STATE OF NORTH CAROLINA

COUNTY OF WAKE

BEFORE THE ENVIRONMENTAL MANAGEMENT COMMISSION
12 EHR 02850

NORTH CAROLINA COASTAL FEDERATION, CAPE FEAR RIVER WATCH, PENDERWATCH and CONSERVANCY, and SIERRA CLUB,

Petitioners,

v.

N.C. DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, DIVISION OF AIR QUALITY,

Respondent,

CAROLINAS CEMENT COMPANY LLC,

Respondent-Intervenor.

SUPPLEMENTAL BRIEF IN RESPONSE TO QUESTIONS PRESENTED BY THE SPECIAL AIR PERMIT APPEALS COMMITTEE

This matter arises out of the North Carolina Department of Environment and Natural Resources ("DENR") Division of Air Quality's ("DAQ") issuance of Air Quality Permit No. 07300R09 to Carolinas Cement Company, Inc. ("CCC") for a new cement plant. Petitioners North Carolina Coastal Federation, Cape Fear River Watch, PenderWatch and Conservancy, and Sierra Club ("Petitioners") filed a contested case petition in the Office of Administrative Hearings ("OAH") challenging the Permit on the grounds that DAQ failed to comply with the North Carolina Air Pollution Control Act and the federal Clean Air Act by issuing a permit that authorizes air pollution in excess of legal limits. Petitioners submit this supplemental brief in response to a question presented by the Special Air Permit Appeals Committee (the "Committee") of the Environmental Management Commission ("EMC"). In an electronic mail message to counsel in this contested case on February 19, 2014, EMC counsel transmitted and provided the parties with an opportunity to respond to questions posed by the Committee, including the following: "Since DAQ replaced Air Quality Permit 07300R09 (Feb 29, 2012) with a new permit on June 21, 2013, (the "R10 Permit") isn't the challenge to Permit 07300R09 moot? Why should the Committee not dismiss the challenge to the ALJ's decision as moot?"[1]

Since Petitioners filed this contested case, DAQ has issued two new permits to CCC. As those permits incorporated the permit terms challenged in this contested case, the controversy underlying this matter still exists, the relief sought by Petitioners has not been granted, and a final resolution on the merits of the R09 case will have a practical effect on the controversy. Therefore, the case is not moot. In the alternative, even if the EMC determines that the case is moot, it falls under at least two exceptions to the mootness doctrine in North Carolina: it is capable of repetition, yet evading review, and it implicates matters of public interest. Therefore the case should not be dismissed as moot.

PROCEDURAL BACKGROUND

DAQ issued Air Quality Permit No. 07300R09 ("R09 permit") to CCC on February 29, 2012. Petitioners challenged the R09 permit in this matter, contested case 12 EHR 02850 ("R09 case"), on April 27, 2012. On June 21, 2013, while the R09 case was pending in the Office of Administrative hearings, DAQ replaced the R09 permit with Air Quality Permit No. 07300R10 ("R10 permit"), which incorporated the terms of the R09 permit with certain revisions unrelated to Petitioners' claims. On August 5, 2013, Petitioners filed a contested case challenging the R10 permit, 13 EHR 016148 ("R10 case"). While both the R09 and R10 cases were pending, DAQ replaced the R10 permit with yet another new air quality permit, Air Quality Permit No.

[1] EMC counsel's e-mail message also included the following question: "The air permit specifies several parameters... but not arsenic.... Why is arsenic not included in the permit?" Condition 2.2(B) on page 73 of the Permit includes an arsenic limit of 28.10 pounds per year.

07300R11 ("R11 permit") on August 29, 2013. The R11 permit revised the emissions limit and monitoring requirements for particulate matter emitted from kiln sources and otherwise adopted the terms of the R10 permit. On September 18, 2013, Petitioners filed contested case 13 EHR 17906 challenging the R11 permit ("R11 case").

I. <u>The R09 Case Is Not Moot Because the Underlying Controversy Remains and Resolution of This Matter Will Have a Practical Effect on the Ongoing Controversy.</u>

DAQ's issuance of superseding permits does not moot this contested case because there is still a live controversy between the parties concerning Petitioners' claims and final resolution of the merits of the R09 case will have a practical effect on that controversy. Generally, a case is considered moot "'[w]hen events occur during the pendency of [the case] which cause the underlying controversy to cease to exist.'" <u>Smith v. Smith</u>, 145 N.C. App. 434, 436, 549 S.E.2d 912, 914 (2001) (quoting <u>In re Hatley</u>, 291 N.C. 693, 694, 231 S.E.2d 633, 634 (1977)). A court should dismiss a case as moot when "'a determination is sought on a matter which, when rendered, cannot have any practical effect on the existing controversy.' . . . Conversely, ***when a court's determination can have a practical effect on a controversy, the court may not dismiss the case as moot.***" <u>Lange v. Lange</u>, 357 N.C. 645, 647, 588 S.E.2d 877, 879 (2003) (emphasis added) (quoting <u>Roberts v. Madison Cty. Realtors Ass'n</u>, 344 N.C. 394, 398–99, 474 S.E.2d 783, 787 (1996)).

Courts routinely recognize that disputes regarding agency action are not moot even if a permit has expired or been superseded. A court will not dismiss a challenge to a permit as moot, even if the permit has expired, if there is a "subsisting controversy between the petitioner and [the agency] over the authority of . . . that agency," <u>Nat'l Parks Conservation Ass'n, Inc. v. U.S. Army Corps of Engineers</u>, 574 F. Supp. 2d 1314, 1322 (S.D. Fla. 2008), or if a "decision respecting the validity of the permit would still affect the rights of the parties," <u>Mine</u>

Reclamation Corp. v. FERC, 30 F.3d 1519, 1522 (D.C. Cir. 1994). In Kescoli v. Babbitt, the court held that a case was not moot even though the originally challenged permit had expired, since the superseding permit contained the same provision at issue in the original challenge, and therefore "[t]he same controversy exists after the issuance of the renewal permit." 101 F.3d 1304, 1309 (9th Cir. 1996); see also Kentucky Riverkeeper, Inc. v. Rowlette, 714 F.3d 402, 406 (6th Cir. 2013) ("[W]hen an expired permit's conditions remain in effect, so too does the case and controversy."). These federal court decisions are relevant and persuasive, given that "the limits of the mootness doctrine are articulated almost identically in the federal courts and the courts of this State." Thomas v. N.C. Dep't of Human Res., 124 N.C. App. 698, 705, 478 S.E.2d 816, 820 (1996).

Here, the underlying controversy—DAQ's commission of legal errors in issuing the air quality permit challenged by Petitioners in this contested case, as well as the subsequent permits—still exists. Although the R10 and R11 permits may have superseded the R09 permit, they contain virtually identical provisions to those challenged in the R09 case.[2] A final decision on the substantive merits of the R09 case can still have a practical effect on the existing controversy by resolving substantively identical claims and issues in the R10 and R11 cases under the doctrines of *res judicata* and collateral estoppel.

II. Even if this Contested Case Were Moot, Exceptions to the Mootness Doctrine Apply.

Even if this case were moot, it should not be dismissed because two of the recognized exceptions to the mootness doctrine apply. In re Brooks, 143 N.C. App. 601, 605, 548 S.E.2d 748, 751 (2001) (explaining that five exceptions to the mootness doctrine are recognized in North Carolina). First, DAQ's action giving rise to the R09 case is capable of repetition while

[2] The R11 permit contains one relevant modification, but this modification serves only to weaken the relevant pollution limit and to exacerbate the errors in the R09 permit.

evading judicial review. Second, resolution of the issues in the R09 case is a matter of public interest.

A. The challenged action is capable of repetition, yet evading review.

A court may decide an otherwise moot case if the challenged action is "'capable of repetition, yet evading review.'" Simeon v. Hardin, 339 N.C. 358, 371, 451 S.E.2d 858, 867 (1994) (quoting Gerstein v. Pugh, 420 U.S. 103, 110 n.11 (1975)). This exception applies if "'(1) the challenged action [is] in its duration too short to be fully litigated prior to its cessation or expiration, and (2) there [is] a reasonable expectation that the same complaining party would be subjected to the same action again.'" State v. Corkum, 735 S.E.2d 420, 422 (N.C. Ct. App. 2012) (citing Boney Publishers, Inc. v. Burlington City Council, 151 N.C. App. 651, 654, 566 S.E.2d 701, 703–04 (2002); Crumpler v. Thornburg, 92 N.C. App. 719, 723, 375 S.E.2d 708, 711 (1989)).

Here, DAQ's issuance of the R09 permit could not be fully litigated prior to expiration of the relevant authorization provided by the permit, and the replacement of the permit with the R10 and R11 permits. CCC's approval to commence construction under the R09 permit expired 18 months after issuance. See 15A NCAC 2D .0530(1) (incorporating by reference 40 C.F.R. § 52.21(r)(2), which states that "[a]pproval to construct [under a prevention of significant deterioration permit, such as CCC's air quality permit] shall become invalid if construction is not commenced within 18 months"). DAQ granted CCC's request to extend the 18-month period by issuing the R11 permit, which reset the 18-month period beginning August 29, 2013. The approval to construct under the R11 permit will similarly expire 18 months after its issuance if CCC does not commence construction during that time.[3] Id. North Carolina courts have

[3] CCC has not yet commenced construction under the R11 permit, and has not provided evidence that it plans to commence construction within the year remaining until the expiration of approval to construct. It is reasonable to

repeatedly held that actions existing for similarly short durations may be too brief to be fully litigated before their expiration, and therefore meet the capable of repetition yet evading review exception. See, e.g., Matter of Jackson, 84 N.C. App. 167, 171, 352 S.E.2d 449, 452 (1987) (an action that expires at the end of a school year is too short to allow "full litigation of the issues"); State v. Corkum, 735 S.E.2d at 422–23 (same for a nine month sentence); Williams v. Vonderau, 362 N.C. 76, 77, 653 S.E.2d 144, 145 (2007) (same for a one-year no-contact order).

Courts in other jurisdictions also recognize that challenges to short-lived environmental permits are not moot under this exception. In Montgomery Environmental Coalition v. Costle, the court held that it had "no difficulty in concluding" that an appeal of a Clean Water Act permit issued for a five-year term was not moot, even though the permit had expired and been replaced by a new permit issued for a four-year term. 646 F.2d 568, 582 (D.C. Cir. 1980). The court determined that it was unlikely that a challenge to a permit of this duration could be fully litigated before its expiration, and therefore the challenge "cannot be considered moot." Id.; see also Alaska Ctr. For Env't v. U.S. Forest Serv., 189 F.3d 851, 855 (9th Cir. 1999) (holding that a national forest special use permit, which was issued for a single year, was "too short to allow full litigation before permit expired"); Hudson Falls v. New York State Dep't of Envtl. Conservation, 557 N.Y.S.2d 702, 704–05 (1990), aff'd, 77 N.Y.2d 983, 575 N.E.2d 394 (1991) (same for a challenge to a set of six environmental permits, some of which were issued for one year). Here, the duration of the R09 permit was clearly too short to allow for Petitioners' claims to be fully litigated before it was replaced by the R10 permit, and the R09 case cannot be considered moot.

---

expect that CCC might not commence construction during this time, since one of the reasons cited for CCC's failure to commence construction under the R09 permit is the uncertainty resulting from the ongoing litigation. Draft R11 Permit Review at 11 ("Because of the uncertainty of the results of the litigation, the final design for the Carolinas Cement Company preheater/precalciner/kiln system and pollution control equipment could not be completed.") (attached as Ex. 1).

The current procedural posture of this case also meets the second prong of the "capable of repetition, yet evading review" test. There is not only a reasonable likelihood that DAQ could repeat the same conduct challenged in the R09 case by issuing a new and substantively similar air quality permit to CCC, but DAQ has in fact already engaged in that conduct by issuing the R10 and R11 permits. As a result, there is no doubt that Petitioners have been subject to the same action challenged in the R09 case, and the EMC should not dismiss the R09 case as moot.

B. The R09 case also involves matters of public interest.

Another exception to the mootness doctrine exists "where the question involved is a matter of public interest." Leak v. High Point City Council, 25 N.C. App. 394, 397, 213 S.E.2d 386, 388 (1975). In this situation, "the court has the duty to make a determination." Id. The North Carolina Court of Appeals held that a case involving confidentiality of public employees' personnel files was not moot under this exemption, because it was "the first case of its kind to reach our court," and because the issues had "far reaching implications." In re Brooks, 143 N.C. App. 601, 606, 548 S.E.2d 748, 752 (2001); see also N.C. State Bar v. Randolph, 325 N.C. 699, 701, 386 S.E.2d 185, 186 (1989) (concluding that a jurisdictional dispute was not moot because it presents a matter of public interest). In Hudson Falls, the court properly recognized that the issue of whether environmental permit renewals were given adequate administrative review "is one of continuing public interest." 557 N.Y.S.2d at 704.

Here, the questions involved include (1) whether DAQ improperly issued a permit that will expose communities to higher emissions of numerous pollutants, and (2) whether citizens may obtain judicial review of DAQ's actions. These questions are ones of continuing public interest and have far-reaching implications for DAQ's evaluation of similar permits going forward. Therefore the EMC has a duty to review the ALJ's decision in the R09 case and issue a final agency decision.

III. If the EMC Dismisses This Contested Case as Moot, It Must Clearly Explain Its Basis for Doing So.

Should the EMC disagree with Petitioners and decide that this contested case is moot, the EMC should clearly indicate that it is doing so because Petitioners' claims are properly raised in the R11 case. Under N.C. Gen. Stat. § 150B-36(d) (2010), "[i]f the agency does not adopt the administrative law judge's decision, it shall set forth the basis for failing to adopt the decision[.]" As a result, if the EMC determines that this case is moot, it should include in its decision a conclusion of law stating that the claims raised herein are properly raised in the R11 case. If the EMC decides that this contested case became moot when DAQ issued the R10 permit, the EMC should also vacate the ALJ's decision on summary judgment in the R09 case, since that decision was rendered after DAQ issued the R10 permit.

CONCLUSION

For each of the reasons above, the R09 case is not moot and should not be dismissed. If the EMC disagrees and dismisses the R09 case, the EMC's order should explain that Petitioners' claims are properly raised in the R11 case.

Respectfully submitted this 4th day of March, 2014.

Geoffrey R. Gisler
NC State Bar No. 35304
Gudrun Thompson
NC State Bar No. 28829
Myra D. Blake
NC State Bar No. 43752
SOUTHERN ENVIRONMENTAL LAW CENTER
601 West Rosemary Street, Suite 220
Chapel Hill, NC 27516
Telephone: (919) 967-1450
Facsimile: (919) 929-9421

ggisler@selcnc.org
gthompson@selcnc.org
mblake@slecnc.org

Attorneys for North Carolina Coastal Federation, Cape Fear River Watch, PenderWatch and Conservancy and Sierra Club

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Supplemental Brief in Response to Questions Presented by the Special Air Permit Appeals Committee has been served by electronic mail and/or by regular mail via the United States mail, postage prepaid, addressed as follows:

Christopher G. Browning Jr.
Garrick Sevilla
Williams Mullen
PO Box 1000
Raleigh, NC 27602
cbrowning@williamsmullen.com
gsevilla@williamsmullen.com

Stanford D. Baird
K&L Gates LLP
PO Box 17047
Raleigh, NC 27619-7047
Stanford.baird@klgates.com

Amy Bircher
Marc Bernstein
Scott Conklin
Brenda Menard
NC Department of Justice
PO Box 629
Raleigh, NC 27602
abircher@ncdoj.gov
mbern@ncdoj.gov
sconklin@ncdoj.gov
bmenard@ncdoj.gov

This the 4th day of March, 2014.

Geoffrey R. Gisler
NC State Bar No. 35304
Attorney for Petitioners

NORTH CAROLINA DIVISION OF AIR QUALITY PSD Preliminary Review – modification of 2Q. 300 construction/operation permit Permit Issue Date: XXXXXX, XX, 2013	Region: Wilmington Regional Office County: New Hanover NC Facility ID: 6500296 Inspector's Name: Terry McCall Date of Last Inspection: 09/12/2012 Compliance Code: 3 / Compliance - inspection
Facility Data Applicant (Facility's Name): Carolinas Cement Company, LLC Facility Address: Carolinas Cement Company, LLC 6411 Ideal Cement Road Castle Hayne, NC 28429 SIC: 3241 / Cement, Hydraulic NAICS: 32731 / Cement Manufacturing Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V	Permit Applicability (this application only) SIP: 15A NCAC 2D .0530(l) NSPS: N/A NESHAP: N/A PSD: N/A PSD Avoidance: N/A NC Toxics: N/A 112(r): N/A Other: 40 CFR 52.21(r)(2)

Contact Data			Application Data
Facility Contact	Authorized Contact	Technical Contact	
James Willis Corporate Environ. Dir. 188 Summerfield Ct. Suite 201 Roanoke, VA 24019 (540) 966-6534 jwillis@titanamerica.com	Russel Fink Vice President/General Manager 1151 Azalea Garden Road Norfolk, VA 23502 (757) 858-6523 Rfink@titanamerica.com	James Willis Corporate Environ. Dir. 188 Summerfield Ct. Suite 201 Roanoke, VA 24019 (540) 966-6534 jwillis@titanamerica.com	Application Numbers: 6500296.13A Date Received: 04/09/2013 Application Type: Modification Application Schedule: PSD Existing Permit Data Existing Permit Number: 07300R10 Existing Permit Issue Date: 06/21/2013 Existing Permit Expiration Date: 10/01/2016

Consultant: QSEM Solutions, Inc. Contact: John Carroll Phone: (919) 848-4003 email: jcarroll@qsemsolutions.com

Review Engineer: Booker Pullen Regional Engineer: Dean Carroll Review Engineer's Signature: Begin Date: May 2, 2013	Comments / Recommendations: Issue: 07300R11 Permit Issue Date: XXXXXX XX, 2013 Permit Expiration Date: October 1, 2016

I. Introduction:

The Division of Air Quality (DAQ) received a copy of application No. 6500296.13A from Carolinas Cement Company LLC, on April 9, 2013. The application was considered complete for processing on that date. The application was amended on June 10, 2013 with additional supporting information, some of which was designated as confidential by the applicant. After review of the information submitted by the applicant, the DAQ agreed that the applicant and handled the material according to DAQ procedures for confidential information.

Application 6500296.13A is requesting an 18 month extension from the current permit construction commencement deadline of August 29, 2013. This request was submitted in accordance with 15A NCAC 2D .0530(l).

This permit will be processed as a 15A NCAC 2Q .0300 modification. In addition, this specific modification will be subject to a 30-day public notice and hearing.

II. Description:

This facility is located in Castle Hayne, North Carolina and is currently an existing cement storage terminal. Construction of the new Portland Cement facility has not yet begun. This facility currently holds permit 07300R10 which was issued on June 21, 2013 to update the permit in accordance with the most recent MACT revision for Portland Cement Plants.

II. Description: (continued)

The proposed Portland Cement plant will include a multi-stage preheater-precalciner kiln with an in-line raw mill, coal mill, and clinker cooler system that will vent through a common main stack. Production is limited in the permit to 2,190,000 tons per year of clinker. The fuels burned at this facility will be coal and petroleum coke with distillate fuel oil used for startup. The raw materials for clinker production will include limestone/marl, clay, quarry spoils, bauxite, flyash/bottom ash, sand, and/or mill scale. Synthetic gypsum or natural gypsum will be milled with the clinker to produce cement.

Associated processes will include mining, blasting, crushing, blending, grinding, material handling, storage for raw materials, fuels, clinker, finished cement, and cement packing and bulk loadout. Cement will be shipped by rail, or truck. The project will also include one Diesel fuel-fired emergency generator.

The Castle Hayne area is in attainment with all the National Ambient Air Quality Standards (NAAQS).

Note: The following website offers a general description of the process at a Portland Cement plant Some of the specific details and functions will be different from the CCC facility proposed for the Castle Hayne Plant.

[http://www.cement.org/basics/images/flashtour.html]

A. <u>Mining Operations</u>:
CCC will obtain the required limestone/marl from a quarry that is located on the property in the area depicted on Exhibit A attached at the back of this review. The raw materials will be removed from the quarry by blasting, drilling, and ripping the material from the rock face using large dozers. The limestone strata at this facility extends to depths of up to approximately 80 feet and contain a high level of moisture.

The large pieces of rock will be collected by large front-end loaders and transferred to haul trucks. The haul trucks will transfer the large pieces of rock to the primary jaw crushers located in the mine/quarry area that will reduce the rock to smaller sizes. These smaller stones are then conveyed to the secondary crusher that is located near the plant.

B. <u>Proportioning, Blending, & Grinding:</u>
Cement uses minerals containing the four essential elements for its creation: calcium, silicon, aluminum, and iron. The most common combination of ingredients is limestone (for calcium) coupled with much smaller quantities of clay and sand. The raw materials for clinker production at this facility may include limestone/marl, clay, quarry spoils, bauxite (principal ore of aluminum), fly ash/bottom ash, sand, and mill scale (iron). Synthetic gypsum or natural gypsum will be milled with the clinker to produce cement. The bauxite, flyash/bottom ash, mill scale will be brought in from the outside and will be added to the mixture. Flyash will be received wet and will be stored in piles inside the raw material storage building, thus minimizing fugitive emissions from material handling and wind erosion.

Rock ripped or blasted from the limestone mine in the quarry is transported to the primary crusher, where chair size rocks are broken into pieces the size of baseballs. Per the CCC PSD application, 50% of the material crushed (mostly overburden – dirt and other materials) will be spoils and would not be conveyed to the plant. This material would be returned to the quarry. A secondary crusher located near the plant reduces the baseball-sized rock to the size of gravel. The next step in Portland Cement manufacturing is preparing the raw mix, or kiln feed, for the pyroprocessing operation. Raw material preparation includes a variety of blending and sizing operations that are designed to provide a feed with appropriate chemical and physical properties. Cement raw materials are received with an initial moisture content varying from 1 to more than 50 percent.

For the Carolinas Cement Plant, grinding of blended raw materials occurs in an in-line raw mill in which kiln exhaust gases are used to heat and dry the raw materials.

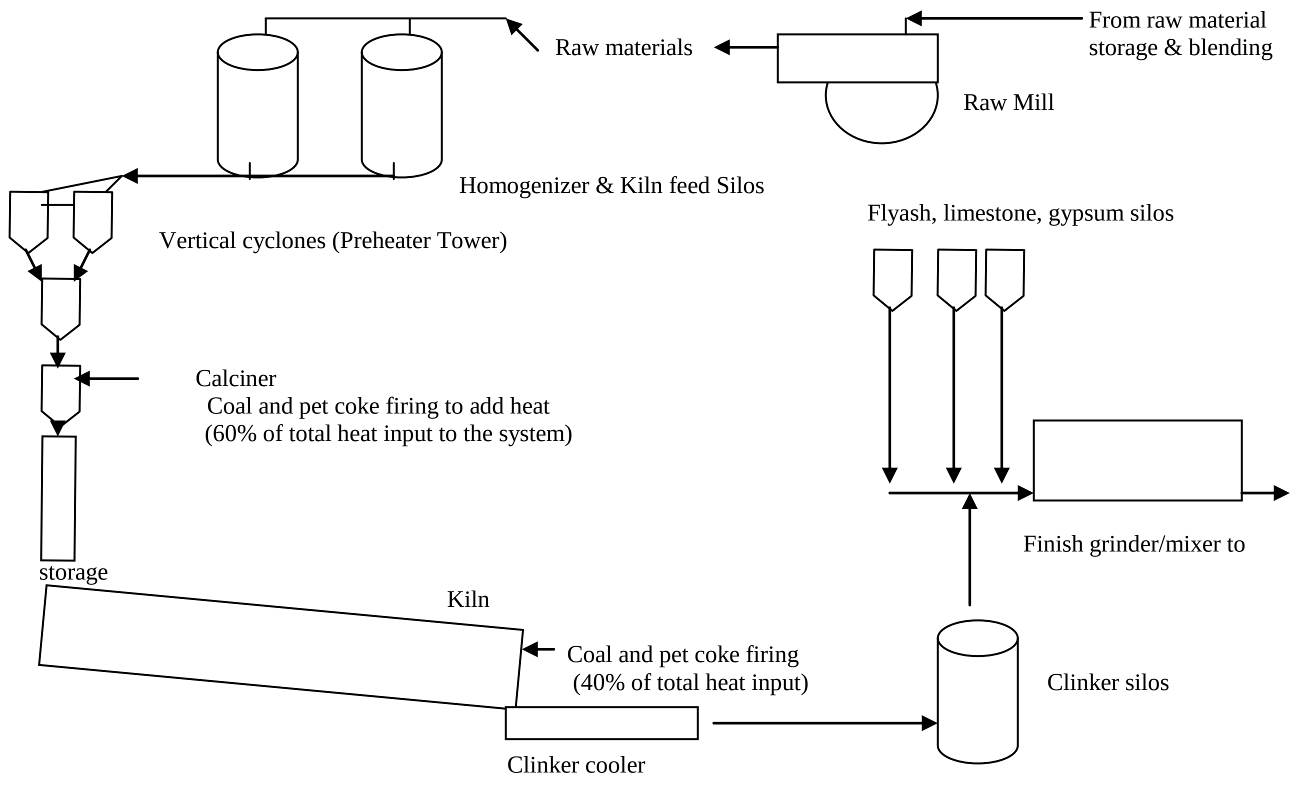
C. Preheater Tower:

The preheater tower at this facility contains a series of vertical cyclone chambers through which the raw materials pass on their way to the kiln. To save energy, the exhaust gases from the kiln rise some 200 feet and are used to preheat the raw materials as they swirl through the preheater cyclones. In the preheater/precalciner stage, materials are heated up to temperatures just below the melting or fusion point. Material transport associated with dry raw milling systems can be accomplished by a variety of mechanisms, including screw conveyors, belt conveyors, drag conveyors, bucket elevators, air slide conveyors, and pneumatic conveying systems.

Approximately 60% of the heat input for this Portland Cement manufacturing facility occurs at the calciner. Pulverized coal and/or petroleum coke is injected and burned in the calciner. This is a direct-fired process.

D. Kiln (Clinker Production):

Central to the Portland Cement manufacturing process is the pyroprocessing system. CCC will use a preheater/ precalciner dry process system. Raw preheated material enters the huge rotating furnace called a kiln. The raw material mix enters the kiln at the elevated end, and the combustion fuels are introduced into the lower end of the kiln in a countercurrent manner. The materials are continuously and slowly moved to the lower end by rotation of the kiln. This horizontally sloped steel cylinder, lined with firebrick, turns from one to three revolutions per minute. As the materials move down the kiln, the material passes through progressively hotter zones toward the flame. At the lower end of the kiln (hottest part) the material may become partially molten. This system transforms the raw mix into red hot clinkers, which are gray, glass-hard, spherically shaped nodules that range from 0.32 to 5.1 centimeters (0.125 to 2.0 inches) in diameter.



Gases go back through the raw mill (mill on condition) before going to the baghouse or the gases go straight to the baghouse (raw mill off condition) prior to going to main stack.

E. Clinker Cooler:
The last component of the pyroprocessing system is the clinker cooler. This process step recoups up to 30 percent of the heat input to the kiln system by recirculating some of the exhaust air back into the intake air of the kiln. The clinker cooler removes enough heat from the product so that it can be handled with conventional conveying equipment. The more common types of clinker coolers are (1) reciprocating grate, (2) planetary, and (3) rotary. In these coolers, the clinker is cooled from about 1100°C to 93°C (2000°F to 200°F) by ambient air that passes through the clinker and into the rotary kiln for use as combustion air.

F. Finish Grinding:
The clinker tumbles onto a grate cooled by forced air. Once cooled, the clinker is ready to be ground into the gray power called Portland Cement. The clinker is ground in a vertical roller mill. The cement is ground so fine that it will easily pass through a sieve that is fine enough to hold water. Up to 5 percent gypsum or natural anhydrite is added to the clinker during grinding to control the cement setting time. Up to 5% limestone may also be ground with the clinker and gypsum. Other specialty chemicals are added as needed to impart specific product properties. Typically, finishing is conducted in a closed circuit system, with product sizing by air separation.

G. Storage and Shipping:
From the grinding mills, the Portland Cement is conveyed to domes where it awaits shipment. CCC will ship cement offsite by rail or truck.

III. Summary of Permit Changes to permit No. 07300R10 per application 6500296.13A:

Old page	New page	Condition No.	Change
Cover Letter			
Page 1	Page 1	Cover page	Changed: Governor's name, Secretary's name, issue date of permit, reformatted page and footnote,
Page 2	Page 2	Cover letter	Changed: heading date, effective date of permit, review engineer name, and telephone number Added: PSD increment increase to permit
Pages 4-5	Pages 4	Cover letter	Revised table of changes associated with application 6500296.13A
Body of Permit			
Page 1	Page 1	Permit Cover Page	Revised: issue date, effective date, Permit number, application number, and replaces permit number
All pages	All pages	Heading of Permit	Changed permit revision number
Page 6	Page 6	Table of permitted sources	Removed MACT applicability from ES-RMHF3B and ES-RMHF3TB. (only subject to NSPS, Subpart OOO and PSD)
Page 9	Pages 9		Removed NSPS and PSD applicability from source ES-4. This is an existing source that was not modified.
Page 10	Page 10		Added footnote "MACT LLL applies to existing sources after the cement manufacturing plant is constructed" back into permit.
Page 40	Page 40		Removed NSPS and PSD applicability from CDP43 (ES-4). This is an existing source that was not modified.
Page 46	46		Changed PM10/PM2.5 BACT limit to reflect new averaging time. Added "All Q values shall be evaluated at the time of the stack test" to Particulate matter section for NSPS F, MACT LLL, and PSD
Page 47	Page 47		Changed BACT for startup and shutdown to work practice standards in accordance with MACT, Subpart LLL.
Pages 53-55	Pages 53-55		Changed the BACT limit equation to reflect a shorter averaging time. Added "All Q values shall be evaluated at the time of the stack test" to Particulate matter section for PSD. Removed the annual limit for filterable PM10/PM2.5, SO_2, NO_x, VOCs, and CO BACT conditions because the limit is not necessary if there are short term limits already in the BACT condition.

IV. Table of Permitted Sources:

The following table contains a summary of all permitted emission sources and associated pollution control devices:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
Mining/Quarrying Operations (MINE/FQ)			
ES-Mine1, PSD	Rock/limestone removal using heavy equipment, drilling, and blasting	None	None
ES-Mine2, PSD	Rock/limestone loading operations (front end loader rock pickup, loader to haul truck, haul truck to jaw crusher)	None	None
ES-FQSP1, PSD	Limestone/marl pile located in the quarry	None	None
ES-FQSP2, PSD	Spoils pile located in the quarry	None	None
ES-FQSP4, PSD	Overburden located in the quarry	None	None
ES-QURD, PSD	Quarry roads	None	None
ES-FQ6, PSD	Spoils stacker pile	None	None
Quarry Operations (MINE/FO)			
ES-FQ1PC1 NSPS OOO, PSD	Primary crusher #1	None	None
ES-FQ3PC2 NSPS OOO, PSD	Primary crusher #2 (spoils)	None	None
ES-FQ8SC NSPS OOO, PSD	Secondary crusher (quarry blend)	None	None
ES-FQ8BC NSPS OOO, PSD	Belt conveyor transfer	None	None
ES-FQ2MC1 NSPS OOO, PSD	Conveyor #1 transfer (limestone/marl)	None	None
ES-FQ7SC NSPS OOO, PSD	Conveyor #1 transfer (spoils)	None	None
ES-FQ1MC2 NSPS OOO, PSD	Conveyor #2 transfer (limestone/marl)	None	None
ES-FQ3SC2 NSPS OOO, PSD	Conveyor #2 transfer (spoils)	None	None
ES-FQ4SC3 NSPS OOO, PSD	Conveyor #3 transfer (spoils)	None	None
ES-FQ8SCF NSPS OOO, PSD	Secondary crusher feeder (quarry blend)	None	None
ES-FQ1HF NSPS OOO, PSD	Hopper/feeder #1 (limestone/marl)	None	None
ES-FQ3HF2 NSPS OOO, PSD	Hopper/feeder #2 (spoils)	None	None
ES-FQ5RS NSPS OOO, PSD	Radial stacker transfer (spoils)	None	None
Coal/Coke System (COAL)			
ES-COALF1HF2 NSPS Y, PSD	Coal/coke hopper/feeder #2	None	None
ES-COALF1BCT NSPS Y, PSD	Coal/coke belt conveyor transfer	None	None
ES-COALF2EH NSPS Y, PSD	Coal/coke enclosed hopper w/dust suppression (water spray)	None	None
ES-COALF3B NSPS Y, PSD	Coal/coke belt to tripper belt	None	None

ES-COALF3TB NSPS Y, PSD	Coal/coke tripper belt to piles	None	None
ES-COALF3PR NSPS Y, PSD	Coal/coke pile reclaimer	None	None
ES-COALFERB NSPS Y, PSD	Coal/coke reclaimer to belt	None	None
ES-COALE1 NSPS Y, PSD	Coal unloading by rail to hopper/transport system	CD1 (211.BF320)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE2 NSPS Y, PSD	Coal unloading by truck to hopper/transport system	CD2 (231.BF310)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE3 NSPS Y, PSD	Coal transport to storage	CD3 (231.BF330)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE4 NSPS Y, PSD	Coal transport from storage	CD4 (241.BF120)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE16 NSPS Y, PSD	Coal mill feed transport	CD16 (461.BF350)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE17 MACT LLL, PSD	Fine coal bin	CD17 (461.BF650)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE18 MACT LLL, PSD	Fine coal bin	CD18 (461.BF750)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE14 NSPS Y, PSD	Coal mill feed bin	CD14 (461.BF130)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-COALE15 NSPS Y, PSD	Coal mill feed bin	CD15 (461.BF230)	One bagfilter with outlet grain loading of 0.005 grains/scf
ES-COAL MACT LLL, PSD	Coal mill (vents to main stack)	CD44B (461.BF500)	Vented to main stack
Plant Roadways			
ES-PLTRD, PSD	Vehicular traffic on paved plant roads	None	None
Storage Piles			
ES-SPCoal1, PSD	Coal/coke storage pile at the plant	None	None
ES-SPCoal2, PSD	Coal/coke storage pile at the plant	None	None
ES-SPBlend1 PSD	Blended stone pile at the plant	None	None
ES-SPBlend2, PSD	Blended stone pile at the plant	None	None
ES-SPMillscale PSD	Mill scale storage pile at the plant	None	None

ES-SPBauxite PSD	Bauxite storage pile at the plant	None	None
ES-SPAsh, PSD	Bottom ash storage pile at the plant	None	None
ES-SPLimestone PSD	Limestone storage pile at the plant	None	None
ES-SPGypsum, PSD	Gypsum storage pile at the plant	None	None
Emergency Generator			
ES-GEN NSPS IIII MACT ZZZZ, PSD	Diesel-fired emergency generator (800 kW, 1072.82 hp output, generator vents through main stack)	None	None

Plant additives unloading and handling			
ES-F1HF1 NSPS F MACT LLL, PSD	Additives hopper/feeder	None	None
ES-F1BCT NSPS F MACT LLL, PSD	Additives belt conveyor transfer	None	None
ES-F5 NSPS F MACT LLL, PSD	Additives belt conveyor transfer	None	None
ES-F7 NSPS F MACT LLL, PSD	Additives belt conveyor transfer	None	None
ES-F7C NSPS F MACT LLL, PSD	Bottom Ash conveyor to silo	None	None
ES-F7D NSPS F MACT LLL, PSD	Bottom ash silo to enclosed belt	None	None
Raw Material Unloading & Handing (RMH)			
ES-RMHF3B NSPS OOO PSD	Quarry blend belt to tripper belt	None	None
ES-RMHF3TB, NSPS OOO PSD	Quarry blend tripper belt to piles	None	None
ES-RMHF3PR NSPS F MACT LLL, PSD	Quarry blend pile reclaimer	None	None
ES-RMHF3R NSPS F MACT LLL, PSD	Quarry blend reclaimer to belt	None	None
ES-RMHF3ABT NSPS F MACT LLL, PSD	Additives belt to tripper belt	None	None
ES-RMHF3ATB NSPS F MACT LLL, PSD	Additives tripper belt to piles	None	None

Raw Material Unloading & Handing (RMH)			
ES-RMHF3APR NSPS F MACT LLL, PSD	Additives pile reclaimer	None	None
ES-RMHF3RB NSPS F MACT LLL, PSD	Additives reclaimer to belt	None	None
ES-RMHF6BCT NSPS F MACT LLL, PSD	Quarry blend belt conveyor transfer	None	None
ES-RMHF7A NSPS F MACT LLL, PSD	Quarry blend conveyor to silo	None	None

ES-RMHF7B NSPS F MACT LLL, PSD	Quarry blend silo to enclosed belt	None	None
Raw Mill Handling System (RMHS)			
ES-RMHSE5 NSPS F MACT LLL, PSD	Raw mill feed bin	CD5 (143.BF650)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE6 NSPS F MACT LLL, PSD	Raw mill feed transport	CD6 (311.BF750)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE7 NSPS F MACT LLL, PSD	Raw mill feed	CD7 (321.BF470)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE8 NSPS F MACT LLL, PSD	Raw mill reject	CD8 (321.BF950)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE9 NSPS F MACT LLL, PSD	Kiln dust bin	CD9 (331.BF400)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE10 NSPS F MACT LLL, PSD	Raw mill transport to silo	CD10 (341.BF410)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE11 NSPS F MACT LLL, PSD	Raw mill silo	CD11 (341.BF350)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE12 NSPS F MACT LLL, PSD	Raw mill silo extraction	CD12 (351.BF440)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-RMHSE13 NSPS F MACT LLL, PSD	Kiln feed	CD13 (351.BF470)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
Totally Enclosed Clinker Handling and Storage (CHS)			
ES-CHSE19 NSPS F MACT LLL, PSD	Clinker discharge from cooler	CD19 (441.BF540)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSE20 NSPS F MACT LLL, PSD	Clinker dome	CD20 (471.BF150)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSE21 NSPS F MACT LLL, PSD	Off-spec bin	CD21 (471.BF240)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
Finish Mills (FM)			
ES-FME22 NSPS F MACT LLL, PSD	Cement mill #1 feed bin	CD22 (511.BF090)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME23 NSPS F MACT LLL, PSD	Cement mill #2 feed bin	CD23 (512.BF050)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME24 NSPS F MACT LLL, PSD	Cement mill #1 feed	CD24 (531.BF290)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME25 NSPS F MACT LLL, PSD	Cement mill #1 recirculation bin	CD25 (531.BF020)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf

ES-FME26 NSPS F MACT LLL, PSD	Cement mill #1 reject	CD26 (531.BF215)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME27 NSPS F MACT LLL, PSD	Cement mill #1 transport	CD27 (531.BF615)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME28 NSPS F MACT LLL, PSD	Cement mill #2 feed	CD28 (532.BF290)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME29 NSPS F MACT LLL, PSD	Cement mill #2 recirculation bin	CD29 (532.BF020)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME30 NSPS F MACT LLL, PSD	Cement mill #2 reject	CD30 (532.BF215)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME31 NSPS F MACT LLL, PSD	Cement mill #2 transport	CD31 (532.BF615)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FM45A NSPS F MACT LLL, PSD	Exhaust from finish mill #1	CD45A (531.BF500)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FM45B NSPS F MACT LLL, PSD	Exhaust from finish mill #2	CD45B (532.BF500)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME46 NSPS F MACT LLL, PSD	Cement additive bin	CD46 (511.BF300)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FME47 NSPS F MACT LLL, PSD	Cement additive intake	CD47 (232.BF150)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-FMEF8TU, PSD	Gypsum/limestone unloading (truck)	None	None
ES-FMF8HF NSPS F MACT LLL, PSD	Gypsum/limestone hopper/feeder	None	None
ES-FMF8BCT NSPS F MACT LLL, PSD	Gypsum/limestone belt conveyor transfer	None	None
Cement Handling, Storage, and Loadout (CHSL)			
ES-CHSLE32 NSPS F MACT LLL, PSD	Cement dome	CD32 (611.BF600)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSLE33 NSPS F MACT LLL, PSD	Cement dome extraction rail	CD33 (621.BF305)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSLE34 NSPS F MACT LLL, PSD	Cement dome extraction truck	CD34 (621.BF315)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSLE40 NSPS F MACT LLL, PSD	Cement silo	CD40 (612.BF600)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSLE41 NSPS F MACT LLL, PSD	Cement silo extraction	CD41 (612.BF620)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf

ES-CHSLE42 NSPS F MACT LLL, PSD	Cement transport	CD42 (622.BF410)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-CHSLE43 NSPS F MACT LLL, PSD	Packaging plant	CD43 (641.BF150)	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-4 ** MACT LLL	Cement silo (2,200 tons est. capacity)	CDP43	One bagfilter (540 square feet of filter surface area)
ES-R33 ** MACT LLL	Screw conveyor and truck load-out spout	CDP30	One bagfilter with outlet grain loading not to exceed 0.005 grains/scf
ES-1 **	Railcar/truck unloading system (screw/ pneumatic) in partially enclosed building	CDP1	One bagfilter (339 square feet of filter surface area)
Kiln System			
ES-KS NSPS F MACT LLL, PSD	One coal/petroleum coke-fired, (distillate fuel used for startup only) multistage preheater-precalciner kiln @ 675 million Btu per hour heat input capacity with inline raw mill, coal mill, alkali bypass and inline clinker cooler	CD44N CD44S CD44A (331.BF200) CD44B (461.BF500) CD44C (451.BF200) CD44D (331.BF300)	Selective non-catalytic reduction (SNCR) system using ammonia containing solution Wet scrubber system (Operating parameters based on the initial performance test) Bagfilter for kiln, cooler, and raw mill (emissions measured at the main stack) Bagfilter for coal mill (emissions measured at the main stack) Bagfilter for preheater bypass (emissions measured at the main stack) Activated carbon injection system (emissions measured at the main stack)

The Permittee shall file a Title V Air Quality Permit Application on or before 12 months after commencing operation.

** Existing sources (all other sources are proposed); ES-1 to be removed from service prior to startup of cement plant

V. Purpose of application 6500296.13A:
Carolinas Cement Company, LLC is requesting an 18 month extension from the current permit construction commencement deadline of August 29, 2013. This request was submitted in accordance with 15A NCAC 2D .0530(l).

VI. Statement of Compliance:
The DAQ has reviewed the compliance status of this facility. On its latest inspection, performed on September 12, 2012 by Terry McCall of the Wilmington Regional Office, the facility appeared to be in compliance with all applicable requirements.

VII. Extension of 18 Month Commencement of Construction Deadline:

- 15A NCAC 2D .0530(l):
  The provisions of 40 CFR 52.21(r)(2) regarding the period of validity of approval to construct are incorporated by reference except that the term" Administrator" is replaced with "Director".

- 40 CFR 52.21(r)(2):
  Approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The Administrator may extend the 18-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between construction of the approved phases of a phased construction project; each phase must commence construction within 18 months of the projected and approved commencement date.

A. The construction of the air pollution sources and control devices listed in permit number 07300R09 has not yet commenced. Since the issuance of construction and operation permit number 07300R09, the terms and conditions written in the permit have been subject to on-going litigation. Two months after issuance of permit number 07300R09, the North Carolina Coastal Federation, Cape Fear River Watch, Pender Watch and Conservancy, and the Sierra Club filed a petition for a Contested Case Hearing with the North Carolina Office of Administrative Hearing appealing the issuance of the permit. Because of the uncertainty of the results of the litigation, the final design for the Carolinas Cement Company preheater/precalciner/kiln system and pollution control equipment could not be completed.

   Pursuant to the conditions of permit 07300R11, the DAQ hereby approves the 18 month extension from the current August 29, 2013 deadline to begin construction at this facility.

B. The 18 month extension request includes the following:
   1. <u>BACT Review and reevaluation:</u>
      The applicant shall review and evaluate new, more effective control technologies that may be available to the Portland Cement Manufacturing Industry since the issuance of the current permit. The applicant shall review EPA data and websites, actual issued air permits for this industry type, relevant Federal regulations for the MACT and NSPS using control technologies that reduce HAPs and criteria pollutants.

   2. <u>Additional PSD requirements</u>:
      Evaluate whether the interim source growth in the area of the permitted source has not caused sufficient degradation of air quality to the extent that operation of the source requesting extension would cause or contribute to increment or NAAQS exceedance.

   3. <u>Public comment period</u>:
      The DAQ will offer a 30 day comment period including a public hearing.

VIII. Source By Source Evaluation:

A. Mining/Quarry Operations (Mine/FQ):
   - Rock/limestone removal using heavy equipment, drilling, and blasting (ES-Mine1)
   - Rock/limestone loading operations (rock from front end loader to haul truck, unloading haul truck to jaw crusher, ES-Mine2)
   - Limestone/marl pile located in quarry area (ES-FQSP1)
   - Spoils pile located in quarry area (ES-FQSP2)
   - Overburden pile located in quarry area (ES-FQSP4)
   - Quarry roads (ES-QURD)
   - Spoils stacker pile (ES-FQ6)

   1. Description: The rock will be removed from the quarry by ripping the material from the rock face using large dozers or by blasting. The large pieces of rock will be collected by a large front-end loader and transferred into the beds of haul trucks. The haul trucks will transfer the large pieces of rock to the primary jaw crushers that will reduce the rock to softball-sized pieces.

2. Applicable Regulatory Requirements:
   In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission sources described above

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Best management practices for drilling, blasting, stone removal, and truck loading operations (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

B. Quarry Operations (FQ):
- Primary crusher #1 (limestone/marl, ES-FQ1PC1)
- Primary crusher #2 (spoils, ES-FQ3PC2)
- Secondary crusher (quarry blend, ES-FQ8SC)
- Mining conveyor #1 transfer (limestone/marl, ES-FQ2MC1)
- Spoils conveyor #1 transfer (spoils, ES-FQ7SC)
- Mining conveyor #2 transfer (limestone/marl, ES-FQ1MC2)
- Spoils conveyor #2 transfer (spoils, ES-FQ3SC2)
- Spoils conveyor #3 transfer (spoils, ES-FQ4SC3)
- Secondary crusher feeder (Quarry blend, ES-FQ8SCF)
- Hopper/feeder #1 (limestone/marl, ES-FQ1HF)
- Hopper/feeder #2 (spoils, ES-FQ3HF2
- Radial stacker transfer (spoils, ES-FQ5RS)

1. Description: The large pieces of rock will be collected by a large front end loader and transferred into the beds of haul trucks. The haul trucks will transfer the large pieces of rock to the primary jaw crushers that will reduce the rock to softball sized pieces. These smaller stones are then conveyed to a secondary crusher and then to the main plant to begin the cement making process.

2. Applicable Regulatory Requirements:
   In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission sources described above

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Best management practices (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

C**.** Coal/Pet Coke Handling System (COAL) and associated control devices
- Coal/pet coke hopper/feeder #2 (ES-COALF1HF2)
- Coal/pet coke belt conveyor transfer (ES-COALF1BCT)
- Coal/pet coke enclosed hopper w/dust suppression (water spray) (ES-COALF2EH)
- Coal/pet coke belt to tripper belt (ES-COALF3B)
- Coal/pet coke tripper belt to piles (ES-COALF3TB)
- Coal/pet coke pile reclaimer (ES-COALF3PR)
- Coal/pet coke reclaimer to belt (ES-COALFERB)
- Coal pile (covered, ES-COALPILE)

- Coal unloading by rail to hopper/transport system (ES-COALE1) with associated bagfilter (CD1)
- Coal unloading by truck to hopper/transport system (ES-COALE2) with associated bagfilter (CD2)
- Coal transport to storage (ES-COALFE3) with associated bagfilter (CD3)
- Coal transport from storage (ES-COALE4) with associated bagfilter (CD4)
- Coal mill feed bin (ES-COALE14) with associated bagfilter (CD14)
- Coal mill feed bin (ES-COALE15) with associated bagfilter (CD15)
- Coal mill feed transport (ES-COALE16) with associated bagfilter (CD16)
- Fine coal bin (ES-COALE17) with associated bagfilter (CD17)
- Fine coal bin (ES-COALE18) with associated bagfilter (CD18)
- Coal mill (ES-COAL) with associated bagfilter (CD44B) venting to the main stack

1. Description: The process of making cement clinker requires heat. Coal or petroleum coke is used as the fuel for providing heat. Coal/petroleum coke received by truck or rail is unloaded to a hopper, transferred by belt conveyors, and placed in longitudinal stockpiles from where it is reclaimed by a reclaimer and taken to the coal mill hoppers. The coal/pet coke is pulverized in the coal bins, and burned as fuel in the preheat tower calciner and in the rotary kiln.

2. Applicable Regulatory Requirements:
   In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission sources described above

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Outlet grain loading not to exceed 0.005 gr/scf (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

D. Paved Plant Roads (PLTRD), Storage piles (SP)

- Vehicular traffic on paved plant roads (ES-PLTRD)
- Coal/coke storage pile at the plant (ES-SPCoal1)
- Coal/coke storage pile at the plant (ES-SPCoal2)
- Blended stone pile at the plant (ES-SPBlend1)
- Blended stone pile at the plant (ES-SPBlend2)
- Mill scale storage pile at the plant (ES-SPMillscale)
- Bauxite storage pile at the plant (ES-SPBauxite)
- Bottom ash storage pile at the plant (ES-SPAsh)
- Limestone storage pile at the plant (ES-SPLimestone)
- Gypsum storage pile at the plant (ES-SPGypsum)

1. Description: The roads on the plant site will be paved. There will be some onsite storage piles of raw material. All clinker storage piles will be fully enclosed. Emissions from the storage of limestone, marl, and other high moisture quarried raw materials are very low and do not need additional control measures. Fugitive emissions from lower moisture raw materials and solid fuel will be minimized by storage under roof, in a partial enclosure, or behind wind screens.

2. Applicable Regulatory Requirements:
   In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission sources described above.

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Vacuum sweeping and/or water flushing of paved road surfaces (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

E. Emergency generator (Diesel-fired, 800 kW, 1072.8 hp, GEN-1)

1. Description: This emergency generator stationary ICE is used to generate electricity for a facility to power critical operating equipment (pumps, aerators, etc.) only during the loss of primary power at the facility that is beyond the control of the owner/operator of the facility or during maintenance when necessary to protect the environment. Emissions are uncontrolled.

2. Applicable Regulatory Requirements:
In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission source(s) described above.

Regulated Pollutant	Limits/Standards	Applicable Regulation
NOx PM10/PM2.5 SO_2 CO VOCs	Purchase engine certified to meet the applicable engine design emission limits in accordance with NSPS Subpart IIII (See Multiple Emission Section IX. A. for individual pollutants)	15A NCAC 2D .0530 PSD (BACT)

F. Plant additives unloading and handling system

- Additives hopper/feeder (ES-F1HF1)
- Additives belt conveyor transfer (ES-F1BCT)
- Additives belt conveyor transfer (ES-F5)
- Additives belt conveyor transfer (ES-F7)
- Bottom Ash conveyor to silo (ES-F7C)
- Bottom ash silo to enclosed belt (ES-F7D)

Raw Material Unloading & Handling (RMH)

- Quarry blend belt to tripper belt (ES-RMHF3B)
- Quarry blend tripper belt to piles (ES-RMHF3TB)
- Quarry blend pile reclaimer (ES-RMHF3PR)
- Quarry blend reclaimer to belt (ES-RMHF3R)
- Additives belt to tripper belt (ES-RMHF3ABT)
- Additives tripper belt to piles (ES-RMHF3ATB)
- Additives pile reclaimer (ES-RMHF3APR)
- Additives reclaimer to belt (ES-RMHF3RB)
- Quarry blend belt conveyor transfer (ES-RMHF6BCT)
- Quarry blend conveyor to silo (ES-RMHF7A)
- Quarry blend silo to enclosed belt (ES-RMHF7B)

1. Description: The Plant additive unloading and handling and the Raw Material Unloading and Handling areas are where raw materials from the quarry and materials that are transported in by truck or rail car are stored and handled.

2. Applicable Regulatory Requirements:
In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission source(s) described above

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Shall be controlled in accordance with MACT Subpart LLL (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

G. Raw Mill Handling System (RMHS)

- Raw mill feed bin (ES-RMHSE5) with associated bagfilter (CD5)
- Raw mill feed transport (ES-RMHSE6) with associated bagfilter (CD6)
- Raw mill feed (ES-RMHSE7) with associated bagfilter (CD7)
- Raw mill reject (ES-RMHSE8) with associated bagfilter (CD8)
- Kiln dust bin (ES-RMHSE9) with associated bagfilter (CD9)
- Raw mill transport to silo (ES-RMHSE10) with associated bagfilter (CD10)
- Raw mill silo (ES-RMHSE11) with associated bagfilter (CD11)
- Raw mill silo extraction (ES-RMHSE12) with associated bagfilter (CD12)
- Kiln feed (ES-RMHSE13) with associated bagfilter (CD13)

Clinker Handling System (CHS)

- Clinker discharge from cooler (ES-CHSE19) with associated bagfilter CD19
- Clinker dome (ES-CHSE20) with associated bagfilter (CD20)
- Off spec bin (ES-CHSE21) with associated bagfilter (CD21)

Finish Mills (FM)

- Cement mill #1 feed bin (ES-FME22) with associated bagfilter (CD22)
- Cement mill #2 feed bin (ES-FME23) with associated bagfilter (CD23)
- Cement mill #1 feed (ES-FME24) with associated bagfilter (CD24)
- Cement mill #1 recirculation bin (ES-FME25) with associated bagfilter (CD25)
- Cement mill #1 reject (ES-FME26) with associated bagfilter (CD26)
- Cement mill #1 transport (ES-FME27) with associated bagfilter (CD27)
- Cement mill #2 feed (ES-FME28) with associated bagfilter (CD28)
- Cement mill #2 recirculation bin (ES-FME29) with associated bagfilter (CD29)
- Cement mill #2 reject (ES-FME30) with associated bagfilter (CD30)
- Cement mill #2 transport (ES-FME31) with associated bagfilter (CD31)
- Exhaust from finish mill #1 (ES-FME45A) with associated bagfilter (CD45A)
- Exhaust from finish mill #2 (ES-FME45B) with associated bagfilter (CD45B)
- Cement additive bin (ES-FME46) with associate bagfilter (CD46)
- Cement additive intake (ES-FME47) with associate bagfilter (CD47)
- Gypsum/limestone unloading (ESFMEF8TU)
- Gypsum/limestone hopper/feeder (ES-FMF8HF)
- Gypsum/limestone belt conveyor transfer (ES-FMF8BCT)
- Gypsum/limestone belt conveyor transfer

1. Description: The Raw Mill Handling System (RMHS**)** system stores and transports the raw materials and reusable kiln dust to the raw mill for the Portland Cement process.

   The clinker handling process is the final process in the production of Portland Cement prior to the finish mills. PM/PM10 emissions are controlled by bagfilters that vent directly to the atmosphere versus being routed to the main stack.

   The finish mills take the cooled clinker and grind it into a fine gray powder. Gypsum and other materials are interground with the clinker add special properties to the cement. PM/PM10 emissions are controlled by bagfilters that vent directly to the atmosphere versus being routed to the main stack.

2. Applicable Regulatory Requirements:
   In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated.

The following provides a summary of limits and/or standards for the emission sources described above

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Bagfilter with outlet grain loading of 0.005 gr/scf (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

H. Cement handling, Storage, and Loadout (CHSL)
- Cement dome with associated bagfilter (CD32)
- Cement dome extraction rail with associated bagfilter (CD33)
- Cement dome extraction truck with associated bagfilter (CD34)
- Cement silo with associated bagfilter (CD40)
- Cement silo extraction with associated bagfilter (CD41)
- Cement transport with associated bagfilter (CD42)
- Packaging plant with associated bagfilter (CD43)
- Screw conveyor and truck load-out spout (CDP30)

1. Description: The cement handling, storage, and load out system prepares the final product for shipment offsite. PM/ PM10 emissions are controlled by bagfilters that vent directly to the atmosphere versus being routed to the main stack.

2. Applicable Regulatory Requirements:
   The Cement Handling, Storage, and Loadout System is subject to both the MACT, Subpart LLL "National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry" and NSPS Subpart F "Standards of Performance for Portland Cement Plants". However, according to 40 CFR §63.1356 and 40 CFR §60.62(d), when sources are subject to two regulations with different emission limits under Title 40, the more stringent requirements apply.

   Neither the MACT Subpart LLL nor the NSPS Subpart F have a particulate emission rate standard for the miscellaneous emission points at a Portland Cement Plant. But since 15A NCAC 2D .0530 has a BACT outlet grain loading to control the emissions of PM, the PM emissions will be subject to the BACT for particulate emissions. State Regulation 15A NCAC 2D .0515 will not apply.

The following provides a summary of limits and/or standards for the emission source(s) described above.

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Outlet grain loading not to exceed 0.005 gr/scf (See Multiple Emissions Section IX. A.)	15A NCAC 2D .0530 PSD (BACT)

I. Kiln System: One coal/petroleum coke-fired, (distillate fuel used for startup only) multi-stage preheater-precalciner kiln @ 675 million Btu per hour heat input capacity with inline raw mill, coal mill, alkali bypass and inline clinker cooler with associated selective non-catalytic reduction (SNCR, CD44N), one bagfilter (CD44A), one carbon injection system/bagfilter (CD44D), one coal mill bagfilter (CD44B), one preheater bypass bagfilter (CD44C), and one wet scrubber (CD44S).

1. Description:
   The preheater tower at this facility contains a series of vertical cyclone chambers through which the raw materials pass on their way to the kiln. In the preheater/precalciner stage, materials are heated up to temperatures just below the melting or fusion point. Pulverized coal or pet coke is injected and burned in the preheater/precalciner section. 60% of the total heat input for the system occurs in this section.

Raw preheated material enters the rotating furnace called a kiln. This system transforms the raw mix into red-hot clinkers. Emissions from the preheater/precalciner kiln system exit the main stack after being treated by a Selective Non Catalytic Reduction system (SNCR, for NOx), one main bagfilter (for filterable PM10/PM2.5, CD44A), one Activated Carbon Injection System (for Hg), one Activated Carbon bagfilter, and one wet scrubber (for SO_2). Emissions from the coal mill are routed through the Coal Mill Baghouse (CD44B) before joining the exhaust stream from the kiln just upstream of bagfilter CD44D and one wet scrubber CD44S.

2. Applicable Regulatory Requirements:
In accordance with the DAQ procedure for an 18 month extension request, BACT will be re-evaluated for the kiln system.

The following provides a summary of limits and/or standards for the emission source s described above.

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate emissions (PM10/PM2.5)	Combined filterable particulate emissions from the kiln/inline raw mill/ inline clinker cooler main stack shall not exceed PM10/PM2.5 emissions as calculated by the following equation: $PM_{alt} = \frac{0.002 \times 1.65 \times (Q_k + Q_c + Q_{ab} + Q_{cm})}{7000}$	15A NCAC 2D .0530 PSD (BACT)
Particulate emissions (Condensable PM10/PM2.5)	Condensible PM10/PM2.5 emissions shall not exceed 0.08 lbs/ton of clinker, or the Permittee shall demonstrate a 50 percent removal across the wet scrubber using Method 202	15A NCAC 2D .0530 PSD (BACT)
Particulate emissions (PM10/PM2.5) (startup/shutdown)	Work practice standards	15A NCAC 2D .0530 PSD (BACT)
Sulfur dioxide	Combined emissions from the kiln/inline raw mill/inline clinker cooler/ coal mill shall not exceed 0.4 lbs per ton of clinker, 30 day rolling average as measured by a Continuous Emissions Monitor or demonstrate a 90% SO_2 control efficiency across the SO_2 control device (wet scrubber)	15A NCAC 2D .0530 PSD (BACT)
Nitrogen dioxide	Combined emissions from the kiln/inline raw mill/inline clinker cooler/coal mill shall not exceed 1.40 pounds per ton clinker, 30 day rolling average as measured by a Continuous Emissions Monitor	15A NCAC 2D .0530 PSD (BACT)
Carbon monoxide	Combined emissions from the kiln/inline raw mill/inline clinker cooler/coal mill shall not exceed 2.80 lbs per ton of clinker, 30 day rolling average as measured by a Continuous Emissions Monitor	15A NCAC 2D .0530 PSD (BACT)
Volatile organic compounds (VOCs)	Combined emissions from the kiln/inline raw mill/inline clinker cooler/coal mill shall not exceed 0.16 lbs per ton of clinker, 30 day rolling average as measured by a Continuous Emissions Monitor	15A NCAC 2D .0530 PSD (BACT)
GHGs	Combined emissions from the kiln/inline raw mill/inline clinker cooler/coal mill/emergency generator shall not exceed 0.91 tons CO_{2e} per ton of clinker, 12-month calendar average, in accordance with 40 CFR Part 98	15A NCAC 2D .0530 PSD (BACT)

IX. Best Available Control Technology (BACT)

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT. BACT is defined both in the CAA (§169) and in the rules as follows [40 CFR 51.166(b)(12)]:

> An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the federal EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that particular case. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the degree of expected air quality impacts." (emphasis added). The EPA has issued additional DRAFT guidance suggesting the use of a "top-down" BACT determination method. While the EPA Environmental Appeals Board recognizes the "top-down" for delegated state agencies, this procedure has never undergone rulemaking and as such, the "top-down" process is not binding on fully approved states, including North Carolina. The Division prefers to follow closely the statutory language when making a BACT determination and therefore the BACT determination is based on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in EPA's final October 1980 PSD Workshop Manual, each case is different and the state must decide how to weigh each of the various BACT factors. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

> The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site. In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision. This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities to judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility.
>
> If, under the design that a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction, or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.

One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country is not applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons.

> For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level. [emphasis added]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology.

Legislative History of the Clean Air Act Amendments of 1977.

As described above, BACT determinations are site specific and require a case-by-case analysis. North Carolina relies on the statutory language of BACT while EPA relies primarily on a draft 1990 document. As a result of these divergent approaches, it is expected that North Carolina's decisions might not always coincide with those of the federal EPA.

A. BACT for Particulate Matter

While Federal EPA guidance is ambivalent on the definition of PM, NCDAQ requires that both filterable and condensable components be considered as PM. A BACT analysis was conducted for PM10/PM2.5 (filterable and condensable). Condensable particulate consists of particulate matter that is less than or equal to 2.5 microns in diameter and is not filterable at process temperatures.

<u>Sources of PM10/PM2.5</u>
Filterable PM10/PM2.5 at a Portland Cement plant is emitted from process sources (i.e., kilns, coolers, mills, haul roads, material handling, mining operations, quarry operations, transfer points), condensable PM10/PM2.5 is emitted from combustion sources (ie. kiln, generator) and fugitive dust sources are emitted from paved roads, unpaved roads, and quarrying operations.

Process sources of filterable PM10/PM2.5 from the project include:
- Raw material handling and storage
- Solid fuel handling and storage
- Raw material milling and blending
- Pyroprocessing (kiln and clinker cooler)
- Clinker and gypsum handling and storage
- Cement finish grinding
- Cement handling and loadout.

Process sources of condensable PM10/PM2.5 will be emitted by the combustion sources at the plant.
- Kiln/Precalciner
- Emergency generator

Fugitive sources of PM10/PM2.5 from the proposed project include:
- Quarrying operations (drilling, blasting, marl ripping, and truck loading)
- Truck and loader traffic on unpaved roads
- Truck traffic on paved roads
- Material transfer points
- Wind erosion from storage piles.

Section 1 – Identification of Control Options

One of the resources North Carolina uses to identify candidate technologies is the RBLC database. Any reliance on the RBLC beyond the identification of candidate technologies is not recommended. The RBLC typically does not include sufficient documentation to determine if any particular emission rate has been achieved in practice or demonstrated. Additionally, the RBLC fails to provide how each permitting agency considered the statutorily required environmental, economic, and energy impacts of the various candidate technologies. Without this information the best use of the RBLC is to identify technologies that might work to reduce a regulated NSR pollutant.

In addition to the RBLC, the NCDAQ also reviewed the most recently revised MACT and NSPS for cement plants and the NSPS for reciprocating internal combustion engines to determine what controls were evaluated as potential candidate technologies. A review was made of other Portland Cement Plants (Universal Cement and Ravena Plant Modernization) with new preheater/precalciner kilns that have been permitted since the 2010 MACT revision (effective date = November 8, 2010) and permitted since the issuance the PSD construction and operation permit (07300R09) for the Carolinas Cement Company. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

Emergency Generator (ID No. ES-GEN)

The recently revised (January 30, 2013) New Source Performance Standard (NSPS), Subpart IIII does not contain any review of new commercially available technology for reducing PM emissions from reciprocating internal combustion engines.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit reveals the PSD/BACT for the emergency generator proposed for this facility is the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII. The Ravena Modernization Plant did not trigger PSD/BACT for PM10/PM2.5.

Review of the RBLC database for permits issued or drafted since the November 2010 NSPS, Subpart F and MACT, Subpart LLL revisions yielded good combustion practices and the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII as BACT. {RBLC data base results: IA-0105, WY-0070, AK-0076, NJ-0079, MI-0395, MI-0394, LA-0254, SC-0113, MI-0402, FL-0328, CA-1212, FL-0332, AK-0072, FL-0327, LA-0251, FL-0322, AK-0071, AK-0073}

Conclusion:

BACT for the emergency generator is still the purchasing of a certified RICE in accordance with 40 CFR Part 60, Subpart IIII as previously determined.

Quarrying Operations –Fugitive Dust

Quarrying operations include drilling, blasting, ripping, and loading of limestone rock and marl into loaders for transport to the primary crusher hopper. BACT for unenclosed quarrying sources is generally control of particulate matter emissions by inherent or applied moisture. It should be noted that the quarry materials at the CCC plant are naturally wet (typically > 15% moisture) and as such additional suppressive spray is not necessary at all times.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. The Ravena Plant Modernization project did not trigger PSD/BACT for PM, and the Universal Cement Company does not have a Quarry.

Conclusion:

BACT for fugitive PM10/PM2.5 in the Quarrying Operations is the same as currently listed in the existing permit.

Paved Roads – Fugitive Dust

The control technologies that are technically feasible for controlling PM10 emissions from paved roads include watering (flushing with water), vacuum sweeping, or a combination of these methods. Primary roadways into and throughout the cement plant will be paved. All paved roadways will remain paved throughout the life of the project.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit and the Ravena Plant Modernization reveals that neither facility had a PSD/BACT control plan for fugitive dust from regularly traveled roads on the plant site. The Universal Cement facility did however have state required control technology for fugitive dust.

Conclusion:

BACT for fugitive PM10/PM2.5 from paved regularly traveled roads is the same as currently listed in the existing permit.

Unpaved Roads – Fugitive Dust

The control technologies that are technically feasible for controlling PM10 emissions from unpaved roads include paving, watering, and application of chemical dust suppressants. Due to the constant changes in quarrying activities, travel routes in a quarry are routinely changing. Therefore, paving roads in an active quarry is technically infeasible. The roads within the quarry area will remain unpaved. Vehicle traffic on these roads will be limited to haul trucks and loaders carrying limestone to the primary crusher and vehicles transporting overburden.

PM10 emissions from unpaved roads can be controlled by watering or chemical dust suppression methods. Studies have shown that on heavily traveled unpaved roads, chemical suppression methods are as effective as watering at regular intervals. Quarries are naturally wet, therefore eliminating the need to water these roads under normal conditions.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit and the Ravena Plant Modernization reveals that neither facility had a PSD/BACT control plan for fugitive dust from unpaved roads on the plant site. The Universal Cement facility did however have state required control technology for fugitive dust.

Conclusion:

BACT for fugitive PM10/PM2.5 from unpaved regularly traveled roads is the same as currently listed in the existing permit.

Transfer Points, Handling Systems, Storage Piles

Definition: A transfer point means a point where any material including but not limited to feed material, fuel, clinker or product, is transferred to or from a conveying system, or between separate parts of a conveying system.

Definition: Storage piles are used to temporarily accumulate amounts of material prior to being placed into one of the process handling systems at the cement plant.

Definition: Handling systems move materials using mechanical devices by loading and unloading them at Portland Cement plants.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit and the Ravena Plant Modernization reveals these facilities relied on best management practices in accordance with MACT Subpart LLL.

Point Sources other than the kiln system

- Coal handling system
- Raw material handling system
- Clinker handling and storage
- Finish mills
- Cement handling and storage

Conclusion:
BACT for fugitive PM10/PM2.5 from the point sources other than the kiln system, transfer points, handling systems, and storage piles is the same as currently listed in the existing permit.

Preheater/precalciner/kiln with inline raw mill/inline coal mill
There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that has been permitted since the 2010 revision of the MACT for Portland Cement plants.

The Universal Cement Plant that will be located in Chicago, IL is a new greenfield facility that evaluated BACT for PM. The information for this facility was reviewed in the RBLC database, and at the following sites:

- http://www.epa.state.il.us/public-notices/2011/universal-cement/project-summary.pdf - project summary
- http://www.epa.state.il.us/ public-notices/2011/ universal-cement/construction-permit.pdf – air permit.

The Ravena Plant Modernization that is located in Ravena, New York is a modernization of an existing plant (replace two existing wet kilns with preheater/precalciner kiln). This facility did not trigger PSD review for PM10/PM2.5 but was required to comply with the MACT PM10/PM2.5 value of 0.01 lbs/ton of clinker. Since the numerical value and averaging time of the MACT was changed in the most recent revision, the Ravena Plant permit will be revised to match the new revised MACT standard. The information for this facility was reviewed in the RBLC database and at website:

- http://lafargeravenafacts.com/documents/permits/2011.07.19b.Findings.Final.pdf

In the previous BACT analysis the following PM10/PM2.5 control options for the kiln system were evaluated:

- Fabric filter system
- Electrostatic precipitator
- Wet scrubbing
- Cyclone collectors and inertial separator systems
- Water sprays, enclosures and other PM10 control systems

Currently, a fabric filter system containing membrane bags constitutes BACT for filterable PM10/PM2.5. The US EPA indicated in the 2010 revision of the MACT for Portland Cement plants that these bags are required to achieve the lowest emission rate in the best performing precalciner/kiln system. By definition, BACT cannot be less stringent than a Federal Standard for the same type of process. A wet scrubber was chosen as BACT to remove condensable PM10/PM2.5.

Summary PSD Projects (preheater/precalciner/kiln/inline raw mill/inline coal mill) – PM10/PM2.5

Company Name	Location	New or Mod. (primary fuel burned)	Control Technology (removal efficiency)	BACT Limit
Universal Cement (RBLC: IL-0111) Cook County	Chicago, IL (not yet constructed) Region 5	New Greenfield (Coal, pet coke, scrap tires) Separate stacks from kiln and clinker cooler	Fabric filter baghouse Fabric filter baghouse	TPM_{10} = 0.01 lbs/ton clinker (kiln) 30-day rolling average TPM10 = 0.14 lbs/ton clinker (kiln) 3-hour rolling average TPM_{10} = 0.01 lbs/ton clinker (cooler) 30-day rolling average
Carolinas Cement New Hanover Co.	Castle Hayne, NC (not yet constructed) Region 4	New process @ exist. facility (Coal, pet coke) Combined stacks for kiln, coal mill, clinker cooler, and alkali bypass	Calculated by equation	TPM_{10} = 0.0145 lbs/ton clinker (kiln system) **
Ravena Plant Modernization Albany County	Ravena, New York (not yet completed)	Modernization @ exist. Facility (coal, pet coke) Combined stack of kiln and clinker cooler after scrubber. Each source has its own bagfilter.	Did not trigger PSD/BACT	Did not trigger BACT Must meet the MACT limit of 0.01 lbs PM/ton clinker with 30 day rolling average.

The following equation was listed in the construction and operation permit (07300R09) for Carolinas Cement Company for the PM BACT emission limit. This equation is based on the usage of a 30 day rolling average and for a kiln system that has both an inline precalciner/kiln/clinker cooler.

** $$PM_{alt} = \frac{0.0008 \times 1.65 \times (Q_k + Q_c)}{7000}$$

(Q_k = exhaust flow of kiln measured in dscf/ton raw feed)

(Q_C = exhaust flow of clinker cooler measured in (dscf/ton raw feed)
TPM_{10} = Total PM_{10}

Since the issuance of the initial construction and operation permit (7300R09) for Carolinas Cement Company, the USEPA has issued revised final regulations for MACT 40 CFR Part 63, Subpart LLL and NSPS 40 CFR Part 60, Subpart F for Portland Cement plants. In these regulations the USEPA has re-evaluated the allowable particulate emissions (surrogate for non-volatile HAP metals) that are emitted from preheater/precalciner /kilns with inline raw mills, inline coal mills, and alkali by-passes. The revised standard is based on a different averaging time due to compliance problems associated with the 30 day averaging time.

In FR Volume 75, pages 54992 and 55020, September 9, 2010 the USEPA established standards for PM by converting the normal operation standards to a concentration basis. In setting the NESHAP limit the EPA reviewed test data from a number of facilities. The NESHAP limit was based on a 30 day rolling average which allows facilities to average out potential short term transients.

The EPA's conversion for PM emissions from new kiln systems without inline clinker coolers in the 2010 revision was: 0.01 lb PM/ton clinker is equivalent to a 0.0008 gr/dscf outlet grain loading. This is based on a volumetric flow and feed-to-clinker ratio of 54,000 dscf/ton of feed and 1.65 tons feed/ton clinker, respectively.

The EPA revised the PM emission limitation for new kilns in the MACT in February 2013 and this revised regulation was published in the federal register with an effective date of February 12, 2013. The revision was necessary because the compliance method that relied on 30 days of monitoring was flawed. According to the EPA, the methodology could not be accurate for the duration of the averaging time for various reasons. As a result, the EPA revised the compliance method by eliminating the 30 day requirement and instead requiring compliance to be demonstrated using Method 5 (1-hour duration) or Method 5I (2-hour duration) to show compliance.

Because the number of test results taken for a compliance test affects the stringency of the standard, the EPA recalculated the performance of the top performing kiln. The EPA calculated the upper predicted level of the top performing kiln by applying a 99% confidence level to the three (3) test values as opposed to the 30 values generated under the previous compliance method. Because three values gives rise to greater uncertainty the calculated emissions from the top performing kiln is higher. (see 75 FR 54988).

The USEPA used the same data as used to establish the 2010 floor which represented the best controlled similar source as required by section 112(d)(3) by placing the information into the Upper Predictive Limit (UPL) Equation, with the averaging time no longer expressed as a 30 day rolling average but rather as the average of three test runs (see Portland Cement Reconsideration Technical Support Document, June 15, 2012, Docket item EPA–HQ–OAR–2011–0817 page 45 of 237 and Federal Register,/Vol. 75, No. 174/Thursday, September 9, 2010/Rules and Regulations, page 54975).

$$UPL = x + t(0.99, n-1) \times \sqrt{s^2 \times \left(\frac{1}{n} + \frac{1}{m}\right)}$$

Where:
x = the mean of the sample data set
n = the number of test runs
m = the number of test runs in the compliance average
s^2 = observed variance
t = student t distribution statistic

This calculation was performed using the following Excel functions:
Normal distribution = 99 percent
UPL = AVERAGE (Test Runs) + [STDEV (Test Runs) x TINV (2 x probability, n-1 degrees of freedom) *SQRT ((1/n) + (1/m))], for a one tailed t-value, probability of 0.01, and sample size of n

The value of ‘‘m’’ denotes the number of future observations, and it is used to calculate an estimate of the variance of the average of m-future observations. For example, if 30-day averages are used to determine compliance (m = 30), the amount of variability in the 30-day average is much lower than the variability of the daily measurements in the data base, which results in a lower UPL for the 30-day average.

EPA finalized the following equation to calculate PM emissions from “new” kiln systems that contained inline clinker coolers, inline alkali bypass systems, and inline coal mills.

$$PM_{alt} = \frac{0.002 \times 1.65 \times (Q_k + Q_c + Q_{ab} + Q_{cm})}{7000}$$

Where:

PM_{alt}	=	The alternative PM emission limit for commingled sources.
0.002	=	The PM exhaust concentration (grains per dry standard cubic feet (gr/dscf)) equivalent to 0.02 lb per ton clinker where clinker cooler and kiln exhaust gas are not combined.
1.65	=	The conversion factor of lb feed per lb clinker.
Q_k	=	The exhaust flow of the kiln (dscf/ton feed).
Q_c	=	The exhaust flow of the clinker cooler (dscf/ton feed).
Q_{ab}	=	The exhaust flow of the alkali bypass (dscf/ton feed).
Q_{cm}	=	The exhaust flow of the coal mill (dscf/ton feed).
7000	=	The conversion factor for grains (gr) per lb.

If exhaust gases for any of the sources contained in the equation are not commingled and are exhausted through a separate stack, their value in the equation would be zero.

As stated previously, the USEPA used the same data to establish the 2013 new source floor as used to establish the 2010 floor which represented the best controlled similar source as required by section 112(d)(3). The USEPA chose a facility located in Lucerne Valley, California named Mitsubishi Cement Cushenbury plant for which they had representative data. This facility was first built in 1982 and updated in the 1990s. This plant is similar to the Carolinas Cement plant but does not have an inline clinker cooler with the kiln. [ref. operation permit of Mitsubishi Cement]. After placing the information into the Upper Predictive Limit (UPL) Equation, with the averaging time no longer expressed as a 30 day rolling average but rather as the average of three test runs, the EPA calculated an outlet grain loading of 0.002 grains/dscf to be equivalent the best control technology for PM emissions from a kiln.

Conclusion:

The Division of Air Quality agrees with the methodology, and research used by the USEPA to identify the control technology that best represents the maximum control available for PM emissions from new precalciner/kilns using the statutory procedures for developing new source MACT. DAQ remains unconvinced that BACT for filterable PM would be as stringent as this value were it not for the statutory requirement that BACT can be no less stringent than emission standards under CAA Section 111 or 112. Consequently, the BACT limit will be the same as the limit required under the MACT.

PM10/PM2.5 -Startup and Shutdown

BACT for filterable particulate emissions (PM10/PM2.5) during startup and shutdown is listed as follows in the current permit:

"filterable particulate emissions shall not exceed 0.0008 gr/dscf, 7-day rolling average, as determined by a PM CEMS."

In the most recently revised MACT standard for Portland Cement manufacturing the USEPA clarified that shutdown means the cessation of kiln operation. Shutdown begins when feed to the kiln is halted and ends when continuous kiln rotation ceases. Startup means the time from when a shutdown kiln first begins firing fuel until it begins producing clinker. Startup begins when a shutdown kiln turns on the induced draft fan and begins firing fuel in the main burner. Startup ends when feed is being continuously introduced into the kiln for at least 120 minutes or when the feed rate exceeds 60 percent of the kiln design limitation rate, whichever occurs first. PM10/PM2.5 (HAP surrogate) emissions from cement kilns are attributable almost entirely to one or the other of these feeds, with raw materials contributing the great preponderance. In addition, kilns burn fuels during startup and shutdown which are cleaner than coal and coke (No. 2 fuel oil at CCC). Thus, PM10/PM2.5 emissions during startup and shutdown necessarily should be far less than the numerical limits in the standards since the kiln will not be introducing raw materials, and will be burning fuels which are cleaner than its normal fuels.

Accordingly, the EPA changed the means of monitoring for compliance with the startup and shutdown standards in the revised MACT. Rather than requiring the monitoring by a CEM or by stack testing, the EPA mandated work practice standards during startup and shutdown, including:

1. Must use clean fuels for startup,
2. Primary fuel cannot be used until the kiln temperature reaches 1200 degrees F.
3. Must operate all air pollution control devices prior to combusting fuels.
4. Maintain records during periods of startup and shutdown.

Conclusion:
The DAQ agrees with the EPA's decision to change the definition and requirements of startup and shutdown at a Portland Cement facility. Consistent with this change in the definition of startup and shutdown, DAQ is changing the BACT for the Carolinas Cement facility to work practice standards in accordance with the revised regulation in 40 CFR Part 63, Subpart LLL.

B. BACT for SO_2

------------------------------------SULFUR DIOXIDE (SO_2) BACT Analysis --

The sources of sulfur oxides (SOx) associated with the proposed project are the preheater/precalciner kiln system, and the one Diesel fuel-fired emergency generator. Sulfur oxides, mainly SO_2, are generated from the sulfur compounds in the raw materials and from sulfur in fuels used to fire the preheater/precalciner kiln system. SO_2 emissions from the emergency generator are directly related to the sulfur content in the Diesel fuel.

SO_2 is both liberated and absorbed throughout the pyroprocessing system, starting at the raw mill, continuing through the preheating/precalcining and burning zones, and ending with clinker production. Sulfides from the raw material (limestone rock) are the predominant source of SO_2. A smaller quantity of SO_2 is liberated from sulfates in fuel, and this SO_2 is more readily absorbed into the kiln feed material and product (clinker) matrix. Coal and petroleum coke are the primary fuels in the kiln system at this facility.

The raw mill and preheater/precalciner use kiln exhaust gases to heat and calcine the raw feed before it enters the kiln. The counter flow of raw materials and exhaust gases in the raw mill and preheater and precalciner, in effect, act as an inherent dry scrubber to control SO_2 emissions creating $CaSO_3$ and $CaSO_4$.

Section 1 - Identification of Control Options – SO_2

One of the resources North Carolina uses to identify candidate technologies is the RBLC database. Any reliance on the RBLC beyond the identification of candidate technologies is not recommended. The RBLC typically does not include sufficient documentation to determine if any particular emission rate has been achieved in practice or demonstrated. Additionally, the RBLC fails to provide how each permitting agency considered the statutorily required environmental, economic, and energy impacts of the various candidate technologies. Without this information the best use of the RBLC is to identify technologies that might work to reduce a regulated NSR pollutant.

In addition to the RBLC, the NCDAQ also reviewed the recently revised MACT and NSPS for cement plants and the NSPS for reciprocating internal combustion engines to determine what controls were evaluated as potential candidate technologies. A review was also made of other Portland Cement Plants (Universal Cement and Ravena Plant Modernization) with new preheater/precalciner kilns that have been permitted since the 2010 MACT revision (effective date = November 8, 2010) and permitted since the issuance the PSD construction and operation permit (07300R09) for the Carolinas Cement Company. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

Emergency Generator (ID No. ES-GEN)

The recently revised (January 30, 2013) New Source Performance Standard (NSPS), Subpart IIII does not contain any review of new commercially available technology for reducing SO_2 emissions from reciprocating internal combustion engines.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit reveals the PSD/BACT for the emergency generator proposed for this facility is the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII. The Ravena Modernization Plant did not trigger PSD/BACT for SO_2.

Review of the RBLC database for permits issued or drafted since the November 2010 NSPS, Subpart F and MACT, Subpart LLL revisions yielded good combustion practices and the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII as BACT. {RBLC data base results: IA-0105, WY-0070, AK-0076, NJ-0079, MI-0395, MI-0394, LA-0254, SC-0113, MI-0402, FL-0328, CA-1212, FL-0332, AK-0072, FL-0327, LA-0251, FL-0322, AK-0071, AK-0073}

SO_2 emissions from the emergency generator will be limited by the usage of ultra low sulfur Diesel fuel as specified in the NSPS standards for reciprocating internal combustion engines. BACT for the emergency generator is still the purchasing of a certified RICE unit in accordance with 40 CFR Part 60, Subpart IIII as previously determined.

Preheater/precalciner/kiln with inline raw mill/inline coal mill

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that has been permitted since the 2010 revision of the MACT for Portland Cement plants.

The Universal Cement Plant that will be located in Chicago, IL is a new Greenfield facility that was evaluated for LAER for NOx and SO_2. The selected control technology for SO_2 is a circulating fluidized bed absorber along with the inherent scrubbing in the Portland Cement manufacturing process. The information for this facility was reviewed in the RBLC database, and at the following websites:

- http://www.epa.state.il.us/public-notices/2011/universal-cement/project-summary.pdf - project summary
- http://www.epa.state.il.us/ public-notices/2011/ universal-cement/construction-permit.pdf – air permit.

The Ravena Plant Modernization that is located in Ravena, New York is a modernization of an existing plant (replace two existing wet kilns with preheater/precalciner kiln). This facility did not trigger PSD review for SO_2 because of the overall reductions per the modification project. The information for this facility was reviewed in the RBLC database and at website:

- http://lafargeravenafacts.com/documents/permits/2011.07.19b.Findings.Final.pdf

In the previous BACT analysis the following SO_2 control options were evaluated: inherent dry scrubbing (integral to the process), use of low sulfur feed materials, increased oxygen levels, wet scrubbing, wet absorbent addition, dry absorbent addition, D-SOX cyclone, lime hydrator, and various combinations of these technologies. Wet scrubbing was determined to be BACT at an emission limit of 0.40 lb/ton clinker.

There are recent developments in SO_2 abatement technology that are commercially available and their effectiveness documented in other industries. As part of this 18 month extension request and BACT review process, these “dry scrubbing” technologies may be potentially considered as alternatives for a wet scrubber on a cement kiln for SO_2 control. These technologies will be applied in a reaction vessel coupled with a dust collection system.

These technologies consist of:

- Slurried hydrated lime injection,
- Semidry hydrated lime injection, and
- Humidified hydrated lime injection;

1.1 Slurried Hydrated Lime Injection (SLI)

Slurried hydrated lime injection (SLI) involves the injection of small water droplets into a hot gas stream containing a calcium hydroxide [$Ca(OH)_2$] suspension. The water droplets adsorb SO_2 forming sulfurous acid which reacts with dissolved Ca $(OH)_2$ forming calcium sulfite and calcium sulfate. The droplet is evaporated to dryness resulting in a solid particle which is removed by a cyclone and fabric filter. Limitations of the process include:

a. Must inject the lime slurry into a gas stream with sufficient temperature to completely evaporate the water droplets.
b. Limitation of lime hydroxide solids content of the droplet allowing for generation of aerosol droplets.
c. Must allow adequate Ca $(OH)_2$ introduction to produce the required stoichiometric ratio for SO_2 removal.
d. Must allow sufficient residence time to allow complete evaporation of water droplets.

The process typically is applied at the outlet of the preheater where gas temperatures are 600-800°F and a conditioning tower or duct may be constructed for adequate residence time (2-3 seconds). This technology is not applicable for use after the raw grinding mill where temperatures are typically less than 220°F (mill-in). The water droplets cannot be evaporated sufficiently to prevent high moisture in the resulting dust layer on the fabric filter bags.

1.2 Semidry Hydrated Lime Injection / Gas Suspension Absorber (GSA)

The gas suspension absorber (GSA) SO_2 removal process involves the injection of a calcium hydroxide [$Ca(OH)_2$] slurry in a gas stream at a temperature of greater than 300-350°F at a solids concentration of 25% solids. The droplets are evaporated and a solid product produced. Solids are removed by a cyclone and fabric filter. A portion of the solids are recirculated to increase reaction efficiency. Limitations of the process include:

a. Must inject the lime slurry into a gas stream with sufficient temperature to completely evaporate the water droplets.
b. Must cool the gases to within 15°F of the moisture dew point for effective SO_2 removal.

This technology is not typically applicable for use after the raw grinding mill where temperatures are less than 220°F (mill-in). The water droplets cannot be evaporated sufficiently to prevent high moisture in the resulting dust layer on the fabric filter and associated "bagblinding" problems. Where hot kiln gas can be bypassed around the mill in mill-down condition, there is the technical possibility of use.

1.3 Humidified Lime Hydrate Injection (Enhanced All-Dry Scrubber System)

A new process has become commercially available in which a humidified (activated) calcium hydrate [$Ca(OH)_2$] is injected into the gas stream at a high Ca/S ratio. The reagent is captured on the fabric surface in a pulse jet fabric filter. The reagent is recovered, re-humidified in a rotary tumbler and re-injected to the filter inlet. Water coating the reagent particle surface adsorbs SO_2 forming sulfuric acid on the surface of the lime particle which forms calcium sulfite and calcium sulfate. The amount of water used is low on a weight percentage basis and reduces gas stream temperature to optimum SO_2 adsorption temperature.

Section 2 – Evaluation of SO_2 Control Options

Each control technology is considered as to whether it is commercially available and/or feasible based on physical, chemical, and engineering principles.

2.1 Slurried Hydrated Lime Injection (SLI):

At this time, no example of slurried hydrated lime injection (SLI) has been found applied at the exit of a raw grinding mill for a cement kiln. The mill exit gas temperature (i.e., 193°F) during mill-in conditions does not provide sufficient heat to evaporate the slurry. It would be possible to fire natural gas at the mill inlet to increase mill outlet temperatures but this would have adverse economic consequences due to increased fuel cost. In addition, increased fuel usage would result in increased PSD pollutants CO_2, NOx, and CO emissions.

2.2 Semidry Hydrated Lime Injection/Gas Suspension Absorber (GSA):

A review of recent PSD permits for cement kiln SO_2 control indicates that one company (Universal Cement, Chicago IL) has proposed to install an FLSmidth (FLS) Gas Suspension Absorber (GSA) on a new preheater-precalciner kiln. This would be the first GSA unit to be installed on a cement kiln in the U.S. The permit application for UC provides limited data for the design and operating parameters and these must be inferred from FLS literature and engineering practice. The inlet gas temperature to the GSA is estimated to be >300°F with an outlet temperature of 180°F and 19.5% moisture. The relatively high inlet temperature allows evaporation of water from the slurry. The estimated SO_2 removal across the GSA is estimated to be 77.5%, with raw mill on, based on the following assumptions:

a. All fuel sulfur is captured in the kiln system and not released as SO_2;
b. Sulfate sulfur in raw meal is not released as SO_2;
c. Sulfide sulfur is approximately 50% of raw meal sulfur;
d. Approximately 60% of raw meal sulfide is captured in the preheater tower; and
e. 50% of SO_2 in the preheater exhaust is captured in the raw grinding mill.

The resulting mill-in GSA inlet SO_2 is estimated to be 259 lb/hr, and the mill-out GSA inlet SO_2 is estimated to be 519 lb/hr without supplemental lime injection. The permit limit is 58.33 lb/hr; therefore GSA removal is estimated to be 77.5% with mill-in. With mill-out, the required removal efficiency would be 88.8%, employing both the GSA and hydrated lime injection. The UC application indicates that the SO_2 abatement would include hydrated lime injection to the preheater. It is assumed that lime injection would be required to reduce the GSA inlet loading to 259 lb/hr during the mill-out condition when the high removal efficiency required to meet the 58.33 lb/hr SO_2 emission limit would not otherwise be achieved. The stated SO_2 control efficiency in the Universal Cement permit application is misleading in that it refers to the overall (raw materials and fuel) sulfur balance (as SO_2) as 98% removal (including inherent absorption) and does not provide the proportion of specific removal of SO_2 in the GSA.

A GSA system was installed as a retrofit technology at the Norcem AS, Brevik cement plant in Norway in 2010. The unit controls emissions from a partial kiln exhaust which does not pass through a raw mill, so the inlet gas is maintained at a favorable temperature of approximately 325°F. This unit has reported an SO_2 removal rate of 97% and HCl removal rate of 95%, for the portion of the exhaust gas that actually passes through the GSA, based on limited testing. Such performance would not be expected at the normal operating temperature for Carolinas Cement of 193°F with mill-in, since higher temperatures are needed for evaporation of slurry water to allow SO_2 removal with a GSA system.

2.3 Enhanced All-Dry Scrubber System (EAD):

Fives Solios has developed an SO_2 abatement system (enhanced all-dry scrubbing) and has installed it on several industrial processes (brick, clay, calciners, lime kiln, boilers, etc.). As of 2010, eight full scale systems have been installed in the U.S., but none yet on a cement kiln. The typical inlet temperature for the proven applications is between 275°F and 400°F, compared to 193°F mill-in and 539°F mill-out for Carolinas Cement. An EAD system has been operating on a preheater lime kiln (Graymont Lime, Pleasant Gap, PA) since 2008. Vendor literature advertises 95% SO_2 removal and 0.01 gr/scf particulate (exceeding the Portland cement NSPS PM limit). In comparison with the cement kiln, the lime kiln does not have an in-line raw mill or precalciner, uses a gravity cascading preheater (not cyclones), and the kiln feed material is coarser and has a simpler chemical composition (i.e., limestone without additives). The residuals produced by the EAD will contain calcium sulfite [$Ca(SO_3)$], calcium sulfate [$Ca(SO_4)$] and unreacted lime hydrate [$Ca(OH)_2$]. These residuals cannot be used to replace gypsum in cement finish mills and would require disposal in a landfill.

In a new cement kiln application using EAD, it is expected that a separate fabric filter for mercury (Hg) removal would not be required. Activated carbon injection (ACI) would be combined with the EAD SO_2 removal system and both pollutants would be removed by the EAD baghouse. One constraint of the design is that the gas temperature must be below 300°F for optimum SO_2 capture, which is lower than the current Carolinas Cement Company design temperature with mill-out. The gas temperature would need to be reduced during mill-out periods by increased gas cooling using water injection at the outlet of the preheater, or the use of dilution air.

2.3.1 EAD Applied to Carolinas Cement:

As part of the BACT review, a the applicant performed a budgetary quotation and expected performance they solicited from Fives Solios for replacement of the wet scrubber and Activated Carbon Injection System filter with an EAD system for SO_2 / HCl control.

The application of the technology required the following:

a. Increasing the flue gas temperature from 193°F to 250°F using a natural gas fired duct burner during mill-in periods; and
b. Cooling of the flue gas stream from 539°F to 300°F to accommodate SO_2 and Hg removal using direct water evaporation during mill-out periods.

A mass balance for each operating condition determined the following:

a. Fuel heat input to increase flue gas temperatures during mill-in periods will be 45 mmBtu/hr; and
b. Water usage to cool flue gases during mill-out conditions will be 214 gpm.

Expected Performance

SO_2 – Solios has indicated an expected performance of 82.1% removal during mill-in operation at an emission rate of 100 lb/hr and 90.5% removal during mill-out operation at an emission rate of 100 lb/hr. These values are equivalent to 0.40 lb/ton clinker produced.

HCl – The system is expected to achieve HCl removal exceeding 90% which results in HCl emissions below the NESHAP limit of 3.0 ppmdv @ 7% O2.

PM – The EAD system, in combination with the main baghouse, is expected to achieve the NESHAP filterable PM limits but may not be effective in removing condensable PM.

Cost Benefit

The estimated installed cost for from Solios is $33,000,000 without the following:

a. Foundations,
b. Duct burner and ancillary components,
c. Conditioning tower and water supply,
d. Inlet/ outlet ducts, ID fans, and support structures.

Inclusion of the above items with contingency, engineering expense, startup testing, etc., results in an estimated installed capital cost of $47,758,860 (Appendix C of the application). Using the expected removal efficiency with annual kiln operation of 80% mill-in and 20% mill-out, the SO_2 removal would be 3,744 tons/yr.

Annual operating cost is estimated to be $13,121,205/yr which includes amortization of equipment, reagent cost, cement kiln dust (CKD) disposal cost, utilities, and fuel cost. The estimated cost benefit for the EAD system is $3,505 per ton of SO_2 abated. This estimate is comparable to the previously estimated cost for wet scrubbing of $3,336 per ton of SO_2 removed.

Cost Estimate EAD Scrubbing System			
Capital Costs			
Direct Costs		Factor	Cost
• EDS Components	Fabric filter		
	Venturi Reactor		
	Ductwork		
	Civil		
	Subtotals Solios		18,200,000
	CT		750,000
	Electrical/MCC		750,000
	Natural gas service		0
	Natural gas burner		750,000
	ID fan		850,000
	Miscellaneous Equipment		0
	Subtotal others		3,100,000
Equipment	Total	18,200,000 + 3,100,000 =	21,300,000
• Other	Instruments	0.02 x 21,300,000	426,000

	Taxes	0.05 x 21,300,000	1,065,000
	Freight	0.04 x 21,300,000	852,000
• PEC	Total	Equipment + Other	23,643,000
• Installation	Foundations	0.10 x PEC	2,364,300
	Erection	0.60 x PEC	14,185,800
	Electrical	0.05 x PEC	1,182,150
	Ducting	0.05 x PEC	1,182,150
	Insulation	0.01 x PEC	236,430
	Site preparation	0.01 x PEC	236,430
	Total	0.82	19,387,260
	Total Direct = PEC + Installation = $43,030,260		
Indirect Costs	Engineering	0.05 x 23,643,000	1,182,150
	Construction/Field expenses	0.05 x 23,643,000	1,182,150
	Contra. Fee	0.05 x 23,643,000	1,182,150
	Startup	0.01 x 23,643,000	236,430
	Performance tests	0.01 x 23,643,000	236,430
	Contingencies	0.03 x 23,643,000	709,290
	Total Indirect Costs = $4,728,600		
Total Capital Costs = Total Direct Costs + Total Indirect costs = $47,758,600			

Cost Estimate EAD Scrubbing System			
Operating Costs (Direct)			
Operating Costs (Direct)			
• Utilities	ID Fan Static Press	14.00 inches water	
	Fan Volume	753,242 ACFM	
	Fan Power	2380 bhp	
	GPM (average)	37.40 GPM	
	Connected Load	2380 bhp	
	Power	1774.95 KWhr	
	Hours operated	8760 Hrs/year	
	Electrical cost	$0.0550/KWHr	
	Annual Cost		$855,170/year
	Natural Gas	47.48 mmGJ/Hr	
	Hours operated	8760 Hr/year	
	Cost	$7.884/mmGJ	
	Annual Cost		$3,279,349/year
• Reagent	Reagent Usage	6745.20 tons/year	
	Cost	$100.00/ton	
	Annual Cost		$674,520/year
• Waste Disposal	CKD	12,264 tons/year	
		$0.0/ton	
	Annual Cost		$0/year
• Water Treatment	Usage	137,192 m^3/year	
	Cost	$0.50/$m^3$	
	Annual Cost		$68,596/year

• Maintenance	Replacement parts	5% of PEC	$1,182,150/year
	Materials		$42000/year
	Labor	Hr/year = 2000	
	Annual Cost	$21.00/Hour	$42,000/year
• Labor	Labor	Hours per year = 2000	
	Cost	$19.00/hour	
	Annual Cost		$38,000/year
• Supervisor	Labor	Hours per year = 300	
	Cost	$30.00/Hour	
	Annual Cost		$9,000/year
• Fuel Savings		$/year	$0.0/year
Total Annual Direct Operating Costs = 6,190,786/year			

Cost Estimate EAD Scrubbing System			
Operating Costs (Indirect)			
• Overhead	60%		
	$/year	0.60 x (Maintenance + Labor + Supervisory costs)	$53,400/year
• Property Tax	0.42%		
	$/year	0.0042 x Total Capital cost	$200,587/year
• Insurance	1.0%		
	$/year	0.01 x Total Capital cost	$477,589/year
• Administration	2.0%		
	$/year	0.02 x Total Capital cost	$955,177/year
• Capital Recovery	7.0%	Interest Rate	
	Life-years	15.0 years	
	Factor	0.109795	
	$/year	0.109795 x 47,758,600	$5,243,666/year
Total Indirect Annual Operating Costs = 6,930,419/year			
Total Annual Costs = Indirect annual + Direct annual = $13,121,205/year			
Uncontrolled emissions = 4182 tons SO_2 per year Control efficiency = 89.53% Annual Emissions Reductions @ 89.53% control = 3744.02 tons SO_2 per year Controlled emission rate = 438.0 tons SO_2 per year			
Cost Benefit = $3,505/ton of SO_2 removed ($13,121,205 ÷ 3774.02)			

Environmental/Energy Impacts

Replacement of the wet scrubber with the dry EAD system will have the following adverse environmental impacts:

a. Increased emissions of PSD pollutant NOx from natural gas combustion of 15 tons/yr;
b. Increased emissions of PSD pollutant CO_2 from natural gas combustion of 18,821 tons/yr;
c. Disposal of residuals in landfill of approximately 12,264 tons/yr;
d. Purchase and receipt of additional gypsum (to replace the gypsum produced by the wet scrubber) for use in finish grinding; and
e. Increase in condensable PM (as compared to the wet scrubber) and increase in ambient air impacts (due to higher total PM emissions).

Conclusion:

It is concluded that the EAD system (with inlet gas heating provision) is equivalent in performance to a wet scrubber in achieving SO_2, and HCl emission limits. The cost benefit ($3505/ton of SO_2 removed) is comparable to the previous estimate ($3336/ton SO_2 removed) for wet the wet scrubber that was previously chosen as BACT. Expected increases in condensable particulate, CO_2, and NO_X emissions combined with adverse impacts on energy and residuals disposal, however, make the technology less suitable than wet scrubbing for the Carolinas Cement facility.

The use of dry scrubbing systems employing slurried lime injection and semi-dry lime injection are also technically feasible but are less suitable due to technical issues such as the need to increase flue gas temperature during mill-in conditions and adverse environmental consequences (increased CO_2, increase in NO_X, and increase in condensable PM emissions).

BACT for SO_2 from the kiln system is the same as currently listed in the existing permit.

Summary PSD Projects (preheater/precalciner/kiln/inline raw mill/inline coal mill) – SO_2

Company Name	Location	New or Mod. (primary fuel burned)	Control Technology (removal efficiency)	Limit
Universal Cement (RBLC: IL-0111) Cook County	Chicago, IL (not yet constructed) Region 5	New Greenfield facility (Coal, pet coke, scrap tires)	LAER Inherent scrubbing & a circulating fluidized bed absorber or equivalent (98% overall efficiency) **	0.4 lbs/ton clinker CEMs required
Carolinas Cement New Hanover Co.	Castle Hayne, NC (not yet constructed) Region 4	New process @ exist. facility (Coal, pet coke)	BACT Wet scrubbing (90% control efficiency)	0.4 lbs/ton clinker or 90% removal CEMs required
Ravena Plant Modernization Albany County	Ravena, New York (not yet completed)	Modernization @ exist. facility (coal, pet coke)	Did not trigger PSD/BACT	Facility used the MACT limit = 0.4 lbs/ton clinker or 90% removal

** The control efficiency is stated to be 98% but includes the inherent scrubbing of the process (information from summary document to public comments for the Universal Cement project).

C. BACT for CO and VOCs

-------------------------------------Carbon Monoxide (CO) AND VOC BACT Analysis -------------------------------------

The sources of CO and VOC associated with the project are the preheater/precalciner kiln system and the new emergency Diesel generator unit. CO and VOC emissions from cement kiln pyroprocessing systems generally occur from two separate and distinct processes in the system: 1) products of incomplete combustion of fuel and 2) decomposition of organic material in the kiln feed. Each CO and VOC formation process occurs under uniquely different conditions and is defined by the process technology and feed materials. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

For the purpose of this discussion, the pyroprocessing technology is confined to the preheater/precalciner design. In this design, raw meal is introduced to the exhaust gas stream from the preheater and preheated through a series of cyclones (stages) in a countercurrent flow design. In the process of heating, organic materials naturally occurring in the feed (kerogen and bitumen) are progressively heated and they begin to thermally degrade. The heating at relatively low temperature and at a low oxygen atmosphere results in complex organic molecules to be cracked, recombined, and re-ordered until the species are reduced to short-chain volatile organic compounds, carbon monoxide (CO), and/or carbon dioxide (CO_2). During the pyrolytic process, a significant fraction of the organic carbon is fully oxidized to CO_2.

Depending on the nature of the organics present in the feed materials, the location of the thermal decomposition in the preheater varies along with the degree of complete oxidation. The presence of light hydrocarbon species in the meal typically results in VOC and condensable hydrocarbons in the kiln preheater gases, but the CO concentrations are low. Conversely, complex hydrocarbons generally produce CO during decomposition, but low concentrations of VOC. Depending on the geological deposit of the feed materials, the composition and concentration of organic materials in the kiln feed (meal) may vary significantly. The spatial distribution within the deposit is both lateral and vertical, and cannot be mitigated by selective mining or material substitution. The level of contaminants in the kiln feed is unique to each site and results in site-specific CO and VOC emission rates. The rate of conversion of meal carbon to CO_2 is influenced by the temperature profile of the preheater, the organic content of the kiln feed, and the composition of the organics in the kiln feed. Recent studies do not indicate that the oxygen content of the flue gases influences the CO emission rate. Papers published in Zement-Kalk-Gips also support the same conclusion. The temperature of the preheater stages is defined by the kiln and mix designs (C_3S, silica, etc.) and cannot be modified sufficiently to complete oxidation of CO and VOC in the preheater.

CO and VOC may also be produced as a product of incomplete combustion of fuel in the precalciner vessel. Modern precalciners burn fuel in suspension with meal. The precalciner vessel is designed to decarbonize (or calcine) the raw feed simultaneously with the combustion of fuel in suspension. This design allows use of liquid, gaseous, and solid fuels over a range of heat values and qualities (ash, moisture, etc.). Because of the continuous generation of thermal energy (combustion) and consumption of thermal energy due to the decarbonization, the temperatures are stabilized and the thermal variation is minimized. This process results in reduced thermal NOx.

<u>Section 1 - Identification of Control Options – CO and VOCs</u>

One of the resources North Carolina uses to identify candidate technologies is the RBLC database. Any reliance on the RBLC beyond the identification of candidate technologies is not recommended. The RBLC typically does not include sufficient documentation to determine if any particular emission rate has been achieved in practice or demonstrated. Additionally, the RBLC fails to provide how each permitting agency considered the statutorily required environmental, economic, and energy impacts of the various candidate technologies. Without this information the best use of the RBLC is to identify technologies that might work to reduce a regulated NSR pollutant.

In addition to the RBLC, the NCDAQ also reviewed the most recently revised MACT and NSPS for cement plants and the NSPS for reciprocating internal combustion engines to determine what controls were evaluated as potential candidate technologies. A review was made of other Portland Cement Plants (Universal Cement and Ravena Plant Modernization) with new preheater/precalciner kilns that have been permitted since the 2010 MACT revision (effective date = November 8, 2010) and permitted since the issuance the PSD construction and operation permit for the Carolinas Cement Company. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

Emergency Generator (ID No. ES-GEN)
The recently revised (January 30, 2013) New Source Performance Standard (NSPS), Subpart IIII does not contain any review of new commercially available technology for reducing CO & VOC emissions from reciprocating internal combustion engines.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit reveals the PSD/BACT for the emergency generator proposed for this facility is the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII. The Ravena Modernization Plant did not trigger PSD/BACT for CO or VOCs.

Review of the RBLC database for permits issued or drafted since the November 2010 NSPS, Subpart F and MACT, Subpart LLL revisions yielded good combustion practices and the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII as BACT. {RBLC data base results: IA-0105, WY-0070, AK-0076, NJ-0079, MI-0395, MI-0394, LA-0254, SC-0113, MI-0402, FL-0328, CA-1212, FL-0332, AK-0072, FL-0327, LA-0251, FL-0322, AK-0071, AK-0073}

Conclusion:
BACT for the CO and the VOC emissions from the emergency generator is still the purchasing of a certified RICE unit in accordance with 40 CFR Part 60, Subpart IIII as previously determined.

Preheater/precalciner/kiln with inline raw mill/inline coal mill
There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that has been permitted since the 2010 revision of the MACT for Portland Cement plants.

The Universal Cement Plant that will be located in Chicago, IL is a new Greenfield facility that evaluated BACT for CO. The information for this facility was reviewed in the RBLC database, and at the following sites:

- http://www.epa.state.il.us/public-notices/2011/universal-cement/project-summary.pdf - project summary
- http://www.epa.state.il.us/ public-notices/2011/ universal-cement/construction-permit.pdf – air permit.

The Ravena Plant Modernization (Larfarge) that is located in Ravena, New York is a modernization of an existing plant (replace two existing wet kilns with preheater/precalciner kiln). This facility did not trigger PSD review for VOCs but did trigger PSD review for CO. The information for this facility was reviewed in the RBLC database, and at the following website:

- http://lafargeravenafacts.com/documents/permits/2011.07.19b.Findings.Final.pdf

In the previous BACT analysis for Carolinas Cement Company the following CO and VOC control options were evaluated:

- Thermal oxidizer (TO)
- Regenerative thermal oxidizer (RTO)
- Catalytic oxidation
- Excess air
- Good combustion practices

Summary PSD Projects (preheater/precalciner/kiln/inline raw mill/inline coal mill) – VOCs

Company Name	Location	New or Mod. (primary fuel burned)	Control Technology (removal efficiency)	Limit
Universal Cement (RBLC: IL-0111) Cook County	Chicago, IL (not yet constructed) Region 5	New Greenfield (Coal, pet coke, scrap tires)	Good combustion	Did not trigger PSD/BACT 0.16 lbs/ton clinker *
Carolinas Cement New Hanover Co.	Castle Hayne, NC (not yet constructed) Region 4	New process @ exist. facility (Coal, pet coke)	Good combustion	BACT 0.16 lbs/ton clinker CEMs
Ravena Plant Modernization Albany County	Ravena, New York (not yet completed)	Modernization @ exist. Facility (coal, pet coke)	Good combustion	Did not trigger PSD/BACT 0.18 lbs/ton clinker **

* calculated from page 18 of project summary document: (97.1 tons VOCs/yr x 2000 lbs/ton) divided by 1.25 million tons clinker/yr)

** calculated from page 124 of air permit: (254.45 tons VOCs/yr x 2000 lbs/ton) divided by 2.81 million tons clinker/yr)

No known new VOC control technologies have been developed or applied to cement kilns since the Carolinas Cement Company PSD construction and operation permit was issued. The BACT determination for the existing permit consists of the use of good combustion practices.

<u>Conclusion:</u>
BACT for VOCs from the kiln system is the same as currently listed in the existing permit.

Summary PSD Projects (preheater/precalciner/kiln/inline raw mill/inline coal mill) – CO

Company Name	Location	New or Mod. (primary fuel burned)	Control Technology (removal efficiency)	Limit
Universal Cement (RBLC: IL-0111) Cook County	Chicago, IL (not yet constructed) Region 5	New Greenfield (Coal, pet coke, scrap tires)	Good combustion	BACT 1.05 lbs/ton clinker (30 day rolling ave.)
Carolinas Cement New Hanover Co.	Castle Hayne, NC (not yet constructed) Region 4	New process @ exist. facility (Coal, pet coke)	Good combustion	BACT 2.8 lbs/ton clinker (30 day rolling ave. as measured by a CEMs)
Ravena Plant Modernization Albany County	Ravena, New York (not yet completed)	Modernization @ exist. Facility (coal, pet coke)	Good combustion	BACT 2.5 lbs/ton clinker (30 day rolling average As determined by a CEMs)

VOC and CO emissions are dependent on the site specific raw materials and the design of the preheater/precalciner/kiln system. Review of the RBLC over the past 10 years yields PSD/BACT determination ranges from 1.05 tons CO/year to 10.5 tons CO/yr. This data is taken from various areas of the United States. Each determination concludes that good combustion has be selected as BACT for Portland Cement Plants.

No known new CO of VOC control technologies have been developed or applied to cement kilns since the Carolinas Cement Company PSD construction and operation permit was issued. The BACT determination for the existing permit is good combustion practices.

<u>Conclusion:</u>
BACT for CO and BACT for VOCs from the kiln system is the same as currently listed in the existing permit.

D. BACT for NOx

--NITROGEN DIOXIDE (NOx) BACT Analysis--

The only sources of NOx emissions associated with the proposed project are the preheater/precalciner kiln system and the new emergency Diesel generator set. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

NOx is formed as a result of reactions occurring during combustion of fuels in the main kiln and precalciner vessel of a traditional preheater/precalciner cement kiln and the combustion of Diesel fuel in the emergency generator. NOx is produced through three mechanisms during combustion (1) fuel NOx, (2) thermal NOx, and (3) “prompt” NOx. Fuel NOx is the NOx that is formed by the oxidation of nitrogen and nitrogen complexes in the fuel. In general, approximately 60 percent of fuel nitrogen is converted to NOx. The resulting emissions are primarily affected by the nitrogen content of fuel and excess O_2 in the flame. Nitrogen in the kiln feed may also contribute to NOx formation although to a much smaller extent. Thermal NOx is the most significant NOx mechanism in kiln combustion. The rate of conversion is controlled by both excess O_2 in the flame and the temperature of the flame. In general, NOx levels increase with higher flame temperatures that are typical in the kiln burning zone. “Prompt NOx” is a term applied to the formation of NOx in the flame surface during luminous oxidation. The formation is instantaneous and does not depend on flame temperature or excess air.

At high temperature and excess O_2, a higher concentration of O radicals (or H radicals) is present and therefore NOx forms more rapidly. At lower temperatures, an equilibrium reaction of NO with O_2 further results in NO_2 formation. Fuel NOx is formed by the reaction of nitrogen in the fuel with available oxygen. In a precalciner kiln, fuel combustion occurs at two locations and each follows a separate mechanism in the formation of NOx (i.e., thermal NOx dominates in the kiln burning zone and fuel NOx dominates in the precalciner). For this reason, the effects of process operation on final NOx levels are complex and do not necessarily conform to conventional understanding of combustion as defined through steam generation technology.

Section 1 - Identification of Control Options – NOx

One of the resources North Carolina uses to identify candidate technologies is the RBLC database. Any reliance on the RBLC beyond the identification of candidate technologies is not recommended. The RBLC typically does not include sufficient documentation to determine if any particular emission rate has been achieved in practice or demonstrated. Additionally, the RBLC fails to provide how each permitting agency considered the statutorily required environmental, economic, and energy impacts of the various candidate technologies. Without this information the best use of the RBLC is to identify technologies that might work to reduce a regulated NSR pollutant.

In addition to the RBLC, the NCDAQ also reviewed the most recently revised MACT and NSPS for cement plants and the NSPS for reciprocating internal combustion engines to determine what controls were evaluated as potential candidate technologies. A review was made of other Portland Cement Plants with new preheater/precalciner kilns that have been permitted since the 2010 MACT revision (effective date = November 8, 2010) and permitted since the issuance the PSD construction and operation permit for the Carolinas Cement Company. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

Emergency Generator (ID No. ES-GEN)

The recently revised (January 30, 2013) New Source Performance Standard (NSPS), Subpart IIII does not contain any review of new commercially available technology for reducing NOx emissions from reciprocating internal combustion engines.

There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants. Review of the Universal Cement permit and the Ravena Plant Modernization reveals the BACT for the emergency generator proposed for these facilities is the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII.

Review of the RBLC database for permits issued or drafted since the November 2010 NSPS, Subpart F and MACT, Subpart LLL revisions yielded good combustion practices and the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII as BACT. {RBLC data base results: IA-0105, WY-0070, AK-0076, NJ-0079, MI-0395, MI-0394, LA-0254, SC-0113, MI-0402, FL-0328, CA-1212, FL-0332, AK-0072, FL-0327, LA-0251, FL-0322, AK-0071, AK-0073}

Conclusion:
BACT for NOx from the emergency generator is still the purchasing of a certified RICE unit in accordance with 40 CFR Part 60, Subpart IIII as previously determined.

Preheater/precalciner/kiln with inline raw mill/inline coal mill
There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization) other than Carolinas Cement Company that has been permitted since the 2010 revision of the MACT for Portland Cement plants.

The Universal Cement Plant that will be located in Chicago, IL is a new Greenfield facility that evaluated for LAER for NOx and SO_2. The selected control technology for NOx is staged combustion and SNCR. The information for this facility was reviewed in the RBLC database, and at the following sites:

- http://www.epa.state.il.us/public-notices/2011/universal-cement/project-summary.pdf - project summary
- http://www.epa.state.il.us/ public-notices/2011/ universal-cement/construction-permit.pdf – air permit.

The Ravena Plant Modernization that is located in Ravena, New York is a modernization of an existing plant (replace two existing wet kilns with preheater/precalciner kiln). This facility did not trigger PSD review for NOx because of the overall reductions per the modification project. The information for this facility was reviewed in the RBLC database, a project summary was reviewed at:

- http://lafargeravenafacts.com/documents/permits/2011.07.19b.Findings.Final.pdf

In the previous BACT analysis the following NOx control options were evaluated:

- Selective non catalytic reduction (SNCR)
- Selective catalytic reduction (SCR)
- Regenerative SCR (RSCR),
- Indirect firing,
- Semi-direct firing,
- Low NOx burners,
- Mill air recirculation,
- Staged combustion
- Calciner modification

No known new NOx control technologies have been developed or applied to cement kilns since the Carolinas Cement Company PSD construction and operation permit was issued. The BACT determination for the existing permit consists of the use of indirect firing, low NOx burners, staged combustion, and SNCR (except for kiln gases in the alkali bypass which are not controlled by SNCR).

Conclusion:
BACT for NOx from the kiln system is the same as currently listed in the existing permit.

Summary PSD Projects (preheater/precalciner/kiln/inline raw mill/inline coal mill) – NOx

Company Name	Location	New or Mod. (primary fuel burned)	Control Technology (removal efficiency)	Limit
Universal Cement (RBLC: IL-0111) Cook County	Chicago, IL (not yet constructed) Region 5	New Greenfield (Coal, pet coke, scrap tires)	SC, SNCR (not listed)	LAER (non attainment for ozone) 1.2 lbs/ton clinker * 30 day rolling average
Carolinas Cement New Hanover Co.	Castle Hayne, NC (not yet constructed) Region 4	New process @ exist. facility (Coal, pet coke)	Indirect firing, SC, LNB, SNCR (50% efficiency)	BACT 1.4 lbs/ton clinker 30 day rolling average

Notes: SC = Staged combustion
LNB = Low NOx burners
SNCR = Selective non-catalytic reduction
RSCR = Regenerative selective catalytic reduction
MKF = Mid-kiln firing

* The Universal Cement air permit also allows for a NOx limit of 1.5 lbs/ton clinker for the first 395 days (13 months) of operation.

E. BACT for GHGs

---Greenhouse Gases (GHGs) BACT Analysis--
The only sources of GHG emissions associated with the proposed project are the preheater/precalciner kiln system and the new emergency Diesel generator unit. GHGs consist chiefly of carbon dioxide (CO_2) with small quantities of other GHG pollutants (methane and nitrous oxide). These pollutants are estimated together as a CO_2-equivalent pollutant (CO_{2e}).

<u>Section 1 - Identification of GHG Control Options</u>

One of the resources North Carolina uses to identify candidate technologies is the RBLC database. Any reliance on the RBLC beyond the identification of candidate technologies is not recommended. The RBLC typically does not include sufficient documentation to determine if any particular emission rate has been achieved in practice or demonstrated. Additionally, the RBLC fails to provide how each permitting agency considered the statutorily required environmental, economic, and energy impacts of the various candidate technologies. Without this information the best use of the RBLC is to identify technologies that might work to reduce a regulated NSR pollutant.

In addition to the RBLC, the NCDAQ also reviewed the most recently revised MACT and NSPS for cement plants and the NSPS for reciprocating internal combustion engines to determine what controls were evaluated as potential candidate technologies. A review was made of other Portland Cement Plants with new preheater/precalciner kilns that have been permitted since the 2010 MACT revision (effective date = November 8, 2010) and permitted since the issuance the PSD construction and operation permit for the Carolinas Cement Company. Where the Division of Air Quality agreed with the applicant, the information from the application was included in this BACT analysis review.

<u>Emergency Generator (ID No. ES-GEN)</u>

The recently revised (January 30, 2013) New Source Performance Standard (NSPS), Subpart IIII does not contain any review of new commercially available technology for reducing GHG emissions from reciprocating internal combustion engines.

Review of the Universal Cement permit reveals the BACT for the emergency generator proposed for this facility is the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII.

Review of the RBLC database for permits issued or drafted since the November 2010 NSPS, Subpart F and MACT, Subpart LLL revisions yielded good combustion practices and the purchase of a certified engine in accordance with 40 CFR Part 60, Subpart IIII as BACT. {RBLC data base results: IA-0105, WY-0070, AK-0076, NJ-0079, MI-0395, MI-0394, LA-0254, SC-0113, MI-0402, FL-0328, CA-1212, FL-0332, AK-0072, FL-0327, LA-0251, FL-0322, AK-0071, AK-0073}

Conclusion:
BACT for GHG emissions from the emergency generator is still the purchasing of a certified RICE unit in accordance with 40 CFR Part 60, Subpart IIII as previously determined.

Preheater/precalciner/kiln with inline raw mill/inline coal mill
There have been two Portland Cement plants (Universal Cement and Ravena Plant Modernization - Larfarge) other than Carolinas Cement Company that have been permitted since the 2010 revision of the MACT for Portland Cement plants.

The Universal Cement Plant that will be located in Chicago, IL is a new Greenfield facility that evaluated for BACT for GHGs. There is no selected add-on control technology that is not inherent to the design of the kiln system. The information for this facility was reviewed in the RBLC database, and at the following sites:
- http://www.epa.state.il.us/public-notices/2011/universal-cement/project-summary.pdf - project summary
- http://www.epa.state.il.us/ public-notices/2011/ universal-cement/construction-permit.pdf – air permit.

The Ravena Plant Modernization that is located in Ravena, New York is a modernization of an existing plant (replace two existing wet kilns with preheater/precalciner kiln). The information for this facility was reviewed in the RBLC database, and at the following site:
- http://lafargeravenafacts.com/documents/permits/2011.07.19b.Findings.Final.pdf - air permit

In the previous BACT analysis the following GHG control options were evaluated:
- Reducing Clinker Content of Cement
- Alternate Fuels
- Firing natural gas
- Firing biomass
- Plant Design Optimization
- Electrical Systems Optimization
- Low Carbonate Alternate Raw Materials
- Carbon Capture and Sequestration Systems (CCS)
  - Pre-combustion
  - Post-combustion
  - Oxy-combustion systems
  - Chemical looping

No known new GHG control technologies have been developed or applied to cement kilns since the Carolinas Cement Company PSD construction and operation permit was issued. The BACT determination for the existing permit consists of the inherent design of the kiln system.

Conclusion:
BACT for GHG emission from the kiln system is the same as currently listed in the existing permit.

Summary PSD Projects (preheater/precalciner/kiln/inline raw mill/inline coal mill) – GHGs

Company Name	Location	New or Mod. (primary fuel burned)	Control Technology (removal efficiency)	Limit
Universal Cement (RBLC: IL-0111) Cook County	Chicago, IL (not yet constructed) Region 5	New Greenfield (Coal, pet coke, scrap tires)	Inherent design of the kiln system	BACT 0.95 tons/ton clinker 12 month rolling average measured by a CEMs in accordance with 40 CFR Part 98, Subparts B and F
Carolinas Cement New Hanover Co.	Castle Hayne, NC (not yet constructed) Region 4	New process @ exist. facility (Coal, pet coke)	Inherent design of the kiln system	BACT 0.91 tons/ton clinker 12 month rolling average per 40 CFR Part 98
Ravena Plant Modernization Albany County	Ravena, New York (not yet completed)	Modernization @ exist. Facility (coal, pet coke)	Inherent design of the kiln system	BACT 0.95 tons/ton clinker 12 month rolling average

X. PSD DISPERSION MODELING ANALYSIS/INCREMENT ANALYSIS

The PSD Dispersion modeling analysis submitted by CCC was received by the North Carolina Air Quality Analysis Branch (Mr. Tom Anderson). The following summary describes the modeling analysis conducted for Particulate Matter as part of the PSD analysis for the proposed Carolinas Cement Company facility that will be located in Castle Hayne, NC. The modeling includes evaluation of PM_{10}, $PM_{2.5}$, and TSP. A complete discussion of the modeling procedures, and all data included, is contained in the report dated April 9, 2013 and titled "Air Dispersion Modeling Report for Particulate Matter".

Table 1 - Class II Significant Impact Results

Pollutant	Averaging Period	Facility maximum Impact (ug/m^3)	Class II Significant Impact Level
PM_{10}	24-hour	34.3	5.0
$PM_{2.5}$	24-hour	11.7	1.2
	Annual	2.9	0.3

Table 2 – PM_{10} Increment Consumption Analysis Results

Averaging Period	Facility maximum Impact 1) (ug/m^3)	Class II Significant Impact Level
24-hour	29.2	30
Annual	6.5	17

1) Includes both CCC and offsite source contributions

Table 3 - Class II Area NAAQS PM_{10} Cumulative Impact Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (μg/m^3)	Monitored Background Concentration (μg/m^3)	Total Impact (μg/m^3)	NAAQS (μg/m^3)	% NAAQS
PM_{10}	24-hour	1,084	20.0	1,104 [1)]	150	736 %
CCC Sources Only						
PM_{10}	24-hour	25	20.0	45	150	30 %
Offsite Sources Only						
PM_{10}	24-hour	1,084	20.0	1,104	150	736 %

1) CCC conducted an analysis to demonstrate that their facility did not cause or contribute to the 24-hour NAAQS exceedence.

Table 4 - Class II Area NAAQS $PM_{2.5}$ Cumulative Impact Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (μg/m^3)	Monitored[1,2] Background Concentration (μg/m^3)	Total Impact (μg/m^3)	NAAQS (μg/m^3)	% NAAQS
$PM_{2.5}$	24-hour	10.7	21.0	31.7	35	90 %
	Annual	2.67	9.13	11.8	12	98 %

Table 5 - Class II Area NAAQS TSP Cumulative Impact Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (μg/m^3)	Monitored[1,2] Background Concentration (μg/m^3)	Total Impact (μg/m^3)	NAAQS (μg/m^3)	% NAAQS
TSP	24-hour	74	N/A	74	150	50 %
	Annual	11	N/A	11	75	15 %

<u>PSD Air Quality Modeling Results Summary:</u>
Based on the PSD air quality ambient impact analysis performed, the proposed Carolinas Cement Company project is not expected to cause or contribute to any violation of the Class II NAAQS, PSD increments, Class I Increments, or any FLM AQRVs.

XI. PSD SUMMARY

15A NCAC 2D .0530 “Prevention of Significant Deterioration (PSD)”, 40 CFR 51.166

PSD regulations apply to major “sources” of pollutants. In the case of Portland Cement plants, the major stationary source threshold is 100 tons/yr, which includes all quantifiable fugitive emissions. Carolinas Cement Company, LLC is considered a major source with regards to PSD because it will emit greater than 100 tons per year of a regulated NSR pollutant.

Carolinas Cement is requesting an 18 month extension from the current August 29, 2013 commence construction deadline. The only PSD pollutant that has changed since the initial construction and operation application is PM. The other pollutants (SO_2, NOx, CO, VOC, and CO_{2e}) remain the same. To comply with the best available control technology determination pursuant to 15A NCAC 2D .0530, "Prevention of Significant Deterioration," PM, PM10, PM2.5 from the preheater/precalciner kiln system, shall not exceed:

- 127.36 tons PM/year per consecutive 12-month period
- 127.36 tons PM10/year per consecutive 12-month period
- 127.36 tons PM2.5/year per consecutive 12-month period

i. Pursuant to 15A NCAC 2D .0530 "Prevention of Significant Deterioration" the facility shall comply with the following limits:
   - Less than or equal to 2,190,000 tons per consecutive 12 month period

ii. Best Available Control Technology

(A) In order to comply with the best available control technology (BACT) determination pursuant to 15A NCAC 2D .0530, "Prevention of Significant Deterioration" – Particulate PM10/PM2.5:
- Clinker production shall not exceed 2,190,000 tons per consecutive 12-month period
- Filterable particulate (PM10/PM2.5) emissions shall be limited according to the following Equation (PM performance tests are performed using Method 5 or 5I and consist of three 1-hr tests or three 2-hr test, respectively):

$$PM_{alt} = \frac{0.002 \times 1.65 \times (Q_k + Q_c + Q_{ab} + Q_{cm})}{7000}$$

Where:
P_{alt} = Calculated particulate emission (lbs/ton clinker) limit when kiln exhaust clinker cooler exhaust are combined
0.002 = outlet grain loading (gr/dscf)
1.65 = Conversion factor of lb feed per lb clinker
Q_k = The exhaust flow rate of the kiln (dscf/ton raw feed)
Q_c = The exhaust flow rate of the clinker cooler (dscf/ton raw feed)
Q_{ab} = The exhaust flow rate of the alkali bypass (dscf/ton raw feed)
Q_{cm} = The exhaust flow rate of the coal mill (dscf/ton raw feed)
7000 = Grains per pound

(B) In order to comply with the best available control technology (BACT) determination pursuant to 15A NCAC 2D .0530, "Prevention of Significant Deterioration" – condensable particulate (PM10/PM2.5):
- Clinker production shall not exceed 2,190,000 tons per consecutive 12-month period
- Condensable particulate (PM10/PM2.5) shall be controlled with a wet scrubber with an emission limit of 0.08 lbs per ton of clinker or, a minimum 50 removal efficiency in accordance with the General Emissions Testing and Reporting Requirements listed in Section 3, Item 18 of the Permit.

(C) Filterable particulate (PM10/PM2.5) emissions from the preheater/precalciner/kiln/inline raw mill/clinker cooler/coal mill system shall be controlled by bagfilters (CD44A and CD44B). To assure compliance, the Permittee shall perform inspections and maintenance as recommended by the manufacturer. In addition to the manufacturer's inspection and maintenance recommendations, or if there is no manufacturer's inspection and maintenance recommendations, as a minimum, the inspection and maintenance requirement shall include the following:
(1) a monthly visual inspection of the system ductwork and material collection unit for leaks; and
(2) an internal inspection of the bagfilter's structural integrity during scheduled kiln system shutdowns.

(3) The results of inspection and maintenance shall be maintained in a logbook (written or electronic format) on-site and made available to an authorized representative upon request. The logbook shall record the following:
(a) the date and time of each recorded action;
(b) the results of each inspection;
(c) the results of any maintenance performed on the bagfilters; and
(d) any variance from manufacturer's recommendations, if any, and corrections made.

(D) Reporting Requirements [15A NCAC 2Q .0508(f)]
The Permittee shall maintain a monthly summary report, acceptable to the Regional Air Quality Supervisor, of monitoring and recordkeeping listed above and shall submit the results within 30 days of a written request by the DAQ.

XII. A Professional Engineers Seal was received with this application. Mr. John Carroll, a registered professional engineer in the state of North Carolina sealed the technical portions of the application on April 5, 2013.

XIII. A consistency determination is not required for this modification because no new sources are being added.

XIV. An application fee is required and was received with the application on April 9, 2013 in the amount of $13,837.00.

XV. Toxic Air Pollutants:
An air toxics review is not required for this modification. The initial emission rate estimates for toxic air pollutants were based on potential to emit (lbs/ton clinker) from the maximum production rate of clinker. This maximum rate will not change due to this modification.

XVI. This facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store any of the regulated substances in quantities above the thresholds in the Rule.

XVII. PSD Increment Tracking:
The Minor Source Baseline date for New Hanover County was triggered for PM-10 on December 14, 1979.

$$PM10\ Hourly\ Emissions\ after\ control = \frac{10.4\ tons\ total\ PM10}{year} \times \frac{1\ year}{8760\ hours} \times \frac{2000\ lbs}{ton} = \frac{2.37\ lbs\ total\ PM10}{hour}$$

For PSD increment tracking purposes, PM-10 emissions have increased by 2.37 pounds per hour as a result of this modification.

XVIII. Public Comment:
Public Notice Requirements – 40 CFR 51.166(q) requires that the permitting agency make available to the public a preliminary determination on the proposed project, including all materials considered in making this determination. With respect to this preliminary determination, the NCDAQ:
A. Will make available in the Wilmington Regional Office, located at 127 Cardinal Drive Extension, Wilmington, North Carolina, all materials submitted, a copy of the preliminary determination, and all other information submitted and considered. In addition, a copy of this same information will be available at the NCDAQ Central Office in Raleigh, NC.
B. Will publish a public notice, by advertisement in a local paper (Wilmington Star News) including the preliminary decision and the opportunity for public comment.
C. Send a copy of the public notice to:
1. The applicant for comments,
2. EPA Region IV for comments.

3. Officials having cognizance over the location of the project as follows:
   a. Any affected state/local air agency – No other state or local agencies are expected to be affected by this project.
   b. Chief Executives of the city and county in which the proposed project is to be located. Notices will be sent to the City Manager for the City of Wilmington.
   c. Federal Land Manager – the Federal Land Manager for the closest Class I areas, Swan Quarter National Wilderness, and Cape Romain did not request a Class I increment analysis. A public notice will not be sent.
   d. Persons on the Title V mailing list and other interested persons.

XIX. Non Attainment:
New Hanover County is not currently designated as nonattainment for any pollutant.

XX. This facility is not subject to 15A NCAC 2Q .0508(g) "Prevention of Accidental Releases" because it does not store chemicals that are subject to this regulation in quantities great enough to cross the threshold limits.

XXI. Conclusion:
Based on the application submitted and the review of this proposal by the NCDAQ, the NCDAQ is making a preliminary determination that the project can be approved and a permit issued. A final determination will be made following public notice and comment and consideration of all comments.

Issue permit No. 07300R11.