TECHNICAL EVALUATION

CEMEX Cement, Inc.
Brooksville Cement Plant

Cooling Damper Installation
Operational Changes

Kilns 1 and 2

Hernando County

DEP File No. 0530010-018-AC

Department of Environmental Protection
Division of Air Resource Management
Bureau of Air Regulation

August 3, 2007

I. APPLICATION INFORMATION

A. APPLICANT

Michael A. Gonzales, Plant Manager
CEMEX Cement, Inc.
Brooksville Plant
16301 Ponce de Leon Blvd.
Brooksville, Florida 34601

B. PROCESSING SCHEDULE

- The Department's Bureau of Air Regulation (BAR) received an application (0530010-018-AC) on October 14, 2005 that included requests to change thallium and fuel sampling requirements and to increase loading and transfer rates for raw material and product silos and bins.
- Additional requests under the same application to install indirect firing systems, new burners and selective non-catalytic reduction (SNCR) systems on Kilns 1 and 2 were processed separately through a permit (0530010-026-AC) issued on December 22, 2006.
- Additional requests under the same application related to petroleum coke and tire derived fuel were withdrawn or deferred by the applicant.
- The Department's Southwest District Office received an application (0530010-019-AC) on November 14, 2005 to install cooling dampers on Kiln 1.
- The Department received a request from the applicant dated August 15, 2006 requesting consolidation of the cooling damper application with application 0530010-018-AC.
- The Department issued and received responses to several requests for additional information. The final information was received on April 13, 2007.
- The Department received a request on July 11 from the applicant to waive the 90-day permit processing clock until July 25, 2007 to facilitate prompt revision and re-issuance of a separate draft permit for a new line at the facility.
- The Department distributed the Public Notice Package for project 0530010-018-AC on August 3, 2007.

C. FACILITY LOCATION

The CEMEX Brooksville Cement Plant is located on Highway 98, northwest of Brooksville in Hernando County. The following figure shows the location of the facility.

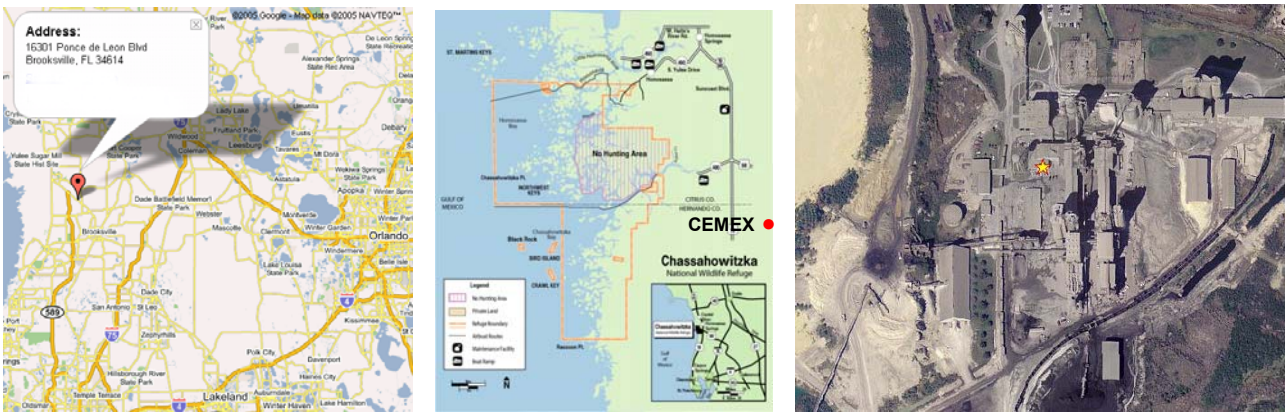

Figure 1. Location of CEMEX Brooksville Cement Plant, Chassahowitzka NWR, Aerial Photo

D. FACILITY CLASSIFICATION CODE (SIC)

Major Group No. 32, Clay, Glass, and Concrete Products
Industry Group No. 324 Cement, Hydraulic

E. REGULATORY CATEGORIES

The following regulatory classifications apply to the subject facility:

Title I, Section 111, Clean Air Act (CAA): This facility is subject to certain Standards of Performance for New Stationary Sources. They are adopted and incorporated by reference in Rule 62-204.800, F.A.C. These include:

- 40 CFR 60, Subpart A - General Provisions.
- 40 CFR 60, Subpart F - Standards of Performance for Portland Cement Plants. Certain requirements from Subpart F are replaced by requirements from 40 CFR 63, Subpart LLL listed below.
- 40 CFR 60, Subpart Y - Standards of Performance for Coal Preparation Plants.
- 40 CFR 60, Subpart OOO - New Source Performance Standards For Nonmetallic Mineral Processing Plants.

Title I, Section 112 CAA: The facility has the potential to emit 10 tons per year or more of any one hazardous air pollutant (HAP) or 25 tons per year or more of any combination of HAPs. This facility is subject to the Major Source provisions of:

- 40 CFR 63, Subpart A - National Emission Standards for Hazardous Air Pollutants – General Provisions.
- 40 CFR 63, Subpart LLL - National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry.

Title I, Part C: The facility is located in an area designated as “attainment”, “maintenance”, or “unclassifiable” for each pollutant subject to a National Ambient Air Quality Standard. The facility is considered a “portland cement plant”, which is one of the 28 Prevention of Significant Deterioration (PSD) source categories with the lower PSD applicability threshold of 100 tons per year. Potential emissions of at least one regulated pollutant exceed 100 tons per year. Therefore, the facility is classified as a PSD-major source of air pollution with respect to Rule 62-212.400, F.A.C., Prevention of Significant Deterioration.

Title IV, CAA: The facility does not operate any units subject to the Acid Rain provisions of the CAA.

Title V, CAA: The facility is a Title V or “Major Source” of air pollution because the potential emissions of at least one regulated pollutant exceed 100 tons per year or because it is a major source of HAP. Regulated pollutants include pollutants such as carbon monoxide (CO), nitrogen oxides (NO_X), particulate matter (PM/PM_{10}), sulfur dioxide (SO_2), and volatile organic compounds (VOC).

State Rules: The cement plant is subject to state Rule 62-296.407, F.A.C. (Portland Cement Plants).

Given that the facility is a Major Stationary Source with respect to the PSD regulations, then project emissions greater than 40 TPY of NO_X, VOC or SO_2, 7 TPY of sulfuric acid mist (SAM), 25/15 TPY of PM/PM_{10}, 3 TPY of fluorides, 0.1 TPY of mercury (Hg) or 1200 pounds per year (lb/yr) of lead (Pb) also require review pursuant to the PSD rules. Pollutants triggering these values require a determination of Best Available Control Technology (BACT) per Rule 62-212.400, F.A.C.

F. FACILITY DESCRIPTION

The existing Brooksville portland cement plant consists of two lines (Lines 1 and 2). Lines 1 and 2 include Polysius GEPOL preheater kilns (Kilns 1 and 2) and clinker cooler (Coolers 1 and 2). A picture of one of the kilns with preheater tower and raw meal homogenizing silo can be seen in Figure 2. Lines 1 and 2 are separately permitted with respect to preheater material feed rates and fuel heat input rates. Ancillary equipment at the plant includes a quarry, raw material handling and conveying equipment, raw mills, finish mills, cement and clinker handling equipment, coal handling equipment and silos, and particulate control/dust collection and recycling equipment.

Large, fabric filter systems (baghouses) are used to capture $PMPM_{10}$ from each kiln and from each clinker cooler (four total). Smaller baghouses are used to limit particulate emissions from other process emissions points. Raw material properties, chemical reactions in the kilns, absorption into the clinker, and combustion controls minimize emissions of NO_X, SO_2, CO, and VOC. Further NO_X control is provided by recently installed Pillard Low NO_X main kiln burners and selective non-catalytic reduction (SNCR) systems.

Figure 2. Polysius GEPOL Preheater Kiln at CEMEX Brooksville Plant

Both CEMEX Brooksville kilns are limited to 150 tons dry preheater feed per hour (30 day average) with a maximum of 165 tons preheater feed in any given hour. Both kilns are permitted to burn a variety of fuels, including coal, No. 2 fuel oil, No. 4 fuel oil, No. 5 fuel oil, No. 6 fuel oil, natural gas, and on-site generated, non-hazardous waste used oil, grease, and rags. Kiln No. 1 is also permitted to fire whole tire derived fuel (TDF) at a rate up to 20 percent of the total heat input.

G. APPLICATION REQUESTS

After withdrawal or deferment of some of the requests (petcoke and TDF) and separate processing of others (SNCR, burners and indirect firing), the remaining requests evaluated addressed in the present permitting action include:

- Increase the maximum transfer rate for Finish Mills 1 and 2 from 98 to 105 tons per hour (TPH);

- Reduce Finish Mills 1 and 2 combined PM limit from 36 lb per hour (lb/hr) and 157.7 tons per year (TPY) to 9 lb/hr and 39.4 TPY from each mill;
- Increase maximum loading rate of clinker silos 1, 2 and 3 from 84 to 93 TPH;
- Increase the raw material storage silos and feed system maximum transfer rate from 290 to 330 TPH (daily average, dry basis);
- Increase the raw material pre-mix bin maximum transfer rate from 290 to 330 TPH (daily average, dry basis);
- Increase the additive material storage bin maximum transfer rate from 30 to 36 TPH; and
- Increase the maximum operating hours of the cement bag loadout operation from 6,240 to 7,400 hours per year;
- Installation of two cooling dampers on Kiln 1;
- Removal of the Kiln 1 requirement for daily sampling for, and recording of thallium concentrations; and
- Allow use of liquid fuel suppliers' records in lieu of analysis of representative sample of each shipment (Permit No. 0530010-003-AC).

II. REGULATIONS THAT APPLY TO THE PROJECT

A. STATE REGULATIONS

This project is subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The Florida Statutes authorize the Department of Environmental Protection to establish rules and regulations regarding air quality as part of the Florida Administrative Code (F.A.C.). This project is subject to the applicable rules and regulations defined in the following Chapters of the Florida Administrative Code. These include: 62-4 (Permitting Requirements); 62-204 (Ambient Air Quality Requirements, PSD Increments, and Federal Regulations Adopted by Reference); 62-210 (Permits Required, Public Notice, Reports, Stack Height Policy, Circumvention, Excess Emissions, and Forms); 62-212 (Preconstruction Review, PSD Review and BACT); 62-213 (Title V Air Operation Permits for Major Sources of Air Pollution); 62-296 (Emission Limiting Standards); and 62-297 (Test Methods and Procedures, Continuous Monitoring Specifications, and Alternate Sampling Procedures).

B. GENERAL PSD APPLICABILITY CRITERIA

The Department regulates major air pollution sources in accordance with Florida's Prevention of Significant Deterioration (PSD) program in accordance with Rule 62-212.400, F.A.C. A PSD review is required in areas currently in attainment with the state and federal Ambient Air Quality Standards (AAQS) or areas designated as "unclassifiable" for a given pollutant. A new facility is considered "major" with respect to PSD if it emits or has the potential to emit: 250 tons per year or more of any regulated air pollutant; or 100 tons per year or more of any regulated air pollutant and the facility belongs to one of the 28 PSD Major Facility Categories defined in Rule 62-210.200, F.A.C.; or 5 tons per year of lead.

For new projects at existing PSD-major sources, each regulated pollutant is reviewed for PSD applicability based on emissions thresholds known as the "Significant Emission Rates" (SER) defined in Rule 62-210.200, F.A.C. Pollutant emissions from the project exceeding these rates are considered "significant" and applicants must employ the Best Available Control Technology (BACT) to minimize emissions of each such pollutant, and evaluate the air quality impacts.

Although a facility may be "major" with respect to PSD for only one regulated pollutant, it may be required to install BACT controls for several regulated pollutants that exceed the Significant Emission Rates.

The only PSD pollutant involved in this permitting action review is PM emissions changes as it relates to the different material handling baghouses transfer /production rates proposal.

III. ESTIMATES OF EMISSION INCREASES DUE TO PROJECTS

No increases in the kiln and cooler process and production rates have been requested or are expected. No emissions increases of the typical gaseous combustion products from pyroprocessing (e.g. NO_X, SO_2, VOC, CO) are requested or expected. The cooling dampers are for the purpose of controlling the manner by which cooling air is introduced in the area of the raw mill circuit to provide more rapid quenching of hot exhaust gases from the Kiln 1 preheater. In theory this additional temperature control is supposed to reduce the de novo formation of dioxin and furan (D/F) in the particulate control equipment (main baghouses).

The applicant has projected emissions of PM/PM_{10} to increase from the previously described materials handling operations (except for Finish Mills 1 and 2). Table 1 is a list of the applicant's estimated past actual emissions from the affected emissions units compared with the future potential emissions from those units. Revisions by the Department are also shown.

Table 1. Comparison of Past Actual to Future Potential PM/PM_{10} Emissions

Emission Unit No./Description	Permitted PM TPY	Past Actual PM/PM_{10} TPY	Future Potential PM/PM_{10} TPY	Project Increase (Decrease) PM/PM_{10}* TPY
E.U.005/Finish Mills 1 and 2 (both)	157.7	143.2 / 121.72	78.8 / 78.8**	(64.42) / (42.92)
E.U. 005/Finish Mills 1 and 2 (both) as Revised by Department	157.7	75 / 75	78.8 / 78.8	3 / 3
E.U.006/Clinker Storage Silos 1 and 2	5.72	1.53 / 1.44	5.72 / 5.72	4.19 / 4.28
E.U.011/Raw Material/Feed Silos	9.43	9.42 / 8.0	9.43 / 9.43	0.01 / 1.3
E.U.016/Clinker Storage Silo 3	5.95	5.78 / 4.91	5.95 / 5.95	0.17 / 1.04
E.U.024/Raw Material Pre-Mix Bin	2.54	2.52 / 2.14	2.54 / 2.54	0.02 / 0.40
E.U.025/Additive Material Storage Bin	11.30	10.30 / 8.76	11.30 / 11.30	1.0 / 2.54
E.U.026/Cement Bag Loadout System	1.87	1.36 / 1.16	2.22 / 2.22	0.86 / 1.06
Applicant's Estimate of Total PM/PM_{10} Increase (Decrease)				**(58.17) / (32.3)**
Department Estimate of Increase after revision of Estimate for Finish Mills 1 and 2				**9.25 / 13.62**

* Difference between Past Actual to Future Potential. PSD significance level of PM/PM_{10} = 25/15 TPY.
** Future Potential to emit for Finish Mills 1 and 2 based on application request for enforceable lb/hr limitation.

The Department does not dispute the estimates by the applicant except for those related to the finish mills. The finish mills are relatively large emissions units compared with the others listed. They have high flows and big baghouses. The estimates of past actual and permitted emissions for Finish Mills 1 and 2 provided by the applicant are based on calculations using the process weight table equations from Rule 62-296.320(4).

The applicant did not submit test data and relied upon past annual emissions estimates submitted to the Department in annual operating reports. They conducted visible emissions testing to demonstrate compliance with an opacity limitation of 10%.

The Department does not expect an actual decrease in emissions from Finish Mills 1 and 2 because the production rates are actually increasing to a small degree and no physical projects are specified leading to an expectation of emissions reductions. However, there are some benefits from the recent operation and maintenance plans required by the portland cement industry maximum achievable control technology (MACT) standards under 40 CFR 63, Subpart LLL.

Essentially the reductions are not "real" although the revised potential emissions can be made enforceable. The Department assumes that emissions in the past are a little less than the requested (lower) future potential emissions limit requested by the applicant.

The Department will assume that without physical changes, the finish mills will not emit less PM/PM_{10} emissions than in the past and will assume the changes in PM/PM_{10} emissions for the project will be zero (0). That will also prevent future use of the "imaginary reductions" for the purposes of "netting" to avoid triggering the PSD rules on future projects that may actually increase emissions.

The revised Department estimates of PM and PM_{10} increases for the requested changes are 6.25 and 10.62 TPY respectively. These values are less than the SER of 25 and 15 TPY for PM and PM_{10} respectively. Therefore a PSD review and BACT determination are not required.

IV. DEPARTMENT REVIEW OF REQUESTS

A. TRANSFER AND PRODUCTION RATES INCREASES FOR MINOR SOURCES

All of the emissions units affected by the transfer and production rate increases are adequately controlled by baghouses. Except for the cement bag loadout system, the same lb/hr limit will continue to apply at each emissions unit in the future as presently applies. With the exception of the finish mills and in lieu of conducting stack tests on each emissions unit, the applicant may rely on visible emissions testing and meet an opacity limitation of 5 percent as provided by Department rules 62-297.620(4) together with 62-310(7)(c).

In the case of the finish mills, the Department will require an initial PM stack test and a simultaneous opacity test within the present fiscal year to demonstrate compliance with the revised PM/PM_{10} emission limits of 9 lb/hr an opacity limit of 10%. After demonstrating compliance by the stack test, the applicant may thereafter request to satisfy the test requirement by meeting a 5% opacity limit. Until such a demonstration is made, the Department will require PM stack tests on an annual basis.

The requirements of 40 CFR 63, Subpart LLL apply to these emissions units. Accordingly, the applicant must, for each baghouse, maintain an operation and maintenance (O&M) plan to address proper operation, parametric monitoring, and a schedule for conducting periodic inspections and preventive maintenance. Baghouse inspections and maintenance activities shall be recorded in a written log. The O&M plan shall be submitted to the Department prior to any compliance tests for these units. Subpart LLL also requires adherence with and greater visible emissions testing frequency. This will insure more vigilance by the applicant regarding these emissions units to insure they comply with the 5% limitations.

The Department agrees with the requests to increase transfer and production rates for the specified non-pyroprocessing emissions units. The Department will issue a permit modification that will be a supplement to the previously issued permits.

B. COOLING DAMPERS

Part of this project is for the applicant's (after-the-fact) installation request of two dampers, 323E and 323N, for cooling the hot preheater gases from Kiln 1 to control dioxin and furans formation while the No. 1 Raw Mill is down. Dampers 323 E and 323N achieve the cooling required to control dioxin/furans formation. Damper 323 N is automatically controlled by the baghouse inlet temperature.

CEMEX provided the following details regarding the cooling dampers' operation: Damper 323 E will be in the open position when the No. 1 Raw Mill is down and in the closed position when the No.1 Raw Mill is in operation. There are no variable positions for Damper 323 E; it is either in the open or closed position. Damper 323 N is controlled by an automatic damper positioner based on the baghouse inlet temperature.

The baghouse inlet temperature set point is based on the limitation established during the compliance test and does not vary (40 CFR 63.1444(b)).

Damper operation/position is indicated to the control room operator by percentage readout on the control monitor. There is redundancy in the baghouse inlet temperature. Two thermocouples exist for monitoring the baghouse inlet temperature. If the signal from the thermocouple is lost or otherwise determined to be in error the control room operator will refer to the secondary thermocouple reading.

The use of Dampers 323N and 323E to control the temperature of kiln gases bypassing the raw mill in the Kiln No. 1 system is not expected to measurably change the raw mill down gas flow rate as measured in the kiln stack. The purpose of these dampers is not to add additional cooling air to the system. The purpose is to add cooling air in a manner that will cool the bypassed gases quickly and uniformly. The placement of the dampers was based on Computational Fluid Dynamic (CFD) modeling and the effectiveness of the dampers has been demonstrated by subsequent D/F performance testing.

The applicant provided the results of D/F emissions testing conducted since 2003. These indicate reductions in D/F emissions following installation of the dampers. The Department does not necessarily agree or disagree that the entire cause or that the main cause of the D/F reductions is the installation of the dampers to reduce de novo D/F formation in the control equipment.

Department has technical reasons suggesting that other phenomena contributed to D/F formation. These include raw materials such as high carbon fly ash from nearby power plants that use low NO_X burners or otherwise do not achieve efficient combustion in their respective furnaces. Such carbon is typically measured as "loss on ignition" (LOI) and can theoretically catalyze or (together with chlorides in the ash or fuel) provide the precursors to D/F formation.

The Department believes the dampers at least help reduce D/F and approves their after-the-fact installation. CEMEX has stated that they are considering additional projects to further regulate and stabilize temperature to prevent D/F formation. The key option under consideration is installation of gas conditioning towers between the preheaters and control equipment consistent with industry practice.

C. THALLIUM SAMPLING REQUIREMENTS

The requirement to conduct daily sampling for the semi-volatile metal, thallium (Tl), in the control equipment dust was included (at the request of the Hernando County Board of County Commissioners) in 1993 in conjunction with approval to burn tires in Kiln 1. The purpose was to control the tendency of Tl to build up in the external cycle of the preheater, raw mill, control equipment and feed silo.

According to the previous operator (Florida Mining and Manufacturing): "the Tl concentration is in the kiln/mill baghouse dust. We monitor the concentration of Tl on a daily basis and as we see the concentration increase, we remove a portion of the dust from the system and dispose of it in an authorized landfill. The removal is generally done on a day when the raw mill is down and the baghouse load is at minimum level, which conversely brings [SIC] the thallium concentration from the system with minimum level, which conversely brings the Tl concentration in the dust to maximum level. This allows us to remove maximum Tl from the system.

Immediately upon taking the raw mill down, we start to take samples of the baghouse dust every hour. These samples are analyzed by X-Ray Fluorescence (XRF) and the indicated concentration is recorded. When concentration level reaches approximately 0.8% we begin to load a tanker truck with the dust. We continue to monitor the concentration as the truck is being loaded and the final dust sample is taken at the end of the loading operation. The indicated concentration at the end of the truck loading will generally be in the 0.3% to 0.4% range. We average the first and last sample that went into the truck for the average concentration of the load. The normal average will be approximately 0.5% to 0.6% on the truck load of 14 to 16 tons of dust."

CEMEX now affirms that they have not wasted baghouse dust for the past four years for purpose of controlling the thallium concentration of the dust or for any other purpose (response to Request for Additional Information "RAI" March 1, 2006).

According to the RAI response, in the last 5 years none of the required tests have shown Tl concentrations that would exceed the permit limit of 1.5%. The monthly average Tl concentration for the two years period has been 0.31 percent and the range of individual thallium concentrations has been 0.02-1.33 %.

The applicant stated that the area currently being mined for limestone on the plant property has gradually turned toward the southwest over the last 6 years. The old mining area directly west of the plant was mined out and closed in the mid to late 1990's. According to CEMEX as its mining area has moved south/southwest of the plant area, the Tl levels have dropped in the limestone and the Tl concentrations in the baghouse dust have also dropped.

While Tl is not listed as a hazardous air pollutant (HAP), the values discussed above are seemingly high for this semi-volatile metal and would represent values in the dust of 200 to 13,000 ppm. By not removing dust, most Tl in the system is likely to be emitted from the stack (rather than via the hot clinker) together with any mercury (Hg) that may have been removed through processes analogous to those described for Tl.

The Department does not propose to make the requested changes.

D. FUEL SAMPLING REQUIREMENT

The applicant also requests to use the supplier's fuel analysis records for liquid fuels instead of conducting its own analysis of each sample representative of the shipment taken by CEMEX in accordance with the protocol given in the present permits. The applicant states that liquid fuels are only used to heat kilns during start up and comprise less than 1.5% of the total annual heat input to Kiln 1. Liquid fuel heating values and sulfur content are consistent. The permitted fuels are No. 2, No. 4, No. 5, No. 6 and on-specification used oil.

The Department agrees with this request but will require adherence to the same protocol regarding the properties of the oil used. The applicant will be required to maintain a purchasing specification applicable to shipment by its suppliers and records of compliance with those specifications.

E. CONCLUSIONS

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the Draft Permit. This determination is based on a technical review of the application, reasonable assurances provided by the applicant and the conditions specified in the Draft permit.