Original

EQUIPMENT FOR PREPARATION AND INJECTION OF ALTERNATE FUEL MATERIAL

CEMEX Construction Materials Florida, LLC
Brooksville, Hernando County, Florida

Hardcopy Submitted: December 16, 2011

307-11-20

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES
4014 NW 13th STREET
GAINESVILLE, FL 32609-1923
352/377-5822 ▪ FAX/377-7158

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KA 307-11-20
December 16, 2011

RECEIVED
DEC 19 2011
DIVISION OF AIR
RESOURCE MANAGEMENT

Ms. Christy Devore
Bureau of Air Regulation
Florida Dept. of Environmental Regulation
2600 Blair Stone Road, MS 5500
Tallahassee, Florida 32399-2400

RE: ***AC Permit Application: Installation of Equipment Necessary for the Preparation and Injection of Alternative Fuel Materials***
CEMEX Construction Materials Florida, LLC; Facility ID: 0530021

Dear Ms. Devore:

Enclosed are four (4) copies of an application for the installation of equipment necessary for the preparation and injection of alternative fuel materials at the CEMEX Construction Materials Florida, Brooksville South cement plant. Through this project, CEMEX Construction Materials Florida is proud to be a leader in innovative and environmentally progressive techniques. The implementation of this project will increase the availability and stability of locally generated energy sources and promote the value of recovered materials that would otherwise be landfilled. We look forward to working with you to move this proposed project to a reality.

Please feel free to contact me at (352) 377-5822 or mlee@koooglerassociates.com or George Townsend, CEMEX Construction Materials Florida, at (352) 799-7881 or gtownsend@cemexusa.com, if you have any questions regarding this submittal. I sincerely appreciate your time and consideration for this innovative project.

Regards,

Max Lee/ksh

Max Lee, PhD., P.E.
KOOGLER AND ASSOCIATES, INC.

cc: George Townsend, CEMEX Construction Materials Florida, LLC
Karl Seltzer, Koogler & Associates, Inc.

Department of Environmental Protection

RECEIVED

Division of Air Resource Management

DEC 19 2011

APPLICATION FOR AIR PERMIT - LONG FORM

DIVISION OF AIR RESOURCE MANAGEMENT

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit:

- For any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial, revised, or renewal Title V air operation permit.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **CEMEX Construction Materials Florida, LLC**	
2. Site Name: **Brooksville South Cement and Power Plant**	
3. Facility Identification Number: **0530021**	
4. Facility Location... Street Address or Other Locator: **10311 Cement Plant Road** City: **Brooksville** County: **Hernando** Zip Code: **34601**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **Maxwell R. Lee, Ph. D, P. E.**
2. Application Contact Mailing Address... Organization/Firm: **Koogler and Associates, Inc** Street Address: **4014 NW 13th Street** City: **Gainesville** State: **Florida** Zip Code: **32609**
3. Application Contact Telephone Numbers... Telephone: **(352) 377 - 5822** ext. **13** Fax: **(352) 377 - 7158**
4. Application Contact E-mail Address: **mlee@kooglerassociates.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application: 12-19-11	3. PSD Number (if applicable):
2. Project Number(s): 0530021-039-AC	4. Siting Number (if applicable):

APPLICATION INFORMATION

Purpose of Application

This application for air permit is being submitted to obtain: (Check one)

Air Construction Permit

- [x] Air construction permit.
- [ ] Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).
- [ ] Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

Air Operation Permit

- [ ] Initial Title V air operation permit.
- [ ] Title V air operation permit revision.
- [ ] Title V air operation permit renewal.
- [ ] Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.
- [ ] Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

- [ ] Air construction permit and Title V permit revision, incorporating the proposed project.
- [ ] Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

- [ ] I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

Application is for installation and shakedown assessment of equipment for handling and injection of alternative fuels with on-site grinding of materials.

Handling includes transport on-site, storage, and processing. On-site processing of materials is requested.

The regulatory analysis and the project description are detailed in Appendix 1.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
044	Kiln No. 2, In-line Raw Mill, Pre-Heater, Pre-Calciner and Clinker Cooler	N/A	N/A
No I.D.	Fuel Processing System		

Application Processing Fee

Check one: ☐ Attached - Amount: $_______________ ☒ Not Applicable

APPLICATION INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1.	Owner/Authorized Representative Name : **Mr. Jim Daniel, Plant Manager**
2.	Owner/Authorized Representative Mailing Address... Organization/Firm: **CEMEX Construction Materials Florida, LLC** Street Address: **10311 Cement Plant Road** City: **Brooksville** State: **Florida** Zip Code: **34601**
3.	Owner/Authorized Representative Telephone Numbers... Telephone: **(352) 799 –7881** Fax: **(352) 540 -4794**
4.	Owner/Authorized Representative E-mail Address: **jdaniel@cemexusa.com**
5.	Owner/Authorized Representative Statement: *I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.* Signature Date 12/15/11

Application Responsible Official Certification

Complete if applying for an initial, revised, or renewal Title V air operation permit or concurrent processing of an air construction permit and revised or renewal Title V air operation permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name:

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):
   - [ ] For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
   - [ ] For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
   - [ ] For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
   - [ ] The designated representative at an Acid Rain source, CAIR source, or Hg Budget source.

3. Application Responsible Official Mailing Address...
   Organization/Firm:
   Street Address: City: State: Zip Code:

4. Application Responsible Official Telephone Numbers...
   Telephone: ( ) ext. Fax: ( )

5. Application Responsible Official E-mail Address:

6. Application Responsible Official Certification:

   I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

   ____________________ Signature

   ______________ Date

APPLICATION INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: **Maxwell R. Lee, Ph. D, P. E.** Registration Number: **58091**
2.	Professional Engineer Mailing Address... Organization/Firm: **Koogler and Associates, Inc.** Street Address: **4014 NW 13th Street** City: **Gainesville** State: **Florida** Zip Code: **32609**
3.	Professional Engineer Telephone Numbers... Telephone: **(352) 377-5822** ext.**13** Fax: **(352) 377-7158**
4.	Professional Engineer E-mail Address: **mlee@kooglerassociates.com**
5.	Professional Engineer Statement: *I, the undersigned, hereby certify, except as particularly noted herein*, that:* *(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and* *(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.* *(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.* *(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.* *(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐ if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.* [signature] 12/16/11 Signature Date (seal)

* Attach any exception to certification statement.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **17** **360.0** East (km) **3162.5** North (km)		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **32**	6. Facility SIC(s): **3241**
7. Facility Comment : **None**			

Facility Contact

1. Facility Contact Name: **George Townsend - Environmental Engineer**
2. Facility Contact Mailing Address... Organization/Firm: **CEMEX Construction Materials Florida, LLC** Street Address: **10311 Cement Plant Road** City: **Brooksville** State: **Florida** Zip Code: **34601**
3. Facility Contact Telephone Numbers: Telephone: **352-799-7881** Fax: **352-799-6088**
4. Facility Contact E-mail Address: gtownsend@cemexusa.com

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Facility Primary Responsible Official E-mail Address:

FACILITY INFORMATION

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1.	☐ Small Business Stationary Source	☒ Unknown
2.	☐ Synthetic Non-Title V Source	
3.	☒ Title V Source	
4.	☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5.	☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6.	☒ Major Source of Hazardous Air Pollutants (HAPs)	
7.	☐ Synthetic Minor Source of HAPs	
8.	☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9.	☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10.	☒ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11.	☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	

12. Facility Regulatory Classifications Comment:
See Appendix 1 for project regulations

Facility is subject to applicable portions of:
40 CFR 51, 52, 70, 71 – GHG Tailoring Rule
40 CFR 63 Subpart LLL
40 CFR 60 Subpart F (superseded by NESHAP Subpart LLL)
40 CFR 60 Subpart Y
40 CFR 60 Subpart OOO
40 CFR 241
40 CFR 63 Subpart ZZZZ and 40 CFR 60 Subpart IIII as applicable.
Rules 62-4 through 62-297, F.A.C. ; specifically 62-297.407, F.A.C. for cement plants

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
PM	**A**	**N**
PM_{10}	**A**	**N**
SO_2	**A**	**N**
NOx	**A**	**N**
CO	**A**	**N**
HAPs	**A**	**N**
D/F	**B**	**N**
H114	**B**	**N**
SAM	**B**	**N**
FL	**B**	**N**

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility-Wide Cap [Y or N]? (all units)	3. Emissions Unit ID's Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap
N/A					

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ________ ☒ Previously Submitted, Date:________
2.	Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ________ ☒ Previously Submitted, Date:________
3.	Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ________ ☒ Previously Submitted, Date:________

Additional Requirements for Air Construction Permit Applications

1.	Area Map Showing Facility Location: ☐ Attached, Document ID:________ ☒ Not Applicable (existing permitted facility)
2.	Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL): ☒ Attached, Document ID: **Appendix 1** ☐ Not Applicable (existing permitted facility)
3.	Rule Applicability Analysis: ☒ Attached, Document ID: **Appendix 1** ☐ Not Applicable (existing permitted facility)
4.	List of Exempt Emissions Units: ☐ Attached, Document ID:________ ☒ Not Applicable
5.	Fugitive Emissions Identification: ☒ Attached, Document ID: **Appendix 1** ☐ Not Applicable
6.	Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☐ Attached, Document ID:________ ☒ Not Applicable
7.	Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☐ Attached, Document ID:________ ☒ Not Applicable
8.	Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☐ Attached, Document ID:________ ☒ Not Applicable
9.	Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☐ Attached, Document ID:________ ☒ Not Applicable
10.	Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID:________ ☒ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units: ☐ Attached, Document ID:__________ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities: (Required for initial/renewal applications only) ☐ Attached, Document ID: __________ ☒ Not Applicable
2. Identification of Applicable Requirements: (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought) ☐ Attached, Document ID:__________ ☒ Not Applicable (revision application with no change in applicable requirements)
3. Compliance Report and Plan: (Required for all initial/revision/renewal applications) ☐ Attached, Document ID:__________ Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.
4. List of Equipment/Activities Regulated under Title VI: (If applicable, required for initial/renewal applications only) ☐ Attached, Document ID:__________ ☐ Equipment/Activities Onsite but Not Required to be Individually Listed ☒ Not Applicable
5. Verification of Risk Management Plan Submission to EPA: (If applicable, required for initial/renewal applications only) ☐ Attached, Document ID:__________ ☒ Not Applicable
6. Requested Changes to Current Title V Air Operation Permit: ☐ Attached, Document ID: __________ ☒ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Facilities Subject to Acid Rain, CAIR, or Hg Budget Program

1. Acid Rain Program Forms:

   Acid Rain Part Application (DEP Form No. 62-210.900(1)(a)):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable (not an Acid Rain source)

   Phase II NO_X Averaging Plan (DEP Form No. 62-210.900(1)(a)1.):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable

   New Unit Exemption (DEP Form No. 62-210.900(1)(a)2.):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable

2. CAIR Part (DEP Form No. 62-210.900(1)(b)):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable (not a CAIR source)

3. Hg Budget Part (DEP Form No. 62-210.900(1)(c)):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable (not a Hg Budget unit)

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section: **Kiln No .2, In-line Raw Mill, Pre-Heater, Pre- Calciner and Clinker Cooler**

3. Emissions Unit Identification Number: **044**

4. Emissions Unit Status Code: **A**	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code: **32**

8. Federal Program Applicability: (Check all that apply) **N/A**

   ☐ Acid Rain Unit

   ☐ CAIR Unit

   ☐ Hg Budget Unit

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment: **This project will not significantly increase emissions.**
Project details:
    1) **Install and shakedown of alternative fuel (AF) systems for handling, storage and injection.**
    2) **Allow AF assessments in the AF systems.**

Emissions Unit Control Equipment/Method: Control **1** of **2**

1. Control Equipment/Method Description: **Baghouse – High Temperature**
2. Control Device or Method Code: **016**

Emissions Unit Control Equipment/Method: Control **2** of **2**

1. Control Equipment/Method Description: **Selective Noncatalytic Reduction (SNCR)**
2. Control Device or Method Code: **107**

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: **258 TPH; 2,107,875 TPY dry preheater feed and fly ash (consecutive 12-month period, fed directly to the calciner)**		
2. Maximum Production Rate: **156 TPH; 1,227,500 TPY clinker (consecutive 12-month period)**		
3. Maximum Heat Input Rate: **490** million Btu/hr **(pyroprocessing system)**		
4. Maximum Incineration Rate:	pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	**24** hours/day **52** weeks/year	**7** days/week **8,760** hours/year
6. Operating Capacity/Schedule Comment: **Based on Permit No. 0530021-029-AV and 0530021-033-AC.**		

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **Kiln No. 2**	2. Emission Point Type Code: **1**

3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:
Equipment ID 331.BF300

4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:

5. Discharge Type Code: **V**	6. Stack Height: **318** feet	7. Exit Diameter: **10.1** feet
8. Exit Temperature: **270°F**	9. Actual Volumetric Flow Rate: **311,000** acfm	10. Water Vapor: **12.2%**

11. Maximum Dry Standard Flow Rate: **194,000** dscfm	12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)

15. Emission Point Comment:

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 12

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Natural Gas; Cement Kiln/Dryer – Kiln and Precalciner**		
2. Source Classification Code (SCC): **3-90-006-02**	3. SCC Units: **Million Cubic Feet Burned**	
4. Maximum Hourly Rate: **0.466**	5. Maximum Annual Rate: **4,082.2**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **Negligible**	8. Maximum % Ash: **Negligible**	9. Million Btu per SCC Unit: **1,050**
10. Segment Comment: **Annual rate is based on the maximum hourly rate and 8,760 hr/yr.**		

Segment Description and Rate: Segment 2 of 11

1. Segment Description (Process/Fuel Type): **Industrial Processes; Mineral Products; Cement Manufacturing (Dry Process); Raw Material Grinding and Drying – Raw Mill**		
2. Source Classification Code (SCC): **3-05-006-13**	3. SCC Units: **Tons Processed**	
4. Maximum Hourly Rate: **258**	5. Maximum Annual Rate: **2,107,875**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **The kiln shall not process more than 258 tons per hour of dry preheater feed and dry flyash and shall not exceed 5,775 tons in any 24-hr period (24-hr average). Process and production rates shall be further limited to 2,107,875 tons of dry preheater feed and dry flyash in any consecutive 12-mo period (5,775 tons/day) and 1,227,500 tons of clinker in any consecutive 12-mo period (3,500 tons/day).**		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment 3 of 12

1. Segment Description (Process/Fuel Type): **Industrial Processes; Mineral Products; Cement Manufacturing (Dry Process); Preheater Kiln**		
2. Source Classification Code (SCC): **3-05-006-22**	3. SCC Units: **Tons Processed**	
4. Maximum Hourly Rate: **258**	5. Maximum Annual Rate: **2,107,875**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **The kiln shall not process more than 258 tons per hour of dry preheater feed and dry flyash and shall not exceed 5,775 tons in any 24-hr period (24-hr average). Process and production rates shall be further limited to 2,107,875 tons of dry preheater feed and dry flyash in any consecutive 12-mo period (5,775 tons/day) and 1,227,500 tons of clinker in any consecutive 12-mo period (3,500 tons/day).**		

Segment Description and Rate: Segment 4 of 11

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Coal; Cement Kiln Dryer**		
2. Source Classification Code (SCC): **3-90-002-01**	3. SCC Units: **Tons Burned**	
4. Maximum Hourly Rate: **20.0**	5. Maximum Annual Rate: **175,200**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **1.0**	8. Maximum % Ash: **10**	9. Million Btu per SCC Unit: **26**
10. Segment Comment: **Annual rate is based on the maximum hourly rate and 8,760 hr/yr.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment 5 of 12

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Distillate Oil; Cement Kiln/Dryer – No. 2 Fuel Oil**		
2. Source Classification Code (SCC): **3-90-005-02**	3. SCC Units: **Thousand Gallons Burned**	
4. Maximum Hourly Rate: **3.6**	5. Maximum Annual Rate: **31,536**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **0.5**	8. Maximum % Ash: **N/A**	9. Million Btu per SCC Unit:
10. Segment Comment: **Annual rate is based on the maximum hourly rate and 8,760 hr/yr.**		

Segment Description and Rate: Segment 6 of 11

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; On-spec Oil; Cement Kiln/Dryer**		
2. Source Classification Code (SCC): **3-90-004-02**	3. SCC Units: **Thousand Gallons Burned**	
4. Maximum Hourly Rate: **3.6**	5. Maximum Annual Rate: **31,536**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **1.5**	8. Maximum % Ash: **N/A**	9. Million Btu per SCC Unit: **26**
10. Segment Comment: **Annual rate is based on the maximum hourly rate and 8,760 hr/yr.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment 7 of 12

1. Segment Description (Process/Fuel Type): **Industrial Processes; Mineral Products; Cement Manufacturing (Dry Process); Clinker Cooler**		
2. Source Classification Code (SCC): **3-05-006-14**	3. SCC Units: **Tons Processed**	
4. Maximum Hourly Rate: **156**	5. Maximum Annual Rate: **1,277,500**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **The Kiln shall not produce more than 156 tons of clinker per hour, and 3,500 tons in any 24-hr period (24-hr average). Process and production rates shall be further limited to 2,107,875 tons of dry preheater feed and dry flyash in any consecutive 12-mo period (5,775 tons/day) and 1,227,500 tons of clinker in any consecutive 12-mo period (3,500 tons/day).**		

Segment Description and Rate: Segment 8 of 11

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Coke; General: Coke**		
2. Source Classification Code (SCC): **3-90-008-99**	3. SCC Units: **Tons Burned**	
4. Maximum Hourly Rate: **20**	5. Maximum Annual Rate: **175,200**	6. Estimated Annual Activity Factor:
7. **Typical** % Sulfur: **0.5-6.0**	8. **Typical** % Ash: **0.5-5.0**	9. Million Btu per SCC Unit: **26.6**
10. Segment Comment: **Annual rate is based on the maximum hourly rate and 8,760 hr/yr.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment 9 of 12

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Alternative Fuel; Whole Tires (TDF)**		
2. Source Classification Code (SCC): **3-90-012-99**	3. SCC Units: **Tons Burned**	
4. Maximum Hourly Rate: **5.25**	5. Maximum Annual Rate: **45,990**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: **28**
10. Segment Comment: **Annual rate based on hourly rate and 8,760 hr/yr.**		

Segment Description and Rate: Segment 10 of 11

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Raw Materials**		
2. Source Classification Code (SCC): **3-90-012-99**	3. SCC Units: **Tons Burned**	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment 11 of 12

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Liquified Petroleum Gas; Propane**		
2. Source Classification Code (SCC): **3-90-010-99**	3. SCC Units: **Thousand Gallons Burned**	
4. Maximum Hourly Rate: **5.2**	5. Maximum Annual Rate: **45,552**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: **90.5**
10. Segment Comment: **Annual rate is based on the maximum hourly rate and 8,760 hr/yr.**		

Segment Description and Rate: Segment 12 of 12 **NEW SEGMENT**

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use; Alternative Fuels – Kiln and Precalciner**		
2. Source Classification Code (SCC): **3-90-012-89**	3. SCC Units: **Tons Burned**	
4. Maximum Hourly Rate: **See Appendix 1**	5. Maximum Annual Rate: **See Appendix 1**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **See Appendix 1**	8. Maximum % Ash:	9. Million Btu per SCC Unit: **See Appendix 1**
10. Segment Comment: **Segment represent non-hazardous fuels: See Appendix 1 for list of fuels.**		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM	**016**		**EL**
PM_{10}	**016**		**EL**
SO_2	**041**		**EL**
NO_x	**107/025**		**EL**
CO			**EL**
VOC			**EL**
H114 (Hg)			**EL**

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **28.8** lb/hour **113.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.112 lb/ton of kiln feed, 0.185 lb/ton of clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **156 ton/hr x 0.185 lb/ton = 28.8 lb/hr** **1,227,500 ton/yr x 0.185 lb/ton = 227,087 lb/yr = 113.5 ton/yr**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.112 lb/ton of kiln feed**	4. Equivalent Allowable Emissions: **28.8** lb/hour **113.5** tons/year
5. Method of Compliance: **Annual compliance testing using EPA Method 5. Minimum sample volume of 30 dscf.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV and BACT.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM_{10}**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **25.0** lb/hour **98.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.097 lb/ton of kiln feed, 0.16 lb/ton of clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:
156 ton/hr x 0.16 lb/ton = 25.0 lb/hr
1,227,500 ton/yr x 0.16 lb/ton = 196,400 lb/yr = 98.2 ton/yr

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.097 lb/ton of kiln feed**	4. Equivalent Allowable Emissions: **25.0** lb/hour **98.2** tons/year
5. Method of Compliance: **Annual compliance testing using EPA Method 5 (assuming all PM measured is PM_{10}).**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV and BACT.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **$PM_{2.5}$**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **14.5** lb/hour **57.1** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.056 lb/ton of kiln feed, 0.093 lb/ton of clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:
156 ton/hr x 0.093 lb/ton = 14.5 lb/hr
1,227,500 ton/yr x 0.093 lb/ton = 114,157 lb/yr = 57.1 ton/yr

$PM_{2.5}$ emission factors conservatively estimated at 50% of fraction of PM. See Table 4 in Appendix 1.

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.056 lb/ton of kiln feed**	4. Equivalent Allowable Emissions: **14.5** lb/hour **57.1** tons/year
5. Method of Compliance: **Annual compliance testing using EPA Method 5.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV, BACT and conservatively estimated at 50% of fraction of PM.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **28.8** lb/hour **113.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.185 lb/ton clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **156 ton/hr x 0.185 lb/ton = 28.8 lb/hr** **1,227,500 ton/yr x 0.185 lb/ton = 227,087 lb/yr = 113.5 ton/yr**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.185 lb/ton clinker**	4. Equivalent Allowable Emissions: **28.8** lb/hour **113.5** tons/year
5. Method of Compliance: **Continuous emissions monitor and EPA Method 6 or 6C.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV and BACT.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **NO_x**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **243.36** lb/hour **957.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.56 lb/ton of clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:

156 ton/hr x 1.56 lb/ton = 243.36 lb/hr
1,227,500 ton/yr x 1.56 lb/ton = 1,914,900 lb/yr = 957.5 ton/yr

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **1.56 lb/ton clinker**	4. Equivalent Allowable Emissions: **243.36** lb/hour **957.5** tons/year
5. Method of Compliance: **Continuous emissions monitor and EPA Method 7 or 7E.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV and BACT.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **CO**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **450** lb/hour **1,767** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.88 lb/ton clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **156 ton/hr x 2.88 lb/ton = 450 lb/hr** **1,227,500 ton/yr x 2.88 lb/ton = 3,535,200 lb/yr = 1,767 ton/yr**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **2.88 lb/ton clinker**	4. Equivalent Allowable Emissions: **449.3** lb/hour **1,767** tons/year
5. Method of Compliance: **Annual compliance test using EPA Method 10 and CO CEMS.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV and BACT.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **15.0** lb/hour **58.9** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.096 lb/ton clinker** Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **156 ton/hr x 0.096 lb/ton = 15.0 lb/hr** **1,227,500 ton/yr x 0.096 lb/ton = 117,840 lb/yr = 58.9 ton/yr**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.096 lb/ton clinker**	4. Equivalent Allowable Emissions: **15.0** lb/hour **58.9** tons/year
5. Method of Compliance: **Continuous emissions monitor and Method 25 or 25A.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0530021-029-AV and BACT.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **H114 (Mercury)**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour **0.061** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **Permit No. 0530021-029-AV, -033-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions:	
11. Potential, Fugitive, and Actual Emissions Comment: **Annual limit of 122 lb/yr based on BACT**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour **0.061** tons/year

5. Method of Compliance:
Method 29 or the Ontario Hydro Method for Subpart LLL Hg Tests

6. Allowable Emissions Comment (Description of Operating Method):
122 lb/yr limit based on BACT. Per recent Subpart LLL revision, this existing kiln is subject to limitations accordingly of 41µg/dscm (NESHAP 2006 amendment. The current limitations of Section 3(12) of Permit No. 0530021-029-AV are superseded by this revised NESHAP.

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE10**	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: 10% Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **Continuous Opacity Monitor; 6-minutes**	
5. Visible Emissions Comment: **Based on Permit No. 0530021-029-AV.**	

Visible Emissions Limitation: Visible Emissions Limitation __ of ___

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor 1 of 8

1. Parameter Code: **EM**	2. Pollutant(s): **CO**
3. CMS Requirement:	☐ Rule ☒ Other
4. Monitor Information... Manufacturer: **ABB** Model Number: **URAS 26**	Serial Number: **04731961/5007**
5. Installation Date: **4/25/2008**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by BACT**	

Continuous Monitoring System: Continuous Monitor 2 of 8

1. Parameter Code: **EM**	2. Pollutant(s): **CO_2**
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... Manufacturer: **ABB** Model Number: **URAS 26**	Serial Number: **0240326926/100**
5. Installation Date: **3/3/2010**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by GHG Rule, 40 CFR 98**	

H. CONTINUOUS MONITOR INFORMATION (CONTINUED)

Continuous Monitoring System: Continuous Monitor 3 of 8

1. Parameter Code: **EM**	2. Pollutant(s): **NO, NO_2, SO_2**
3. CMS Requirement:	☐ Rule ☒ Other
4. Monitor Information... Manufacturer: **ABB** Model Number: **Limas 11 UV**	Serial Number: **04731961/5001**
5. Installation Date: **4/25/2010**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by BACT**	

Continuous Monitoring System: Continuous Monitor 4 of 8

1. Parameter Code: **EM**	2. Pollutant(s): **THC**
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... Manufacturer: **ABB** Model Number: **Multi-FID 14**	Serial Number: **04731961/6010**
5. Installation Date: **4/25/2010**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by Subpart LLL**	

H. CONTINUOUS MONITOR INFORMATION (CONTINUED)

Continuous Monitoring System: Continuous Monitor 5 of 8

1. Parameter Code: **FLOW**	2. Pollutant(s):
3. CMS Requirement:	[X] Rule [ ] Other
4. Monitor Information... Manufacturer: **Durag** Model Number: **D-FL 200 G**	Serial Number: **432176**
5. Installation Date: **4/25/2010**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by GHG Rule, 40 CFR 98 and BACT**	

Continuous Monitoring System: Continuous Monitor 6 of 8

1. Parameter Code: **VE**	2. Pollutant(s): **Opacity**
3. CMS Requirement:	[ ] Rule [X] Other
4. Monitor Information... Manufacturer: **Durag** Model Number: **D-R 290**	Serial Number: **432024**
5. Installation Date: **4/25/2010**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by BACT**	

H. CONTINUOUS MONITOR INFORMATION (CONTINUED)

Continuous Monitoring System: Continuous Monitor 7 of 8

1. Parameter Code: **EM**	2. Pollutant(s): **H_2O**
3. CMS Requirement:	☐ Rule ☒ Other
4. Monitor Information... Manufacturer: **NEO Monitors** Model Number: **Laser Gas II**	Serial Number: **10075**
5. Installation Date: **4/25/2010**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor 8 of 8

1. Parameter Code: **EM**	2. Pollutant(s): **O_2**
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... Manufacturer: **ABB** Model Number: **URAS 26**	Serial Number: **04731961/5007**
5. Installation Date: **4/25/2008**	6. Performance Specification Test Date: **3/19/2010**
7. Continuous Monitor Comment: **required by LLL for oxygen correction**	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Appendix 1** ☐ Previously Submitted, Date ________
2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Appendix 1** ☐ Previously Submitted, Date ________
3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID:______ ☒ Previously Submitted, Date **On file with DEP**
4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID______ ☐ Previously Submitted, Date ________ ☒ Not Applicable (construction application)
5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ______ ☒ Previously Submitted, Date **On file with DEP** ☐ Not Applicable
6. Compliance Demonstration Reports/Records: ☐ Attached, Document ID: ________ Test Date(s)/Pollutant(s) Tested: ________ ☐ Previously Submitted, Date: ______ Test Date(s)/Pollutant(s) Tested: ________ ☐ To be Submitted, Date (if known): ________ Test Date(s)/Pollutant(s) Tested: ________ ☒ Not Applicable Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.
7. Other Information Required by Rule or Statute: ☐ Attached, Document ID: ________ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: ________ ☒ Not Applicable	
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: ________ ☒ Not Applicable	
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: ________ ☒ Not Applicable	

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: ________	
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: ________ ☒ Not Applicable	
3. Alternative Methods of Operation: ☐ Attached, Document ID: ________ ☒ Not Applicable	
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: ________ ☒ Not Applicable	

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☒ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section: **Fuel Processing System**

3. Emissions Unit Identification Number: **N/A**

4. Emissions Unit Status Code **C**	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code: **32**

8. Federal Program Applicability: (Check all that apply)

   ☐ Acid Rain Unit
   ☐ CAIR Unit
   ☐ Hg Budget Unit

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment: **Emission unit consists of equipment for alternative fuel (see appendix 1) processing prior to injection into the kiln/precalciner. This units potential emissions are below the minimum limits for necessary regulation.**

Emissions Unit Control Equipment/Method: Control 1 of 1

1. Control Equipment/Method Description: **Water Spray as needed**	
2. Control Device or Method Code: **016**	

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: **330, 000** tons per year
2. Maximum Production Rate:
3. Maximum Heat Input Rate: million Btu/hr
4. Maximum Incineration Rate: pounds/hr tons/day
5. Requested Maximum Operating Schedule: hours/day days/week weeks/year **8670** hours/year
6. Operating Capacity/Schedule Comment: **The kiln system is expected to use a maximum of 330,000 tons of AF per year. As such, preparation equipment is designed for that amount. The amount will depend of density and other material factors. Although a continuous (8,760 hours/yr) operating schedule is being requested, the processing equipment will not run 8,760 hours/yr due to the semi-batch processing nature of alternative fuels.**

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram:		2. Emission Point Type Code:
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: **See Appendix 1, Table 1, Grinder and screen, for more details.** **This unit will be portable and located at the alternative storage location.**		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:		
5. Discharge Type Code:	6. Stack Height: feet	7. Exit Diameter: feet
8. Exit Temperature: °F	9. Actual Volumetric Flow Rate: acfm	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: dscfm		12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 2

1. Segment Description (Process/Fuel Type): **Industrial Processes; Mineral Products; Cement Manufacturing (Dry Process); Other Not Classified** **(Alternate Fuel Processing)**		
2. Source Classification Code (SCC): **3-05-006-99**	3. SCC Units: **Tons Fuel Material**	
4. Maximum Hourly Rate:	5. Maximum Annual Rate: **330,000**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **See Appendix 1, Table 1, Grinder and screen, for more details**		

Segment Description and Rate: Segment 2 of 2

1. Segment Description (Process/Fuel Type): **Internal Combustion Engines → Industrial → Distillate Oil (Diesel) → Reciprocating**		
2. Source Classification Code (SCC): **2-02-001-02**	3. SCC Units: **Thousand Gallons Burned**	
4. Maximum Hourly Rate: **0.01356**	5. Maximum Annual Rate: **118.8**	6. Estimated Annual Activity Factor: **N/A**
7. Maximum % Sulfur:	8. Maximum % Ash: **Negligible**	9. Million Btu per SCC Unit: **137 (AP-42)**
10. Segment Comment: **Maximum Hourly Rate:** **630 HP grinder + 100 HP screen/conveyor (See App. 1 for equipment) x (2545 Btu/hr/HP) x (1mmbtu/10^6 Btu) x (1 TGB/137 mmbtu) = 0.01356 TGB/hr** **Maximum Annual Rate:** **(630 + 100) HP grinder x (2545 Btu/hr/HP) x (1gal/137,000 Btu) x (8,760 hr/yr) =118.8 TGB/yr** **Note that the engines for preparation are expected to be electric and thus will not consume such fuels. This also assumes engines will be running 8,760 hr/yr.**		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM			**NS**
PM_{10}			**NS**
SO_2			**NS**
NO_x			**EL**
CO			**EL**
VOC			**EL**
• **Tier 3 engines require emission controls by design.** • **Engines expected to be electric so these pollutants likely not to apply.**			

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.054** lb/hour **0.236** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:

Emissions from Appendix 1, Table 1, steps 3,4,5 and engine emissions
Step 3: 0.0144 ton/yr
Step 4: 0.198 ton/yr
Step 5: 0.0231 ton/yr
Engines: negligible

Total: 0.236 ton/yr / 8760 hr/yr * 2000 lb/ton = 0.054 lb/hr

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **PM_{10}**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.024** lb/hour **0.1** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:

Emissions from Appendix 1, Table 1, steps 3,4,5 and engine emissions
Step 3: 0.00682 ton/yr
Step 4: 0.0891 ton/yr
Step 5: 0.0076 ton/yr
Engines: negligible

Total: 0.104 ton/yr / 8760 hr/yr * 2000 lb/ton = 0.0237 lb/hr

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **$PM_{2.5}$**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.0269** lb/hour **0.118** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:

Emissions from Appendix 1, Table 1, steps 3,4,5 and engine emissions
Step 3: 0.0072 ton/yr
Step 4: 0.0990 ton/yr
Step 5: 0.0116 ton/yr
Engines: negligible

Total: 0.1178 ton/yr / 8760 hr/yr * 2000 lb/ton = 0.0269 lb/hr

$PM_{2.5}$ emission factors conservatively estimated at 50%of fraction of PM. See Table 4 in Appendix 1.

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.5** lb/hour **6.56** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Emissions from Appendix 1, Table 1, engine emissions** **Total: 6.56 ton/yr / 8760 hr/yr * 2000 lb/ton = 1.5 lb/hr**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **NO_x**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.8** lb/hour **21.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:
Emissions from Appendix 1, Table 1, engine emissions

Total: 21.2 ton/yr / 8760 hr/yr * 2000 lb/ton = 4.8 lb/hr

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **CO**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.73** lb/hour **25.1** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:

Emissions from Appendix 1, Table 1, engine emissions

Total: 25.1 ton/yr / 8760 hr/yr * 2000 lb/ton = 5.73 lb/hr

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.8** lb/hour **21.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **See Appendix 1**	7. Emissions Method Code: **3b**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Emissions from Appendix 1, Table 1, engine emissions** **Total: 21.2 ton/yr / 8760 hr/yr * 2000 lb/ton = 4.8 lb/hr**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **See Appendix 1 for limits for certain types of engines.**	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: Annual VE testing	
5. Visible Emissions Comment: **Request per FDEP Guidance Memoranda DARM-PER-33 that VE testing not be required.**	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor NA of ___

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor ___ of ___

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Appendix 1** ☐ Previously Submitted, Date ___________
2.	Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: **N/A** ☐ Previously Submitted, Date ___________
3.	Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: **N/A** ☐ Previously Submitted, Date ___________
4.	Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ___________ ☐ Previously Submitted, Date ___________ ☒ Not Applicable
5.	Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Appendix 1** ☐ Previously Submitted, Date ___________ ☐ Not Applicable
6.	Compliance Demonstration Reports/Records: ☐ Attached, Document ID: ___________ Test Date(s)/Pollutant(s) Tested: ___________ ☐ Previously Submitted, Date: ___________ Test Date(s)/Pollutant(s) Tested: ___________ ☐ To be Submitted, Date (if known): ___________ Test Date(s)/Pollutant(s) Tested: ___________ ☒ Not Applicable Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.
7.	Other Information Required by Rule or Statute: ☐ Attached, Document ID: ___________ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: ___________ ☒ Not Applicable	
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: ___________ ☒ Not Applicable	
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: ___________ ☒ Not Applicable	

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: App. 1_____ ☐ Not Applicable	
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: __________ ☐ Not Applicable	
3. Alternative Methods of Operation: ☐ Attached, Document ID: __________ ☐ Not Applicable	
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: __________ ☐ Not Applicable	

Additional Requirements Comment

APPENDIX 1

A P P E N D I X 1

KOOGLER & ASSOCIATES, INC.

ENVIRONMENTAL SERVICES

TABLE OF CONTENTS

ATTACHMENT 1

CEMEX Construction Materials Florida, LLC

FACILITY ID: 0530021

APPLICATION FOR AIR CONSTRUCTION PERMIT AUTHORIZING ALTERNATIVE FUELS PROJECT

Description of Proposed Project

INTRODUCTION

CEMEX Construction Materials Florida, LLC owns and operates a cement plant located in Brooksville, Florida, designated as the Brooksville South CEMEX facility. The cement kiln of interest is Emission Unit 044, one dry-process kiln with preheater, precalciner, and clinker cooler capable of producing 1,227,500 tons per year (TPY) of clinker. This unit began operation in late 2008.

Brooksville South CEMEX is requesting the construction of mechanical and pneumatic alternative fuels handling and feed systems for the precalciner and main kiln burner; installation of a new multi-fuel main kiln burner system; and the processing equipment for a variety of alternative fuels including Engineered Fuel (EF) which may include, but not limited to, Tire-Derived Fuel (TDF), plastics, roofing materials, cellulosic biomass, agricultural biogenic materials , carpet-derived fuel and biosolids. While CEMEX requests liquid alternative fuels, such as biodiesel, these liquids are intended to be used primarily as "sweetners" such that the optimum fuel blend is injected to the kiln. Further explanation is provided below.

The facility is currently authorized through its Title V air operation permit to process and inject the following fuels: coal, distillate oil, flyash, on-spec oil, whole tires, natural gas, and petroleum coke. The installed equipment would expand the types of fuels that may be used in the pyroprocessing system.

As discussed below, the requested category of fuels will be assessed as reasonable assurance that use of these fuels does not result in a significant net emissions increase. The potential impact of the alternative fuels is discussed in detail in this attachment for three areas of concern.

1) Air Emissions Impacts
2) Kiln Structure Impacts
3) Clinker Quality Impacts

Of greatest importance for this permit request are Air Emission Impacts. The section addressing potential air emission impacts details the pollutants of concern to the FDEP, EPA, and – for a broader perspective – European Union emission data demonstrating the relative independence of these pollutant emissions from fuel type is discussed.

In this permit application, the above fuel types will be reviewed for the purposes of PSD analysis. Subsequent to construction and shakedown of the injection system and processing equipment, Brooksville South CEMEX will comply to annual review of emissions per, rule 62-212.300(1)(e), F.A.C.

As discussed in the regulatory analysis, this permit will assure compliance to all federal, state, and local regulations. This application does not request an increase in either production or operation limits. During this construction permit, the South Brooksville CEMEX Facility shall operate under and at all times within the constraints specified by its existing operation permit (05320021-029-AV). In support of this project, the EPA states on May 17, 2011 in the Federal Register, "...burning alternative fuels (whether classified as solid wastes or not) does not appreciably affect cement kiln HAP's emissions."[1]

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[1] Fed. Reg. Vol 76. No. 95, page 28322

ALTERNATIVE FUEL PROPOSED OVERVIEW

As noted above, Brooksville South CEMEX request the construction of mechanical and pneumatic alternative fuels handling and feed systems for the precalciner and main kiln burner; installation of a new or modified multi-fuel main kiln burner system; and the preparing and firing of a variety of alternative fuels (AF) including combinations of Engineered Fuel (EF),Tire-Derived Fuel (TDF), plastics, roofing materials, cellulosic biomass, agricultural organic byproducts, carpet-derived fuel and biosolids.

Brooksville South CEMEX puts forth the following points that demonstrate the value of this project, not only to CEMEX but to the State and the environment. The project provides the following benefits:

1. Increases the availability and stability of energy sources through the use of locally generated, processed, and transported energy sources in comparison to conventional fuels (i.e., coal which can be and is transported from around the world to this plant and other cement plants).

2. Promotion of related recycling and recovery business activities (i.e., employment, taxable income) in the State.

3. Reduction of greenhouse gas emissions by re-using and reducing landfilled biogenic material, reducing source material transportation, and reducing methane emissions from landfilled materials.

4. Increased demand for recovered materials as fuel encourages recovery versus landfilling. This matches the goals of the State efforts to increase waste diversion for re-use or recycling,[2]

5. Promotion of a more diverse energy supply which improves the viability of CEMEX and the alternative fuels market suppliers.

The practice of using alternative fuels in cement kilns is well documented for over 40 years. Both the U.S. EPA and European Union continue to promote the use of alternative fuels for cement kiln in preference to fossil fuels.[3,4] Portland cement plants are entirely different operations in many ways from that of incinerators. A Portland cement plant can produce a marketable product through efficient thermal combustion of alternative fuels in a cement kiln that not only utilizes materials for their heat content that would otherwise have been landfilled, but the ash also supplies essential ingredients (silica, aluminum, calcium, iron, etc.) and becomes a component of the final product (cement). The use of alternative materials in cement production can safely eliminate a substantial amount of potentially

[2] http://www.dep.state.fl.us/waste/recyclinggoal75/default.htm (last visited April 18. 2011)
[3] EPA Cement Sector Report, Trends in Beneficial Use of Alternative Fuels and Raw Materials. October 2008.
[4] Cement, Lime and Magnesium Oxide Manufacturing Facilities, May 2010 http://eippcb.jrc.ec.europa.eu

landfilled waste, as well as reduce environmental impacts associated with mining and transport of fossil fuels. Similarly, greenhouse gas emissions are reduced by eliminating landfilling, which generates methane gas as a byproduct of anaerobic decomposition. The greenhouse gas potential of methane is 21 times greater than that of the carbon dioxide produced during combustion. A significant recent EPA-funded study indicates that there are overall environmental air emissions benefits to waste combustion compared to landfilling with gas reclamation[5].

Brooksville South CEMEX views its effort to promote the beneficial reuse of these recovered materials in cement production to be in concert with the guidance of the EPA[6] and European IPPC Bureau[7]. The World Business Council for Sustainable Development ranks the United States as 13th in the list of countries replacing conventional fuels with alternative fuels including countries such as Germany and Switzerland[8]. In 2010, German cement plants replaced conventional fuels with alternative fuels by 61 percent[9] on average.

ALTERNATIVE FUEL SYSTEM - BASIS FOR PSD ANALYSIS

Because the PSD analysis will be verified by an annual review per rule 62-212.300(1)(e), F.A.C., this feed equipment and these fuels should not require for air permitting purposes a test burn. The permit application is based on an analysis that compares baseline actual emissions with projected actual emissions and avoids the requirements of subsection 62-212.400(4) through (12), F.A.C. Brooksville South CEMEX will be subject to the following monitoring, reporting and recordkeeping provisions.

a. The permittee shall monitor the emissions of any PSD pollutant that the Department identifies could increase as a result of the construction or modification and that is emitted by any emissions unit that could be affected; and, using the most reliable information available, calculate and maintain a record of the annual emissions, in tons per year on a calendar year basis, for a period of 5 years following resumption of regular operations after the change. Emissions shall be computed in accordance with the provisions in Rule 62-210.370, F.A.C.

b. The permittee shall report to the Department within 60 days after the end of each calendar

[5] Rosenthal, E. *Europe Finds Clean Energy in Trash, but U.S. Lags*. 2011 [cited 2011 3/10/2011]; Available from: http://www.nytimes.com/2010/04/13/science/earth/13trash.html?_r=1

[6] International, I. *Trends in Beneficial Use of Alternative Fuels and Raw Materials*. 2008; Available from: http://www.epa.gov/sectors/pdf/cement-sector-report.pdf.

[7] Cement, Lime and Magnesium Oxide Manufacturing Facilities, May 2010, Table 4.16, http://eippcb.jrc.ec.europa.eu

[8] Development, W.B.C.f.S., *Guidelines for the Selection and Use of Fuels and Raw Materials in the Cement Manufacturing Process*, 2005, http://www.wbcsd.org/DocRoot/Vift3qGjo1v6HREH7jM6/tf2-guidelines.pdf (last visited April 2, 2011)

[9] Verein Deutsche Zementindustrie, Environmental Data of the German Cement Industry 2009, http://www.vdz-online.de/uploads/media/Environmental_data_2010.pdf (last visited December 2, 2011)

year during the trial period setting out the unit's annual emissions during the calendar year that preceded submission of the report. The report shall contain the following:

1) The name, address and telephone number of the owner or operator of the major stationary source;
2) The annual emissions calculations pursuant to the provisions of 62-210.370, F.A.C., which are provided in Appendix C of this permit;
3) If the emissions differ from the preconstruction projection, an explanation as to why there is a difference; and
4) Any other information that the owner or operator wishes to include in the report.

c. The information required to be documented and maintained pursuant to subparagraphs 62-212.300(1)(e)1 and 2, F.A.C., shall be submitted to the Department, which shall make it available for review to the general public.

For this construction project, Brooksville South CEMEX requests that the permit require the annual reporting of actual emissions from the cement kiln for the following pollutants: nitrogen oxides (NOx (reported as NO_2)0, sulfur dioxide (SO_2) and carbon monoxide (CO) based on data from the existing continuous emissions monitoring (CEMS); volatile organic compounds (VOC) based on data from the existing THC monitor; mercury (Hg) based on material balance, lead (Pb); and particulate matter (PM) based on stack test data. Note that upon compliance to the upcoming new rules of the Subpart LLL NESHAP, the cement plant will also have CEMs for hydrochloric acid (HCl), PM, and mercury. While PSD rules require such monitoring, the documentation below fully supports the argument that emissions are not expected to significantly increase due to this project.

Brooksville South CEMEX proposes that acceptance criteria of fuels, as required of currently allowed fuels, not be based on a specific fuel vendor or geographic location but on the merits of the fuel to comply with air permitting regulations. These pollutants are addressed below in separate sections for each category of fuels for PSD purposes.

It is important to note that biogenic fuels have been widely permitted by the EPA for control and retention of Greenhouse Gasses (GHG) for PSD purposes.[10] This permit application reviews PSD analysis for greenhouse gases and the biogenic portion of these materials for the beneficial usage of such materials.

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[10] Greenhouse Gas Best Available Control Technology Analysis for Ravena Plant Modernization Project. Prepared for Lafarge Building Materials, Inc. by Environmental Quality Management, Inc.

REGULATORY APPLICABILITY ANALYSIS

FEDERAL

1. Greenhouse Gas Tailoring Rule for PSD Analysis, 40 CFR 51, 52, 70, and 71 – *Applicable*

Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailoring Rule

The EPA established the criteria for PSD review of greenhouse gases for construction projects in the Federal Register on June 3, 2010. For Brooksville South CEMEX, the GHG emissions from this project would be considered "subject to regulation" as the facility has potential emissions of greater than 100,000 tpy of CO2e <u>and</u> if the construction increases emissions of GHGs by 75,000 tpy CO2e or more.

40 CFR 51.166(b)(48)(v) Beginning July 1, 2011, in addition to the provisions in paragraph (b)(48)(iv) of this section, the pollutant GHGs shall also be subject to regulation:

(b) At an existing stationary source that emits or has the potential to emit 100,000 tpy CO2e, when such stationary source undertakes a physical change or change in the method of operation that will result in an emissions increase of 75,000 tpy CO2e or more.

As such, this project is <u>not</u> subject to regulation of GHGs until the source undertakes a physical change or change in the method of operations that will result in an emissions increase of 75,000 tpy CO2e or more. Thus, the PSD analysis described in this application determines if Brooksville South CEMEX is subject to regulation for GHG. Note that if Brooksville South CEMEX is determined to not have an increase of 75,000 tpy CO2e from this construction, then this project at the Brooksville South CEMEX is not subject to regulation of GHG regardless of other determinations of PSD pollutants.

It is important to note that the EPA deferred determination of PSD applicability for CO2 for combustion of biogenic materials (language of the rule provided below) until after July 20, 2014 per 40 CFR 51.166, 52.21, 70.2(2) and 71.2(2) (all amended July 20, 2011). 40 CFR 71.2(2) states:

For purposes of this paragraph, prior to July 21, 2014, the mass of the greenhouse gas carbon dioxide shall not include carbon dioxide emissions resulting from the combustion or decomposition of nonfossilized and biodegradable organic material originating from plants, animals, or micro-organisms (including products, by-products, residues and waste from agriculture, forestry and related industries as well as the nonfossilized and biodegradable *organic fractions of industrial and municipal wastes, including gases and liquids recovered from the decomposition of non-fossilized and biodegradable organic material).*

Based on this deferment, Brooksville South CEMEX has established in the PSD analysis the biogenic CO2 emissions from alternative fuels and noted that portion of GHG emissions is deferred per the EPA rule.

A related recent rule, 40 CFR 98, should be mentioned. The rule requires reporting of calendar year summed emissions of greenhouse gas emissions. EPA now requires continuous monitoring of CO2 from the process and annual reporting of GHG emissions per 40 CFR 98. This new rule requires that the cement plant reporting of GHG include the fraction of emissions from biogenic sources. It should be noted that 40 CFR 98 establishes a default value of 20 percent for the biogenic portion of tires(40 CFR 98.33(e)(3)(iv)). This default value coincides well with values provided in the European Union.

2. NESHAP 63 Subpart LLL (Cement MACT), 40 CFR 63.1340-63.1358
– Applicable

National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry

The Cement MACT establishes emission limits that must be met, although it does not limit the types of materials that can be used in the kiln, other than clarification that if the kiln were to burn hazardous waste, it would be subject to and regulated under Subpart EEE instead of Subpart LLL.[11] The Brooksville South CEMEX kiln has not in the past and there is no intention in the future for the kiln to use "hazardous waste" as a fuel, so Subpart LLL and not Subpart EEE would apply. Again, Subpart LLL establishes emission limits and does not prohibit the use of non-hazardous discarded materials such as, municipal solid waste, refuse-derived waste, or any other form of solid waste as a fuel. As stated above, the use of solid waste does not at this time trigger any other NSPS or NESHAP standards. The Cement MACT controls. The Cement MACT requirements apply to the Brooksville South CEMEX kiln, and these requirements are already established in the current Title V permit.

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[11] Subpart LLL addresses the use of fly ash a fuel but does not prohibit its use. Under 40 CFR 63.1346(f), the mercury content of fly ash may be restricted to ensure that mercury levels do not increase above baseline levels. Subpart LLL does not restrict any other type of fuel.

40 CFR 63 Subpart LLL (commonly referred to as the Cement MACT) applies to this cement kiln, and new provisions based on revisions to the federal rule promulgated by EPA in 2010 will apply to the kiln beginning in 2013. (See 75 Federal Register 54970, September 9, 2010). The federal Cement MACT applies to all new and existing Portland cement plants at major and area sources, and the affected source includes the kiln. A "kiln" is defined under this rule to mean a device including the preheater and precalciner devices, and raw mills.

3 <u>NSPS Subpart CCCC (2000 CISWI and 2011 New Unit CISWI)</u>, 40 CFR 60.2000-60.2265 – *Not Applicable*

Standards of Performance for Commercial and Industrial Solid Waste Incineration Units for Which Construction is Commenced After November 30, 1999 or for Which Modification or Reconstruction is commenced on or After June 1, 2001

Cement kilns subject to the Cement MACT, like the Brooksville South CEMEX kiln, are exempt from the 2000 version of Subpart CCCC. The 2000 version of Subpart CCCC therefore does not apply. The 2011 version of Subpart CCCC applies only to <u>new</u> units (constructed after June 2010). Because the Brooksville South CEMEX kiln is considered an "existing" unit and is not considered a "new" unit for purposes of the 2011 version of Subpart CCCC, the 2011 version is not applicable even if solid waste were to be used as a fuel or an ingredient in the Brooksville South CEMEX kiln. The only exception would be if the kiln were to be "modified" or "reconstructed" under the definitions of NSPS after September 21, 2011.

EPA's rules for Commercial and Industrial Solid Waste Incineration (CISWI) Units were first promulgated on December 1, 2000 (60 Federal Register 75338), and in 2001 EPA granted a request for reconsideration and voluntarily remanded the rule, which the court granted without vacatur. This rule was never stayed and remains in effect. Subpart CCCC, as promulgated in 2000, specifically provides that <u>cement kilns</u> regulated under NESHAP 63 Subpart LLL, the Cement MACT, are *exempt* from compliance with the CISWI rules under Subpart CCCC, 40 CFR 60.2020(l). This exemption remains effective for compliance with the 2000 version of Subpart CCCC.

EPA subsequently revised the rules in 2005. Those revisions were then challenged, resulting in the D.C. Circuit Court of Appeals vacating and remanding the "CISWI definitions rule" in 2007. As a result of the 2007 remand, EPA revised Subpart CCCC this year (76 Federal Register 15704 (March 21, 2011)), and the new Subpart CCCC requirements become effective on May 20, 2011. EPA's preamble specifically provides that only "incinerators" and "small remote incinerators" remain subject to the standards in the 2000 Subpart CCCC rules. See 76 Federal Register 15711, col. 2. EPA states that CISWI units falling within other subcategories, including cement kilns, *"will not in any case"* be subject to the 2000 Subpart CCCC CISWI standards.

Under the new, 2011 version of Subpart CCCC, new, modified, reconstructed cement kilns will no longer be exempt from the CISWI rules. Paragraph (l) of 40 CFR 60.2020 that established the exemption from Subpart CCCC is now "reserved." Waste-burning cement kilns constructed prior to June 4, 2010, are not considered to be "new" units subject to the 2011 Subpart CCCC standards (unless they are subsequently modified or reconstructed). Waste-burning cement kilns constructed prior to June 4, 2010, are considered to be "existing" units subject to the 2011 version of NSPS Subpart DDDD (and not the 2000 or 2011 versions of Subpart CCCC). As explained in more detail below, if the Brooksville South CEMEX kiln were to use solid waste (not engineered or alternative fuels) in the future after Subpart DDDD becomes applicable and enforceable in Florida, then standards established pursuant to Subpart DDDD could apply (but not Subpart CCCC—unless the kiln is modified or reconstructed after September 21, 2011).

4. NSPS Subpart DDDD (CISWI, Existing Units), 40 CFR 60.2500-60.2875 – *Not Applicable*

Emissions Guidelines (EG) and Compliance Times for Commercial and Industrial Solid Waste Incineration Units

Under the 2000 version of Subpart DDDD, which is applicable in Florida, cement kilns are specifically exempt (along with 14 other source categories). The 2011 version of Subpart DDDD will not apply to waste-burning kilns in Florida until the Department of Environmental Protection undertakes a rulemaking to incorporate the provisions of Subpart DDDD into its rules, the Department submits a state plan to or seeks delegation from EPA, and EPA subsequently approves the plan or grants delegation. The new version of the rule, applicable to existing waste-burning kilns, does not apply directly to sources, and it is not anticipated that the requirements would be effective in Florida for at least two to five more years.

NSPS Subpart DDDD establishes "emission guidelines" and compliance schedules for the control of emissions from existing CISWI units. This NSPS does not establish standards that apply directly to emission units because "NSPS" standards are to be established for <u>new</u> units. Because Subpart DDDD is intended to apply to "existing" and not "new" units, the rules are considered "guidelines" for states. Unlike most NSPS standards, Subpart DDDD applies to state air quality programs instead of to emission units. A state may submit a request for delegation of Subpart DDDD or a state may develop its own "state plan" to implement Subpart DDDD. The rules require state plans to be submitted by March 21, 2012, for CISWI units other than incinerator units (e.g., waste-burning kilns) that commenced construction on or before June 4, 2010. 40 CFR 60.2524.

Regardless of whether a state develops its own plan or simply requests delegation by March 21, 2012, the deadline for compliance may not be later than March 21, 2016, or three years after the effective date of EPA's approval of the state plan, whichever occurs first. Because the 2011 version of Subpart DDDD was promulgated by EPA only recently, the Florida Department of Environmental Protection (DEP) has not yet taken steps to develop a state plan or to seek delegation of Subpart DDDD, either of which would require notice and comment rulemaking under Chapter 120, Florida Statutes. The 2011 version of Subpart DDDD does not establish immediate and direct compliance requirements for non-incinerator CISWI units (like waste-burning kilns), so Subpart DDDD is not currently applicable to the Brooksville South CEMEX kiln, regardless of the fuels used. Further, units *not* using solid waste as a fuel will not be subject to Subpart DDDD now or in the future.

As stated above, the 2000 version of Subpart DDDD, which applies in Florida, exempts 15 different types of operations, including cement kilns. The Brooksville South CEMEX kiln is therefore not subject to this version of Subpart DDDD. Under the 2011 version of Subpart DDDD, waste-burning cement kilns that were constructed after November 30, 1999, and before June 4, 2010, will be required to comply with the standards and requirements for "existing units" established under Subpart DDDD – as implemented by the state. As long as the Brooksville South CEMEX kiln does not burn solid waste, it will not be subject to Subpart DDDD. If the Brooksville South CEMEX kiln were to begin using solid waste as a fuel, then Subpart DDDD (Table 8) could apply once Florida adopts the rules and its approved plan or delegation is in place. There is not currently a mechanism for applicability of the 2011 version of Subpart DDDD in Florida for waste-burning kilns, or a deadline for compliance with the applicable requirements under Subpart DDDD for waste-burning kilns. Until the Florida DEP completes a rulemaking to implement the 2011 version of Subpart DDDD through a state plan or delegation from EPA, and EPA has approved that plan or delegation, the provisions of the 2011 version of Subpart DDDD are not applicable to exiting

CISWI waste-burning kilns in Florida regardless of the fuels being used. The Brooksville South CEMEX kiln is therefore not subject to Subpart DDDD at this time, regardless of the fuel it uses.

5. <u>Solid Waste Definition</u>: 40 CFR 241; Alternative Fuels Proposed for Brooksville South CEMEX's Kiln are *not Solid Waste*

Non-Hazardous Secondary Materials That Are Solid Waste When Used as a Fuel or Ingredient

EPA recently promulgated new rules to be used when determining whether non-hazardous secondary materials are solid waste or not when used as fuels or ingredients in combustion units, including cement kilns. 40 CFR 241.3 (76 Federal Register 15456, March 21, 2011) and re-proposed on December 2, 2011 (to be issued in the Federal Register in next few weeks). The new rules provide that non-hazardous secondary material is *not* solid waste when combusted as a fuel or used as an ingredient if the material is sufficiently processed and it meets a "legitimacy" test. Under the legitimacy criteria, the processed material must be managed as a valuable commodity, storage of the material must not exceed reasonable time frames, and the material must be managed and adequately contained. In addition, the material must have a meaningful heating value if used as a fuel and must provide a useful contribution to the production or manufacturing process if used as an ingredient. Lastly, the material "must contain contaminants or groups of contaminants at levels comparable in concentration to or lower than those in traditional fuel(s) which the combustion unit is designed to burn. In determining which traditional fuel(s) a unit is designed to burn, persons can choose a traditional fuel that can be or is burned in the particular type of boiler, whether or not the combustion unit is permitted to burn that traditional fuel. In comparing contaminants between traditional fuel(s) and a non-hazardous secondary material, persons can use ranges of traditional fuel contaminant levels compiled from national surveys, as well as contaminant level data from the specific traditional fuel being replaced. Such comparisons are to be based on a direct comparison of the contaminant levels in both the non-hazardous secondary material and traditional fuel(s) prior to combustion."[12]

[12] 40 CFR 241.3(d)(iii).

Under EPA's rules, a facility would either maintain records to demonstrate that any non-hazardous secondary materials used as a fuel or ingredient do not constitute solid waste, or a facility could seek a "non-waste determination" from the EPA Administrator that a non-hazardous secondary material that is used as a fuel or ingredient is not a solid waste. Unless a facility seeks a formal determination, it would be required to maintain records to verify the sufficiency of the material processing and that the use of the material met the legitimacy test. Subpart CCCC (40 CFR 60.2740(v) provides that a facility burning materials other than traditional fuels "must keep records as to how the operations that produced the material satisfy the definitions of processing in s. 241.2." Alternatively, "[i]f the material received a non-waste determination pursuant to the petition process submitted under s. 241.3(c), you must keep a copy of the non-waste determination granted by EPA." EPA made it very clear in the preamble to the proposed definition of solid waste that facilities are to make self-determinations of whether a non-hazardous secondary material meets regulatory criteria *unless* a petition is submitted for an EPA determination. EPA believed that the self-implementing approach would "govern for the majority of situations." 75 Fed. Reg. 31860 (June 4, 2010). Facilities burning tires are likewise required to maintain records, including a certification that the tires are non-waste. This "certification" is to be signed by the owner or operator of the combustion unit, or by a responsible official of the established tire collection program." There is no requirement for EPA (or a state's) pre-approval or subsequent approval.[13]

Similarly, at least for units subject to the Boiler MACT rules under 40 CFR 63 Subparts DDDDD or JJJJJJ, a facility's responsible official would need to certify that the units did not use any non-hazardous secondary materials as a fuel or ingredient that would constitute a solid waste. Even under the new Boiler MACT rules, there is no requirement for agency consent or authorization prior to using the materials as a fuels or ingredients, nor is there a requirement for submittal of all supporting documentation to the permitting agency for confirmation that the materials being used are not solid waste.

Note that Florida has not yet incorporated by reference EPA's new rules establishing the test for determining whether non-hazardous secondary materials are solid waste for purposes of the air emission standards. Florida has also not revised its rules to establish any different requirements for

[13] 40 CFR 63.2175(w)

submittal of information for determinations as to whether materials being used as a fuel or ingredient are solid waste or not. Additionally and most important, EPA is retaining authority to make any *formal* non-waste determinations—this authority to make such determinations is not being delegated to the states.

The re-proposed rules are in a state of flux and could change prior to any applicable compliance deadlines. After the Florida DEP has completed a rulemaking to implement the re-proposed 2011 version of NSPS Subpart DDDD, after EPA has either approved the state's plan or has delegated implementation of the re-proposed 2011 version of Subpart DDDD to DEP, and after a compliance deadline has been formally established, it may be appropriate to confirm that the Brooksville South CEMEX kiln will not be using any non-hazardous secondary material as a fuel or ingredient that would be considered a solid waste. This could be done by a responsible official certification similar to that required under CISWI and the Boiler MACT. This certification would help ensure that all applicable requirements are appropriately identified in the Title V permit for the facility. Today, however, Subpart DDDD does not apply to the Brooksville South CEMEX kiln, and Brooksville South CEMEX would not be prohibited from using a material in its cement kiln that constitutes a non-hazardous solid waste.

6. NSPS Subpart Eb (Large MWCs), 40 CFR 60.50b-60.59b
– Not Applicable

Standards of Performance for Large Municipal Waste Combustors for Which Construction is Commenced After September 20, 1994 or for Which Modification or Reconstruction is Commenced After June 19, 1996

NSPS Subpart Eb regulating large municipal waste combustors does not apply to cement kilns. The federal rules specifically provide as follows: "Cement kilns firing municipal solid waste are not subject to this subpart." 40 CFR 60.50b(p). Under this subpart, "municipal solid waste" is defined as:

> "... household, commercial/retail, and/or institutional waste. Household waste includes material discarded by single and multiple residential dwellings, hotels, motels, and other similar permanent or temporary housing establishments or facilities. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, non-manufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes material discarded by schools, nonmedical waste discarded by hospitals, material discarded by nonmanufacturing activities at prisons and government facilities, and material discarded by

other similar establishments or facilities. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which includes but is not limited to railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff). Household, commercial/retail, and institutional wastes include: (1) Yard waste; (2) Refuse-derived fuel; and (3) Motor vehicle maintenance materials limited to vehicle batteries and tires except as specified in s. 60.50b(g)."

The term "refuse-derived fuel" is in turn defined as "a type of municipal solid waste produced by processing municipal solid waste through shredding and size classification. This includes all classes of refuse-derived fuel including low-density fluff refuse-derived fuel through densified refuse-derived fuel and pelletized refuse-derived fuel." 40 CFR 60.51b.

The use of <u>any</u> materials considered to be municipal solid waste or refuse-derived fuel, consistent with the above definitions, may therefore be used in a cement kiln without subjecting the kiln to NSPS Subpart Eb. Because cement kilns using municipal solid waste and refuse-derived fuel are not subject to Subpart Eb, Brooksville South CEMEX's use of the proposed list of fuels in its kiln, even if the fuels would be considered municipal solid waste, would not trigger applicability of Subpart Eb.

STATE

Rule 62-296.407, F.A.C., applies to Portland cement plants. The emission limit established for "new" cement plant kilns is 0.3 pounds of particulate matter per ton of feed to the kiln. The limit established for clinker coolers within a new cement plant is 0.1 pounds of particulate matter per ton of feed to the kiln. The Brooksville South CEMEX kiln would be considered a new cement plant, so this standard would apply. The more stringent kiln particulate matter emission standard established under the Brooksville South CEMEX Title V permit of 0.11 pounds per ton of feed, however, ensures that these emission limits set forth in Rule 62-296.407 are achieved.

LOCAL

The Hernando County Code does not specifically regulate Portland cement kilns.

Alternate Fuel Infrastructure and Operations

Alternative Fuels Acceptance

Brooksville South CEMEX is currently authorized to fire the following fossil fuels: coal, natural gas, distillate oil, petroleum coke, flyash, on-spec oil and whole tires. Brooksville South CEMEX requests to clarify that the pyro-processing kiln is not limited to firing only "bituminous" coal and is capable of firing other coals from any location. Also, Brooksville South CEMEX would like to broaden their allowance of whole tires and allow all tire-derived fuel. According to their current permit, Brooksville South CEMEX is expressly prohibited from firing the following materials in the pyro-processing system: hazardous wastes, petroleum contaminated soil or materials, used oil, oil fuels or solid fuels other than those allowed by their permit. Based on this permitting, the unit should only be limited to not burn hazardous waste as defined in 40 CFR 261, nuclear waste and radioactive waste. Brooksville South CEMEX will take all precautions and complete any required documentation to not knowingly fire biomedical waste, asbestos-containing materials (ACM) per 40 CFR 61 subpart M. If Brooksville South CEMEX identifies delivered material that is not allowed, the supplier shall be contacted and the material shall be returned, disposed, or any other appropriate legal method of handling the material shall be employed. Brooksville South CEMEX proposes that such records shall be stored onsite for at least five years and available for inspection upon request.

Description of Alternative Fuels (AF)

- *Engineered Fuels (EF)* are composed of various materials such as, but not limited to, biomass, agricultural byproducts, food processing/milling materials, animal meal, fibrous/plant waste, plastics, paper, cardboard, used animal bedding, carpet, carpet manufacturing byproducts, automotive manufacturing byproducts, wood, treated wood, creosote treated wood (railroad ties, telephone poles), clean-up debris from natural disasters, household/commercial/institutional refuse derived fuels, processed municipal solid waste, rubber, dried/sanitized biosolids (Class A, B only), recovered/reject coal, rubber, tire manufacturing byproducts, TDF, roofing shingles, construction/demolition materials, absorbents, oily contaminated materials, oil absorbents, oil filter fluff, used grease, spent carbon, carbon black, printed paper, printing byproducts, paint filter cake, synthetic materials/fibers, textiles, geotextiles, wax, hospital wastes (including sanitized infectious materials), pharmaceutical, cosmetics, confiscated drugs from law enforcement, non-hazardous industrial byproducts, post-industrial packaging film. The blending and processing may also include the addition of used oils or other non-hazardous liquids to ensure consistent BTU values.

ensure consistent BTU values. any AF mix (see below) that is engineered to have targeted, consistent fuel properties such as: calorific value, moisture, particle size, ash content, and volatility. The properties are established based on available AF material supply and are carefully controlled through blending materials or through separation of incombustible materials from combustible materials. Brooksville South CEMEX intends that EF will be the primary AF material, processed from available individual materials as listed below (such as: wood, plastic, carpet, paper, roofing material, tires, etc.) or EF may be provided by a supplier that can meet Brooksville South CEMEX's targeted fuel quality requirements.

- *Tire-Derived Fuel (TDF)*, which includes whole and shredded tires with or without steel belt material including portions of tires such as tirefluff.
- *Roofing materials*, which consists of roofing shingles and related roofing materials with the bulk of the incombustible grit material separated and which is not subject to regulations as an asbestos-containing material per 40 CFR 61 subpart M.
- *Plastics*, is any of a group of synthetic or natural organic materials that are many types of resins, resinoids, polymers, cellulose derivatives, casein materials, and proteins. A typical plastic is polyethylene plastic used in agricultural and silvicultural operations which may include incidental amounts of chlorinated plastics. *{Permitting Note: The permit application addresses the negative impact of chlorinated plastics on the kiln system and product to further ensure plastics will only have limited amount of chlorinated plastics}.*
- *Agricultural Biogenic Materials*, which includes materials such as peanut hulls, rice hulls, corn husks, citrus peels, cotton gin byproducts, animal bedding and other similar types of materials.
- *Cellulosic Biomass-untreated*, which includes materials such as untreated lumber, tree stumps, tree limbs, slash, bark, sawdust, sander dust, wood chips scraps, wood scraps, wood slabs, wood millings, wood shavings and processed pellets made from wood or other forest residues.
- *Cellulosic Biomass-treated*, which includes preservative-treated wood that may contain treatments such as creosote, copper-chromium-arsenic (CCA), or AQC, painted wood, or resinated woods (plywood, particle board, medium density fiberboard, oriented strand board, laminated beams, finger-jointed trim and other sheet goods). Brooksville South CEMEX requests to fire no more than 1,000 lb/hour averaged on a monthly average basis of segregated streams of wood treated with copper-chromium-arsenic (CCA) compounds. As discussed below, CCA compounds are mostly integrated into the cement clinker product. The input rate is approximately 1 percent of typical kiln heat input rate.
- Carpet-Derived Fuel, which includes shredded new, reject or used carpet. Note that the material may contain incidental related materials (e.g., tack-down strips, nails, etc.).
- *Biosolids*, which includes organic materials sanitized to meet EPA Class A sanitization standards and is derived from treatment processes of public treatment water systems
- *AF Mix*, which includes a blended combination of two or more of any of the above materials. This is separate classification from an engineered fuel since the consistency of the material may not be designed/engineered to meet specific, targeted fuel properties.

AF Receiving, Preparation, Transport, Handling, and Storage

Receiving

All materials will be transported to the facility by covered truck and stored in accordance with applicable regulation. Most materials such as carpet, plastic, and paper will likely be delivered in large bales, but other materials such as roofing shingles, peanut hulls, engineered fuels, sawdust, wood shavings, etc. will come in loose.

Each AF material received will be sampled and analyzed in a manner consistent with industry standards for quality assurance and quality control to ensure that representative data is collected. This sampling and analysis is part of the requirements needed to determine the expected clinker product. At a minimum, the frequency of sampling and analysis shall be consistent with the frequency of sampling and analysis of currently used fossil fuels.

Preparation

Depending on the material being processed, the material will be grinded and may also be screened to ensure uniform particle size or dirt and silica removal and passed through a belt magnet for metal removal. All processed materials will be stored under cover as needed, to prevent fugitive emissions, to keep dry and to prevent entry into storm water. After processing is complete, mechanically transported materials will be moved by mobile equipment (front loader, truck and trailer, etc.) from storage to a hopper system which feeds the injection into the pyroprocessing system. Pneumatically fed materials will be transported via mobile equipment from storage into a dosing system, and then inserted into the pyroprocessing system. The current design input of heat to the kiln is 490 MMBtu/hour of heat as input set forth in permit 0530021-029-AV. Based on a conservative presumption of 50% heat value of alternative fuels relative to coal, the maximum annual input of alternative fuels is 330,000 tons of material. As such, the emissions data are based on this theoretical amount of usage. This value is theoretical and in reality is expected to be far less due to the practicality of operations. Additionally, dust suppression in storage areas will be used as needed and any stored alternative fuel material causing nuisance odors will be removed from the site.

As noted above, Brooksville South CEMEX requests that the permit include the preparation of the equipment as a separate emissions unit, "Fuel Processing System". This unit is expected to use electric engines. However, for conservative emissions estimates, Table 1 includes diesel engine emissions. All applicable NESHAP and NSPS requirements for this equipment will be complied with. As needed to prevent fugitive emissions, Brooksville South CEMEX will store materials under cover.

TRANSPORT, HANDLING, AND STORAGE

Note that Table 1 (step 1) includes fugitive emissions from truck transport which is calculated based on the roundtrip distance from the facility gate to the alternative fuel storage area. The transport and storage will be in covered trucks or containers as needed to control fugitive emissions. Nearly all materials, such as virgin biomass (typically 15 to 30 percent moisture), contain enough moisture to not require cover. Figure 1 shows the transport route to be taken by trucks delivering alternative fuels. The trucks will either enter through the front gate (the route is 1.86 miles roundtrip) and preparation of the material will occur at or near the drop-off point.

AF INJECTION EQUIPMENT DESCRIPTION

Brooksville South CEMEX is investing significant capital into these alternative fuel systems. CEMEX intends to implement the injection systems in two phases. Phase I will be for installation of the pneumatic injection system. The kiln heat input, 490 [mmbtu/hr], is approximately 60 percent of heat input in the precalciner and 40 percent in the main burner system. The precalciner systems will include a Phase I feeder system(s), Schenk Feeder or equivalent (Figure 2), with a nominal input of 10 to 20 tons per hour dependent on factors such as material viscosity and density. The feeder system shown in Figures 3-7 was used for the recent CEMEX Miami biomass trials (0250014-031-AC) and is expected to be similar for this process. Such a system is currently in operation at the Brooksville South plant which is again, Phase I. The system is a compact and simple design as an alternative fuel feeding system capable of handling many kinds of fuels with varying densities and physical properties. This same system is to be used for many other alternative fuel trial burns. The system is composed of: two offloading ports, screw conveyors to move the biomass from the offloading ports to the feed metering system and a pneumatic blower to the injection porthole in the precalciner.

Covered trucks unload sized biomass into the offloading ports as shown in Figure 4. Figure 5 shows the feeder screw conveyors system at the bottom of the offload ports that feed the biomass to the Schenck metering system that is located at the top of the angled conveyor, followed by a pneumatic blower which blows the biomass up to the injection porthole. Figure 6 shows the conveyor from the offloading ports to the metering system. Figure 7 shows the pneumatic blower system from the metering system. The porthole installed in the precalciner tower matches the pneumatic system sizing, which is 8-inch in diameter.

The mechanical and main burners systems will comprise Phase II. This installation will be a more permanent installation and follow Phase I. The location for the equipment to be used in Phase II will be selected in the future based on the optimization and assessment of the Phase I equipment. A process diagram of a gravimetric mechanical feeder system that should be similar to the Phase II design is shown in Figure 8. Additionally, the main kiln burner will have to be retrofitted to accommodate the co-firing of the new alternative fuels. Although a burner design has not been selected yet, Figure 9 shows a general main kiln multi-fuel burner manufactured by Pillard Feuerungen GmbH. In this design, a portion of the primary air is guided in a separate tube around the main fueling vessel and, near the outlet, nozzles inject the air to expand and aerate the outgoing fuel to ensure better burning. According to the manufacturer of this design, this design is capable of firing up to 80% alternative fuels with traditional fuels.

Given that the feeder system can have multiple entry points to the precalciner, which is needed to handle a broad range of fuel materials, the precalciner injection equipment is expected to have more than one injection system. The main burner system modifications will also provide opportunity for total replacement of coal. The nominal input of the main burner injection system will also be designed for up to 15 tons per hour. These tonnages are dependent on the material properties and dosages to the systems and will be determined through injection system assessments.

The estimated time frame for completing equipment installation for both Phase I and Phase II (following issuance of the air construction permit) will take approximately 12 to 36 months. Following completion of equipment installation, Brooksville South CEMEX will begin to introduce each of the requested alternative fuels and will need time to complete the shakedown of the equipment. Brooksville South CEMEX therefore requests a five-year construction permit for this project.

Regardless of the phasing of equipment, CEMEX requests that the permitting not specify the equipment installation in phases but instead apply that all equipment must go through shakedown and assessment.

COST ESTIMATES

Due to the site specific criteria for the injector system, initial cost estimations for the installations are difficult to quantify. Although, one cement plant has reported an initial investment cost of $2.6 million for the handling and receiving equipment for alternative fuels[14]. Though, this cost includes an additional SNCR and flue gas analysis system (which Brooksville South CEMEX is not requesting), in addition to the general receiving and handling equipment. Though, this cost includes an additional SNCR and flue gas analysis system (which Brooksville South CEMEX is not requesting), in addition to the general receiving and handling equipment. According to another report based on a sample plant burning alternative fuels, the investment for hardware equipment (screening and shredding) and the dosing/feeding equipment should total nearly $4 million[15].

[14] Veijonen, K. "Biomass to replace fossil fuels in cement industry Finnsementti Oy, Parainen, Finland" EUBIONET III – IEE/07/777/SI2.499477, 02/2009.

[15] MVW Lechtenberg & Partner. "Economics- How to calculate and finance your AF Project" MVW – Lechtenberg Projektentwicklungs- und Beteiligungsgesellschaft mbH. Page 9. 24 February 2010.

TABLE 1. FUGITIVE EMISSIONS ESTIMATE – TRANSPORT, STORAGE, HANDLING, AND PROCESSING

Step	Action/Task	Unit of Measurement	% of Total Throughput	PM Emission Factor	PM_{10} Emission Factor	PM Emissions	PM_{10} Emissions
1	AF Transport to Piles[a]	27,900 miles	100%	0.556 lb/VMT	0.556 lb/VMT	7.76 tons/yr	7.76 tons/yr
2	Store in Covered Pile	330,000 tons	100%	*negligible, stored under cover*			
3	Material Loading to Grinding Hopper by Frontend Loader[b]	330,000 tons	100%	8.74E-05 lb/ton	4.13E-05 lb/ton	1.44E-02 tons/yr	6.82E-03 tons/yr
4	Grinder[b]	330,000 tons	100%	1.20E-03 lb/ton	5.40E-04 lb/ton	1.98E-01 tons/yr	8.91E-02 tons/yr
5	Screening[b]	330,000 tons	100%	1.40E-04 lb/ton	4.60E-05 lb/ton	2.31E-02 tons/yr	7.59E-03 tons/yr
6	Material Transport to Injection System[a]	1,500 miles	100%	0.556 lb/VMT	0.556 lb/VMT	0.42 tons/yr	0.42 tons/yr
7	Material Loaded into Pneumatic Hopper[b]	330,000 tons	100%	1.00E-04 lb/ton	1.00E-04 lb/ton	0.017 tons/yr	0.017 tons/yr
8	Pneumatic Transport to Calciner	330,000 tons	100%	*negligible, fully enclosed*			
					Total:	8.43 tons/yr	8.30 tons/yr

Source	Hours	SO_2 Emission Factor[c]	NO_x and NMHC Emis. Factor[c]	CO Emission Factor[c]	SO_2 Emissions	NO_x and NMHC Emissions	CO Emissions
Grinder Engine (630 HP Engine)	8,760 hours	0.929 g/bhp.hr	3.0 g/bhp.hr	3.7 g/bhp.hr	5.6589 tons	18.2742 tons	22.5381 tons
Screen Engine (100 HP Engine)	8,760 hours	0.929 g/bhp.hr	3.0 g/bhp.hr	2.6 g/bhp.hr	0.8982 tons	2.9007 tons	2.5139 tons
				Total:	6.5571 tons	21.1748 tons	25.0521 tons

Sample Calculations:	
Step 1	$\frac{1.86\ miles}{trip^d} x \frac{trip^d}{22\ tons} x$ *330,000 tons altfuel= 27,900 miles*
Step 6	$\frac{0.1\ miles}{trip} x \frac{trip}{22\ tons} x$ *330,000 tons = 1,667 miles*
a.	$E = [k(sL)^{0.91}(W)^{1.02}] x (1 - \frac{P}{4N})$ *where from AP-42 and references, k=0.0027, sL=12, W=22, p=120, N=365* $E = [0.0027(12)^{0.91}(22)^{1.02}] x (1 - \frac{120}{4(365)}) = 0.556$

a. Potential PM emissions from truck traffic from paved roads are calculated based on AP- 42, Chapter 13.2.-1, Equation 2 and sample calculation a. above.

b. Emission factors of screening, crushing, and conveying based on AP-42 Table 11.19.2-2. Alternate fuel PM factors assumed to have similar emissions to aggregate operation. Uncontrolled emission factors are used.

c. Schenk Shredder having a maximum size horse power diesel engine (630 HP for the grinder and 100 HP for the screen). 100 and 630 HP Tier 3 engine emission factors for NOx, NMHC, and CO stated below (http://www.dieselnet.com/standards/us/nonroad.php#tier3). SO2 EF based on AP-42, 3.3-1 emission factor of 2.05 x 10^{-3} lbs/bhp*hr-Sox and using a conversion factor of 453 grams/lb.

d. Trip: Round trip route from plant entrance to storage piles

Engine Power	Tier	Year	CO	HC	NMHC+NOx	NOx	PM
(100 ≤ hp < 175)	Tier 3	2007	3.70	-	3.00	-	-†
(600 ≤ hp < 750)	Tier 3	2006	2.60	-	3.00	-	-†

† Not adopted, engines must meet Tier 2 PM standard

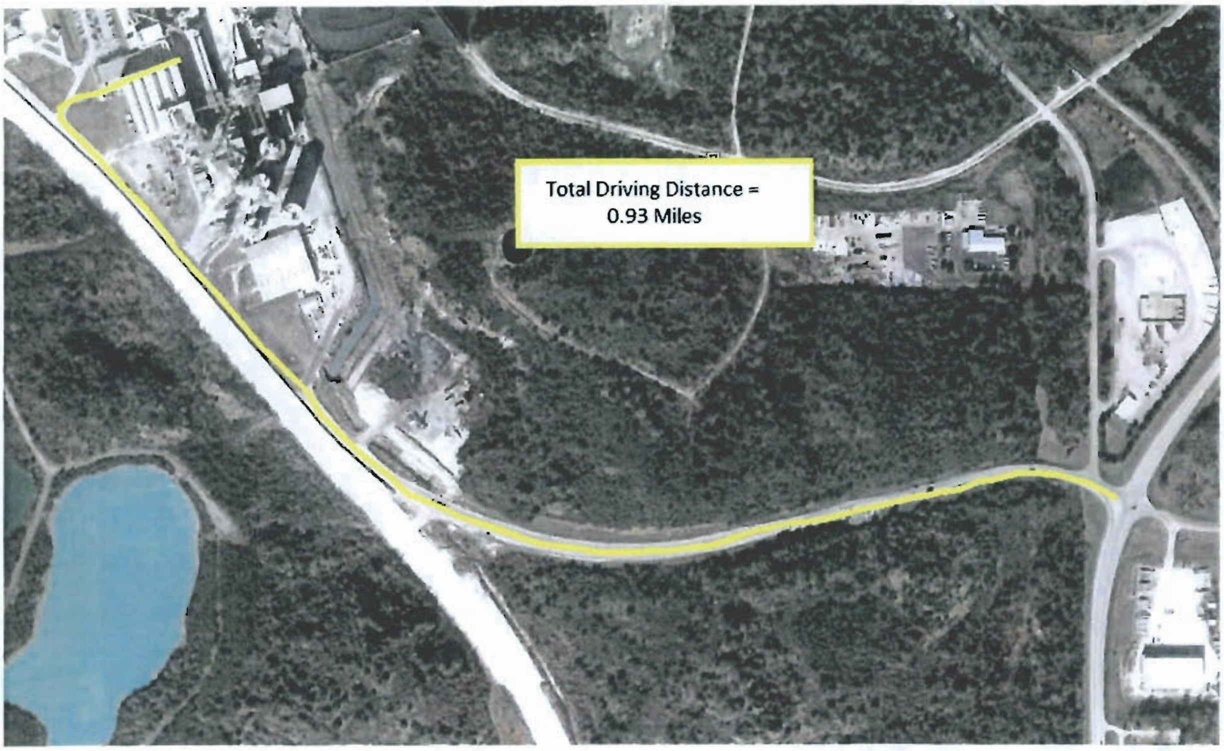

FIGURE 1. BROOKSVILLE SOUTH PLANT TRUCK PATH FOR DROPOFF OF ALTERNATIVE FUELS (ROUND TRIP PATH = 1.86 MILES

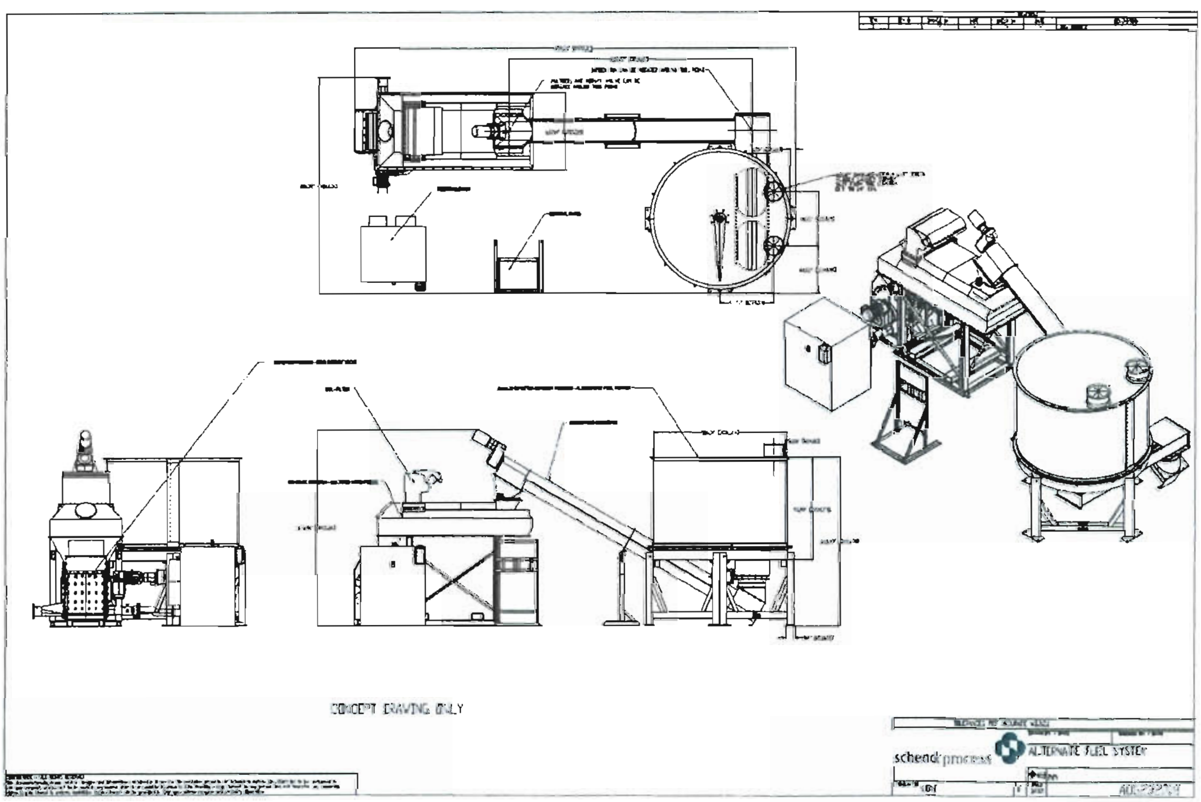

FIGURE 2. SCHENCK FEEDER SYSTEM WITH OPTIONAL ENCLOSED FEED HOPPER

FIGURE 3. GENERAL SCHENK FEEDER SYSTEM (PHASE I)

FIGURE 4. TWO OFFLOADING PORTS OF TYPICAL SCHENK FEEDER SYSTEM

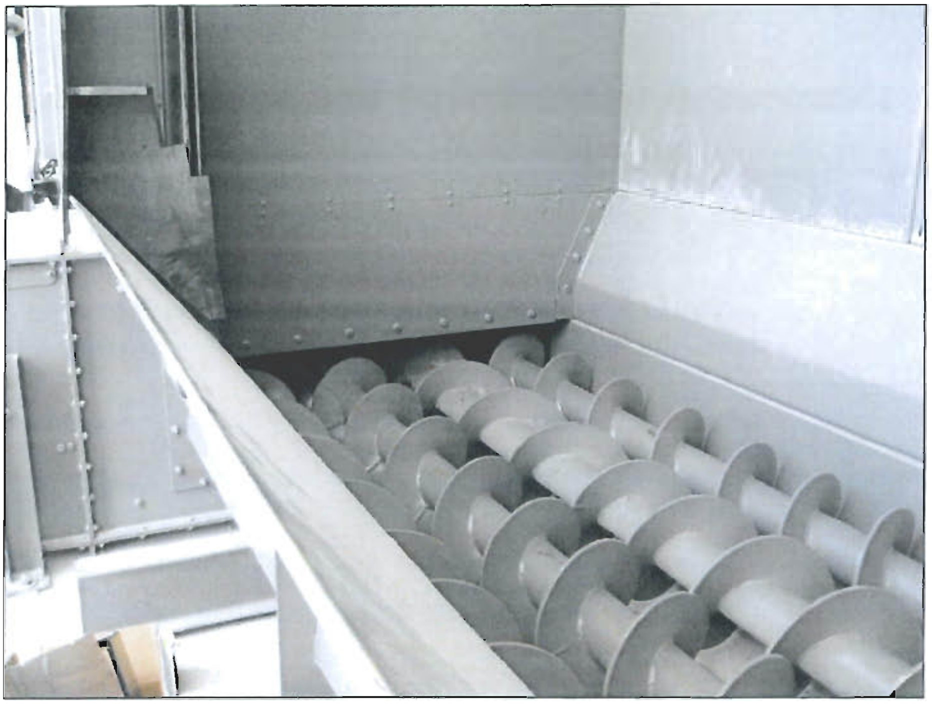

FIGURE 5. SCREW CONVEYOR IN BOTTOM OF OFFLOADING PORTS.

FIGURE 6. CONVEYORS COMING FROM OFFLOADING PORTS TO METERING SYSTEM.

FIGURE 7. PNEUMATIC BLOWER FROM METERING SYSTEM TO INJECTION PORTHOLE.

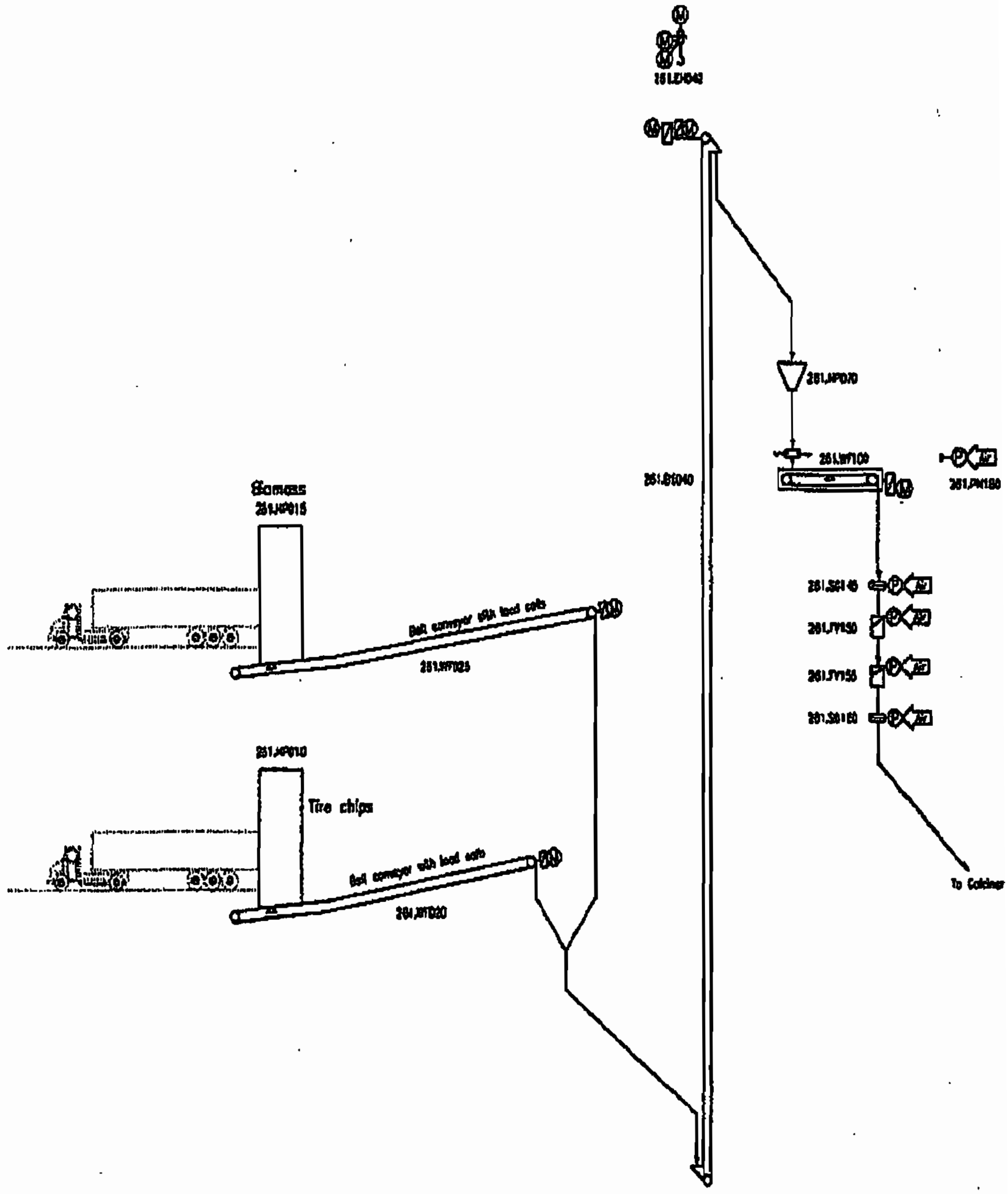

Figure 8. Projected Phase II Process Flow Diagram - Mechanical Feeder System

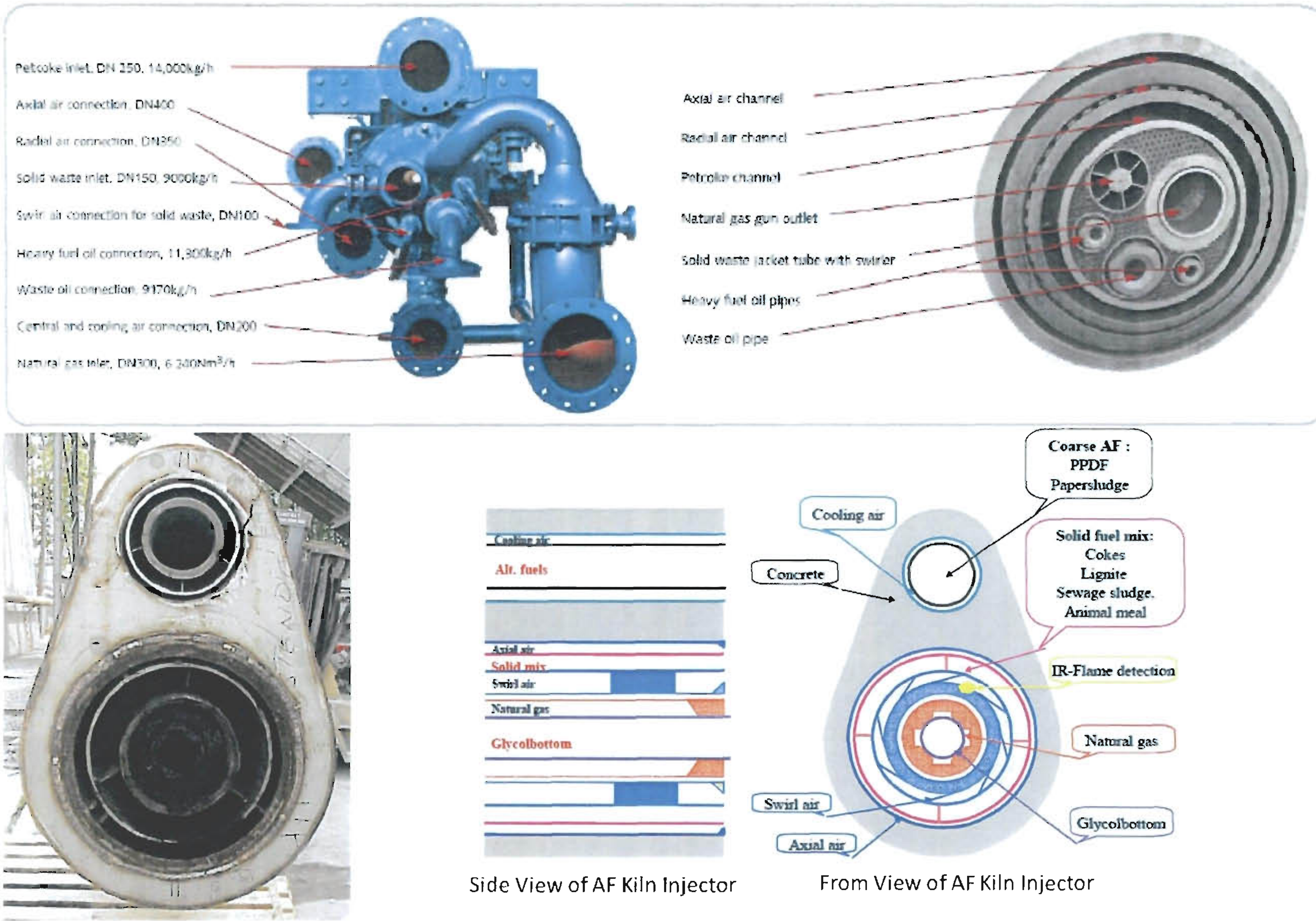

FIGURE 9. ALTERNATIVE FUEL-TYPE MAIN KILN BURNERS.

AF Best Management Practices

The following best management practices are proposed for the use the fuels at the Brooksville South CEMEX Cement Plant.

BEST MANAGEMENT PRACTICES (BMP) PLAN FOR MINIMIZATION OF FUGITIVE DUSTFIRE PREVENTION, AND QUALITY ASSURANCE.

Practice	Description
Minimization of Fugitive Dust	1) Drop points to storage areas shall be designed to minimize the overall exposed (or exposed to the atmosphere) drop height for materials that have the potential to create air born dust particles. 2) Periodic maintenance shall be performed to maintain offloading locations and associated drop point integrity as necessary. 3) Periodic visual observation of operations shall be performed by personnel trained on EPA Visible Emissions Method 22 and/or Method 9. If fugitive dust is detected appropriate fugitive dust minimization techniques shall be implemented..
Fire Prevention/ Spontaneous Combustion Minimization	1) The Emergency Response Plan includes: a. Annual training of onsite personnel on how to properly respond to fires and training on the identification and prevention of potential fire hazards; and b. All buildings and mobile equipment are equipped with fire fighting equipment as required by all county, state, and federal codes and regulations. 2) Proper storage of recovered materials to ensure that heat generated from pile compaction does not result in spontaneous combustion. 3) All fuel areas must display appropriate signage (fire hazard warnings, no smoking, etc.) to notify personnel and visitors of any potential fire hazards to prevent accidental combustion of fuel materials. 4) All onsite welding activities require a "Hot Work Permit" to adequately process for and prevent fires as a result of welding.

Practice	Description
Quality Assurance	1) The materials shall be delivered to the Plant with all loads properly secured, contained, and covered. 2) For each shipment of material, the permittee shall record the date, quantity and a description of the material received and keep a record of the Bill of Lading for a minimum of two years. 3) The permittee shall inspect and sample shipments of material to ensure that delivered materials meet the respective expected selection criteria. If the permittee identifies off specification material, the supplier shall be contacted and the material shall be returned, disposed, blended, or any other appropriate legal method of handling the material shall be employed. 4) The permittee shall maintain records of off-specification deliveries and actions taken to correct such abnormalities. Such records shall be stored onsite for at least two years and available for inspection upon request.

Monitoring and Testing

Emissions monitoring for each material tested shall consist of the following monitoring and stack testing:

- CO – CEM Data (PSD pollutant)
- CO2 – CEM Data (PSD pollutant)
- NO_x – CEM Data (PSD pollutant)
- SO_2 – CEM Data (PSD pollutant)
- VOC (as THC) – CEM Data (PSD pollutant)
- Opacity – COM Data (surrogate for HAP per NESHAP subpart LLL)
- PM – EPA Method 5 (PSD pollutant)
- Hg – Materials Balance (HAP per NESHAP subpart LLL)

Submittal of all stack test reports as required by Title V permit will be provided in a timely manner as required by rule.

Infrastructure-Fuel Shakedown and AF Assessment Periods

The air construction permit should include shakedown periods similar to that provided in the Tarmac permit, 0250020-031-AC. These periods provide the necessary time for Brooksville South CEMEX to adjust equipment and operations as necessary in order to find the optimal fuel feed rate, particle size, raw material blend, etc. so that testing can be conducted under normal operations. While Brooksville South CEMEX expects to remain in compliance with all permitted emission limits during the shakedown period, it is possible that upset conditions could occur. Any process information or emissions data collected during such upset conditions does not represent normal operations and therefore should be excluded from any data set used to determine expected normal operational impacts to air emissions, process operation, and material quality. Therefore, recognition of these periods in a permitting note would help ensure a common understanding that the first three months of operation after an equipment change and the first three months after each new alternative fuel category are introduced may not be representative of future operations.

The AF injection equipment is requested to have a period of "shakedown" that will allow Brooksville South CEMEX a time period (120 operational days) irrespective of fuel fired to ensure proper installation as well as develop good operating practices for normal kiln system operation with the equipment. An operational day, for purposes of the shakedown period, shall be defined as any day in which alternative fuels are fed to the pyro processing system. Such shakedown periods are common for newly constructed equipment and allow a period for operators learn how to operate such equipment without the operations during that period applicable to PSD analysis. As repeatedly stated above, Brooksville South CEMEX will comply with all permitted limits of emissions.

Separate to the injection equipment systems shakedown periods mentioned above, each category of AF described above is requested to be assessed in the new equipment. The AF assessment periods are necessary since material handling, separations, resizing, and feeder operations will be impacted by the varying physical properties of each fuel material (moisture, density, viscosity, hardness, ash content, calorific value, etc.). An operational day, for purposes of the AF assessment period, shall be defined as any day in which alternative fuels are fed to the pyro processing system. These periods will be called, "AF assessments" and will similarly allow for each category a period for the operators to introduce each new AF into either the main burner system or the precalciner/calciner to develop good operating practices for the AF resulting in normal kiln system operation without the operations during that period applying to PSD analysis. As repeatedly stated above, Brooksville South CEMEX will comply with all permitted limits of emissions.

For assessment of each AF material category Brooksville South CEMEX proposes to take a representative as-fired sample of the AF and have it analyzed for parameters listed below. The parameters listed in Table 2 below are proposed to be measured for each AF material assessed. Also included in the table below are target levels based on data collected by the USGS for coal. Target levels listed below are not enforceable, but are listed for purposes of reference of AF to coal parameters. The target levels selected are based on the range of values of coal in the United States Geological Survey (USGS) database. Brooksville South CEMEX views the target values to be a range of values that are similar to coal. Note that this database does not include the range of fossil fuels (e.g., petroleum coke) that Brooksville South CEMEX is authorized to burn. As noted in the regulatory analysis section of this application, the EPA rule, "The Identification of Non-hazardous Secondary Materials that are solid waste" (40 CFR 241) is to be separately addressed by Brooksville South CEMEX as required by that rule. This information is neither comprehensive nor determinative of 40 CFR 241 but does provide information of the similarity of alternative fuels to common coal sources.

TABLE 2. PROPOSED TARGET LIMITS FOR ALTERNATIVE FUELS

Parameter*	Target Levels•
Higher Heating Value	> 5000 Btu/lb
Arsenic	< 2000 ppm by weight
Cadmium	< 200 ppm by weight
Chromium	< 200 ppm by weight
Lead	< 1000 ppm by weight
Beryllium	< 20 ppm by weight
Mercury	< 0.3 ppm by weight

* Heating value is on dry basis. Concentration values are wet basis.

•Target levels are based on USGS data of coal samples. http://pubs.usgs.gov/of/2010/1196/

Parameter	Analytical Methods
Heating Value	Proximate Analysis appropriate for given fuel
Mercury	EPA 7470A/7471A
Other Metals	EPA SW-846 or EPA Method 6010B

Other equivalent methods may be used with written approval of the Division of Air Resource Management.

Material Analysis

For each type of AF allowed (except for cellulosic biomass-untreated, tire-derived fuel and agricultural biogenic materials), the permittee shall obtain analytical results of a representative sample of the AF prior to the initial delivery of the AF. The sample will be analyzed for the parameters above. Testing will be repeated on an annual basis with sampling repeated for materials on-site in the month of January.

REPORTING

CEMEX shall complete and submitted to the Department each calendar quarterly reports within 30 days following the end of the quarter.

- General description of the EF type and quantity of materials utilized/consumed as fuel
- Required analytical results generated within the quarter (including repeat testing for problem shipments).
- Quarterly trend of CEMs emissions data (rolling 30-day average.)
- Mercury balances as required by Title V Permit

The impact of the material content on air emissions, kiln structure and clinker quality are addressed in the following sections. The detailed information of the Air emissions section provides specific detailed information of the impact of alternative fuel compared to fossil fuels. The depth of the emissions information shows that the combined impact of fuels and raw materials in a Portland cement kiln must be clearly understood to interpret the impact of alternative fuels. In concert with this understanding, the EPA states on May 17, 2011 in the Federal Register, "...burning alternative fuels (whether classified as solid wastes or not) does not appreciably affect cement kiln HAP's emissions."[16]

[16] Fed. Reg. Vol 76. No. 95, page 28322

IMPACTS OF ALTERNATIVE FUELS

A kiln functions to make cement, not to burn fuel. Coal and pet coke comprise over 85 percent of the fuels used currently in the U.S. cement industry[17]. These fossil fuels used for combustion, e.g., coal and pet coke, are historically the fuels of choice, not for cost, but primarily for predictable fuel combustion properties, predictable availability, and able to be stored for long periods. Alternative fuels can have a wide range of physical and chemical properties such that the thermochemistry of kiln system can be out of balance and can cause significant damage to the kiln (see Section Thermostress on Kiln). For example, alternative fuels that have highly variable heat content and cause fuel mass flow variations can cause local overheating and redox reactions. The potential for increased thermal stresses in the kiln can damage the anchor and furnace shell. Variable alkali, chlorine, or sulfur content of a fuel can cause kiln refractory damage and possibly alkali bursting. As well, the mechanical behavior of particle size of fuels plays an important role in thermal distribution that must be considered. Clearly, as the percent of fuel substitution increases, the specifications of the alternative fuel must be well controlled and predictable. If the fuel has highly variably properties, the cement product can be ruined and the value of both cement and fuel is worthless.

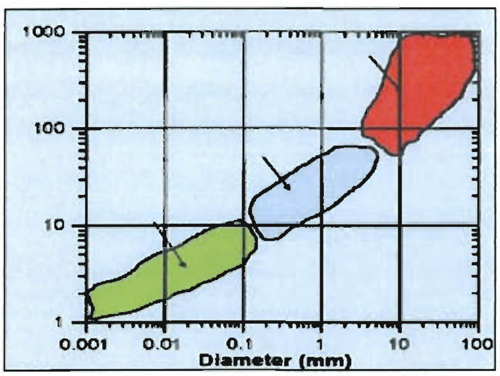

FIGURE 10. BURNOUT TIME (SECONDS) VERSUS FUEL PARTICLE SIZE (MM)

(Source: http://www.flsmidth.com/~/media/Brochures/Brochures%20for%20kilns%20and%20firing/AlternativeFuel.ashx)

The above diagram explains that the particle size will affect the speed of combustion (i.e., burnout time) such that fluctuations of particle size of a given material will change the combustion time and the

[17] International, I. *Trends in Beneficial Use of Alternative Fuels and Raw Materials*. 2008; Available from: http://www.epa.gov/sectors/pdf/cement-sector-report.pdf.

thermochemistry in the kiln. Note that this concept of impacts to thermochemistry includes changes to the physical location of the heat distribution. So, using a fuel with variable particle size will change the burnout time and will change the location of the flame combustion in the kiln. This shift of the flame combustion can severely impact the chemistry of the raw material conversion. The discussion above of the optimum burning regime and the effect of particle size clearly shows the need to use a fuel that has constant and controllable composition and characteristics.

Understanding the potential impacts (as discussed above) that alternative fuels can have on a kiln system demonstrates that a cement kiln is not simply an incinerator and that a cement kiln takes great risks with its equipment and product if it does not properly control the consistency and quality of its fuels. This is a very important distinction that indicates that cement kilns are not simply taking solid waste and burning it in the kiln. Instead they are taking select materials that are in their existing state of minimal value and are processing them sufficiently to make a valuable and useful material out of them. Similarly, the fuels blended with limestone, clay, sand, iron ore, and fly ash into a raw mix design can be thermally reacted into clinker and ground into cement. Thus a product is made that is of greater value than the sum of its parts.

Air Emission Impacts

The main constituents of the exhaust gases from a cement kiln are nitrogen (N_2), CO_2 from calcination of $CaCO_3$ and combustion of fuel, water vapor from the combustion process and from the raw materials, and excess oxygen. The pollutants of concern for non-hazardous fuels are as follows:[18]

- Organic compounds
- Nitrogen Oxides
- Sulfur Dioxide
- Carbon Monoxide
- Particulate matter
- Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD and PCDFs)
- Metals and their compounds
- Hydrogen fluoride
- Hydrogen chloride
- Greenhouse Gases

[18] Cement, Lime and Magnesium Oxide Manufacturing Facilities, May 2010 http://eippcb.jrc.ec.europa.eu

It should be stressed that while emission estimates are addressed, the Brooksville South CEMEX Cement Plant will not exceed any current permit limit. Furthermore, in comparison to combustion for raw power production, Brooksville South CEMEX must create a salable product using the combustion process. As such, the combustion must be well controlled and predictable. Upsets or erratic behavior in combustion not only affect emissions, which are of concern to Brooksville South CEMEX, but can damage the kiln and most important create worthless product.

Estimated emissions and operational assessments based on limiting factors in cement manufacture are addressed in the following sections for each pollutant of concern.

Volatile Organic Compounds

The main source of organic compound emissions in the cement manufacturing process comes from the raw materials as compounds are volatilized in the preheater tower at relatively low temperatures (rather than destroyed). The nominal temperatures ranging from 1600°F to 3000 °F are achieved in the combustion areas of a cement kiln and preheater tower are necessary to produce consistent clinker quality. These extreme temperatures lead to the effective destruction of organic compounds that may be present in fuels as they are combusted. The EPA requires for effective destruction of non-halogenated compounds to be 99.99+% or greater that a temperature in excess of 1830 °F for two seconds and an oxygen concentration of 2 percent or more are required.[19] The thermal characteristics of precalciner cement kilns like the one at Brooksville South CEMEX, as reported in numerous documents, well exceed this requirement. The Brooksville South CEMEX kiln system has these attributes:[20, 21, 22, 23]

- Gas residence times in the kiln on the order of 10 seconds at temperatures ranging from 1800 to 3000°F; in the calciner for approximately 3 seconds at temperatures ranging from 1600°F to 1800°F; in the preheater for 10 seconds at steadily changing temperatures from 1800 to 800°F
- Combustion that takes place under oxidizing conditions, meaning that oxygen concentration in gasses leaving the kiln is typically in the range of 2 – 3 percent
- Residence time of materials introduced at the feed end of the kiln being approximately 30 minutes
- The presence of extreme turbulence in the kiln, assuring complete mixing of combustible material

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[19] Mantus, E.K.; Kelly, K.E.; Pascoe, G.A.; *All Fired Up – Burning Hazardous Waste in Cement Kilns*, Environmental Toxicology International, December, 1992.

[20] EPA Cement Sector Report, Trends in Beneficial Use of Alternative Fuels and Raw Materials. October 2008.

[21] Cement, Lime and Magnesium Oxide Manufacturing Facilities, May 2010 http://eippcb.jrc.ec.europa.eu

[22] National Policy on High Temperature Thermal Waste Treatment and Cement Kiln Alternative Use, Cement Production Technology, Report No. 66011-02; Issue 2, Dr. Kare Helge Karestensen

[23] Karstensen, K.H., et. Al., "Environmentally Sound Destruction of Obsolete Pesticides in Developing Countries Using Cement Kilns." Environmental Science and Policy. 2006. Pg. 577-586.

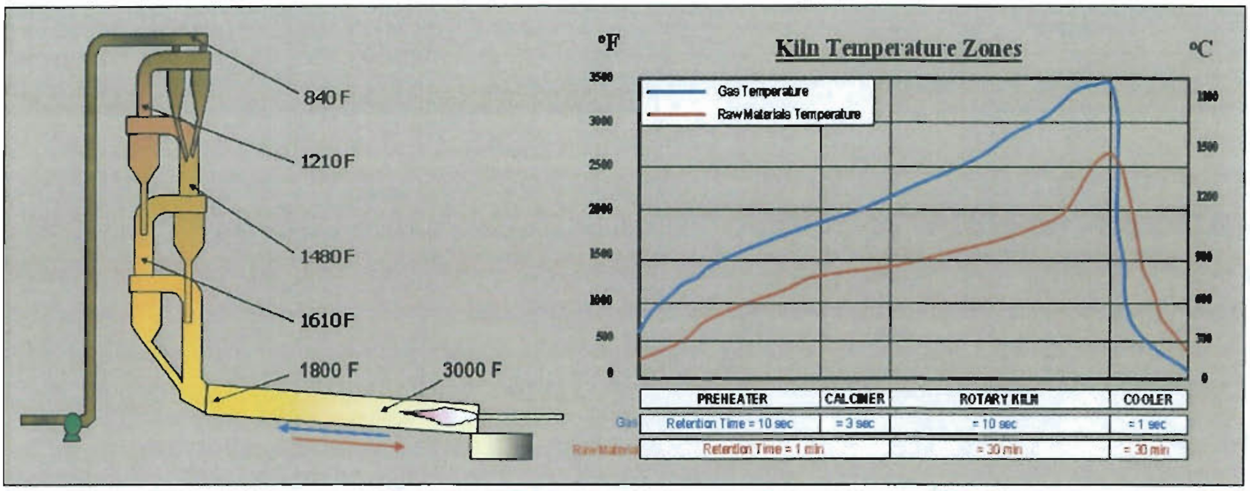

FIGURE 11. TEMPERATURE PROFILE IN PREHEATER CEMENT KILNS

NITROGEN OXIDES

Nitrogen Oxide (NO_x) emissions are not expected to change since they can be controlled by adjustments to the multistage combustion system timing, fuel input rates, and the use of selective non-catalytic reduction (SNCR). The SNCR system is a post-combustion control system that injects ammonia into the exhaust gas stream and converts NOx to N_2 and H_2O. The SNCR allows NOx emissions to be accurately controlled regardless of the NOx outlet concentration. Due to the generally inverse relationship of NOx and carbon monoxide (CO) emissions, the NOx control by SNCR can also control CO emissions.

Primarily, NO_x can be generated in two ways during combustion. These include thermal NO_x and fuel NO_x. Thermal NO_x is generated when molecular nitrogen and oxygen dissociate at high temperatures (above 2,370 °F) and react. This form of NO_x generation is the most pronounced in the cement industry and is reduced with a lower peak flame temperature. Fuel NO_x is generated when ionized nitrogen in the fuel is released during combustion. This is dependent on fuel type and input rate, and will vary with operating parameters. Contributions of this type, fuel -NO_x, generation are minor when compared to thermal NO_x generation[24].

[24] Neuffer, Bill, and Mike Laney. Alternative Control Techniques Document Update: NOx Emissions from New Cement Kilns. Research Triangle Park, N.C., U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards., Sector Policies and Programs Division, 2007. Print.

SULFUR DIOXIDE

Sulfur compounds in raw materials are present mainly as sulfates (i.e. calcium sulfate, $CaSO_4$) or as sulfides (i.e. pyrite or marcasite, FeS_2). Sulfates introduced to the kiln through either raw material and/or fuels are thermally stable up to temperatures of 1,200 °C. This means that they will persist until the sintering zone of the rotary kiln where they are thermally decomposed and oxidized to produce sulfur dioxide (SO_2). SO_2 generated at the sintering zone will react with alkalis or calcium oxide and be incorporated into the clinker. It will not give rise to gaseous SO_2 emissions. On the other hand, sulfides (and also other organic sulfur compounds) found in the raw materials enter the preheater tower and are readily decomposed and oxidized between 400 and 600 °C to produce SO_2 as the raw materials are heated by the exhaust gasses in the preheater tower. At these temperatures, not enough calcium oxide has been thermally generated to react with the sulfide-generated SO_2. Up to 30% of the total sulfide input in the raw materials may leave the preheater section as gaseous SO_2.[25] This means that SO_2 emissions are to predominately determined by the sulfide content of the raw materials, not by the fuel composition. The fuel sulfur content for both traditional and alternative fuels has been shown to not significantly impact SO_2 emissions.[18, 26, 27, 28] This understanding of the limited impact of fuel sulfur is further evidenced by the current Best Available Control Technology applied to all Florida cement kilns, which relies solely on the inherent natural alkali scrubbing of sulfur by the alkaline raw material input to the kiln and not on limits of fuel content sulfur.

Although very little effect in SO_2 emissions is seen from fuel input, typical sulfur levels in alternative fuels indicate a reduction in SO_2 emissions. Furthermore, th sSulfur content in the alternative fuel is normally less than that of coal (or the equivalent conventional fuel) and must accounted for in the clinker composition. Coal sulfur content reaches 31,000 ppm and averages 2243 ppm according to the USGS coal database[29].

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[25] National Policy on High Temperature Thermal Waste Treatment and Cement Kiln Alternative Use, Cement Production Technology, Report No. 66011-02; Issue 2, Dr. Kare Helge Karestensen

[26] EPA Report No. 600/R-97-115 entitled "Air Emissions From Scrap Tire Combustion"

[27] Cement, Lime and Magnesium Oxide Manufacturing Facilities, May 2010, Figures 1.32, http://eippcb.jrc.ec.europa.eu

[28] 76 Fed. Reg. 28318, 28322 (May 17, 2011)

[29] US Coal Quality Database. USGS, 4 Apr. 2004. Web. 17 Oct. 2011. <http://energy.er.usgs.gov/coalqual.htm>.

Carbon Monoxide

Carbon Monoxide (CO) emissions are not expected to increase since they can be controlled through the process of complete combustion and indirectly through the use of SNCR. The requirement for an oxidizing environment in the kiln promotes complete combustion and limits CO production. Indeed, the impact of CO emissions which can be observed in the initial evaluations of new fuels or raw materials is not based on the carbon content of the fuel or raw material but the extend of mixing, timing and temperature. In these initial evaluations the possibility of incomplete combustion is more likely and thus the need to have shakedown periods in which the emissions at that time are not representative of normal operation. SNCR allows NOx emissions control and due to the relationship of NOx and CO, NOx control by SNCR allows indirect control of CO. Brooksville South CEMEX closely monitors the combustion of all fuel materials to ensure there is no partial combustion which could create CO emissions, as well as other constituents. The Brooksville South CEMEX Plant is designed for the use of alternate fuels that are challenging e.g., reduced volatile content and large partial size) by having a separate calciner chamber. This separate calciner chamber is referred to as a Combustion Chamber. The Combustion Chamber allows for the controlled introduction and blending of alternative fuels along with kiln feed, tertiary air (ambient air/combustion air) and mixing with other fuels (fine coal) to insure proper ignition with retention in a high temperature atmosphere to initiate combustion of the alternate fuel. Characteristics of the alternative fuels, such as particle size, can affect the combustion efficiency which can impact CO emissions. Impacts on CO emissions from alternative fuels are a function of improper system operations and not the fuel type[9] which is the basis for the request for AF assessment periods. Brooksville South CEMEX will evaluate the CO emissions and through the shakedown periods learn to maximize combustion efficiency and, in turn, limit CO emissions.

The preheater is designed to extend retention time to provide long residence time at high temperatures to complete the combustion process. Brooksville South CEMEX closely monitors the carbon monoxide from post- combustion in the Stage 2 Cyclone post combustion in the calciner chamber and in the preheater exit gases ensure proper combustion of all fuel. Currently, the Brooksville South CEMEX Cement Plant operates with an oxygen rich combustion environment through the calciner and preheater assisting in the combustion process. Brooksville South CEMEX monitors CO with process continuous emissions monitoring to assure compliance and proper combustion. Proper combustion is maintained through process controls such as changes in the introduction of tertiary air, increases in process draft and oxygen content through the process, changes in fine coal feed rates into the Combustion Chamber, and/or changes in the kiln feed rates.

Through monitoring and testing of the recovered materials prior to introduction and with combustion characteristics monitoring and process adjustments, Brooksville South CEMEX will ensure proper and complete combustion of the alternate fuel to minimize generation of constituents of partial combustion, such as CO. As mentioned above, particle size will be evaluated in the process for impacts to the combustion.

PARTICULATE MATTER

The efficiency of a baghouse is related to the particulate loading. The solution to possible increased loading is to increase efficiency of particulate matter capture in the baghouse. The impact on particulate matter loading from fuel ash content is minimal (typically less than 10 percent of the total mass loading to the baghouse) given most of the particulate matter originates from the raw materials. As such the impact of PM emissions from fuel is expected to be limited. For example, the raw material particulate loading to the baghouse is about 8 percent of the raw material input (210 tons maximum raw material input = 16.8 tons of dust per hour). Particulate matter from fuel ash is based on fuel type. Coal input for maximum production is 18 tons per hour. The ash content of coal is typically 10 percent or less. So the fuel ash dust loading to the baghouse is 1.8 tons per hours. Therefore, the fraction of fuel ash to total dust is 10.7 percent of the total dust loading to the baghouse. Assuming a scenario of an alternative fuel replacing half the coal input, having half the heat content and twice the ash content, the portion of fuel ash could increase from 10.7 percent to 17.6 percent. As discussed below, this fraction of difference is within the range of emissions monitoring measurement accuracy.

Collaborative studies by EPA show that with competent test teams, the within-team Relative Standard Deviation (RSD) of a Method 5 test was 10.4 percent and the between-team RSD was 12.1 percent[30]. More recently, ASME reported that the RSD is from 5 to 11% and the accuracy of a Method 5 test (the departure of the average of three test runs from the true stack gas concentration) should be less than 14.7 percent[31].

Given that the precision and accuracy of one standard deviation of Method 5 test results are in the range of approximately 10-15 percent of the emission rate being measured, the impact of the fuel ash content should be within the measurement error of Method 5 and should not result in a measurable increase.

Particulate matter (PM) testing is used to show compliance by Method 5 at Brooksville South CEMEX. Beginning in 2013, in accordance with revised NESHAP subpart LLL requirements, continuous emissions monitoring (CEM) will be used to determine compliance with the PM emission limit. The required

[30] Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary sources Specific Methods. Section 3.16 EPA/600/4-77/027b.

[31] Lanier, S.; Hendricks, C. Reference Method Accuracy and Precision (ReMAP): Phase I. February 2001. ASME International.

relative accuracy of this PM CEMs will be 20 percent. Therefore, given that baghouse efficiency increases with increased particulate loading, the fraction of PM originating from fuels is typically 10 percent of PM entering the baghouse and the accuracy of current method testing and future CEM monitoring, a measurable impact of alternative fuels to PM emissions is not expected.

POLYCHLORINATED DIBENZO-P-DIOXINS AND DIBENZOFURANS (PCDD AND PCDFs)

EPA has long recognized that the predominate factor affecting D/F emissions from a cement kiln is the temperature of gases at the inlet to the control device.[32] Emissions of dioxin/furans (D/F) are not expected to change when using these alternate fuels due to the dependence of the formation of D/F on exhaust gas residence time within the kiln and particulate matter loading when at a temperature range of 700°F to 400°F, which is independent of the fuel type. Research has shown that there are no statistical significant differences in PCDD/PCDF emissions when comparing the use of conventional fuels and secondary fuel sources[33]. Moreover, as EPA found when establishing the MACT floor for hazardous waste burning kilns, fuel type does not have an impact on D/F formation because D/F is formed post-combustion.[34] This is consistent with EPA's recent affirmance that "burning alternative fuels . . . does not appreciably affect cement kilns' HAP emissions."[35],[36] as well, review of U.S, European and Australian kiln emissions of D/F shows no difference in D/F emissions in comparing conventional and alternative fuels.[37],[38], [39] Even the burning of hazardous wastes has been shown to not influence the formation of PCDD/PCDF emissions[40].

Similarly for the Brooksville South CEMEX Plant, FDEP states in the technical evaluation for draft permit 0530021-031-AC,

> "At high temperatures and sufficient residence times, dioxins/furans can be destroyed. Pre-heater/pre-calciner kilns like that at the Brooksville South Cement Plant have high temperatures and sufficient retention times to destroy these organic compounds. The preheater/calciner design rapidly cools the exhaust gases, which prevents dioxin/furans from reforming."

[32] 63 Fed. Reg. 14182, 14196 (Mar. 24, 1998)

[33] Abad, E., Martinez, K., Caixach, J., Rivera, J., "Polychlorinated Dibenzo-p-dioxin/Polychlorinated Dibenzofuran Releases into the Atmosphere from the Use of Secondary Fuels in Cement Kilns during Clinker Formation." Environmental Science Technology. 2004. Pg. 4734-4738.

[34] 64 Fed. Reg. 52828, 52876 (Sep. 30, 1999)

[35] 76 Fed. Reg. 28318, 28322 (May 17, 2011)

[36] FDEP technical Evaluation, 0530021-031-AC draft permit.

[37] "Air Emissions Summary for Portland Cement Pyroprocessing". Portland Cement Association.R&D SN3048

[38] Cement, Lime and Magnesium Oxide Manufacturing Facilities, May 2010, Table 1.38, http://eippcb.jrc.ec.europa.eu

[39] Dioxin and The Cement Industry in Australia. Technical Note. Cement Industry Federation. July 2002.

[40] Karstensen, K.H., "Formation, release and control of dioxins in cement kilns" Chemosphere. 2008. Pg. 543-560.

Brooksville South CEMEX operates a pre-heater/pre-calciner kiln. Through the Portland cement NESHAP (40 CFR 63 subpart LLL), EPA restricts the inlet temperature to the baghouse to a limit that is established during emissions testing for D/F. Brooksville South CEMEX has shown compliance to the D/F standard (described below) since it was established by EPA.

- 0.4 nanograms (toxic equivalent) per dry standard cubic meter (corrected to 7% O_2) – when the temperature at baghouse inlet 400 degree F or less.
- 0.2 nanograms (toxic equivalent) per dry standard cubic meter (corrected to 7% O_2) – when the temperature at baghouse inlet greater than 400 degree F.

METALS AND THEIR COMPOUNDS

When burning alternative fuels, the concentrations of metals pollutants measured in the stack-gas fall within the variability of traditional fuel emission values[41,42]. To explore this trend further, it is important to first define the possible outlets of such pollutants in the cement processing system. Metals that enter a kiln, either through the raw materials or through the fuel, have the capability of exiting the system through three separate routes; they can enter and become part of the raw clinker, bind to the cement dust or exit through the stack, if volatile[43]. In turn, the metals species that enter the clinker are, in fact, captured and the metals in the cement dust are treated by the air pollution control system. Previous studies have indicated that non-volatile metals, such as arsenic, chromium, nickel and zinc are primarily captured by the clinker in the kiln[44].

It should additionally be noted that metal emissions are similarly emitted from traditional fuels compared to other fuel types. The following discussion is provided only for illustrative purposed for comparison of emissions of conventional fuels to hazardous waste fuels. As mentioned previously, Brooksville South CEMEX is not requesting to use hazardous wastes or materials for fuel. A comprehensive review was conducted for such comparative emissions data. This study provides in depth information on comparative emissions for a broad range of pollutants. For example, the following table shows comparison of metal emissions.

This table shows that there is no significant difference in metal emissions when burning hazardous waste compared to conventional fuels except for lead and mercury. As explained below, lead emissions are not expected to increase based on the alternative fuels. The stack testing recently conducted indicates that PSD would not be triggered due to lead emissions. Mercury emissions are monitored through materials analysis and must remain below PSD thresholds to remain compliant to the air Title V permit.

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[41] Zemba, S., Ames, M., Green, L., Botelho, M.J., Gossman, D., Linkov, I., Palma-Oliveira, J., "Emissions of metals and polychlorinated dibenxo(p)dioxins and furans (PCDD/Fs) from Portland cement manufacturing plants: Inter-kiln variability and dependence on fuel-types" Science of the Total Environment. 2011. Pg. 4198-4205.

[42] International Cement Review, *Burning Issues,* February, 2000.

[43] Conesa, J.A., Galvez, A., Mateos, F., Martin-Gullon, I., Font, R., "Organic and inorganic pollutants from cement kiln stack feeding alternative fuels" Journal of Hazardous Materials. 2008. Pg. 585-592.

[44] Richards, J., Goshaw, D., Speer, D., Holder, T., "Air Emissions Data Summary for Portland Cement Pyroprocessing Operations Firing Tire-Derived Fuels." Environmental Science Technology. 2004. Pg. 4734-4738. PCA R&D Serial No. 3050. 2008

TABLE 3. COMPARISON OF KILNS METAL EMISSIONS – CONVENTIONAL AND HAZARDOUS WASTE

METAL	CK/HWF[b] vs. CK/CF[a]
Antimony	No significant difference
Arsenic	No significant difference
Barium	No significant difference
Beryllium	No significant difference
Cadmium	No significant difference
Chromium	No significant difference
Lead	CK/HWF > CK/CF[d]
Mercury	CK/HWF > CK/CF[d]
Nickel	No significant difference
Selenium	No significant difference[e]
Silver	No significant difference
Thallium	No significant difference
Vanadium	No significant difference
Zinc	No significant difference

[a] Conclusions based on a 95% confidence level (i.e., 95% confidence that the results were not obtained by random chance).
[b] CK/HWF = cement kiln burning hazardous waste fuel.
[c] CK/CF = cement kiln burning only conventional fuel (e.g., coal).
[d] CK/HWF > CK/CF = emissions from cement kiln burning hazardous waste greater than emissions from cement kiln burning only conventional fuel.
[e] Statistical trends suggest CK/HWF < CK/CF.

Thus, metals other than lead and mercury are inherently and readily treated and removed from the gas stream and less problematic air pollutants. However, volatile metals, such as mercury, primarily exit the kiln through the gas stream and are indeed of concern. It should be stressed that these volatile metals are naturally present in raw materials, traditional fuels and alternative fuels. A summary of the two metals that are subject to PSD thresholds in the cement manufacturing process are discussed below.

<u>MERCURY</u>

The current permitted limit of mercury for the Brooksville South CEMEX Cement Plant is 122 pounds per year and the PSD threshold is 200 pounds per year. Furthermore, the Annual operating report information indicates that based on material analysis and dust shuttling efforts in 2010 that total emissions of mercury are 6.56 lb/year- far below the PSD threshold and one of the lowest in the nation. This permit limit negates the requirement for PSD review of mercury. Because of the volatile nature of this metal, it is assumed that 100% of all input mercury is emitted from the cement making process. Mercury input is required in the Title V permit to be determined by material sampling and analysis, and material/fuel consumption amounts, regardless of the type of fuel used. This requirement for sampling and analysis will apply to alternative fuels used at the facility and will ensure that Brooksville South CEMEX does not exceed the annual mercury limit. Furthermore, the recently revised Portland Cement

NESHAP requires the future installation of continuous emission monitors for mercury emissions to demonstrate compliance. Nonetheless, as shown in Figure 12 below, most secondary fuels contain concentrations of mercury that are far less than coal. Even some solid waste derived fuels, which have significantly higher mercury concentrations than other alternative fuels, still have concentrations on par with Appalachian Coal, which is a conventional fuel. It should also be noted that coal analyses by the USGS have shown coal samples with much higher metal. including mercury, coal, than alternative fuels.[45]

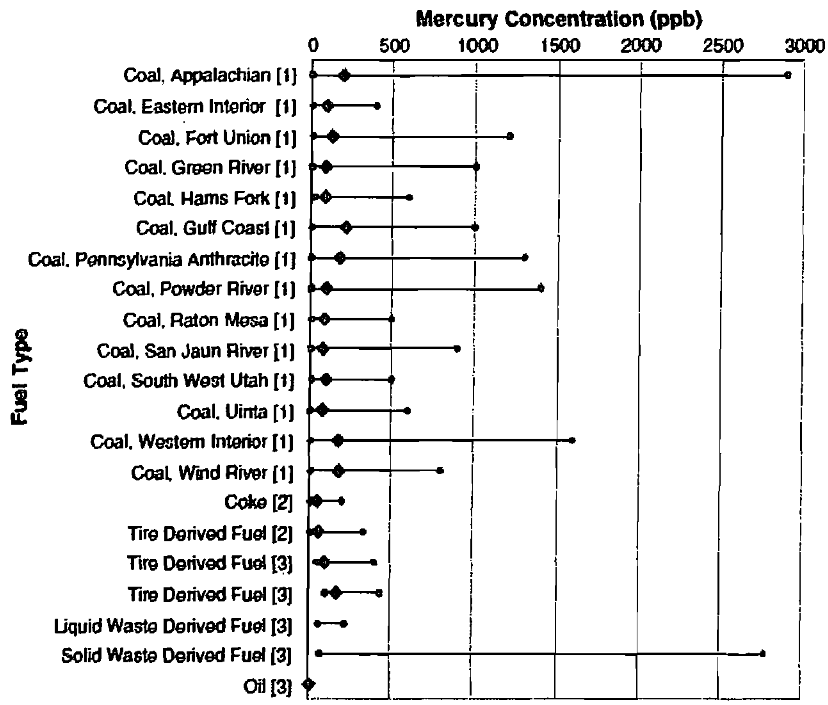

FIGURE 12. COMPARISON OF MERCURY CONCENTRATIONS IN VARIOUS CEMENT MANUFACTURING FUELS.[46]

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[45] http://pubs.usgs.gov/of/2010/1196/ (last visited December 1, 2011)

[46] Sikkema, J.K., Alleman, J.E., Ong, S.K., Wheelock, T.D., "Mercury regulation, fate, transport, transformation, and abatement within cement manufacturing facilities: Review." Science of the Total Environment. 2011. Pg. 4167-4178.

LEAD

Lead emissions for 2010 were (or 7.5 X 10^{-5} lb/ton kiln feed) 44.98 pounds for an input of 989,560 tons of kiln feed. The contribution of lead is from raw materials and fuels. The lead content of limestone (85 percent or more of raw materials) is typically 3 ppm[47]and the typical content of coal is 10 ppm (Kentucky coal)[48]. Since fuel represents approximately 10% of the input to a cement kiln, compared to approximately 90% raw material input, the total lead input due to fuel is significantly lower than the input from raw materials. Thus, any fuel contribution increase should be far below the PSD threshold of 1200 pounds per year. Therefore the PSD analysis for each material does not include lead.

[47] Hill, L; Stevenson, R., Mercury and lead Content in Raw Materials. Portland Cement *Association, R&D serial No. 288.*
[48] http://kgs.uky.edu/kgsweb/DataSearching/Coal/Quality/QualitySearch.asp (last visited April 18, 2011)

HYDROGEN FLUORIDE

Fluorine input to the kiln is from both raw materials and fuels. EPA's review of HAPs in the Portland Cement NESHAP determined HF to not be a regulated pollutant. HF emissions measurements of German kilns in 2004 showed most measures below detection (0.04 to 0.06 mg/Nm^3) and all values less than 0.5mg/Nm^3 (0.6 ppm).[49] In contrast, other industries such as aluminum smelters are regulated for HF emissions. HF is extremely acidic and because of the alkaline nature of the raw materials and product, the very high dust loading in the kiln acts to provide an excellent scrubbing method. Fluoride input to the kiln from either fuel or raw materials is either captured in clinker or reacted to calcium fluoride (CaF_2) which is thermally stable in the burning process. Note that flouride impacts the quality of cement and is readily analyzed as excess amounts of fluoride in cement are detrimental above 0.25 %.[50]

[49] Environmental Data of the German Cement Industry 2009. VDZ. Page 30.
[50] Javed I, Bhatty. "Role of Minor Elements in Cement Manufacture and Use". PCA R&D Serial No. 1990

HYDROGEN CHLORIDE

The ratio of sulfates and chlorides to alkalis must be maintained for proper operation of the kiln (this is discussed further in the following sections). The bulk of alkali input to the kiln comes from raw materials, and alkali levels are low in the limestone from the Brooksville South CEMEX quarry. Because of this, the chlorine content of all fuels and raw materials used must be monitored.

The chlorine content of the fuels used in the kiln is process-limited so as to ensure acceptable clinker quality and limit kiln degradation. Indeed, preheater tower buildup and clogs is a function of chlorine in the gas stream. Extended periods of chlorine at levels above 0.2 to 0.3 percent are expected to cause build up in the preheater tower. See further information in Section, "Blockage and Buildup". Many alternative fuels, such as tires, carpet-derived fuel, paper, roofing materials, have far less chlorine than coal. For these reasons, the Department has assurance that Brooksville South CEMEX will not use alternative fuels in a manner that causes chlorine input to deviate from the existing range. The Portland Cement NESHAP revisions that become effective in 2013 will require HCl monitored by CEMs.

GREENHOUSE GASES

Emissions of greenhouse gases (GHG or CO2) from the pyroprocessing of raw materials in a cement kiln are inherent to cement production. Both the combustion of fuels as well as the chemical reactions necessary to produce cement results in significant GHG emissions. However, to date the only practical control available to cement kilns for reduced GHG emissions is the use of alternative fuel materials and/or efficient operations. In fact, the most recent GHG PSD determination for a cement plant reviewed and recommended a wide range of alternative fuels for GHG reductions.[51] The majority of GHGs originate from limestone (CaCo3) decomposed to CaO and CO2. In addition to limestone decomposition, fuel combustion generates GHG emissions in the form of CO2, methane (CH4) and nitrous oxide (N2O). EPA now requires continuous monitoring of CO2 from the process and annual reporting of GHG emissions per 40 CFR 98. This new rule requires that the cement plant reporting GHG report the fraction of emissions from biogenic sources. In fact, 40 CFR 98.34(e) establishes a default value of 20 percent for the biogenic portion of tires. Of the many reasons that Brooksville South CEMEX is pursuing an alternative fuels program, reduction of GHG emissions is a major consideration. The PSD evaluation addresses GHGs. Note that the EPA deferred PSD determination of GHG emissions from biogenic sources as of July 20, 2011 until 2014. Regardless, the results of the PSD analysis indicate the GHG emissions are below PSD thresholds. It should be noted that EPA in recent BACT analysis for both cement kilns and power plants has determined that biogenic materials as alternative fuels are a primary means of reducing GHG emissions.

[51] NYDEC Permit ID: 4-0124-00001/00112 Facility DEC ID: 40124000, issued 05/27/2011

TABLE 4. SUMMARY OF IMPACT OF FUEL ON AIR EMISSIONS AT BROOKSVILLE SOUTH CEMEX

Pollutant	Origin of Pollutant	Control of Pollutant	Dependence of Pollutant Emissions on Fuel Composition
VOC	Raw materials and fuels	Efficient combustion	Minimal
NO_x	Thermal conversion of N_2 in air and nitrogen in fuel/raw materials	Selective Non-Catalytic Reduction (SNCR)	Negligible contribution from fuel nitrogen. Dominated by thermal NO_x. SNCR control negates changes in NO_x
SO_2	Sulfites in raw materials	Natural scrubbing of alkaline gases/particulate	Negligible contribution from fuel nitrogen.
CO	Raw materials and fuels	Efficient combustion	Partial
PM	Raw materials and fuels	Fabric filter	Partial
D/F	Post combustion De-novo synthesis[1]	Down-comer tower temperature	Minimal
Hg	Raw materials and fuels	None	Partial
Pb	Raw materials and fuels	Alkaline scrubbing and fabric filter	Partial
HF	Raw materials and fuels	Low F- materials and fuels Alkaline scrubbing and fabric filter	Partial
HCl	Raw materials and fuels	Low Cl- materials and fuels Alkaline scrubbing and fabric filter	Partial
GHGs	Raw materials and fuels	Biogenic fuels	Significant

1. see D/F section for definition of post-combustion de novo synthesis

OTHER EMISSIONS

PCBs

Polychlorinated biphenyls (PCBs) are a type of organic compound with 2 to 10 chlorine atoms attached to a biphenyl, or two joined benzene rings. These compounds are environmentally persistent and toxic. They had many uses, including, but not limited to, coolants and insulating fluids, plasticizers, pesticide extenders, sealants, and adhesives. PCBs today are restricted in use and not commonly found in non-hazardous waste materials. The historical usage of these materials should be addressed as a possible contaminant. Brooksville South CEMEX has no intention of knowingly using waste that has significant amounts PCB materials. The following information provides reasonable assurance that any de minimis amounts of these materials will be effectively destroyed in the cement kiln.

The US EPA Toxic Substance Control Act (TSCA) specifies that for the incineration of PCBs (99.9999% destruction), a temperature of 2200°F, a residence time of two seconds, and an oxygen concentration of 2-3 percent is required.[52] Further related to the thermal destruction of PCBs, laboratory data from the University of Dayton Research Institute[53] demonstrates that PCB-type compounds are 99.99+ percent destroyed at temperatures in excess of 1830°F with a residence time of two seconds and an oxygen concentration of 2-3 percent. As discussed above the heat and time of residence in the kiln system well exceeds these conditions required for effective destruction of PCBs. This effective destruction in the kiln system should provide DEP assurance of any possible air emissions concerns.

[52] Karstensen, K.H., *Can Cement Kilns be used for PCB Disposal?,* SINTEF (undated)

[53] Rubey, W.A.; Dellinger, B., et al, *High-Temperature Gas – Phase Formation and Destruction of Polychlorinated Dibenzofurans,* Chemosphere, Vol. 14, No. 10, pp 1483-94, 1985.

Kiln and Process Impacts

It is possible for the equipment involved in cement manufacture to be affected by the materials used in the process. The consequences of changes in material inputs include, but are not limited to, unexpected changes in production capacity, thermo stress on equipment, corrosion, and blockages and buildups. All of these can lead to inefficient operation and equipment malfunctions. The type of fuel used on the system can introduce material components into the process that can interfere with operation as well as the chemistry of the process. For these reasons, Brooksville South CEMEX takes extensive measures to ensure that all raw material and fuel inputs are carefully monitored and meet the necessary quality specifications for its fuel and raw material blends.

Production Changes

Alternative fuels generally contain higher moisture content than traditional fuels like coal or petroleum coke, and although lower moisture can be targeted it is expected that the moisture content of alternative fuel materials will be higher. As a result, the amount of exhaust gas produced when burning alternative fuels may increase.[54] Clinker production is often limited by process fan capacity, so an increase of gas production can result in decreased clinker production capacity. Elevated moisture in the fuel also can decrease flame temperature, which also can similarly decrease production capacity.

Thermo Stress on Equipment

Rotary cement kilns do not contain homogenous temperature environments on the inside. These complex chemical reactors contain several temperature zones that are imperative to the proper formation of clinker. The walls of a kiln are lined with various types of thermally insulating refractory (i.e. brick) at the different temperature regions.[55] The use of alternative fuels can cause temperature fluctuations in the kiln. The difference in heating content and particle size of these fuels compared to traditional fuels may cause the flame in the kiln to take a different shape, shifting the location where sintering and transitioning temperatures occur. When this happens, sections of the kiln's interior lining

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[54] MVW Lechtenberg & Partner. "Kiln Impact." Proc. of Workshop Alternative Fuel Project Implementation, Mülheim an Der Ruhr, Germany.

[55] Potgieter, J.H., R.H.M. Godoi, and R. van Grieken. "A case study of high-temperature corrosion in rotary cement kilns." The Journal of The South African Institute of Mining and Metallurgy (Nov. 2004): 603-606. The South African Institute of Mining and Metallurgy. Web. 19 Oct. 2011. <http://www.saimm.co.za/Journal/v104n10p603.pdf>.

may be subject to temperatures if they were not designed for and cracking or spalling of the brick inside the kiln can occur. [31]

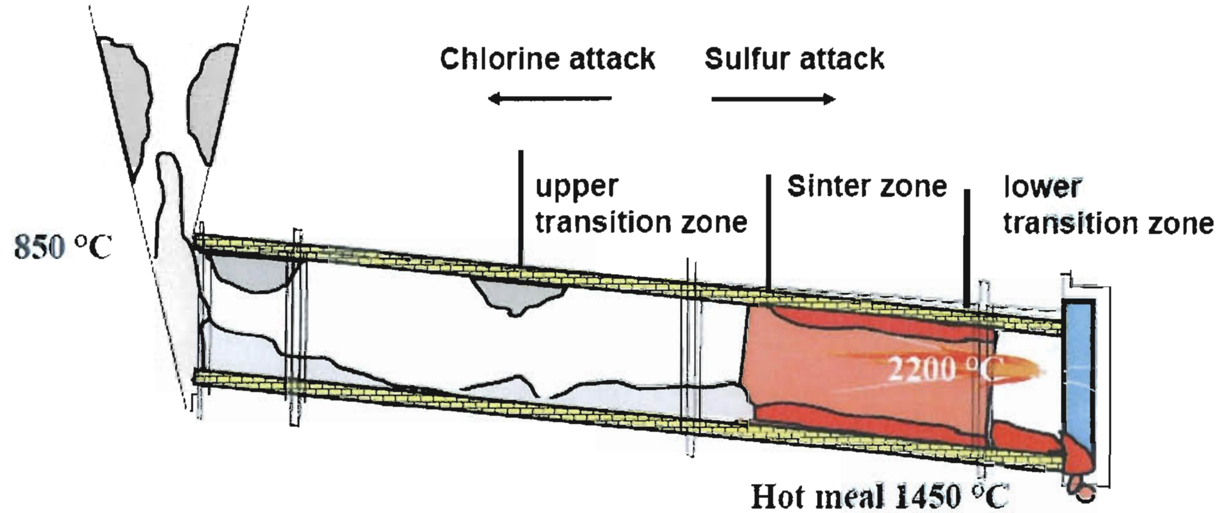

FIGURE 13. ROTARY KILN TEMPERATURE ZONES, CORROSION, AND BUILDUP[56]

CORROSION

Since the introduction of corrosive compounds through input materials is possible, they are closely monitored and screened to prevent damage to the kiln. The main culprits of corrosion inside of a cement kiln are sulfur and chlorine. Both of these chemicals readily form acid gasses than can penetrate the refractory lining. The oxygen-deficient environment in a cement kiln provides an opportunity for these acid gasses to act as the oxygen donors and react with iron lining of the kiln. [57] Additionally, the elevated presence of alkalis inside the kiln can penetrate the refractory lining and form alkali salt crystals in between the kiln shell and the brick. As these crystals form, they can damage the brick and even cause it to crack. [58] The zones subject to this form of corrosion may change when firing different fuels, so it is important for the fuel types and inputs to be carefully coordinated.

[56] Schmidl, Dr. Erwin, and Holcim. Impact of Alternative Fuels on Refractory Material. 9 Dec. 2008.

[57] Potgieter, J.H., R.H.M. Godoi, and R. van Grieken. "A case study of high-temperature corrosion in rotary cement kilns." The Journal of The South African Institute of Mining and Metallurgy (Nov. 2004): 603-606. The South African Institute of Mining and Metallurgy. Web. 19 Oct. 2011. <http://www.saimm.co.za/Journal/v104n10p603.pdf>.

[58] MVW Lechtenberg & Partner. "Kiln Impact." Proc. of Workshop Alternative Fuel Project Implementation, Mülheim an Der Ruhr, Germany.

Blockages and Buildups

Monitoring the input of sulfur and chlorine into the cement kiln is paramount to successfully synthesizing cement product. It is necessary to maintain the proper ratio of sulfur to alkalis; otherwise there is a risk of kiln buildup. Kiln buildup occurs when an excessive amount of condensed solids appear due to out-of-balance chemical ratios of alkalis present in the raw material (i.e. sodium and potassium), sulfur, and chlorine. If this balance is not maintained, buildup deposits in the preheater tower of alkali chlorides and alkali sulfates can clog the preheater tower within minutes of a severe chemical imbalance and require the shutdown of the kiln. The following equation, known as the sulfate modulus, shows the relationship of the three primary components that affect kiln buildup.[59]

$$M = \frac{\frac{SO_3}{80}}{\frac{K_2O}{94} + \frac{Na_2O}{62} - \frac{0.5 * Cl}{35.5}} = 0.8 \text{ } to \text{ } 1.25$$

[59] Ref: Permit Application, from Permit No. 0250020-031-AC

Clinker Impacts

When considering the effects that alternative fuels may have on human health and the environment, it is important also to remember that CEMEX Construction Materials Florida is manufacturing a salable product. This product must be of consistent and competitive quality; and its quality is directly affected by the raw materials and fuels used in its synthesis. Cement manufacture is unique in that it produces very few waste streams. In a preheater kiln, there are only two mechanisms for compounds to leave the system once entered:

1. Gaseous and particle emissions through the designed emission point (from the stack)
2. Entrained in the clinker (as product)

Gaseous and particle emissions have been discussed previously in this application. This section will focus on several characteristics of clinker that can be affected by the use of alternative fuels, and thus the limiting factors of certain inputs. The Department can be assured that alternative fuel use will be carefully monitored by Brooksville South CEMEX in order to successfully meet the requirements to satisfactorily manufacture an acceptable clinker product while operating within its permitted limits.

Clinker Formation

Deviations in temperature can affect the formation of clinker crystals inside of a rotary kiln. If heating and cooling of raw feed is too slow, cement crystals become large and more energy is required for grinding.[60] It is important that fuel substitutions do not significantly alter temperature conditions in the kiln. Similarly, the presence of excess sulfur in the fuel will limit gypsum addition, and produce a clinker that is more difficult to grind.[61]

Flowability

A high sulfur fuel can have several effects on the cement product. One of these effects can be the formation of alkali oxides, which can react with the moisture in the air and decrease cement flowability, making it more difficult to transport.[37]

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[60] Wellington, Mark, and Sanjiv Dhanjal. *Optimising Combustion with Alternate Fuels and Monitoring with Online XRD.* Proc. Of ACFM Technical Symposium, Jakarta. Web. <http://www.fct-actech.com/documents/20060711AFCM%202006-FCT%20Conference%20paper.pdf>.

[61] Longman, P.A. *Chemistry in the Kiln.*

SETTING TIME

One of the more important features of a cement product is its setting time. This is the time that is required before the cement becomes hard when it is being used. Several compounds that may be present in the fuel may adversely affect cement setting time when available in high concentrations. These include, but are not limited to, fluorine, phosphorus, and zinc.[62, 63] Fuels used with elevated levels of these constituents that may conflict with the quality of the final product are not desirable and will not be targeted for use in the Brooksville South CEMEX Cement Plant Kiln.

APPEARANCE

Some heavy metals, such as manganese, phosphorous have the ability to affect cement color significantly degrading the saleability of the cement.[53]

STRENGTH

Arguably the key component to a quality cement product, this aspect can be affected by several different components in fuels. Fluorine, present in in high concentrations, will decrease early strength, though if limited to approximately 0.2% and used in conjunction with alkalis and SO_3, strength can be maximized. Heavy metals like titanium and manganese are not volatile and will be entrained into the clinker. These metals also slightly decrease early strength. As well, zinc, copper, vanadium, and lead will slow cement hydration and reduce strength development in concentrations over 0.5%. Phosphorus will also reduce early strength. If alkalis are present in the fuel, they can enhance early strength, but may reduce late strength.[53]

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[62] Longman, P.A. *Chemistry in the Kiln*.

[63] MVW Lechtenberg & Partner. "Kiln Impact." Proc. of Workshop Alternative Fuel Project Implementation, Mülheim an Der Ruhr, Germany.

ESTIMATED EMISSIONS

Estimated emissions are addressed in the following sections for each category of fuel material. Baseline emissions are calculated in detail for the baseline fuel, which is coal, using the hierarchy of data per 62-210.370, F.A.C. The coal emission factors for NO_x, SO_2, THC (as VOC) and CO are based on facility CEMs data. Emission factors for PM are based on yearly stack tests. Note that the facility commenced full operation of the dry process kiln in 2008. Therefore, the emissions data for the 2008 baseline is based on a partial year. The summary indicates that estimated emissions for any or all fuels should not exceed the values of PSD applicability thresholds.

Notwithstanding the calculation of estimated emissions, the following discussion is provided on current methods to control pollutant emissions applied at the Brooksville South CEMEX Cement Plant.

Each fuel type and the PSD analysis of each fuel are provided below. As noted above, the PSD-specific analysis does not include mercury or lead. The analysis addresses NO_x, SO_2, CO, VOC, PM/PM10 and greenhouse gases.

PSD ANALYSIS – COMPARISON TO SIMILAR PROJECTS

Comprehensive data of European cement kilns show that firing of alternative fuels does not increase emissions of air pollutants.[5] Therefore, for PSD analysis in review of other projects is the general trend of similar or reduced emissions from comparable projects. The following example of emissions summary data shows these general trends.

See the following figures:

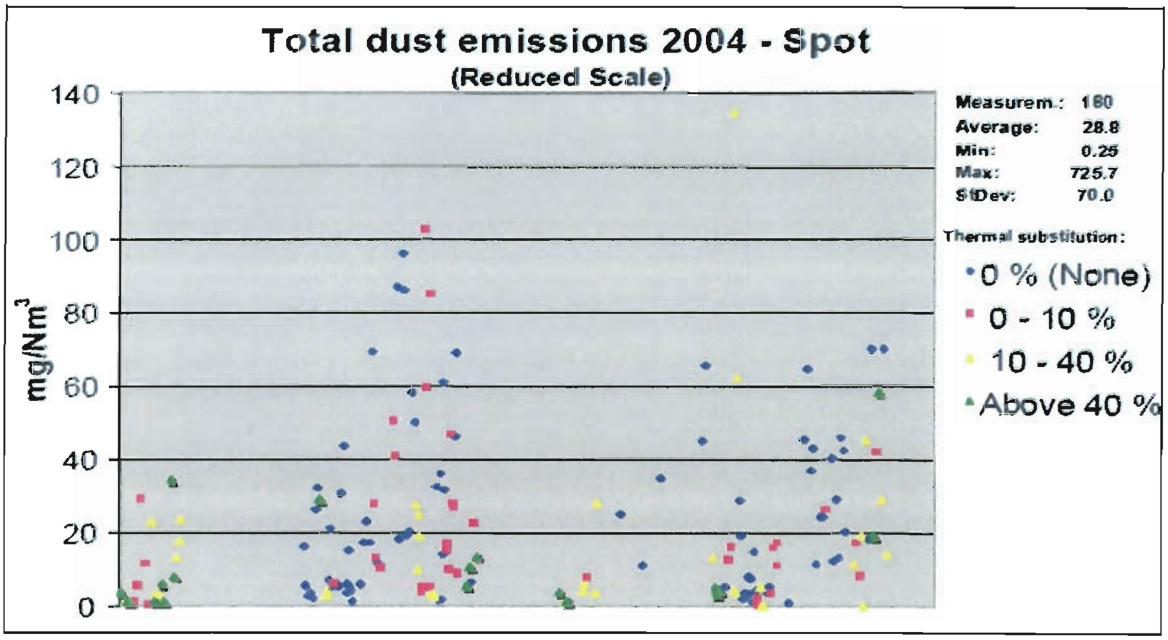

FIGURE 14. DUST EMISSION VALUES FROM 180 SPOT DUST MEASUREMENTS IN THE CLEAN GAS OF ROTARY KILNS IN THE EU-27 AND EU-23+ COUNTRIES.

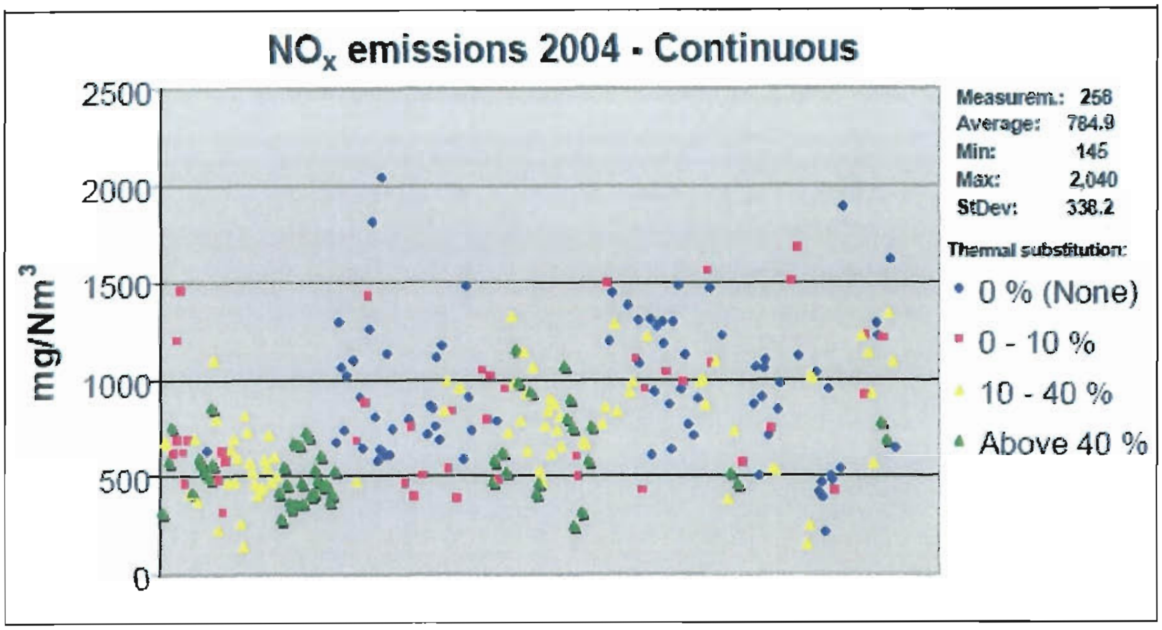

FIGURE 15. NOX EMISSIONS (EXPRESSED AS NO2) FROM CEMENT KILNS IN THE EU-27 AND EU-23+ COUNTRIES IN 2004 CATEGORIZED BY SUBSTITUTION RATE

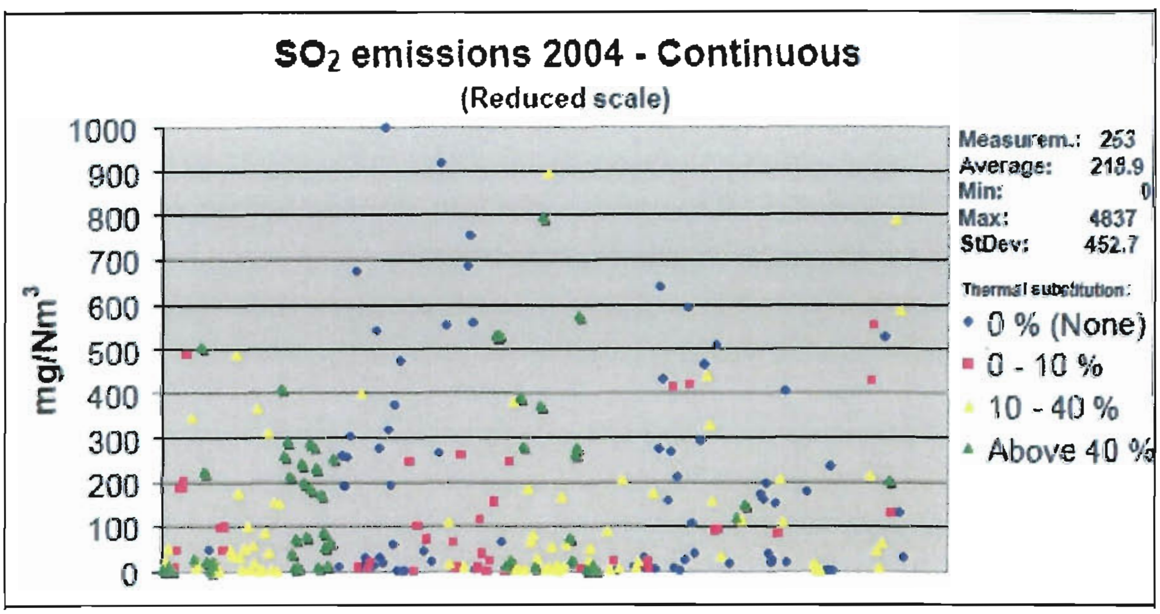

FIGURE 16. VALUES OF SO2 MEASUREMENTS IN THE CLEAN GAS FROM CEMENT PLANTS IN THE EU-27 AND EU-23+ COUNTRIES

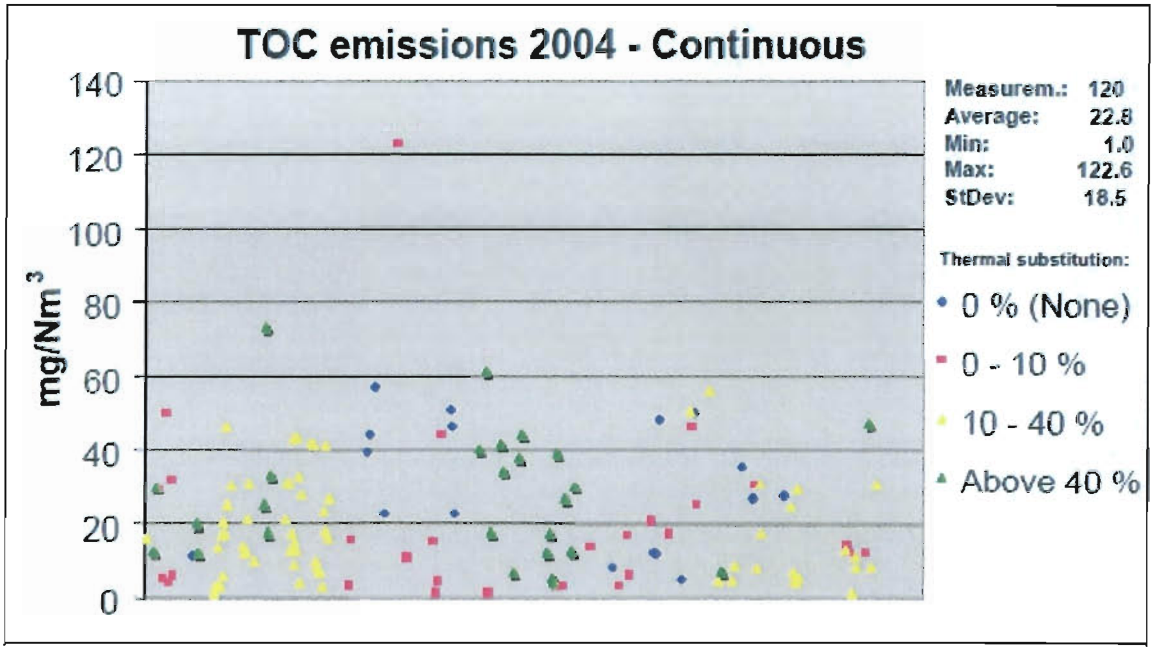

FIGURE 17. TOC EMISSION VALUES FROM CONTINUOUS MEASUREMENTS IN THE CLEAN GAS OF CEMENT KILNS IN THE EU-27 AND EU-23+ COUNTRIES

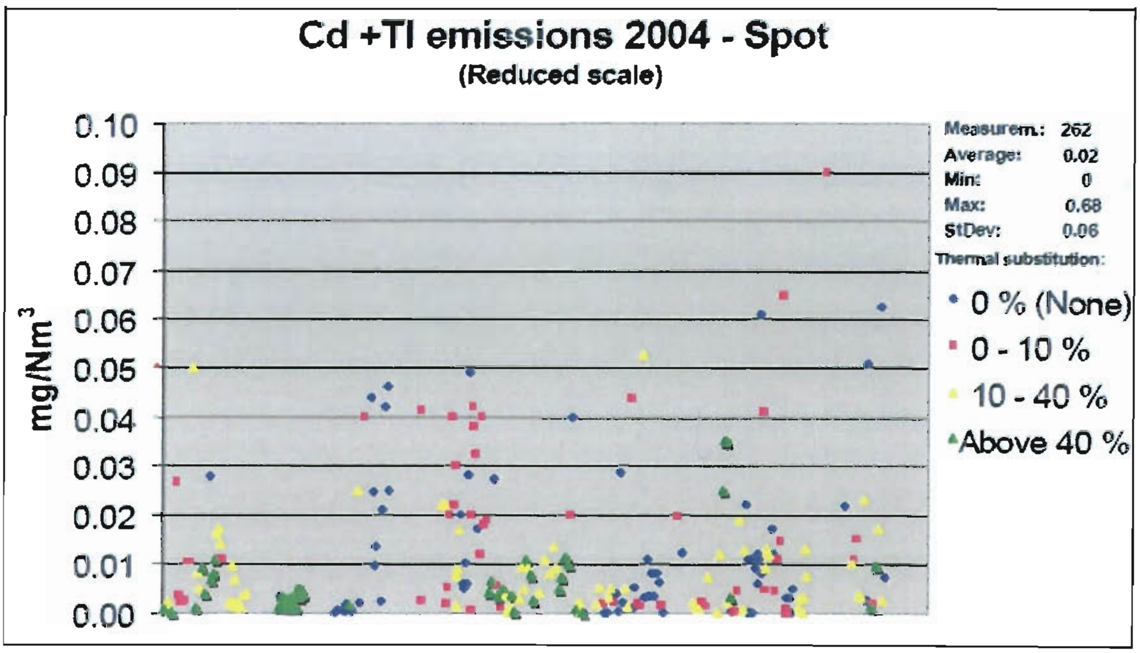

FIGURE 18. CADMIUM AND THALLIUM EMISSION VALUES FROM 262 SPOT (CD, TL) MEASUREMENTS IN THE EU-27 AND EU-23+ COUNTRIES

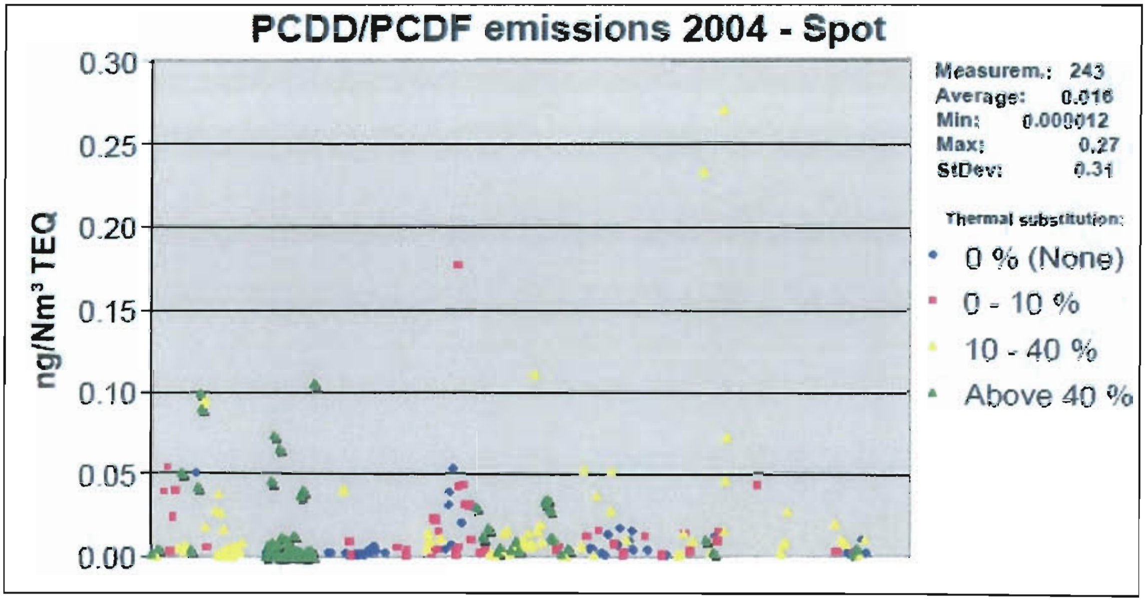

FIGURE 19. EMISSIONS OF PCDD/F IN THE EU-27 AND EU-23+ COUNTRIES IN 2004 CATEGORIZED BY THERMAL SUBSTITUTION RATE

PSD ANALYSIS – ESTIMATED EMISSIONS AT BROOKSVILLE SOUTH CEMEX

For all fuels, a maximum heat substitution of 100% is assumed. Pollutants analyzed include PSD pollutants SO_2, NO_x, CO, VOCs, PM/PM10/PM2.5, and greenhouse gasses (GHG) CO_2, N_2O and CH_4. Volatile and semi-volatile metals, mercury and lead, are not quantitatively analyzed. A summary of the quantitative analyses of the PSD and GHG emissions is shown in Table 5.

TABLE 5. SUMMARY OF ESTIMATED EMISSIONS FOR RECOVERED MATERIALS – BROOKSVILLE SOUTH CEMEX

	SO_2 Inc./Dec. (tons)	NO_x Inc./Dec. (tons)	CO Inc./Dec. (tons)	VOC Inc./Dec. (tons)	PM/PM10 Inc./Dec. (tons)	PM2.5[a] Inc./Dec. (tons)	CO_2[c] Inc./Dec. (tons)	CH_4[c] Inc./Dec. (tons)	N_2O[c] Inc./Dec. (tons)	CO_{2e}[b] Inc./Dec. (tons)
Fugitives	6.56	21.17	25.05	21.17	8.43	4.22	0.00	0.00	0.00	0.00
Engineered Fuel	-2.08	---	---	-0.28	-9.21	-4.60	-11,526	33.68	0.50	-10,663
Tire Derived Fuel	-0.41	---	---	-2.89	0.49	0.24	-18,999	33.68	0.50	-18,136
Plastics	-1.57	---	---	-7.96	4.21	2.11	-36,330	33.68	0.50	-35,467
Agricultural Biogenics	-0.71	---	---	2.65	4.37	2.19	26,875	33.68	0.50	27,737
Carpet Derived Fuel	-1.57	---	---	-7.96	4.21	2.11	-36,330	33.68	0.50	-35,467
Cellulosic Biomass	-0.71	---	---	2.65	4.37	2.19	-6,627	33.68	0.50	-5,765
Roofing Materials	0.19	---	---	4.45	5.85	2.92	-35,762	-12.18	-2.08	-36,662
Biosolids	-0.79	---	---	1.30	-3.56	-1.78	11,873	33.68	0.50	12,736
	↓	↓	↓	↓	↓	↓				
Worst Case Scenario	6.75	21.17	25.05	25.62	14.28	7.14	26,875	33.68	0.50	27,737
	↓	↓	↓	↓	↓	↓				
Threshold	40	40	100	40	25/15	10	NA	NA	NA	75,000

a. PM2.5 from Fugitives in Table 2. PM2.5 from alternative fuel firing conservatively estimated at 50% of fraction of PM.

b. CO_{2e} (equivalency) data gathered from equivalency ratios located in Table A-1 of 40 CFR 98

c. GHG emission factors obtained from Table C-1 and Table C-2 from 40 CFR 98

BASELINE CALCULATIONS – TRADITIONAL FUELS

Representative data of emissions from traditional fuels used during the years from 2009 to 2010 are applied for comparison to alternative fuel categories. While data from 2008 is available, the kiln did not begin production until the end of that year. Therefore, any data from that year would skew the yearly averages. Traditional fuels for fueling the kiln, as allowed in the Title V permit, are coal, natural gas, distillate oil, petroleum coke, flyash, on-spec oil and whole tires. Traditional fuels have fueled the kiln for normal operations since operation began, simplifying the baseline data calculations. The following table shows baseline emissions from coal under normal operations.

TABLE 6. SUMMARY OF BASELINE EMISSIONS FOR COAL.

CEM Data

Nitrogen Oxides		
Average[a]:	339.28 ton/yr	0.677 lb/MMBtu
2010:	531.09 ton/yr	0.733 lb/MMBtu
2009:	459.80 ton/yr	0.648 lb/MMBtu
2008:	26.94 ton/yr	0.648 lb/MMBtu
Max Two Year Average:	(2009, 2010)	0.691 lb/MMBtu

Volatile Organic Compounds		
Average[a]:	9.93 ton/yr	2.29E-02 lb/MMBtu
2010:	16.85 ton/yr	2.33E-02 lb/MMBtu
2009:	11.75 ton/yr	1.66E-02 lb/MMBtu
2008:	1.20 ton/yr	2.89E-02 lb/MMBtu
Max Two Year Average:	(2009, 2010)	0.020 lb/MMBtu

Sulfur Dioxide		
Average[a]:	1.98 ton/yr	3.13E-03 lb/MMBtu
2010:	4.29 ton/yr	5.92E-03 lb/MMBtu
2009:	1.60 ton/yr	2.26E-03 lb/MMBtu
2008:	0.05 ton/yr	1.20E-03 lb/MMBtu
Max Two Year Average:	(2009, 2010)	0.004 lb/MMBtu

a. Average from 2010 and 2009 only. 2008 was not a fully operational year.

Stack Test Data

Particulate Matter[a]		
Average[c]:	13.62 ton/yr	1.89E-02 lb/MMBtu
2010:	21.20 ton/yr	2.93E-02 lb/MMBtu
2009:	6.04 ton/yr	8.52E-03 lb/MMBtu
2008:	--	--
Max Two Year Average:	(2009, 2010)	1.89E-02 lb/MMBtu

Carbon Monoxide[b]		
Average[c]:	309.18 ton/yr	0.43 lb/MMBtu
2010:	395.82 ton/yr	0.55 lb/MMBtu
2009:	222.53 ton/yr	0.31 lb/MMBtu
2008:	--	--
Max Two Year Average:	(2009, 2010)	0.43 lb/MMBtu

a. Data retreived from stack testing

b. Data retreived from AOR

c. Average from 2010 and 2009 only. 2008 was not a fully operational year.

TABLE 7. SUMMARY OF PRODUCTION AND FUEL USE BY YEAR

Operational Parameters

Year	2010
Coal[a]	55,090 ton/yr
Distillate Oil[a]	113,700 gal/yr
Total Heat Input	1,448,258 MMBtu/yr
Preheater Feed[b]	929,586 ton/yr
Clinker Production	599,733 ton/yr

Year	2009
Coal[a]	53,726 ton/yr
Distillate Oil[a]	152,930 gal/yr
Total Heat Input	1,418,286 MMBtu/yr
Preheater Feed[b]	719,944 ton/yr
Clinker Production	464,480 ton/yr

Year	2008
Coal[a]	2,623 ton/yr
Distillate Oil[a]	106,677 gal/yr
Total Heat Input	83,133 MMBtu/yr
Preheater Feed[b]	35,977 ton/yr
Clinker Production	23,211 ton/yr

a. coal 26 mmbtu/ton, residual oil 0.14 mmbtu/gal

b. clinker factor of 1.55 assumed

**2010,2009, 2008 fuel consumption and clinker production retrieved from eAOR and AOR

ENGINEERED FUEL

Engineered fuel is comprised of materials such as those included in the list of requested materials (e.g. clean woody biomass) and other non-hazardous materials to meet a fuel design specification that allows Brooksville South CEMEX to ensure it will meet regulatory limits as discussed in the Regulatory analysis section and quality control purposes. Brooksville South CEMEX will work with Engineered fuel supplier companies, as a contracted provider to meet the specifications.

Engineered Fuel (EF) is composed of various materials such as, but not limited to, biomass, agricultural byproducts, food processing/milling materials, animal meal, fibrous/plant waste, plastics, paper, cardboard, used animal bedding, carpet, carpet manufacturing byproducts, automotive manufacturing byproducts, wood, treated wood, creosote treated wood (railroad ties, telephone poles), clean-up debris from natural disasters, household/commercial/institutional refuse derived fuels, processed municipal solid waste, rubber, dried/sanitized biosolids (Class A, B only), recovered/reject coal, rubber, tire manufacturing byproducts, TDF, roofing shingles, construction/demolition materials, absorbents, oily contaminated materials, oil absorbents, oil filter fluff, used grease, spent carbon, carbon black, printed paper, printing byproducts, paint filter cake, synthetic materials/fibers, textiles, geotextiles, wax, hospital wastes (including sanitized infectious materials), pharmaceutical, cosmetics, confiscated drugs from law enforcement, non-hazardous industrial byproducts, post-industrial packaging film. The blending and processing may also include the addition of used oils or other non-hazardous liquids to ensure consistent BTU values. any AF mix (see below) that is engineered to have targeted, consistent fuel properties such as: calorific value, moisture, particle size, ash content, and volatility. The properties are established based on available AF material supply and are carefully controlled through blending materials or through separation of incombustible materials from combustible materials. Brooksville South CEMEX intends that EF will be the primary AF material, processed from available individual materials as listed below (such as: wood, plastic, carpet, paper, roofing material, tires, etc.) or EF may be provided by a supplier that can meet Brooksville South CEMEX's targeted fuel quality requirements.

PSD Analysis

The PSD analysis for engineered fuel is based on the results of studies at the Castle Cement Ribblesdale Cement Plant while burning CEMFUEL. CEMFUEL is manufactured from industrial wastes such as paints and printing inks. The main constituents include solvents, working fluids (oils, lubricants, etc.), contaminated fuels, organic sludge (e.g. food industry wastes) and other organic chemical products. The emission results from this study show that emissions are comparable to that of traditional fuels.

TABLE 8. CALCULATION OF PROJECTED ENGINEERED FUEL EMISSION FACTOR

Engineered Fuel Emissions - Direct Comparison
Based on Testing Conducted at the Castle Cement, Ribblesdale Plant (CEMFUEL)

	Measured Stack Emission Factors (EF)				
	SO_2	NO_x	CO	VOC	PM
Castle Cement Baseline EF	45 mg/Nm³	513 mg/Nm³	1526 mg/Nm³	51 mg/Nm³	25 mg/Nm³
Castle Cement Alt. Fuel EF	13 mg/Nm³	420 mg/Nm³	1651 mg/Nm³	50 mg/Nm³	8 mg/Nm³
Observed Change in Emissions (%)	-71.11%	-18.13%	8.19%	-1.96%	-68.00%
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	1.2E-3 lb/mmbtu	0.57 lb/mmbtu	0.5 lb/mmbtu	2.0E-2 lb/mmbtu	6.0E-3 lb/mmbtu

TABLE 9. SUMMARY OF EMISSIONS FROM ENGINEERED FUEL

Engineered Fuel

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	18.00%	percent
Heat Content	13,264	7,800	btu/lb
Heat Content	26.5	15.6	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input	Emission Factor	Estimated Emissions	Difference in Emissions
		(mmbtu)	(lb/mmbtu)	(tons)	(tons)
SO_2	Test Material[a]	1,433,272	1.18E-03	0.85	-2.08
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
VOC	Test Material[a]	1,433,272	1.95E-02	13.99	-0.28
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[a]	1,433,272	0.006	4.33	-9.21
	Coal Equivalent[b]		0.019	13.54	

CO_2	Test Material[c]	1,433,272	2.00E+02	143297.83	-11525.66
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	0.071	50.88	33.68
	Coal Equivalent[c]		0.024	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the Castle Cement, Ribblesdale Plant (CEMFUEL)
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
   CO2, N2O, and CH4 emission factors taken from MSW values
d. Independent of fuel and controlled by plant operator and ammonia injection

Tire-Derived Fuel (TDF)

Tire-derived fuel consists of shredded used tires that may have some steel belt material. The TDF may also include tirefluff. Tires are readily available and have a higher heating value than coal. The high temperatures, long residence times, and inherent scrubbing that take place within a cement kiln provide an environment conducive to the efficient combustion of tires. For these reasons, firing tire-derived fuels in cement kilns has become relatively common practice in Florida. Additionally, combustion of TDF alleviates problems associated with the stockpiling or landfilling of waste tires. Use of TDF in cement kilns has already been approved for a number of Florida cement production facilities and Brooksville South CEMEX is currently permitted to burn whole tires.

The following table is from the FDEP Technical Evaluation for the Kiln 2 project at Brooksville South, permit number 0530021-022-AC. This FDEP information indicates that tires and tire-derived fuel should either not change or reduce emissions except zinc.

TABLE 10. GENERAL EXPECTED EFFECTS OF TDF ON EMISSIONS

Pollutant	Expected Effect of TDF/Scrap Tire
CO	None
SO2	None
NOx	Decrease
PM	None
Total Hydrocarbons	None
Zinc	Increase
Other Metals	None or Decrease
Dioxins/Furans	None
Benzene	Decrease
Formaldehyde	Decrease
Semi-volatiles	Decrease

The above results are consistent with a USEPA report citing that "with the exception of zinc emissions, potential emissions from TDF are not expected to be very much different from other conventional fossil fuels, as long as combustion occurs in a well-designed, well-operated, and well-maintained combustion device".[Emphasis added.] The data above is also consistent with claims of NO_x reductions as a result of firing TDF. [0530021-022-AC]

PSD Analysis

Plant data are available for tires, which is the source material of tirefluff. Estimated emissions calculations are based on whole tire burning at the Tarmac Pennsuco Cement Plant. The information found in Table 10, below, was extrapolated, applying the percent increase or decrease in emissions found to an equivalent baseline factor.

TABLE 11. CALCULATION OF PROJECTED TIRE DERIVED FUEL EMISSION FACTOR

Tire-Derived Fuel Emissions - Direct Comparison

Based on Testing Conducted at the Tarmac America LLC, Pennsuco Cement Plant (Tire Derived Fuel)

	Measured Stack Emission Factors (EF)				
	SO_2	NO_x	CO	VOC	PM
Tarmac Baseline EF	0.012 lb/ton C	1.964 lb/ton C	1.409 lb/ton C	0.125 lb/ton C	0.042 lb/ton C
Tarmac Alt. Fuel EF	0.011 lb/ton C	1.922 lb/ton C	1.534 lb/ton C	0.100 lb/ton C	0.043 lb/ton C
Observed Change in Emissions (%)	-13.88%	-2.16%	8.83%	-20.27%	3.61%
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	3.5E-3 lb/mmbtu	0.68 lb/mmbtu	0.5 lb/mmbtu	1.6E-2 lb/mmbtu	2.0E-2 lb/mmbtu

TABLE 12. ESTIMATED EMISSIONS FROM TIRE DERIVED FUEL

Tire Derived Fuel

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	3.00%	percent
Heat Content	13,264	15,125	btu/lb
Heat Content	26.5	30.3	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input	Emission Factor	Estimated Emissions	Difference in Emissions
		(mmbtu/yr)	(lb/mmbtu)	(tons)	(tons)
SO_2	Test Material[a]	1,433,272	3.52E-03	2.52	-0.41
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
VOC	Test Material[a]	1,433,272	1.59E-02	11.38	-2.89
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[a]	1,433,272	1.96E-02	14.03	0.49
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	1.90E+02	135824.75	-18998.74
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	7.10E-02	50.88	33.68
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the Tarmac America LLC, Pennsuco Cement Plant (Tire Derived Fuel)
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
CO2, N2O, and CH4 emission factors taken from Tires values
d. Independent of fuel and controlled by plant operator and ammonia injection

PLASTICS

Plastics is any of a group of synthetic or natural organic materials that are many types of resins, resinoids, polymers, cellulose derivatives, casein materials, and proteins. A typical plastic is polyethylene plastic used in agricultural and silvicultural operations which may include incidental amounts of chlorinated plastics.. The energy content per ton for plastics ranges from equal to near 50 percent higher than coal. The high temperatures, long residence times, and inherent scrubbing that take place within a cement kiln calciner provides an environment well suited to the efficient combustion of plasticsfilm. While there are a broad range of plastic makeups, it should be noted that chlorinated plastics which can typically have up to 50 percent mass of chlorine as fuel for cement are unacceptable. As mentioned above, precalciner kiln chemistry is negatively impacted by high chlorine materials (see Section above, Chlorine) that can clog the preheater and destroy the kiln and clinker product. The sulfate modulus described above is a calculated measure of this impact of chlorine and is used in the cement industry as a measure of safety for kiln buildup prevention.

PSD Analysis

The PSD analysis for plastic is based on the results of a study done at LaFarge's Whitehall Cement Plant in Whitehall Township, PA while burning plastic derived fuel (PDF). This study, which was performed in 2005, for NO_x, CO and SO_2 and showed a net decrease in emissions. The VOC emission factors were determined by using Table 2.5-7 from AP42. The emission results from this study show that emissions were comparable to that of traditional fuels and none of the pollutants exceeded PSD threshold.

TABLE 13. CALCULATION OF PROJECTED PLASTICS EMISSION FACTOR

Plastics Emissions - Direct Comparison

Based on Testing Conducted at the LaFarge, Whitehall Plant (Plastic Derived Fuel) and AP-42

	Measured Stack Emission Factors (EF)				
	SO_2	NO_x	CO	VOC	PM
LaFarge Baseline EF	166 lb/hr	162 lb/hr	915 lb/hr	--	1.64 lb/hr
LaFarge Alt. Fuel EF	77 lb/hr	101 lb/hr	330 lb/hr	--	2.15 lb/hr
Observed Change in Emissions (%)	-53.61%	-37.65%	-63.93%	--	31.10%
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	1.9E-3 lb/mmbtu	0.43 lb/mmbtu	0.2 lb/mmbtu	8.8E-3 lb/mmbtu*	2.5E-2 lb/mmbtu

**Based on Table 2.5-7 from AP42, Used Plastic, Forced Air (Benzene + Toluene + Ethyl Benzene + 1-Hexene), assumed heat value of 14600 btu/lb*

TABLE 14. ESTIMATED EMISSIONS FROM PLASTICS

Plastics

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	1.00%	percent
Heat Content	13,264	14,600	btu/lb
Heat Content	26.5	29.2	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input	Emission Factor	Estimated Emissions	Difference in Emissions
		(mmbtu/yr)	(lb/mmbtu)	(tons)	(tons)
SO_2	Test Material[a]	1,433,272	1.90E-03	1.36	-1.57
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
VOC	Test Material[d]	1,433,272	8.82E-03	6.32	-7.96
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[a]	1,433,272	2.48E-02	17.75	4.21
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	1.65E+02	118493.62	-36329.86
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	7.10E-02	50.88	33.68
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the LaFarge, Whitehall Plant (Plastic Derived Fuel) and AP-42
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
   CO2 EF taken from Plastics values; CH4 and N2O EF taken from MSW values
d. *Based on Table 2.5-7 from AP42, Used Plastic, Forced Air (Benzene + Toluene + Ethyl Benzene + 1-Hexene), assumed heat value of 14600 btu/lb
e. Independent of fuel and controlled by plant operator and ammonia injection

AGRICULTURAL BIOGENIC MATERIALS

Agricultural biogenic materials include organic materials from agricultural operations such as peanut hulls, rice hulls, corn husks, citrus peels, cotton gin byproducts, animal bedding, etc. These materials are typically of little value to farmers but have significant heat value and raw materials (e.g., silica, iron). The materials can provide significant heat content and other parameters acceptable for kiln firing.

PSD Analysis

The PSD analysis for agricultural byproducts is based on the results of a complete and reported study done at CEMEX's Miami Cement Plant in Miami, FL while burning woody biomass. This study, which was performed in 2010, saw a net decrease in NO_x and SO_2 and increases of CO and VOC. This study was a short term trial and had periods of startup/shutdown of the injection equipment that limited the amount of emissions data and the amount of time for the kiln operators to learn to use the equipment. The PM emission factors were determined by using Table 1.6-1 from AP42. The emission results from this study show that emissions were comparable to that of traditional fuels and none of the pollutants exceeded PSD threshold.

TABLE 15. CALCULATION OF PROJECTED AGRICULTURAL BIOGENIC MATERIALS EMISSION FACTOR

Agricultural Biogenic Materials Emissions - Direct Comparison

Based on Testing Conducted at the CEMEX, Miami Cement Plant (Woody Biomass) and AP-42

	Measured Stack Emission Factors (EF)				
	SO_2*	NO_x*	CO*	VOC*	PM
Cemex Baseline Emission Factor (EF) =	0.041 lb/ton C	2.704 lb/ton C	542.139 lb/ton C	0.060 lb/ton C	--
Cemex Alt. Fuel Emission Factor (EF) =	0.031 lb/ton C	2.059 lb/ton C	562.359 lb/ton C	0.071 lb/ton C	--
Observed Change in Emissions (%)	-24.10%	-23.85%	3.73%	18.55%	--
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	3.1E-3 lb/mmbtu	0.53 lb/mmbtu	0.4 lb/mmbtu	2.4E-2 lb/mmbtu	2.5E-2 lb/mmbtu**

**Based on Test period from September 2010 to November 2010*

***Based on Table 1.6-1 from AP42*

TABLE 16. ESTIMATED EMISSIONS FROM AGRICULTURAL BIOGENIC MATERIALS

Agricultural Biogenic Materials

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	24.0%	percent
Heat Content	13,264	7,650	btu/lb
Heat Content	26.5	15.3	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input (mmbtu)	Emission Factor (lb/mmbtu)	Estimated Emissions (tons)	Difference in Emissions (tons)
SO_2	Test Material[a]	1,433,272	3.10E-03	2.22	-0.71
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
VOC	Test Material[a]	1,433,272	2.36E-02	16.92	2.65
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[d]	1,433,272	2.50E-02	17.92	4.37
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	2.54E+02	181698.05	26874.57
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	7.10E-02	50.88	33.68
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the CEMEX, Miami Cement Plant (Woody Biomass) and AP-42
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
CO2 EF average of Agricultural ByProducts and Peat values
CH4 and N2O EF taken from Solid Biomass Fuels values
d. **Based on Table 1.6-1 from AP42
e. Independent of fuel and controlled by plant operator and ammonia injection

Carpet Derived Fuel

In the US, approximately 2 million tons of carpet is replaced annually. Most carpet is disposed of in landfills. Carpet is composed in part of non-chlorinated plastic and has an overall heating value similar to that of coal, and carpet contains a significant fraction (≈ 30 % by weight) of $CaCO_3$ in the backing material which is a beneficial component of cement production.[64]

PSD Analysis

The PSD analysis for carpet derived fuel is based on the results of a study done at LaFarge's Whitehall Cement Plant in Whitehall Township, PA while burning plastic derived fuel (PDF). This study, which was performed in 2005, was chosen to represent the emissions of carpet derived fuel due to its non-chlorinated plastic composition. The VOC emission factors were determined by using Table 2.5-7 from AP42. The emission results from this study show that emissions were comparable to that of traditional fuels and none of the pollutants exceeded PSD threshold.

[64] Carpet Derived Fuel - Emissions from Combustion of Post-consumer Carpet in a cement Kiln, P Lemieux, et al., IT3 conference 2005. Paper for presentation at the 2005 Conference on Incineration and Thermal Treatment Technologies, Galveston, TX, May 9-13, 2005

TABLE 17. CALCULATION OF PROJECTED CARPET DERIVED FUEL EMISSION FACTOR

Carpet-Derived Fuel Emissions - Direct Comparison

Based on Testing Conducted at the LaFarge, Whitehall Plant (Plastic Derived Fuel) and AP-42

	Measured Stack Emission Factors (EF)				
	SO_2	NO_x	CO	VOC	PM
LaFarge Baseline EF	166 lb/hr	162 lb/hr	915 lb/hr	--	1.64 lb/hr
LaForge Alt. Fuel EF	77 lb/hr	101 lb/hr	330 lb/hr	--	2.15 lb/hr
Observed Change in Emissions (%)	-53.61%	-37.65%	-63.93%	--	31.10%
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	1.9E-3 lb/mmbtu	0.43 lb/mmbtu	0.2 lb/mmbtu	8.8E-3 lb/mmbtu*	2.5E-2 lb/mmbtu

**Based on Table 2.5-7 from AP42, Used Plastic, Forced Air (Benzene + Toluene + Ethyl Benzene + 1-Hexene), assumed heat value of 14600 btu/lb*

TABLE 18. ESTIMATED EMISSIONS FROM CARPET DERIVED FUEL

Carpet Derived Fuel

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	1.0%	percent
Heat Content	13,264	7,450	btu/lb
Heat Content	26.5	14.9	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input (mmbtu)	Emission Factor (lb/mmbtu)	Estimated Emissions (tons)	Difference in Emissions (tons)
SO_2	Test Material[a]	1,433,272	1.90E-03	1.36	-1.57
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
VOC	Test Material[d]	1,433,272	8.82E-03	6.32	-7.96
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[a]	1,433,272	0.025	17.75	4.21
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	1.65E+02	118493.62	-36329.86
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	0.071	50.88	33.68
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the LaFarge, Whitehall Plant (Plastic Derived Fuel) and AP-42
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
CO2 EF taken from Plastics values; CH4 and N2O EF taken from MSW values
d. *Based on Table 2.5-7 from AP42, Used Plastic, Forced Air (Benzene + Toluene + Ethyl Benzene + 1-Hexene), assumed heat value of 14600 btu/lb
e. Independent of fuel and controlled by plant operator and ammonia injection

Cellulosic Biomass

Brooksville South CEMEX is proposing two categories of cellulosic biomass. The first category is untreated cellulosic biomass , which includes materials such as peanut hulls, rice hulls, corn husks, citrus peels, cotton gin byproducts, animal bedding and other similar types of materials. The second category is treated or manufactured cellulosic biomass which does not meet the definition of untreated cellulosic biomass. For example treated cellulosic biomass would include preservative-treated wood that may contain treatments such as creosote, copper-chromium-arsenic (CCA), or AQC, painted wood, or resinated woods (plywood, particle board, medium density fiberboard, oriented strand board, laminated beams, finger-jointed trim and other sheet goods). Note that as a conservative measure, Brooksville South CEMEX is offered to limit CCA-treated lumber to 1,000 lb/hr on a 7-operational day average. As discussed above, CCA is well absorbed into the clinker materials. The heat input from such CCA wood is approximately 1 percent of heat input. In comparison, past studies have recommended to limit CCA-treated wood to less than 10 percent of heat input, on the basis of chromium negative impact on cement product quality and not on air emissions. Additional information of CCA-treated wood as fuel in cement kiln are found for air emission impacts and clinker quality in references.[65,66,67,68]

The potential for CCA metal emissions can be best represented with the following hypothetical example. The typical concentrations of arsenic and chromium can range from 0.2 to 2.5 pounds per cubic foot in various blends of CCA-treated wood. Using a very conservative scenario, the concentration of arsenic, copper and chromium in the CCA wood is assumed to be 2.5 pounds per cubic foot. The typical density of treated wood is 35 lbs/cubic foot.[69] Using the assumed metals concentrations and an input rate of 1,000 lb/hour of CCA wood, the input of arsenic, copper and chromium into the kiln would be 71.4 pounds per hour. The emitted portion of the metals from the fuel input's emission factor of 0.0005% is

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[65] Bernardin, G. 1995. St. Lawrence Cement. Proceedings of the CITW Life Cycle Assessment Workshop. June 20-21. Canadian Institute of Treated Wood, Ottawa, Ont.

[66] Development of design criteria for integrated treatment technologies for thermal processing of end-of-life CCAtreated timber products – Vol 2. PN04.2012.Australian Govt. Forest and Wood Products Research and Development Corp.

[67] Guidelines Disposal of Wastes in Cement Plants, October 2005. Swiss Agency for the Environment, Forest, and Landscapes SAEFL.

[68] Millette, L. and A. Auger. 1997. Integrated management of used treated wood. Paper presented at the Workshop on Utility Poles - Environmental Issues. Madison Wisconsin, Oct. 13 and 14, 1997.

[69] (http://www.floridacenter.org/publications/Ma0650892.pdf)

derived from data presented by the German Cement Industry. Using the emission factor and amount of metals input into the kiln, the worst case potential hourly emissions would be 0.0004 pounds per hour. Assuming continuous annual operation (8,760 hr/yr) the annual emissions of arsenic, copper or chromium would be 3.1 pounds per year.

PSD Analysis

The PSD analysis for woody biomass is based on the results of a study done at CEMEX's Miami Cement Plant in Miami, FL while burning woody biomass. This study, which was performed in 2010, saw a net decrease in NO_x and SO_2. The PM emission factors were determined by using Table 1.6-1 from AP42. The emission results from this study show that emissions were comparable to that of traditional fuels and none of the pollutants exceeded PSD threshold. Note that non-PSD pollutants of concern, such as metals are discussed above.

TABLE 19. CALCULATION OF PROJECTED CELLULOSIC BIOMASS EMISSION FACTOR

Cellulosic Biomass Emissions - Direct Comparison

Based on Testing Conducted at the CEMEX, Miami Cement Plant (Woody Biomass) and AP-42

	Measured Stack Emission Factors (EF)				
	SO_2*	NO_x*	CO*	VOC*	PM
Cemex Baseline Emission Factor (EF) =	0.041 lb/ton C	2.704 lb/ton C	542.139 lb/ton C	0.060 lb/ton C	--
Cemex Alt. Fuel Emission Factor (EF) =	0.031 lb/ton C	2.059 lb/ton C	562.359 lb/ton C	0.071 lb/ton C	--
Observed Change in Emissions (%)	-24.10%	-23.85%	3.73%	18.55%	--
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	3.1E-3 lb/mmbtu	0.53 lb/mmbtu	0.4 lb/mmbtu	2.4E-2 lb/mmbtu	2.5E-2 lb/mmbtu**

*Based on Test period from September 2010 to November 2010

**Based on Table 1.6-1 from AP42

TABLE 20. ESTIMATED EMISSIONS FROM CELLULOSIC BIOMASS.

Cellulosic Biomass

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	18.7%	percent
Heat Content	13,264	8,950	btu/lb
Heat Content	26.5	17.9	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input (mmbtu)	Emission Factor (lb/mmbtu)	Estimated Emissions (tons)	Difference in Emissions (tons)
SO_2	Test Material[a]	1,433,272	3.10E-03	2.22	-0.71
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[e]
	Coal Equivalent[b]				
VOC	Test Material[a]	1,433,272	2.36E-02	16.92	2.65
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[d]	1,433,272	2.50E-02	17.92	4.37
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	2.07E+02	148196.04	-6627.45
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	7.10E-02	50.88	33.68
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the CEMEX, Miami Cement Plant (Woody Biomass) and AP-42
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
CO2 emission factor taken from Wood and Wood Residual values
CH4 and N2O emission factors taken from Solid Biomass Fuels values
d. **Based on Table 1.6-1 from AP42
e. Independent of fuel and controlled by plant operator and ammonia injection

Roofing Materials

Roofing materials contain valuable heat content and raw materials of a very consistent composition. This material is an excellent source of raw material and heat content for cement production. Roofing materials are primarily roof shingles. Such shingles are no longer manufactured with asbestos and the supplier can provide written certification of this assertion.

Studies have indicated the presence of asbestos is some materials utilized by this project. For example, although asbestos are not used in modern shingle manufacture in the US, antiquated shingles may contain asbestos.[70] Specific to shingles, a series of 27,694 case studies taken from 1994 to 2007 indicated that only 1.53 percent of samples contained asbestos.[71] Prior to the early 1980's some roofing shingle manufacturers used asbestos as a fire prevention. Due to litigation and regulation, roofing products after this period are not manufactured with asbestos. The presence of asbestos is of concern due to the material's inherent carcinogenic characteristics when fibrous particles become airborne and inhaled. It follows that these fibers may be of concern when introduced to a rotary kiln.

When introduced to a cement kiln, asbestos will be subject to temperatures in excess of 2000 °F. Studies have shown that asbestos minerals subject to temperatures in excess of 1000 °F undergo an irreversible conversion to a different crystalline phase and become non-hazardous.[72, 73] This means that any asbestos containing materials present in alternative fuels will be effectively destroyed and not produce hazardous emissions once in the kiln environment.

PSD Analysis

The PSD analysis for shingles is based on the results of a study done at LaFarge's Brookfield Cement Plant in Nova Scotia, Canada while burning shingles. The emission results from this study show that emissions were relatively comparable to that of traditional fuels and none of the pollutants exceeded PSD threshold.

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[70] Guidance for Controlling Asbestos-Containing Materials in Buildings. N.p.: US EPA, 1985. WBDG. Web. 3 Nov. 2011. <http://www.wbdg.org/ccb/EPA/epa_560585024.pdf>.

[71] Innovative Waste Consulting Services, LLC. "Environmental Issues Associated With Asphalt Shingle Recycling.Web. <http://www.shinglerecycling.org/sites/www.shinglerecycling.org/files/shingle_PDF/EPA%20Shingle%20Report_Final.pdf>.

[72] Manley, Kirk. "Asbestos Abatement/Destruction Using Plasma Arc Technology." Feb. 1998. Web. 03 Nov. 2011. <http://owww.cecer.army.mil/facts/sheets/UL37.html>.

[73] Jameson, Rex. Asphalt Roofing Shingles into Energy Project. Rep. Print.

TABLE 21. CALCULATION OF PROJECTED ROOFING MATERIALS EMISSION FACTOR

Roofing Materials Emissions - Direct Comparison
Based on Testing Conducted at the LaFarge Brookfield (Shingles) Cement Plant

	Measured Stack Emission Factors (EF)				
	SO_2	NO_x	CO	VOC	PM
LaFarge's Baseline Emission Factor (EF)	42.22 ug/Nm³	37.57 ug/Nm³	20.00 ug/Nm³	1.54 ug/Nm³	2.34 ug/Nm³
LaFarge's Alt. Fuel Emission Factor (EF)	45.00 ug/Nm³	39.80 ug/Nm³	18.60 ug/Nm³	2.02 ug/Nm³	3.35 ug/Nm³
Observed Change in Emissions (%)	6.58%	5.94%	-7.00%	31.17%	43.16%
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	4.4E-3 lb/mmbtu	0.73 lb/mmbtu	0.4 lb/mmbtu	2.6E-2 lb/mmbtu	2.7E-2 lb/mmbtu

**Test conducted with facility co-firing chipped tyres at 40% substitution, and PSP at 17% substitution*

TABLE 22. ESTIMATED EMISSIONS FROM ROOFING MATERIALS

Roofing Materials

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%	3.0%	percent
Heat Content	13,264	5,800	btu/lb
Heat Content	26.5	11.6	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input	Emission Factor	Estimated Emissions	Difference in Emissions
		(mmbtu)	(lb/mmbtu)	(tons)	(tons)
SO_2	Test Material[a]	1,433,272	4.36E-03	3.12	0.19
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
VOC	Test Material[a]	1,433,272	2.61E-02	18.72	4.45
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[a]	1,433,272	0.027	19.39	5.85
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	1.66E+02	119061.91	-35761.57
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	0.007	5.02	-12.18
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0006	0.43	-2.08
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the LaFarge Brookfield (Shingles) Cement Plant
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
CO2 EF taken from Asphalt and Road Oil values; CH4 and N2O EF taken from Petroleum values
d. Independent of fuel and controlled by plant operator and ammonia injection

Biosolids

Biosolids are solid or semi-solid materials that are created from the treatment of wastewater. As such, the production of this waste is constant. In general, this waste is disposed of via three separate methods; being used as a fertilizer for agriculture, landfilling and incineration[74]. However, its use as an energy substitute in industrial processes has increasingly gained interest. When used in a cement kiln as a partial substitute for traditional fuels, the complete elimination of this waste is achieved while concurrently producing energy. The extreme temperatures in a cement kiln and the rapid cooling that occurs following the kiln obstructs the formation of Dixon-furans, the heavy metals present in the sludge become entrapped in the liquid fraction of the raw materials and, since the material is a biomass, there is a significant reduction in greenhouse gases that are emitted[75]. In the case of one study in Vallcarca, Spain, the human health risk/benefit analysis associated with the substitution of 20% of a traditional cement kiln fuel with biosolids produced comparable results to the emissions generated from an exclusive traditional fuel stream[76].

PSD Analysis

The PSD analysis for carpet derived fuel is based on the results of a study done at LaFarge's Cauldon Words Plant while burning processed sewage pellets (PSP). The emission results from this study show that emissions were comparable to that of traditional fuels and none of the pollutants exceeded PSD threshold.

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[74] Morton, E.L., "A Sustainable Use For Dried Biosolids" WEFTEC. 2006. Pg. 2060-2067.

[75] Zabaniotou, A., Theogilou, C., "Green energy at cement kiln in Cyprus- Use of sewage sludge as a conventional fuel substitute" Renewable and Sustainable Energy Reviews. 2008. Pg. 531-541.

[76] Rovira, J., Mari, M., Nadal, M., Schuhmacher, M., Domingo, J.L., "Use of sewage sludge as secondary fuel in a cement plant: human health risks" Environment International. 2011. Pg. 105-111.

TABLE 23. CALCULATION OF PROJECTED BIOSOLIDS EMISSION FACTOR

Biosolids Emissions - Direct Comparison

Based on Testing Conducted at the LaFarge, Cauldron Works Plant (Process Sewage Pellets)

	Measured Stack Emission Factors (EF)				
Biosolids	SO_2	NO_x	CO	VOC	PM
LaForge Baseline Emission Factor (EF) =	59	713	1434	121	19
LaForge Alt. Fuel Emission Factor (EF)[*] =	43	765	1488	132	14
Observed Change in Emissions (%)	-27.12%	7.29%	3.77%	9.09%	-26.32%
Brooksville South Baseline EF	4.1E-3 lb/mmbtu	0.69 lb/mmbtu	0.4 lb/mmbtu	2.0E-2 lb/mmbtu	1.9E-2 lb/mmbtu
Brooksville South Predicted Alt. Fuel EF	3.0E-3 lb/mmbtu	0.74 lb/mmbtu	0.4 lb/mmbtu	2.2E-2 lb/mmbtu	1.4E-2 lb/mmbtu

**Test conducted with facility co-firing chipped tyres at 40% substitution, and PSP at 17% substitution*

TABLE 24. ESTIMATED EMISSIONS FOR BIOSOLIDS

Biosolids

Material Comparison:

	Coal (wet)	Material (wet)	
Moisture Content	5.98%		percent
Heat Content	13,264		btu/lb
Heat Content	26.5	0.0	mmbtu/ton

Emissions Comparison:

100%	Maximum Fuel Substitution	Projected Heat Input	Emission Factor	Estimated Emissions	Difference in Emissions
		(mmbtu)	(lb/mmbtu)	(tons)	(tons)
SO_2	Test Material[a]	1,433,272	2.98E-03	2.14	-0.79
	Coal Equivalent[b]		4.09E-03	2.93	
NO_x	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
CO	Test Material[a]	---	---	---	< PSD Threshold[d]
	Coal Equivalent[b]				
VOC	Test Material[a]	1,433,272	2.17E-02	15.57	1.30
	Coal Equivalent[b]		1.99E-02	14.27	
PM	Test Material[a]	1,433,272	0.014	9.98	-3.56
	Coal Equivalent[b]		1.89E-02	13.54	
CO_2	Test Material[c]	1,433,272	2.33E+02	166696.71	11873.23
	Coal Equivalent[c]		2.16E+02	154823.49	
CH_4	Test Material[c]	1,433,272	0.071	50.88	33.68
	Coal Equivalent[c]		2.40E-02	17.20	
N_2O	Test Material[c]	1,433,272	0.0042	3.01	0.50
	Coal Equivalent[c]		3.50E-03	2.51	

a. Based on Testing Conducted at the LaFarge, Cauldron Works Plant (Process Sewage Pellets)
b. EF: Based on CEM data, stack test data, and material usage (see Table 4)
c. Emission Factor (EF) based on data gathered from Tables C-1 and C-2 from 40 CFR 98
   CO2 EF taken from Solid Byproducts values; CH4 and N2O EF taken from Solid Biomass Fuels values
d. Independent of fuel and controlled by plant operator and ammonia injection