit(s) of 40 CFR Part 60, Subpart OOO as amended on April 28, 2009.

d. For the purpose of this condition, calciner operating day means a 24-hour period between 12:00 midnight and the following midnight during which the calciner is operated.

e. Emissions control technologies, procedures and measurements utilized by any source(s) during the performance testing shall be recorded in detail and included with the pertinent test report(s).

f. If a listed source has been tested previously and the testing result(s) has been accepted by the Division, this source is exempt from the testing requirement(s) in this condition for the same pollutants if the specific testing requirements for each underlying regulation were satisfied with the previous test.

g. During the performance tests for SO_2 and PM_{10} for Calciner Nos. 1, 2, 3, and 4 (KLN1, KLN2, KLN3, and KLN4), the average pressure drop across the wet scrubbers (SC01, SC02, SC03, and SC04) and the flow rates for the wet scrubbers of the scrubbant shall be continuously monitored in order to develop exceedances thresholds per Condition 6.1.7b x and xi and the excursion threshold per Condition 6.1.7c.v.

h. During the performance tests for SO_2 for Calciner Nos. 1, 2, 3, and 4 (KLN1, KLN2, KLN3, and KLN4), the overall SO_2 control efficiency (OCE) of the wet scrubbers (SC01, SC02, SC03, and SC04) shall be determined for use in Condition 6.2.15.

i. The SO_2 test required by this condition for Calciner Nos. 1, 2, 3, and 4 (KLN1, KLN2, KLN3, and KLN4) should be conducted with the scrubbant liquid at a minimum pH of 6.0.

Comment 18

- Condition 4.2.6.g: Delete reference to SO2 emissions. The parameters listed are related to ongoing monitoring requirements under NSPS Subpart UUU for units that control PM emissions with wet scrubbers, and they have no relationship with SO2 emissions or associated scrubber control efficiency.

  Further, CARBO notes that unless wet scrubbers are specified as PM BACT, there is no basis for collecting this parametric information or developing correlations to reference method testing. As such, this requirement either should be deleted or restricted to factors related to PM emissions as specified by NSPS Subpart UUU.

- Condition 4.2.6.h: As noted under the comment under Condition 3.3.9 regarding SO2 BACT limits, CARBO strongly prefers to have an SO2 BACT limit that does not incorporate scrubber control efficiency, and we have significant concerns about the use of results from the initial (and subsequent) performance tests as the sole basis for determining the applicable scrubber control efficiency factor. Given the highly variable nature of clay composition, its sulfur content, and the resulting production of SO2 emissions, it is virtually impossible to extrapolate the results of a single

three-hour stack test into acceptable ranges of operation for a control device that may be experienced over an entire year of operation. This is particularly true for scrubbers, which cannot perform at consistently high removal efficiencies when incoming pollutant loading falls to relatively low levels. CARBO requests that this condition be deleted.

EPD Response.

The change was not made, since the scrubbers have been added as part of BACT controls. Also, the Division believes ongoing parameter monitoring is necessary for the scrubbers to ensure the 90 percent control efficiency required is being met. This issue is also addressed in comment 11 and its response.

Comment 19

- Condition 4.2.10: As noted in the comment to Condition 3.2.2.b above, the wet scrubbers are not included as part of the PM BACT determination. Accordingly, measurement of scrubber pressure drop and/or reagent flow rate should not be required, and the second sentence of this condition should be deleted. The provision should be retained if EPD determines that wet scrubbers are included in the PM BACT definition.

EPD Response.

The change was not made. The Division considers it necessary to monitor scrubber performance during the initial testing to establish the proper operating conditions for the scrubbers. This data can then be used to ensure continued high removal efficiencies during subsequent operation of the scrubbers.

Comment 20

- Condition 4.2.11: As noted above regarding Condition 4.2.6.h, infrequent stack testing does not accurately reflect all possible operating conditions that may be experienced by the calciners. CARBO strongly prefers to have an SO2 BACT limit that does not incorporate scrubber control efficiency, and we have significant concerns about the use of results from the initial (and subsequent) performance tests as the sole basis for determining the applicable scrubber control efficiency factor. Given the highly variable nature of clay composition, its sulfur content, and the resulting production of SO2 emissions, it is virtually impossible to extrapolate the results of a single three-hour stack test into acceptable ranges of operation for a control device that may be experienced over an entire year of operation. This is particularly true for scrubbers, which cannot perform at consistently high removal efficiencies when incoming pollutant loading falls to relatively low levels. CARBO requests that this sentence be deleted.

  Also, the parametric factors included in the third sentence of this condition appear to have been obtained from the NSPS Subpart UUU requirements for PM scrubbers, and are not particularly indicative of SO2 scrubber performance. Given the highly variable nature of clay composition, its sulfur content, and the resulting production of SO2 emissions, it is virtually impossible to extrapolate the results of an infrequent three-hour stack tests into acceptable ranges of operation for a control device that may be experienced over the coming year.

This is especially true when considering parameters such as scrubber pressure drop, which is only instructive when considering the formation of scale or other forms of fouling on the packed tower media. Because such fouling typically occurs over an extended period of operation, data produced during a one-time or annual stack test cannot possibly be considered representative or adequately robust to account for all operating conditions that may be encountered. Also, use of such data is not indicative of all operating conditions; for example, scrubber pressure drop may occur when calciner operating load is reduced, even though there is no discernable impact on emissions or scrubber performance. Accordingly, the third sentence of this condition should be deleted.

EPD Response.

The change was not made as explained in the response to comment 11.

Comment 21

- Condition 4.2.13: The requirement to determine scrubber control efficiencies is addressed by other conditions in the permit, and CARBO has requested that BACT limits be structured to eliminate the specific quantification of scrubber control efficiency for HCl, HF and SO2. Consistent with CARBO's request to structure the BACT limits in this manner, this condition should be deleted.

EPD Response.

The change was not made. The control efficiency of 90 percent for HCl and HF has previously been determined to be BACT for sources of this type and it is less than the 95 control efficiency used in the application for emission estimates.

Comment 22

- Condition 5.2.1: As noted in the comment to Condition 3.2.2.b, several of the conditions of this permit apply even though wet scrubbers have not been listed as part of the PM BACT definition. In particular, the requirement to install COMS and/or monitor certain scrubber operating parameters is primarily defined by the form of the PM BACT limit. CARBO asks that EPD review and either confirm this condition as proposed, or modify it consistent with the final PM BACT determination.

  Additionally, under the Monitoring System Being Used & Installation Location column, revise the numbering references to the spray dryer baghouses for each of Spray Dryers 1-8.

EPD Response.

COMS have not been added for the calciners, since the scrubbers are being used as additional particulate matter control after the baghouses. Corrections were made to the numbering of the locations of the opacity COMS for the spray dryers.

5.2.1 The Permittee shall install, calibrate, maintain, and operate a system to continuously monitor and record the indicated emissions or parameters on the following equipment listed. Each system shall meet the applicable performance specification(s) of the Division's monitoring requirements and be operated in a manner sufficient to provide a reasonable assurance of compliance with the applicable emission standards in this permit.

[40 CFR 60.735(b), 40 CFR 60.743(d) and 391-3-1-.02(6)(b)1]

Emission Unit Being Monitored	Emission Unit ID	Emissions or Parameters Being Monitored	Monitoring System Being Used & Installation Location
Calciner No. 1	KLN1	Scrubber Pressure Drop, Flow rate and pH	Wet Scrubber SC01
Calciner No. 2	KLN2	Scrubber Pressure Drop, Flow rate and pH	Wet Scrubber SC02
Calciner No. 3	KLN3	Scrubber Pressure Drop, Flow rate and pH	Wet Scrubber SC03
Calciner No. 4	KLN4	Scrubber Pressure Drop, Flow rate and pH	Wet Scrubber SC04
Spray Dryer No. 1	SD01	Opacity (COMS)	Outlet of the Spray Dryer No. 1 Baghouses (SB01, SB02, SB03 and SB04) Stack 002
Spray Dryer No. 2	SD02	Opacity (COMS)	Outlet of the Spray Dryer No. 2 Baghouses (SB05, SB06, SB07 and SB08) Stack 003
Spray Dryer No. 3	SD03	Opacity (COMS)	Outlet of the Spray Dryer No. 3 Baghouses (SB09, SB10, SB11 and SB12) Stack 010
Spray Dryer No. 4	SD04	Opacity (COMS)	Outlet of the Spray Dryer No. 4 Baghouses (SB13, SB14, SB15 and SB16) Stack 011
Spray Dryer No. 5	SD05	Opacity (COMS)	Outlet of the Spray Dryer No. 5 Baghouses (SB17, SB18, SB19 and SB20) Stack 017
Spray Dryer No. 6	SD06	Opacity (COMS)	Outlet of the Spray Dryer No. 6 Baghouses (SB21, SB22, SB23 and SB24) Stack 018
Spray Dryer No. 7	SD07	Opacity (COMS)	Outlet of the Spray Dryer No. 7 Baghouses (SB25, SB26, SB27 and SB28) Stack 024

Emission Unit Being Monitored	Emission Unit ID	Emissions or Parameters Being Monitored	Monitoring System Being Used & Installation Location
Spray Dryer No. 8	SD08	Opacity (COMS)	Outlet of the Spray Dryer No. 8 Baghouses (SB291, SB30, SB31 and SB32) Stack 025

Comment 23

- New Condition 5.2.X: In reference to recent communication between CARBO and EPD, CARBO wants to include the option to test exhaust SO2 emissions with the use of a portable analyzer in the same manner as we currently are able to test for NOx. CARBO believes this is a more accurate and meaningful approach to characterizing SO2 emissions, and we propose that the requirement would follow the same structure as Condition 5.2.8 does for NOx. Furthermore, testing with a portable analyzer will enable CARBO to directly measure scrubber performance / control efficiency through monitoring SO2 emissions at the scrubber inlet and outlet, as opposed to relying on operating parameters that may not be indicative.

  Although we are requesting the use of portable analyzers to measure SO2, CARBO intends to retain the ability to test SO2 emissions using the traditional clay sampling method should the portable analyzer method prove to be inaccurate or unsuitable for demonstration of ongoing compliance.

  EPD Response.

  This proposed condition was not added to the permit, since the accuracy of the portable analyzers for sulfur dioxide has not yet been established. However, the use of portable analyzers could be considered in a future permit amendment

Comment 24

- Condition 5.2.9: Revise this condition to be applicable to existing 5.2.8 (regarding NOx) and new 5.2.X (regarding measurement of SO2).

  EPD Response.

  This change was not made, since the proposed condition 5.2.X was not adopted. See comment 23.

Comment 25

- Condition 5.2.10: As described elsewhere in these comments, CARBO notes that monitoring scrubber control parameters should be required only if wet scrubbers are formally defined as PM BACT. However, should EPD choose to retain the requirement to monitor these parameters, the following revisions should be made to clarify and improve the basis of measurement.

  - Condition 5.2.10.d: Duplicate condition with 5.2.10.b. Revise to apply to scrubber liquid flow as follows:

"The scrubber liquid flow rate (1-hour block average) to each scrubber unit."

- Condition 5.2.10.e: Duplicate condition with 5.2.10.c. Revise to apply to scrubber pH as follows:

"The scrubber pH (1-hour block average) for each scrubber unit."

- New Condition 5.2.10.g: Add a condition to apply to scrubber pressure drop as follows:

"The scrubber pressure drop (1-hour block average) for each scrubber unit."

- Condition 5.2.10.f: Revise to apply this condition to the four emergency diesel generators individually, as follows:

"… and each emergency diesel generator."

EPD Response.

These corrections were made.

5.2.10 The Permittee shall install, calibrate, maintain, and operate a system to continuously monitor and record each of the indicated parameters on the following equipment in accordance with the manufacturer's recommendations. Where such performance specification(s) exist, each system shall meet the applicable performance specification(s) of the Division's monitoring requirements.
[391-3-1-.02(6)(b)1]

a. The gas temperature at the inlet of each of the baghouse systems serving calciners.

b. The slurry input rate (1-hour block average) to each spray dryer.

c. The kiln feed input rate (1-hour block average) to each calciner.

d. The scrubber liquid flow rate (1-hour block average) for each scrubber unit.

e. The scrubber pH (1-hour block average) for each scrubber unit.

f. Monthly fuel usage for each spray dryer, calciner, 9.8 MM/Btu natural gas-fired boiler and each emergency diesel generator.

g. The scrubber pressure drop (1-hour block average) for each scrubber unit.

Comment 26

- Condition 5.2.11: Revise the second sentence of the condition to clarify that the Dust Suppression Plan is subject to review and approval by EPD "upon request," as follows:

  "…review and approval by the Division, upon request, and shall include records…"

  EPD Response.

  These corrections were made.

Comment 27

- Condition 6.1.7.b.i: Revise this condition to account for the alternative method of measuring SO2 through the use of portable analyzers, as provided in the New Condition 5.2.X, which includes a provision to notify EPD when measured emissions exceed the applicable emission limit. Revise the condition as follows:

  "Each exceedance of the SO2 emission limit of 34.25 lb/hr for calciners in Condition 3.3.9 as determined per Condition 6.2.15, except where such exceedances are measured and reported per Condition 5.2.X.i."

  EPD Response.

  This change was not made, since the proposed condition 5.2.X was not adopted. See comment 23.

Comment 28

- Condition 6.1.7.b.vi: This condition lists the allowable diesel sulfur content as 500 ppm / 0.05%. Revise this condition to reflect the actual diesel fuel sulfur limit of 15 ppm / 0.0015%.

  EPD Response.

  These corrections were made.

6.1.7 For the purpose of reporting excess emissions, exceedances or excursions in the report required in Condition 6.1.4, the following excess emissions, exceedances, and excursions shall be reported:
[391-3-1-.02(6)(b)1, 40 CFR 52.21, 40 CFR Part 60, Subparts Dc, OOO, UUU and IIII, 40 CFR Part 63, Subpart ZZZZ and 40 CFR 63.40 through 63.44/112(g) case-by-case MACT]

a. Excess emissions: (means for the purpose of this condition and Condition 6.1.4, any condition that is detected by monitoring or record keeping which is specifically defined, or stated to be, excess emissions by an applicable requirement)

None.

b. Exceedances: (means for the purpose of this condition and Condition 6.1.4, any condition that is detected by monitoring or record keeping that provides data in terms of an emission limitation or standard and that indicates that emissions (or opacity) do not meet the applicable emission limitation or standard consistent with the averaging period specified for averaging the results of the monitoring)

i. Each exceedance of the SO_2 emission limit of 34.25 lbs/hr for calciners in Condition 3.3.9 as determined per Condition 6.2.15.

ii. Each exceedance of visible emission limit of 10% opacity (6-minute block average) in Condition 3.3.9 for calciners and spray dryers, as indicated by COMS required by Condition 5.2.1.

iii. Firing any of the boilers, spray dryers and calciners with fuel(s) other than natural gas and propane.

iv. Any monthly average of methanol emissions from any spray dryer that exceed the limit of 0.48 lbs per ton of kiln feed in Condition 3.3.12.

v. Any 12-month rolling total of methanol emissions from any spray dryer that exceeds the 10.04 tons limit in Condition 3.3.12.

vi. Any instance of firing any of the stationary emergency diesel generators subject to Condition 3.3.10 with diesel fuel that contains more than 0.0015% sulfur (15 ppm) by weight; contains either more than 35% by volume of aromatic content or has a cetane index of less than 40.

vii. Any 12-month rolling total of HCl emissions from any calciner that exceeds the 8.70 tons limit in Condition 3.3.12.

viii. Any 12-month rolling total of HF emissions from any calciner that exceeds the 37.92 tons limit in Condition 3.3.12.

ix. Any 12-month rolling total of VOC emissions from the two spray dryers on each process line that equals or exceeds the 13.64 tons limit in Condition 3.3.9.

x. Any 12-month rolling total GHG emissions for any calciner in excess of 36,715 tpy CO2e.

xi. Any 12-month rolling total GHG emissions for any spray dryer in excess of 28,760 tpy CO2e.

xii. Any 12-month rolling total GHG emissions for any boiler in excess of 5,997 tpy CO2e.

xiii. Any 12-month rolling total GHG emissions for any emergency generator in excess of 844 tpy CO2e.

xiv. Any daily 2-hour average of the wet scrubber pressure drop determined as described in Condition 5.2.1 that is less than 90 percent of the average value recorded according to Condition 4.2.1 during the most recent performance test that demonstrated compliance with the particulate matter standard; or

xv. Each daily wet scrubber liquid flow rate recorded as described in Condition 5.2.1 that is less than 80 percent or greater than 120 percent of the average value recorded according to Condition 4.2.1 during the most recent performance test that demonstrated compliance with the particulate matter standard.

c. Excursions: (means for the purpose of this condition and Condition 6.1.4, any departure from an indicator range or value established for monitoring consistent with any averaging period specified for averaging the results of the monitoring)

i. Any temperature at the inlet of any baghouse specified in Condition 5.2.2 that exceeds the filter bag design temperature or the equivalent filter bag design temperature, as recorded in accordance with Condition 5.2.2.

ii. For the sources specified in Condition 5.2.3, any two consecutive required daily determinations of visible emissions from the same source for which visible emissions are equal to or exceed the opacity action level.

iii. Any visible emissions or mechanical failure or malfunction discovered by the walk through described in Condition 5.2.5 that are not eliminated or corrected within 24 hours of first discovering the visible emissions or mechanical failure or malfunction.

iv. Each event that the quarterly 30-minute visible emissions inspection required by Condition 5.2.7 was not conducted.

v. Any 3-hour period during which the average pH of the scrubbant for the wet scrubbers (APCD ID Nos. SC01, SC02, SC03, and SC04) is below 6.0 standard units.

vi. Any instance of operating any of the stationary emergency diesel generators for more than 500 hours during any period of 12 rolling/consecutive months as limited by Condition 3.2.4.

vii. Any instance of the accumulated maintenance check and readiness testing time for any emergency stationary diesel generator exceeding 100 hours during any period of 12 rolling/consecutive months as limited by Condition 3.3.4

viii. Any daily 2-hour average wet scrubber pressure drop recorded per Condition No. 5.2.1 for each Calciner Nos. 1, 2, 3, and 4 (KLN1, KLN2, KLN3, and KLN4) that is less than 90 percent of the average value determined per Condition 4.2.6.

ix. Any daily 2-hour average wet scrubber liquid flow rate recorded per Condition No. 5.2.1 for each Calciner Nos. 1, 2, 3, and 4 (KLN1, KLN2, KLN3, and KLN4) that is less than 80 percent or greater than 120 percent of the average value determined per Condition 4.2.6.

d. In addition to the excess emissions, exceedances and excursions specified above, the following should also be included with the report required in Condition 6.1.4:

i. The results of all NO_x monitoring conducted per Condition 5.2.8 during the quarterly reporting period.

Comment 29

- Condition 6.1.7.b.x: As described elsewhere in these comments, CARBO notes that monitoring scrubber control parameters should be required only if wet scrubbers are formally defined as PM BACT. CARBO asks that EPD review and either confirm this condition as proposed, or modify it consistent with the final PM BACT determination.

  Condition 6.1.7.b.xi: Similar to the comment above regarding scrubber pressure drop, CARBO notes that monitoring of scrubber control parameters should be required only if wet scrubbers are formally defined as PM BACT. CARBO asks that EPD review and either confirm this condition as proposed, or modify it consistent with the final PM BACT determination.

EPD Response.

The Division disagrees that scrubber parameter monitoring is only necessary when they are defined as BACT, however the point is moot, since they have been added as BACT. Scrubber parameters found outside of their proper ranges have been determined to be excursions rather than exceedances. The 2-hour averages for scrubber pressure drop and liquid flow rate have been updated and moved from 6.1.7 b. x and xi to become 6.1.7 c. viii and ix. The other exceedances were renumbered as appropriate.

Comment 30

- New Condition 6.1.7.d.ii: Add this condition to account for reporting of SO2 exceedances according to the proposed method in New Condition 5.2.X (similar to that already available for NOx), as follows:

  "The results of all SO2 monitoring conducted per Condition 5.2.X during the quarterly reporting period."

EPD Response.

This change was not made, since the proposed condition 5.2.X was not adopted. See comment 23.

Comment 31

- Condition 6.2.1.b: This notification requirement is not included under NSPS Subpart A, 60.7, and it provides little value while representing a compliance risk that is solely administrative in nature. Delete this condition.

EPD Response.

This change was made, since the requirement of 6.2.1 b has been deleted from the regulation.

Comment 32

- Condition 6.2.15: In consideration of the alternative monitoring provisions for SO2 included under Condition 5.2.X, this condition should be revised so that it can be observed as an alternative to the new monitoring provisions. Revise as follows:

  "In lieu of the SO2 monitoring provisions contained in Condition 5.2.x, the Permitee…."

  Also, this condition should be modified to account for the proper uncontrolled clay sulfur content of 16.4 lb/ton, as opposed to the currently referenced 1.64 lb/ton threshold.

  EPD Response.

  This change was not made, since the proposed condition 5.2.X was not adopted. See comment 23.

Comment 33

- Condition 6.2.16: This condition is unclear regarding the source of "the HCl and HF emission factors" that must be used to calculate monthly emission rates. CARBO interprets these factors to pertain to the maximum lb/ton emission factors that are contained in Condition 3.3.12 and the associated table, presuming the correction of these factors to the uncontrolled levels as noted in previous comments.

  EPD Response.

  No changes were made to this condition. The intent is to establish what control efficiencies are attained during performance testing and then use this data along with input rates measured in the raw clay to establish emission estimates. Further clarification can be provided if necessary.

Comment 34

- Condition 3.3.12 includes a three-part limit on HCl and HF emissions from the kilns. The condition for SO2 was revised to make this a two-part limit (lb/hr and control efficiency) – we request that these limits be revised to be consistent with SO2 (i.e. 1.98 lb/hr & 90% for HCl, and 8.7 lb/hr & 90% for HF). Also, the lb/ton limits already presume 90% control, so that value would effectively require 99% control.

  EPD Response.

  This change was made, the revised condition can be seen in the response to comment 11.

Comment 35

- Condition 5.2.10.f refers to fuel monitoring for the emergency diesel generators. The condition is unclear as to how we can measure. We'd prefer to avoid the expense of fuel meters for these units and propose assuming full-load fuel consumption rates multiplied by actual metered run time as the basis for recording fuel consumption. This is conservative and will not undercount fuel use.

  EPD Response.

Condition 5.2.10 f was removed and 5.2.10 g relettered as f. Monitoring hours of operation should be sufficient for the emergency diesel generators.

5.2.10 The Permittee shall install, calibrate, maintain, and operate a system to continuously monitor and record each of the indicated parameters on the following equipment in accordance with the manufacturer's recommendations. Where such performance specification(s) exist, each system shall meet the applicable performance specification(s) of the Division's monitoring requirements.
[391-3-1-.02(6)(b)1]

a. The gas temperature at the inlet of each of the baghouse systems serving calciners.

b. The slurry input rate (1-hour block average) to each spray dryer.

c. The kiln feed input rate (1-hour block average) to each calciner.

d. The scrubber liquid flow rate (1-hour block average) for each scrubber unit.

e. The scrubber pH (1-hour block average) for each scrubber unit.

f. The scrubber pressure drop (1-hour block average) for each scrubber unit.

Comment 36

- Condition 5.2.8.c: the equation here contains an O2 correction that is appropriate for a Method 19 calculation, but not relevant for a direct mass measurement (in combination with measured flow). I believe this is an issue that has been identified previously with EPD, but the corrected equation did not make its way into this draft. Please take a look at this equation and revise.

EPD Response.

This change was made

5.2.8 The Permittee shall monitor the NO_x concentrations from the exhaust gases from each direct-fired rotary calciner stack (Stack ID Nos. S005, S016, S026, and S037) for each week or portion of week of operation of each calciner using the following procedures:
[40 CFR 52.21 – PSD/BACT and 391-3-1-.02(6)(b)1]

a. Within 60 days of the commencement of operation of each calciner, the Permittee shall begin to conduct measurements of NO_x and oxygen (O_2) concentrations in the exhaust gas of each

calciner. The initial measurement period shall consist of three (3) test runs, each thirty (30) minutes in duration. Subsequent measurement periods shall consist of one (1) test run thirty minutes in duration.

b. Measurements of the NO_x and O_2 concentration in calciner exhaust gases shall be conducted using the procedures of the American Society for Testing and Materials Standard (ASTM) Test Method for Determination of NO_x, Carbon Monoxide(CO), and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers, ASTM D 6522; or procedures of Gas Research Institute Method GRI-96/0008, EPA/EMC Conditional Test Method (CTM-30) Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Emissions from Natural Gas-Fired Engines, Boilers and Process Heaters Using Portable Analyzers, or Procedures of EPA Reference Methods 7E and 3A, or other methods and procedures approved by the Division.

c. NO_x emissions rate (pounds per hour) for all emissions units shall be determined using the following equation;

$$E_{NOx} = K \times C_d \times Q_{std}$$

where:

E_{NOx} = Mass emissions rate of NO_x (lb/hr);

K = Conversion factor for NO_x = 1.194 x 10^{-7} ([lb/scf]/ppm)

C_d = Concentration of NO_x (ppm by volume, dry basis);

Q_{std} = Standard hourly flow rate from kiln exhaust as measured by Method 2, dscfh

(Note: In lieu of a standard hourly flow rate from the calciner exhaust measured by Method 2, data from a continuous flow monitor, installed as per Condition 5.2.9 of this permit, taken concurrently with the NO_x measurements can be used).

d. Following the initial measurement, the Permittee shall conduct the same measurements each calendar week or portion of calendar week for each calciner. Weekly measurements shall continue until three (3) consecutive weekly measurements are

each less than 90 lbs./hr (75% of the BACT emission limit in Condition 3.3.9). Following three (3) consecutive weekly measurements that are each less than 90 lbs./hr, the measurements may be performed at a frequency of one per calendar quarter (quarters ending March 31, June 30, September 30, and December 31).

e. Following any quarterly measurement that is greater than 90 lbs./hr, the Permittee shall conduct a new measurement within one unit operating day. Following this measurement, subsequent measurements shall be conducted weekly and quarterly measurements may be resumed as prescribed by Condition 5.2.8(d) (d).

f. A record of NO_x monitoring shall be kept in a form suitable for inspection or submittal for a period of five (5) years. The record shall at a minimum contain the cause and corrective action for all excursions and, for each test run, the mass emission rate and concentration of NO_x, the concentration of oxygen, measured stack gas flow rate.

g. A unit operating day shall be defined as any day that the unit is operated for more than 30 minutes between 12:00 midnight and the following midnight.

h. Any measured NO_x emissions exceeding 121 lbs./hr shall be reported to the Division in writing with 15 working days of measurement. The report shall include calciner exhaust flow rate and kiln feed rate during the NO_x measurement.

EPD CHANGES

A few changes were made to the permit as the result of defining the scrubbers as part of BACT for particulate matter. These basically include the changes for a wet control device from 40 CFR 60, Subpart UUU. A paragraph was added after the table in Condition 5.2.1 specifying the accuracy of the scrubber parameter devices as per 40 CFR 60.734. The citation was also added.

In Condition 6.1.7 b, two new exceedances were added as xiv and xv to include the requirements of 40 CFR 60.735.

In Condition 4.2.1 a paragraph was added at the end to include the requirements of 40 CFR 60.736 regarding the test methods and procedures used to establish the baseline values for calculating the excursions under 6.1.7 b viii and ix.

APPENDIX A

AIR QUALITY PERMIT
3295-165-0012-P-01-0

APPENDIX B

WRITTEN COMMENTS
RECEIVED DURING
COMMENT PERIOD