US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

PREVENTION OF SIGNIFICANT DETERIORATION GREENHOUSE GAS PERMIT APPLICATION FOR A CLINKER PRODUCTION INCREASE AT THE CEMEX CONSTRUCTION MATERIALS SOUTH LLC BALCONES CEMENT PLANT COMAL COUNTY, TEXAS

SUBMITTED TO:

ENVIRONMENTAL PROTECTION AGENCY
REGION VI
MULTIMEDIA PLANNING AND PERMITTING DIVISION
FOUNTAIN PLACE 12TH FLOOR, SUITE 1200
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

SUBMITTED BY:

ZEPHYR ENVIRONMENTAL CORPORATION
2600 VIA FORTUNA, SUITE 450
AUSTIN, TEXAS 78746

PREPARED BY:

ZEPHYR ENVIRONMENTAL CORPORATION
2600 VIA FORTUNA, SUITE 450
AUSTIN, TEXAS 78746

REVISED AUGUST 2013

zephyr

US EPA ARCHIVE DOCUMENT

TABLE OF CONTENTS

APPENDICES

US EPA ARCHIVE DOCUMENT

1.0 INTRODUCTION

Cemex Construction Materials South, LLC (CEMEX) owns and operates a cement production plant in New Braunfels, Comal County, Texas. Air emissions generated at the Balcones Plant are authorized via multiple Texas Commission on Environmental Quality (TCEQ) Air Permits, permit by rule authorizations, and standard permit authorizations. The cement kilns (Kiln No. 1 and 2) and material handling emissions that are affected by this amendment are authorized under Air Permit No. 6048. The State and PSD air permit application for non-GHG pollutants was submitted previously to the TCEQ.

CEMEX is submitting this air permit amendment application for Air Permit No 6048 to authorize an increase in Kiln No. 2 clinker production. Kiln No. 2 is currently limited to 3,600 tons clinker per day (30-day average). CEMEX is proposing a 10% increase in the Kiln No. 2 production to 3,960 tons of clinker per day (30-day average). Kiln No. 2 began initial operation in 2008 and based on operational experience CEMEX believes the kiln can achieve higher production levels than what was originally estimated and permitted. The production increase does not require any physical changes to the kiln system.

CEMEX is also submitting this air permit amendment application to authorize upgrades to the main kiln burners in Kiln No. 1 and Kiln No. 2 to multipath adjustable units. The upgrades consist of adding a channel to allow the use of currently authorized alternative fuels as Biomass and Refuse Derived Fuel in the main kiln burners. The burner upgrades will not increase the maximum fuel firing rate for either kiln but will increase flexibility in the amount and kind of fuels that can be burned in the main kiln.

On June 3, 2010, the EPA published final rules for permitting sources of Greenhouse Gases (GHGs) under the prevention of significant deterioration (PSD) and Title V air permitting programs, known as the GHG Tailoring Rule.[1] After July 1, 2011, new sources emitting more than 100,000 tons/yr of GHGs and modifications increasing GHG emissions more than 75,000 tons/yr at existing major sources are subject to PSD review, regardless of whether PSD was triggered for other pollutants. Facilities that emit at least 100,000 tons/yr are subject to Title V permitting requirements.

On December 23, 2010, EPA signed a Federal Implementation Plan (FIP) authorizing EPA to issue PSD permits in Texas for GHG sources until Texas submits the required SIP revision for GHG permitting and it is approved by EPA.[2]

The proposed project increase triggers PSD review for GHG regulated pollutants because the calculated project emissions increase of GHG emissions is greater than 75,000 tons/yr and the site is considered an existing major source. Included in this application are a project scope

[1] 75 FR 31514 (June 3, 2010).

[2] 75 FR 81874 (Dec. 29, 2010).

description, GHG emissions calculations, GHG netting analysis, and a GHG Best Available Control Technology (BACT) analysis.

US EPA ARCHIVE DOCUMENT

FORM PI-1
GENERAL APPLICATION

US EPA ARCHIVE DOCUMENT

Texas Commission on Environmental Quality
Form PI-1 General Application for
Air Preconstruction Permit and Amendment

Important Note: The agency **requires** that a Core Data Form be submitted on all incoming applications unless a Regulated Entity and Customer Reference Number have been issued *and* no core data information has changed. For more information regarding the Core Data Form, call (512) 239-5175 or go to www.tceq.texas.gov/permitting/central_registry/guidance.html.

I. Applicant Information					
A. Company or Other Legal Name: CEMEX Construction Materials South, LLC					
Texas Secretary of State Charter/Registration Number (*if applicable*):					
B. Company Official Contact Name: Jimmy Rabon					
Title: Plant Manager					
Mailing Address: 2580 Wald Road					
City: New Braunfels		State: Texas		ZIP Code: 78132	
Telephone No.: 210-250-4097		Fax No.: 210-250-4144		E-mail Address: jimmy.rabon@cemex.com	
C. Technical Contact Name: Kim Bradley					
Title: Environmental Manager					
Company Name: CEMEX Construction Materials South, LLC					
Mailing Address: 2580 Wald Road					
City: New Braunfels		State: Texas		ZIP Code: 78132	
Telephone No.: 210-250-4009		Fax No.: 210-250-4144		E-mail Address: kimberlyb.bradley@cemex.com	
D. Site Name: CEMEX - Balcones Cement Plant					
E. Area Name/Type of Facility:				☑ Permanent ☐ Portable	
F. Principal Company Product or Business: cement					
Principal Standard Industrial Classification Code (SIC): 3241					
Principal North American Industry Classification System (NAICS):					
G. Projected Start of Construction Date: 6/1/2012					
Projected Start of Operation Date: 6/1/2012					
H. Facility and Site Location Information (If no street address, provide clear driving directions to the site in writing.):					
Street Address: 2580 Wald Road					
City/Town: New Braunfels		County: Comal		ZIP Code: 78132	
Latitude (nearest second): 29 40' 22"			Longitude (nearest second): 98 10' 56"		

US EPA ARCHIVE DOCUMENT

Texas Commission on Environmental Quality
Form PI-1 General Application for
Air Preconstruction Permit and Amendment

TCEQ

I. Applicant Information (continued)	
I. Account Identification Number (leave blank if new site or facility): CS-0022-K	
J. Core Data Form.	
Is the Core Data Form (Form 10400) attached? If *No*, provide customer reference number and regulated entity number (complete K and L).	☐ YES ☑ NO
K. Customer Reference Number (CN): CN603403973	
L. Regulated Entity Number (RN): RN102605375	
II. General Information	
A. Is confidential information submitted with this application? If *Yes*, mark each **confidential** page **confidential** in large red letters at the bottom of each page.	☐ YES ☑ NO
B. Is this application in response to an investigation or enforcement action? If *Yes*, attach a copy of any correspondence from the agency.	☐ YES ☑ NO
C. Number of New Jobs: 0	
D. Provide the name of the State Senator and State Representative and district numbers for this facility site:	
Senator: Hon. Jeff Wentworth,	District No.: 25
Representative: Hon. Doug Miller	District No.: 73
III. Type of Permit Action Requested	
A. Mark the appropriate box indicating what type of action is requested. Initial ☐ Amendment ☑ Revision (30 TAC 116.116(e)) ☐ Change of Location ☐ Relocation ☐	
B. Permit Number (if existing): 6048	
C. Permit Type: Mark the appropriate box indicating what type of permit is requested. *(check all that apply, skip for change of location)* Construction ☑ Flexible ☐ Multiple Plant ☐ Nonattainment ☐ Prevention of Significant Deterioration ☑ Hazardous Air Pollutant Major Source ☐ Plant-Wide Applicability Limit ☐ Other:____________________	
D. Is a permit renewal application being submitted in conjunction with this amendment in accordance with 30 TAC 116.315(c).	☐ YES ☑ NO

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

III. Type of Permit Action Requested (continued)		
E. Is this application for a change of location of previously permitted facilities? If Yes, complete III.E.1 - III.E.4.		☐ YES ☑ NO
1. Current Location of Facility (If no street address, provide clear driving directions to the site in writing.):		
Street Address:		
City:	County:	ZIP Code:
2. Proposed Location of Facility (If no street address, provide clear driving directions to the site in writing.):		
Street Address:		
City:	County:	ZIP Code:
3. Will the proposed facility, site, and plot plan meet all current technical requirements of the permit special conditions? If *No*, attach detailed information.		☐ YES ☐ NO
4. Is the site where the facility is moving considered a major source of criteria pollutants or HAPs?		☐ YES ☐ NO
F. Consolidation into this Permit: List any standard permits, exemptions or permits by rule to be consolidated into this permit including those for planned maintenance, startup, and shutdown.		
List: none		
G. Are you permitting planned maintenance, startup, and shutdown emissions? If *Yes*, attach information on any changes to emissions under this application as specified in VII and VIII.		☐ YES ☑ NO
H. Federal Operating Permit Requirements (30 TAC Chapter 122 Applicability)		
Is this facility located at a site required to obtain a federal operating permit? If *Yes*, list all associated permit number(s), attach pages as needed).		☑ YES ☐ NO ☐ To be determined
Associated Permit No (s.): O-1126		
1. Identify the requirements of 30 TAC Chapter 122 that will be triggered if this application is approved.		
FOP Significant Revision ☐ FOP Minor ☐ Application for an FOP Revision ☐ To Be Determined ☐		
Operational Flexibility/Off-Permit Notification ☐ Streamlined Revision for GOP ☐ None ☑		

III. Type of Permit Action Requested (continued)		
H. Federal Operating Permit Requirements (30 TAC Chapter 122 Applicability) *(continued)*		
2. Identify the type(s) of FOP(s) issued and/or FOP application(s) submitted/pending for the site. (check all that apply)		
GOP Issued ☐	GOP application/revision application: submitted or under APD review ☐	
SOP Issued ☑	SOP application/revision application submitted or under APD review ☑	
IV. Public Notice Applicability		
A. Is this a new permit application or a change of location application?		☐ YES ☑ NO
B. Is this application for a concrete batch plant? If Yes, complete V.C.1 – V.C.2.		☐ YES ☑ NO
C. Is this an application for a major modification of a PSD, nonattainment, FCAA 112(g) permit, or exceedance of a PAL permit?		☐ YES ☐ NO
D. Is this application for a PSD or major modification of a PSD located within 100 kilometers of an affected state?		☐ YES ☐ NO
If *Yes*, list the affected state(s).		
E. Is this a state permit amendment application? If Yes, complete IV.E.1. – IV.E.3.		
1. Is there any change in character of emissions in this application?		☐ YES ☑ NO
2. Is there a new air contaminant in this application?		☐ YES ☑ NO
3. Do the facilities handle, load, unload, dry, manufacture, or process grain, seed, legumes, or vegetables fibers (agricultural facilities)?		☐ YES ☑ NO
F. List the total annual emission increases associated with the application (*list* **all** *that apply and attach additional sheets as needed*):		
Volatile Organic Compounds (VOC): 0		
Sulfur Dioxide (SO_2): 0		
Carbon Monoxide (CO): 0		
Nitrogen Oxides (NO_x): 0		
Particulate Matter (PM): 4.69		
PM $_{10}$ microns or less (PM_{10}): 2.32		
PM $_{2.5}$ microns or less ($PM_{2.5}$): 0.89		
Lead (Pb):		
Hazardous Air Pollutants (HAPs):		
Other speciated air contaminants **not** listed above:		

US EPA ARCHIVE DOCUMENT

V. Public Notice Information (complete if applicable)			
A. Public Notice Contact Name: Kim Bradley			
Title: Environmental Manager			
Mailing Address: 2580 Wald Road			
City: New Braunfels	State: Texas	ZIP Code: 78132	
B. Name of the Public Place: New Braunfels Public Library			
Physical Address (No P.O. Boxes): 700 East Common St.			
City: New Braunfels	County: Comal	ZIP Code: 78130	
The public place has granted authorization to place the application for public viewing and copying.			☑ YES ☐ NO
The public place has internet access available for the public.			☑ YES ☐ NO
C. Concrete Batch Plants, PSD, and Nonattainment Permits			
1. County Judge Information (For Concrete Batch Plants and PSD and/or Nonattainment Permits) for this facility site.			
The Honorable: Sherman Krause			
Mailing Address: 150 N. Seguin Ave			
City: New Braunfels	State: Texas	ZIP Code: 78130	
2. Is the facility located in a municipality or an extraterritorial jurisdiction of a municipality? *(For Concrete Batch Plants)*			☐ YES ☐ NO
Presiding Officers Name(s):			
Title:			
Mailing Address:			
City:	State:	ZIP Code:	
3. Provide the name, mailing address of the chief executives of the city and county, Federal Land Manager, or Indian Governing Body for the location where the facility is or will be located.			
Chief Executive:			
Mailing Address:			
City:	State:	ZIP Code:	
Name of the Federal Land Manager:			
Title:			
Mailing Address:			
City:	State:	ZIP Code:	

US EPA ARCHIVE DOCUMENT

V. Public Notice Information (complete if applicable) (continued)	
3. Provide the name, mailing address of the chief executives of the city and county, State, Federal Land Manager, or Indian Governing Body for the location where the facility is or will be located. *(continued)*	
Name of the Indian Governing Body:	
Title:	
Mailing Address:	
City: State: ZIP Code:	
D. Bilingual Notice	
Is a bilingual program **required** by the Texas Education Code in the School District?	☑ YES ☐ NO
Are the children who attend either the elementary school or the middle school closest to your facility eligible to be enrolled in a bilingual program provided by the district?	☑ YES ☐ NO
If *Yes*, list which languages are required by the bilingual program? Spanish	
VI. Small Business Classification (Required)	
A. Does this company (including parent companies and subsidiary companies) have fewer than 100 employees or less than $6 million in annual gross receipts?	☐ YES ☑ NO
B. Is the site a major stationary source for federal air quality permitting?	☑ YES ☐ NO
C. Are the site emissions of any regulated air pollutant greater than or equal to 50 tpy?	☑ YES ☐ NO
D. Are the site emissions of all regulated air pollutants combined less than 75 tpy?	☑ YES ☐ NO
VII. Technical Information	
A. The following information must be submitted with your Form PI-1 (this is just a checklist to make sure you have included everything)	
1. Current Area Map ☑	
2. Plot Plan ☑	
3. Existing Authorizations ☑	
4. Process Flow Diagram ☐ Process unchanged from previous submittal	
5. Process Description ☑	
6. Maximum Emissions Data and Calculations ☑	
7. Air Permit Application Tables ☑	
a. Table 1(a) (Form 10153) entitled, Emission Point Summary ☑	
b. Table 2 (Form 10155) entitled, Material Balance ☑	
c. Other equipment, process or control device tables ☐ No new equipment with applicable tables.	

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

VII. Technical Information				
B. Are any schools located within 3,000 feet of this facility?				☐ YES ☑ NO
C. Maximum Operating Schedule:				
Hours: 24	Day(s): 7	Week(s): 52	Year(s):	
Seasonal Operation? If Yes, please describe in the space provide below.				☐ YES ☑ NO
D. Have the planned MSS emissions been previously submitted as part of an emissions inventory?				☐ YES ☑ NO
Provide a list of each planned MSS facility or related activity and indicate which years the MSS activities have been included in the emissions inventories. Attach pages as needed.				
E. Does this application involve any air contaminants for which a *disaster review* is required?				☐ YES ☑ NO
F. Does this application include a pollutant of concern on the *Air Pollutant Watch List (APWL)*?				☐ YES ☑ NO
VIII. State Regulatory Requirements **Applicants must demonstrate compliance with all applicable state regulations to obtain a permit or amendment**. *The application must contain detailed attachments addressing applicability or non applicability; identify state regulations; show how requirements are met; and include compliance demonstrations.*				
A. Will the emissions from the proposed facility protect public health and welfare, and comply with all rules and regulations of the TCEQ?				☑ YES ☐ NO
B. Will emissions of significant air contaminants from the facility be measured?				☑ YES ☐ NO
C. Is the Best Available Control Technology (BACT) demonstration attached?				☑ YES ☐ NO
D. Will the proposed facilities achieve the performance represented in the permit application as demonstrated through recordkeeping, monitoring, stack testing, or other applicable methods?				☑ YES ☐ NO
IX. Federal Regulatory Requirements **Applicants must demonstrate compliance with all applicable federal regulations to obtain a permit or amendment** *The application must contain detailed attachments addressing applicability or non applicability; identify federal regulation subparts; show how requirements are met; and include compliance demonstrations.*				
A. Does Title 40 Code of Federal Regulations Part 60, (40 CFR Part 60) New Source Performance Standard (NSPS) apply to a facility in this application?				☑ YES ☐ NO
B. Does 40 CFR Part 61, National Emissions Standard for Hazardous Air Pollutants (NESHAP) apply to a facility in this application?				☐ YES ☑ NO
C. Does 40 CFR Part 63, Maximum Achievable Control Technology (MACT) standard apply to a facility in this application?				☑ YES ☐ NO

IX. Federal Regulatory Requirements **Applicants must demonstrate compliance with all applicable federal regulations to obtain a permit or amendment** ***The application must contain detailed attachments addressing applicability or non applicability; identify federal regulation subparts; show how requirements are met; and include compliance demonstrations.***	
D. Do nonattainment permitting requirements apply to this application?	☐ YES ☑ NO
E. Do prevention of significant deterioration permitting requirements apply to this application?	☑ YES ☐ NO
F. Do Hazardous Air Pollutant Major Source [FCAA 112(g)] requirements apply to this application?	☐ YES ☑ NO
G. Is a Plant-wide Applicability Limit permit being requested?	☐ YES ☑ NO
X. Professional Engineer (P.E.) Seal	
Is the estimated capital cost of the project greater than $2 million dollars?	☐ YES ☑ NO
If *Yes*, submit the application under the seal of a Texas licensed P.E.	
XI. Permit Fee Information	
Check, Money Order, Transaction Number ,ePay Voucher Number: Check # 22757	Fee Amount: $ 7,500
Company name on check: Zephyr Environmental Corporation	Paid online?: ☐ YES ☑ NO
Is a copy of the check or money order attached to the original submittal of this application?	☑ YES ☐ NO ☐ N/A
Is a Table 30 (Form 10196) entitled, Estimated Capital Cost and Fee Verification, attached?	☑ YES ☐ NO ☐ N/A

US EPA ARCHIVE DOCUMENT

Texas Commission on Environmental Quality
Form PI-1 General Application for
Air Preconstruction Permit and Amendment

XII. Delinquent Fees and Penalties
This form **will not be processed** until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ is paid in accordance with the Delinquent Fee and Penalty Protocol. For more information regarding Delinquent Fees and Penalties, go to the TCEQ Web site at: www.tceq.texas.gov/agency/delin/index.html.
XIII. Signature
The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7, Texas Clean Air Act (TCAA), as amended, or any of the air quality rules and regulations of the Texas Commission on Environmental Quality or any local governmental ordinance or resolution enacted pursuant to the TCAA I further state that I understand my signature indicates that this application meets all applicable nonattainment, prevention of significant deterioration, or major source of hazardous air pollutant permitting requirements. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties.
Name: Jimmy Rabon
Signature: [signature] *Original Signature Required*
Date: 29 DEC 11

2.0 PROJECT SCOPE

2.1 INTRODUCTION

The CEMEX facility consists of two cement kilns, raw and finish mills, clinker coolers, and ancillary material transfer equipment. The general operation of the kilns is not changing as a result of this amendment.

Raw materials (including limestone, sand, gypsum, and various other materials) are mixed and ground in the raw mills and then fed through a pre-heater or pre-heater/pre-calciner system into a rotary kiln. In the kiln, the pre-heated materials are heated to increasingly higher temperatures as they traverse the length of kiln. The high temperatures create different chemical reactions that transform the raw materials into conglomerated cement known as clinker. The clinker exits the kiln and travels along the clinker cooler until it is cool enough to move to storage or on for further processing. In the finish mills the clinker and additives are ground to create the final cement product.

The fuels coal and coke are ground in the coal/coke mill and can be introduced into the kiln or at the pre-heater or pre-heater/pre-calciner. Alternative fuels and natural gas can be introduced directly into the kiln or at the pre-heater or pre-heater/pre-calciner.

The primary combustion air to the kiln is blown in from the exterior, while secondary combustion air can be supplied from the clinker cooler. Air from the clinker cooler can also be used to dry material in the coal/coke mills. Exhaust gases from fuel combustion in the kiln and pre-heater (or pre-heater/pre-calciner) are used in the raw mill for heating and drying the material and eventually exhausted to atmosphere at the main kiln baghouse (Emission Point Numbers, EPNs, PS-16 and PS-77). Process flow diagrams for Kiln 1 and Kiln 2 are included in this section.

2.2 KILN NO. 2 PRODUCTION INCREASE

The kiln will not require any equipment modifications in order to increase the production to the proposed rate of 3,960 tons of clinker per day (30-day average) and 1,386,000 tons of clinker per year. This kiln has been in operation for less than three years and has demonstrated an ability to reach a higher production capacity than what was originally estimated and permitted.

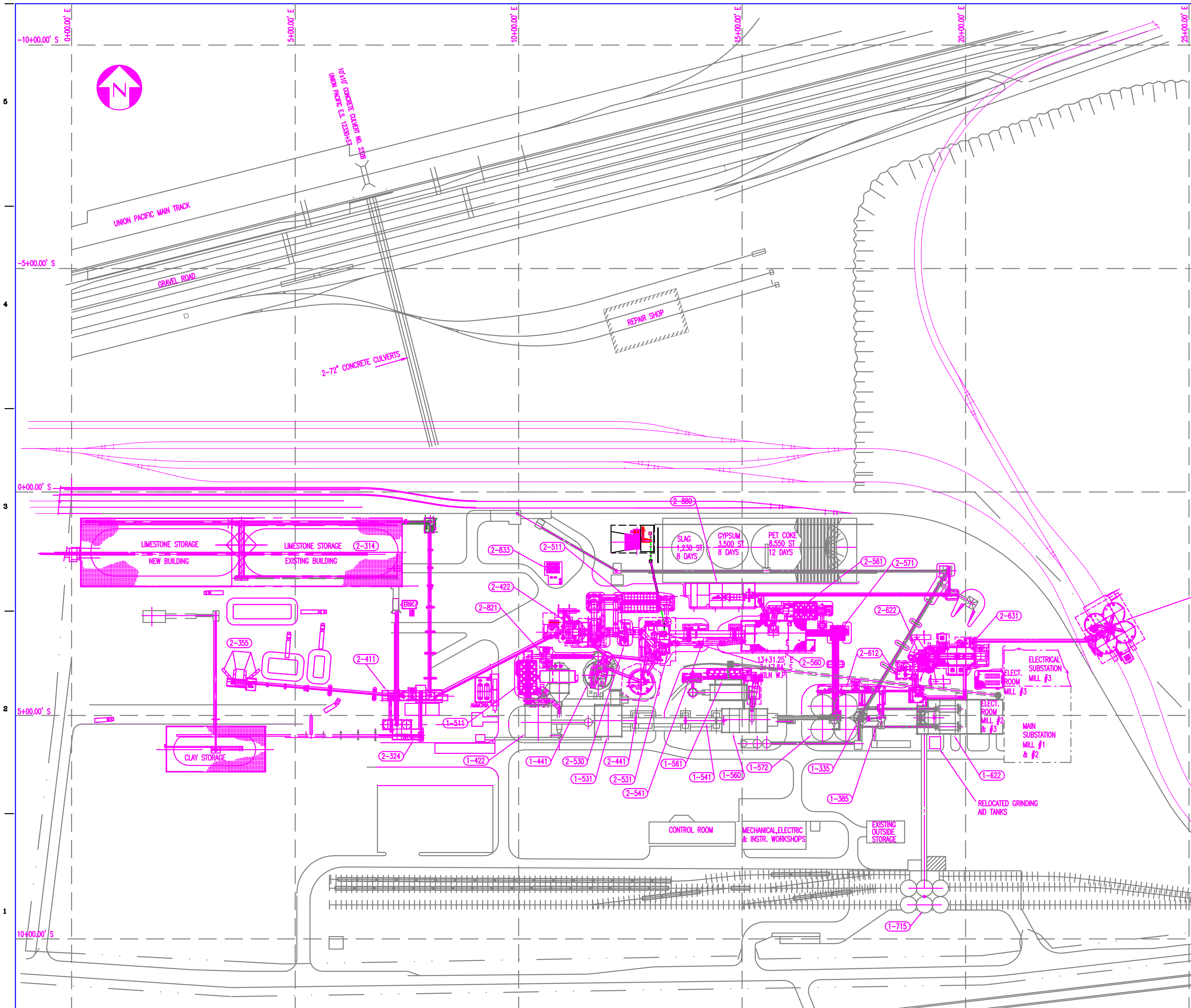
2.3 UPGRADES TO KILN 1 AND 2 BURNERS

CEMEX is proposing to upgrade the kiln burners to multipath adjustable units. The upgraded burners will allow the kiln operator to react quickly to changing process conditions. Advantages of the new burner include:

US EPA ARCHIVE DOCUMENT

- Potential for easy and accurate adjustment of flame shape to improve flame stability, heat transfer to the clinker, and to extend service life of brickwork as well;
- Potential to lower primary air rate by 6% - 12% according to kiln and fuel requirements with possibility to reduce the specific heat consumption (less fuel consumption);
- Ability to handle and feed alternative fuels in distinct and separate fuel lines.

US EPA ARCHIVE DOCUMENT



LEGEND

LINE NO.	AREA	DESCRIPTION
1	335	GYPSUM SILO
1	385	SLAG SILO
1	422	RAW MILL SYSTEM
1	441	BLENDING SILO
1	511	MAIN BAGHOUSE
1	531	PREHEATER TOWER
1	541	KILN
1	560	CLINKER COOLER
1	561	COOLER VENT
1	572	CLINKER STORAGE
1	622	CEMENT MILL
1	715	CEMENT STORAGE
2	314	LIMESTONE STORAGE HALL
2	324	CLAY TRANSPORT
2	411	RAW MILL FEED BINS
2	351	RAW MILL ADDITIVES RECEPTION
2	355	RAW MILL ADDITIVES STORAGE
~~2~~	~~385~~	~~SLAG SILO~~
2	411	RAW MILL FEED
2	422	RAW MILL SYSTEM 322 STPH
2	441	BLENDING SILO 10,240 ST
2	511	KILN DUST SYSTEM
2	530	KILN ID FAN
2	531	PREHEATER TOWER
2	541	KILN
2	560	CLINKER COOLER
2	561	COOLER VENT
2	571	CLINKER HANDLING
2	612	CEMENT MILL FEED
2	622	CEMENT MILL 198 STPH
2	631	CEMENT TRANSPORT
2	715	CEMENT STORAGE 40,000 ST
2	821	COMPRESSOR ROOM
2	833	WATER COOLING TOWER
2	880	PET COAL MILL 27.5 STPH

REVISIONS

No.	DATE	DESCRIPTION	BY

DRAWING No.	TITLE	SUPPLIER
898-11-02-002	ELEVATIONS	CEMEX
898-11-02-001	LAYOUT	CEMEX

REFERENCE DRAWING

CEMEX

CHECKED BY: - DATE: DD-MMM-AA
APPROVED BY: - DATE: DD-MMM-AA

CEMEX
CEMEX USA

CLIENT:

PLANT: BALCONES, PLANT

PROJECT No. -
NAME: PLANT BALCONES ALTERNATIVE FUELS

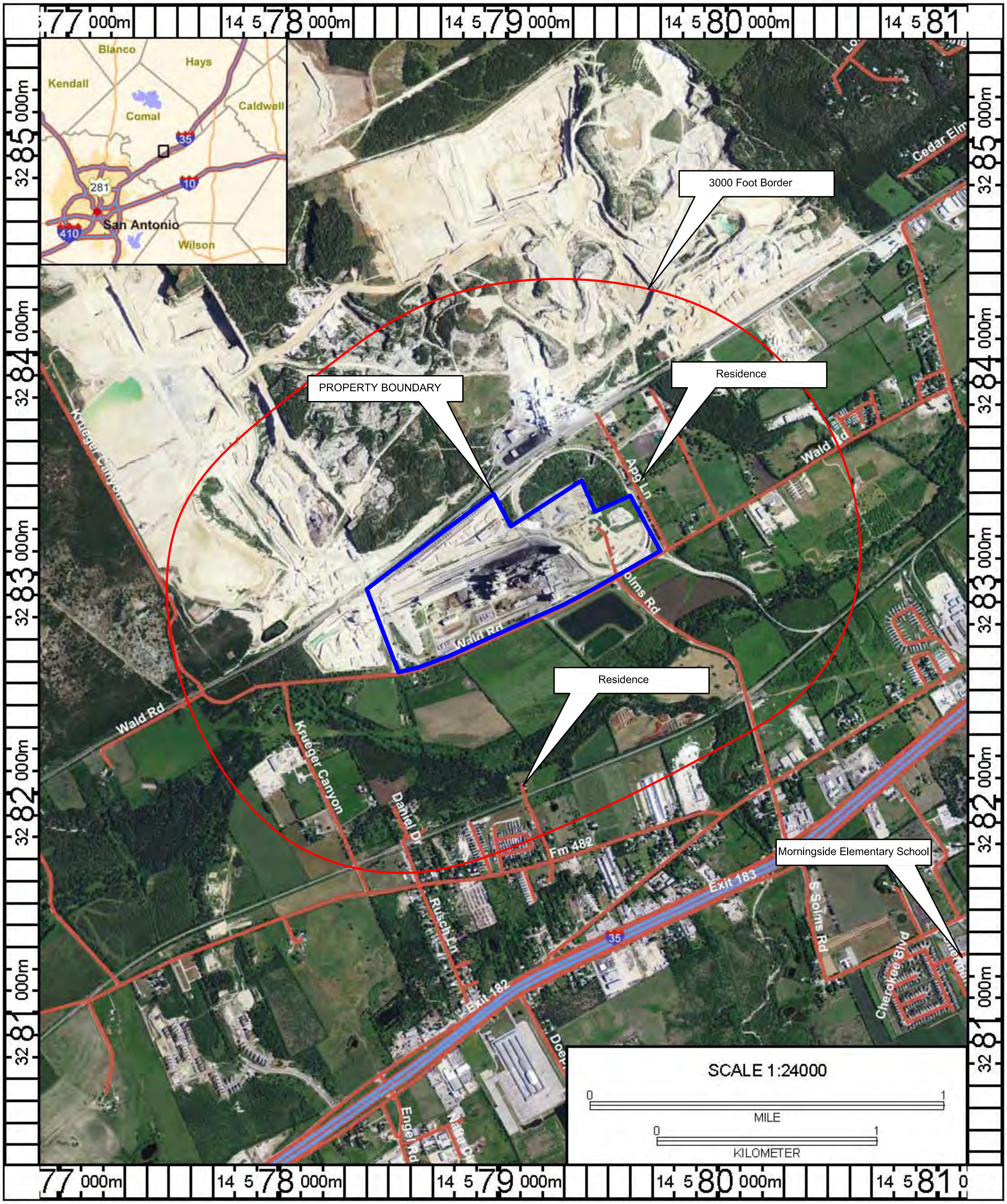
TITLE:

PLOT PLAN

DRAWN:	LSC	DATE:	04-APR-11
CHECKED:	EJdIC	DATE:	04-APR-11
APPROVED:		DATE:	
UNITS:	Inches	SCALE:	1"=100'

DRAWING No. 111-11-02-001 REV.No. 0

FILE:
PRINT DATE:



Datum: NAD83

Copyright (C) 2011 MyTopo

Digital USGS AERIAL PHOTOGRAPH
—NEW BRAUNFELS WEST SE, TX (May 4, 2010)
MAP SOURCE: Terrain Navigator Pro

SITE LOCATION

zephyr

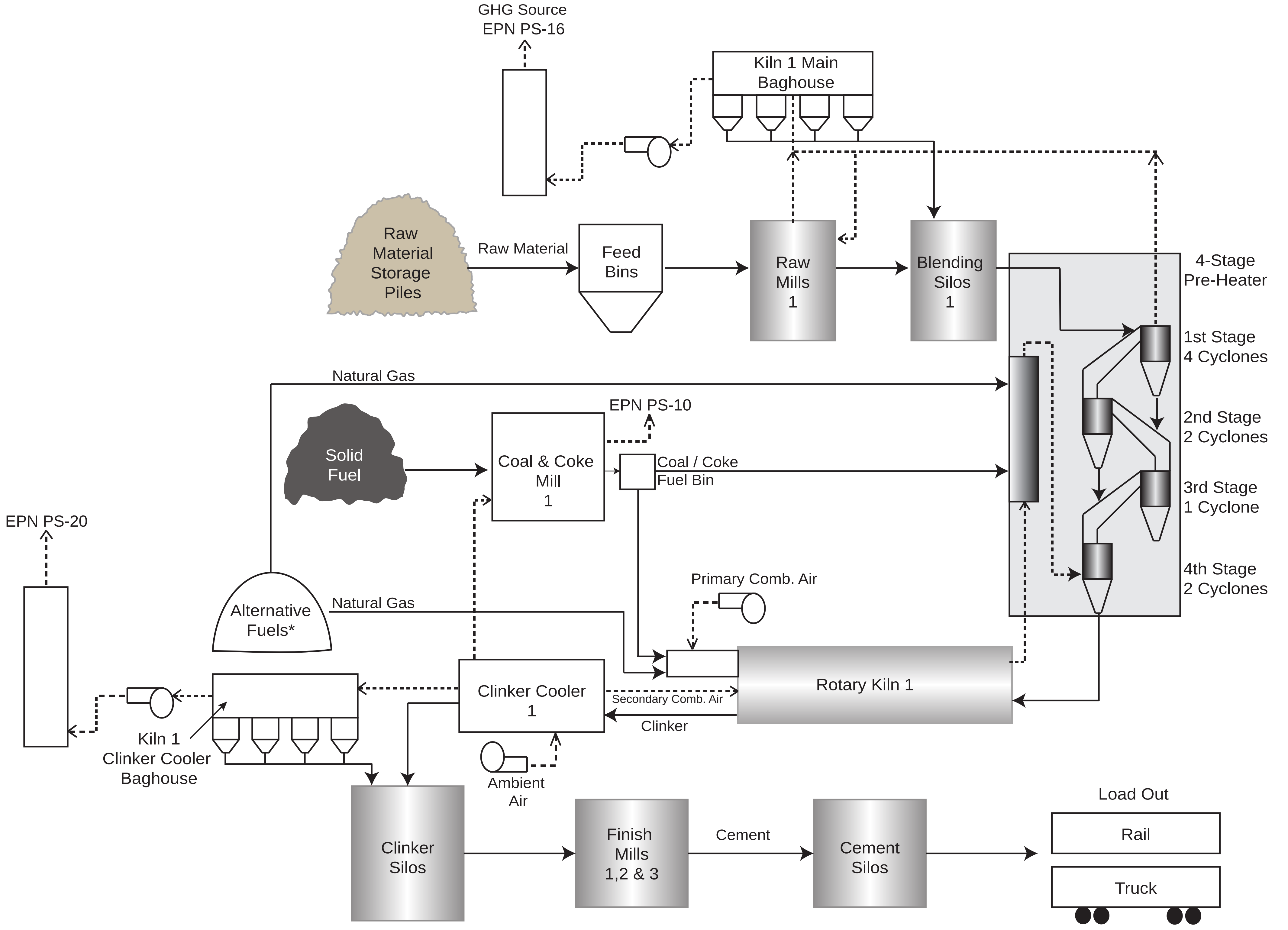
AREA MAP

BALCONES CEMENT PLANT

CEMEX CEMENT of TEXAS, L.P.
New Braunfels, TX

File Name: H:\CEMEX\Balcones\10537 Graphics			
Designed By: R. von Czoernig	Reviewed By: Thomas S.	Project No.: 10537	Date: 8/24/2011

US EPA ARCHIVE DOCUMENT



*Alternative Fuel Categories Include:
-Tires and rubber products
-Wood products
-Construction and demolition debris
-Textiles
-Agricultural products

Gas Flow - - - - -

Material Flow ———

zephyr

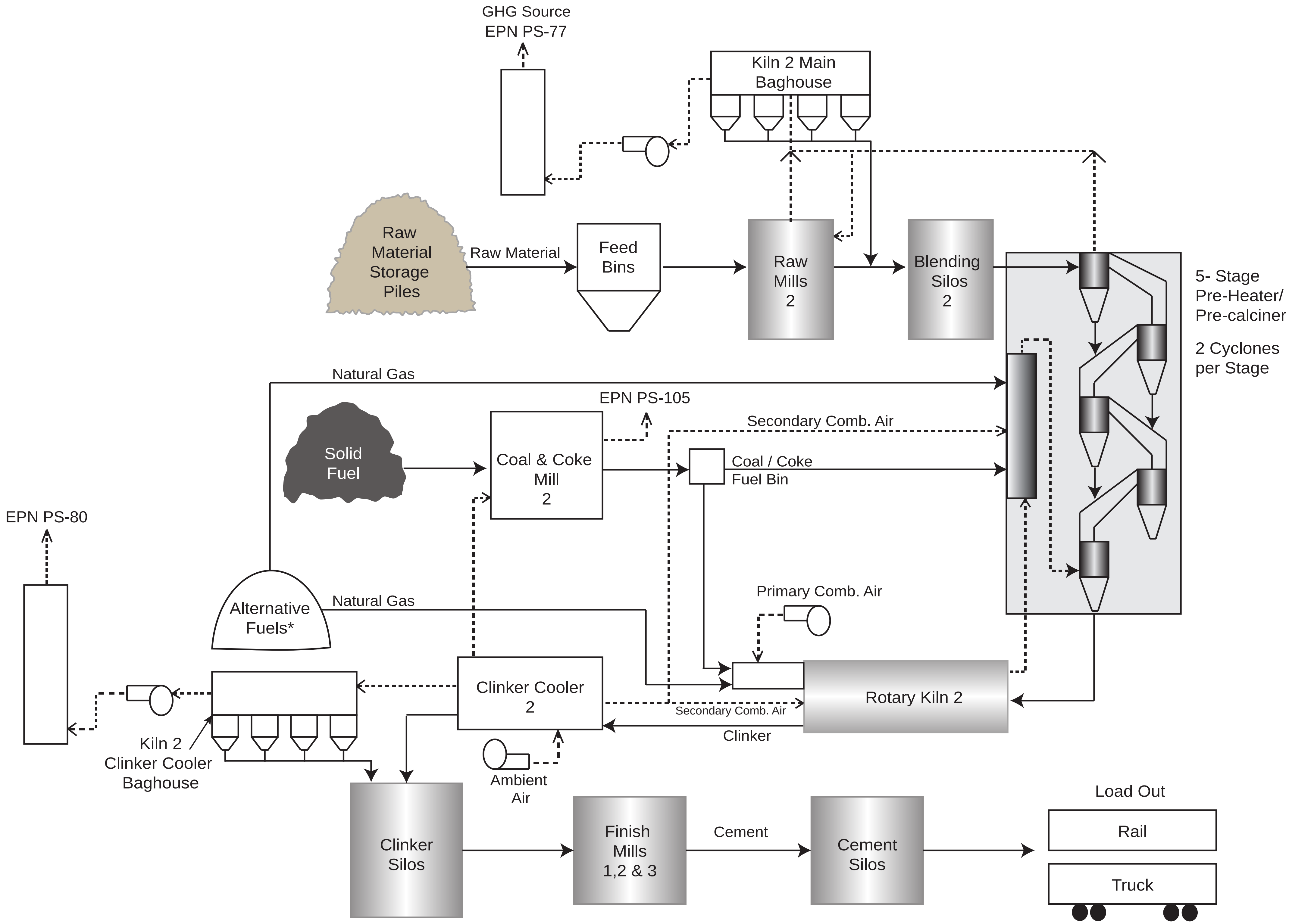
PROCESS FLOW DIAGRAM- KILN 1

CEMEX BALCONES CEMENT PLANT
New Braunfels, Texas

H:\Cemex\Balcones\10537 Graphics

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	L. Moon	010537	08.29.2013

US EPA ARCHIVE DOCUMENT



*Alternative Fuel Categories Include:
- Tires and rubber products
- Wood products
- Construction and demolition debris
- Textiles
- Agricultural products

Gas Flow - - - - -
Material Flow ——

zephyr

PROCESS FLOW DIAGRAM- KILN 2

CEMEX BALCONES CEMENT PLANT
New Braunfels, Texas

H:\Cemex\Balcones\10537 Graphics

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	L. Moon	010537	08.29.2013

3.0 GHG EMISSION CALCULATIONS

3.1 GHG EMISSIONS FROM CEMENT KILNS

GHG emission calculations for the kilns are based on maximum annual clinker production rates and the lb CO_2e/ton clinker emission factor proposed as Best Available Control Technology (BACT). During kiln start-up there is a period of time where fuel is being combusted to warm up the system and no clinker is being produced. The actual GHG emissions on a lb/hr basis will be lower during startup than during normal operation because less fuel is being combusted. The BACT calculation in Table 3-1 and the GHG emission calculations in Table 3-2 include GHG emissions associated with startup, shutdown, and maintenance in the annual totals.

The clinker production represented for Kiln No. 1 is the same as currently permitted. The clinker production represented for Kiln No. 2 includes a 10% increase over currently permitted levels. See Tables 3-1 and 3-2 for more details.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

CEMEX Construction Material South, LLC
Balcones Cement Plant
Permit 6048 Amendment

Table 3-1
Kiln CO_2e Emissions Calculations

EPN	EPN Name	Proposed Clinker produced per day [1] Tons	Proposed Clinker produced per year Tons	CO_2e Emission Factor [2] lb/ton clinker	Proposed CO_2e Annual Emissions (tons/yr)
PS-16	Kiln No. 1	3,250	1,137,500	1900	1,080,625
PS-77	Kiln No. 2	3,960	1,386,000	1900	1,316,700

1. 30 day average
2. Based on 12-month rolling average BACT limit of 0.95 tons of CO_2e/ton of clinker.

Table 3-2
CEMEX Construction Material South, LLC
Balcones Cement Plant
Kiln CO_2e Emissions Calculations

GHG Emissions from fuel firing

EPN	Maximum Heat Input (MMBtu/yr)	Pollutant	Emission Factor (kg/MMBtu)[1, 2]	GHG Mass Emissions (tpy)	Global Warming Potential[3]	CO_2e (tpy)
Kiln 1	4,102,239	CO_2	102.41	463,088	1	463,088
		CH_4	1.1E-02	49.74	21	1,044.6
		N_2O	1.6E-03	7.24	310	2,242.9
				463,145		466,375
Kiln 2	4,998,420	CO_2	102.41	564,254	1	564,254
		CH_4	1.1E-02	60.61	21	1,272.8
		N_2O	1.6E-03	8.82	310	2,732.8
			Totals	564,324		568,260

GHG Emissions from Limestone Calcination

	Clinker Production tons/yr	Calcination Emission Factor[4] ton CO2/ton clinker	CO2 (tpy)	GHG Mass Emissions (tpy)	CO_2e (tpy)
Kiln 1	1,137,500	0.54	614,250.0	1	614,250
Kiln 2	1,386,000	0.54	748,440.0	1	748,440

Total Kiln GHG Emissions

	CO_2 (tpy)	CO_2e (tpy)
Kiln 1	1,077,395	1,080,625
Kiln 2	1,312,764	1,316,700

<u>Note</u>

1. Based on firing 100% petroleum coke which provides a worst case estimate of GHG emissions
2. *Factors from Table C-1 and C-2 of 40 CFR Part 98, Mandatory Greenhouse Gas Reporting.*
3. *Global Warming Potential factors based on Table A-1 of 40 CFR 98 Mandatory Greenhouse Gas Reporting.*
4. Developed from Balcones Plant 2011 CO_2 monitoring data (total CEMs measured CO_2 - CO_2 calculated from fuel combustion / clinker production)

US EPA ARCHIVE DOCUMENT

Table 3-3
CEMEX Construction Material South, LLC
Balcones Cement Plant
CO_2e Baseline Emission Calculations

Year	Emission Source	EPN	CO2 MT/yr[1,2]	CH4 MT/yr[1,2]	N2O MT/yr[1,2]	CO2 ton/yr[3]	CH4 ton/yr[3]	N2O ton/yr[3]	CO2e ton/yr[4]
2010	Kiln 1	PS-16	507,938.7	60.0	8.7	559,897.2	66.2	9.6	564,269.9
2011	Kiln 1	PS-16	663,737.5	78.4	11.4	731,633.0	86.5	12.6	737,347.6
								2-yr average	650,808.7
2010	Kiln 2	PS-77	765,912.3	90.5	13.2	844,259.6	99.8	14.6	850,865.1
2011	Kiln 2	PS-77	863,863.3	102.1	14.8	952,230.3	112.5	16.4	959,667.8
								2-yr average	905,266.4

1. Reported for 40 CFR 98 Mandatory Greenhouse Gas Reporting Rule for Calendar Year 2010
2. Reported for 40 CFR 98 Mandatory Greenhouse Gas Reporting Rule for Calendar Year 2011
3. Metric tons converted to short tons using 2204.586 ton/ 2000 MT conversion factor
4. Global Warming Potential factors based on Table A-1 of 40 CFR 98 Mandatory Greenhouse Gas Reporting.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

4.0 PREVENTION OF SIGNIFICANT DETERIORATION APPLICABILITY

In the EPA guidance document *PSD and Title V Permitting Guidance for Greenhouse Gases,* the following PSD Applicability Test was provided for Step 1 of the PSD Tailoring rule for existing sources:

EPA Tailoring Rule Step 1 - PSD Applicability Test for GHGs

PSD applies to the GHG emissions from a proposed modification to an existing major source if the following is true:

- The emissions increase ***and*** the **net** emissions increase of GHGs from the modification would be equal to or greater than 75,000 TPY on a CO_2e basis ***and*** greater than zero TPY on a mass basis.

Since the net emissions increase of GHG is greater than 75,000 ton/yr of CO_2e and greater than zero ton/yr on a mass basis, PSD is triggered for GHG emissions. The emissions netting analysis is documented on the attached TCEQ PSD netting tables: Table 1F and Table 2F. Also included in Appendix A is the "The GHG PSD APPLICABILITY FLOWCHART – EXISTING SOURCES from the *PSD and Title V Permitting Guidance for Greenhouse Gases.*

TCEQ PSD NETTING TABLES

US EPA ARCHIVE DOCUMENT

TCEQ

TABLE 1F
AIR QUALITY APPLICATION SUPPLEMENT

Permit No.:	6048	Application Submittal Date:	
Company	CEMEX Construction Materials South, LLC		
RN:	RN102605375	Facility Location:	New Braunfels
City	New Braunfels	County:	Comal
Permit Unit I.D.:	PS-77	Permit Name:	Kiln No. 2 Baghouse
Permit Activity:	☐ New Major Source	☑ Modification	
Project or Process Description: Authorize a production increase for Kiln 2 and burner upgrades for both kilns.			

Complete for all pollutants with a project emission increase.	**POLLUTANTS**						
	Ozone		**CO**	**SO_2**	**PM**	**GHG**	**CO_2e**
	NOx	**VOC**					
Nonattainment? (yes or no)						No	No
Existing site PTE (tpy)	**This form for GHG only**					> 100,000	> 100,000
Proposed project increases (tpy from 2F)[3]						> 0	841,250
Is the existing site a major source? If not, is the project a major source by itself? (yes or no)	Yes						
If site is major, is project increase significant? (yes or no)						Yes	Yes
If netting required, estimated start of construction: 5 years prior to start of construction: estimated start of operation:		Contemporaneous Period				***SEE NOTE***	
Net contemporaneous change, including proposed project, from Table 3F (tpy)						> 0	>841250
FNSR applicable? (yes or no)						Yes	Yes

1. Other PSD pollutants
2. Nonattainment major source is defined in Table 1 in 30 TAC 116.12(11) by pollutant and county. PSD thresholds are found in 40 CFR §51.166(b)(1).
3. Sum of proposed emissions minus baseline emissions, increases only. Nonattainment thresholds are found in Table 1 in 30 TAC 116.12(11) and PSD thresholds in 40 CFR §51.166(b)(23).

NOTES Netting was not performed since no projects occurred in the contemporaneous period that reduced GHG emissions.

The presentations made above and on the accompanying tables are true and correct to the best of my knowledge.

Kimberly Bradley — Director, Environmental — 7/11/12

Signature — Title — Date

© 2011 RMT, Inc. All rights reserved.

US EPA ARCHIVE DOCUMENT

TCEQ

TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	GHG (CO2e)	Permit:	6048
Baseline Period:	Jan. 2010	to	Dec. 2011

Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	Proposed Emissions[5]	B Projected Actual	Difference (A-B)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	KF13	PS-16	6048	650,808.73	650,808.73		1,080,625.00	429,816.27		429,816.27
2	KILN2	PS-77	6048	905,266.43	905,266.43		1,316,700.00	411,433.57		411,433.57
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
									Page Subtotal[9]	841,249.84

TCEQ - 20470(rEVISED 10/08) Table 1F
These forms are for use by facilities subject to air quality pemrit requirements and may be revised periodically. (APDG 5915v1)

5.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The PSD rules define BACT as:

> *Best available control technology* means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under [the] Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.[3]

In the EPA guidance document titled *PSD and Title V Permitting Guidance for Greenhouse Gases*, EPA recommended the use of the Agency's five-step "top-down" BACT process to determine BACT for GHGs.[4] In brief, the top-down process calls for all available control technologies for a given pollutant to be identified and ranked in descending order of control effectiveness. The permit applicant should first examine the highest-ranked ("top") option. The top-ranked options should be established as BACT unless the permit applicant demonstrates to the satisfaction of the permitting authority that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the top ranked technology is not "achievable" in that case. If the most effective control strategy is eliminated in this fashion, then the next most effective alternative should be evaluated, and so on, until an option is selected as BACT.

EPA has broken down this analytical process into the following five steps:

Step 1: Identify all available control technologies.
Step 2: Eliminate technically infeasible options.
Step 3: Rank remaining control technologies.

[3] 40 C.F.R. § 52.21(b)(12.)

[4] EPA, *PSD and Title V Permitting Guidance for Greenhouse Gases*, p. 18 (Nov. 2010).

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Step 4: Evaluate most effective controls and document results.
Step 5: Select the BACT.

Please note, 40 CFR 52.21 (j)(3) states "A major modification shall apply best available control technology for each regulated NSR pollutant for which it would result in a significant net emissions increase at the source. This requirement applies to each proposed emissions unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operation in the unit".

40 CFR 52.21(b)(2)(iii)(f) states that "A physical change or change in the method of operation shall not include …an increase in the hours of operation or in the production rate, unless such change would be prohibited under any federally enforceable permit condition…"

Pages 22-24 of the PSD and Title V Permitting Guidance for Greenhouse Gases (March 2011) discuss these issues in a section called "Determining the Scope of the BACT Analysis". This guidance contends that for new sources triggering PSD, the rules provide discretion for permitting authorities to evaluate BACT on a facility-wide basis by taking into account operations and equipment which affect the environmental performance of the whole facility. However for existing units, the guidance refers to the above citation (52.21(j)(3)), and reiterates that BACT only applies to emissions units that are physically or operationally changed. Therefore, this BACT analysis will only address Kilns 1 and 2.

5.1 BACT FOR THE KILNS

5.1.1 Step 1: Identify All Available Control Technologies

EPA has issued a "white paper", entitled *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Portland Cement Industry*[5] *(referred to in this application as "The Cement Industry GHG White Paper")*, which provides GHG BACT guidance specific to the industry. The recommended control techniques and measures to mitigate greenhouse gas emissions are addressed below.

5.1.1.1 Cement Kiln Energy Efficiency

Process Control and Management Systems

The Cement Industry GHG White Paper recommends using automated control systems to maintain operating conditions in the kiln at optimum levels. The Balcones plant has automated control systems for both Kiln 1 and Kiln 2 which are integrated into a central control room. The kilns have an indirect firing system with the main characteristics of low amount of primary air,

[5] EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions From the Portland Cement Industry*, (Oct. 2010).

flame adjustment control and fuel rate control by the dosing equipment. Process gas analyzers are used by control room operators to monitor CO and O_2 levels to insure efficient combustion. The calciner fuel rate is automatically controlled based on the stage 5 temperature and the kiln main burner is adjusted by the operator depending of the oxygen levels, kiln burning zone temperature and clinker quality.

Replacement of kiln seals

The Cement Industry GHG White Paper recommends that all facilities should have a regular maintenance plan for the kiln seals. Leaking seals can result in increased heat loss which increases fuel use. The CEMEX Balcones Plant has a maintenance routine to inspect the kiln seals weekly and during the major outages. Components of the kiln seals are replaced as needed based on inspections during kiln stops.

Kiln Combustion System Optimization

The Cement Industry GHG White Paper recommends incorporating available technologies to optimize kiln combustion into kiln designs. Incomplete fuel burning, poor mixing of fuel with combustion air, and poorly adjusted firing can lead to increased fuel usage (as well as increased NOx and CO emissions).

The combustion system process for Kilns 1 and 2 are designed to provide for efficient use of fuel. Kilns 1 and 2 have an indirect firing system with the main characteristics of low amount of primary air, flame adjustment control, and fuel rate control by the dosing equipment.

The primary air accounts for 10 to 40% of the total air needed depending on the type of firing system. The additional 90 or 60% of the air is called secondary air and consists of hot air from the clinker cooler. The higher the secondary air the more efficient the combustion system.

Precalciner kilns like the Balcones Kiln 1 and Kiln 2 are designed to maximize the heat input to the calciner and typically 60% of fuel is fed to the calciner. Most of the air required by the combustion at the calciner is hot air from the clinker cooler. This air is known as tertiary air. Mixing and heat transfer at the calciner has proven calcination levels above 90% and significantly reduces the thermal load at the kiln.

Use of Fluxes and Mineralizers to Reduce Energy Demand

The Cement Industry GHG White Paper recommends considering the use of fluxes and mineralizers to reduce the temperature at which the clinker melt begins to form in the kiln, promote formation of clinker compounds, and reduce the lower temperature limit of the tricalcium silicate stability range. The Cement Industry GHG White Paper states: *"Fluorides are often used as a mineralizer and can reduce the sintering temperature by 190°F. Although there*

US EPA ARCHIVE DOCUMENT

is a fuel savings, that savings may be offset by the high cost of the fluxing agent or mineralizer. (ECRA, 2009)."

CEMEX conducted a test using fluoride in a kiln at one of its other U.S. cement plants. Based on the test results, CEMEX evaluated the use of fluoride in kilns and determined the benefit in fuel savings does not offset the cost of the fluoride. There were also negative effects in quality of cement and concrete physical properties that prohibited the use at some plants. Therefore, CEMEX does not use fluxes and mineralizers in Kilns 1 and 2.

Kiln/Preheater Insulation

The Cement Industry GHG White Paper recommends proper insulation to keep heat loss through the kiln shell at a minimum. Kilns 1 and 2 are insulated with refractory brick and the preheaters are insulated with a combination of brick and castable over a light-weight insulating material. The kiln refractory is inspected during every major outage and portions of the refractory are replaced, as needed, depending on the condition.

Refractory Material Selection

The Cement Industry GHG White Paper states: "*The refractory bricks lining the combustion zone of the kiln protect the outer shell from the high combustion temperatures, as well as chemical and mechanical stresses. Although the choice of refractory materials is highly dependent on fuels, raw materials, and operating conditions, consideration should be given to refractory materials that provide the highest insulating capacity and have the longest life."*

The kiln refractory for Kiln 1 and 2 is very standard for the cement industry and was selected based on the conditions of each zone (mainly thermal and chemical conditions). The refractory is inspected every major outage and it is replaced depending on the condition.

Grate Cooler Conversion

The Cement Industry GHG White Paper recommends replacing planetary and travelling grate coolers with a more energy efficient reciprocating grate coolers as an option for improving energy efficiency. Kilns 1 and 2 are equipped with reciprocating grate coolers which recuperate heat back to the kiln. The secondary air coming from the coolers provide oxygen for combustion and heat recuperated from the clinker improving the overall kiln energy efficiency.

Heat Recovery from Kiln and Clinker Cooler Exhausts

The Cement Industry GHG White Paper states: "*There are several exhaust streams in the cement manufacturing operation that contain significant amounts of heat energy, including the kiln exhaust, clinker cooler, and kiln preheater and precalciner. …Generally, only long dry kilns*

US EPA ARCHIVE DOCUMENT

produce exhaust gases with temperatures high enough to make heat recovery for power economical….Heat recovery for power may not be possible at facilities with in-line raw mills where the waste heat is used to extensively dry the raw materials…".

Kilns 1 and 2 have in-line raw mills, where the waste heat from the kiln and precalciners are used to dry and preheat the raw materials. The exhaust from the clinker coolers is used partly as secondary air which provide oxygen and heat to the kilns and also to provide heat for drying the coal.

Suspension Preheater Low Pressure Drop Cyclones

Cyclones are used to preheat the raw meal prior to the kiln. Exhaust gases from the in-line kiln, precalciner are routed to the cyclones and provide the heat to preheat the raw meal suspended or residing in the cyclone. The Cement Industry GHG White Paper recommends the use of low pressure drop cyclones as a method of improving energy efficiency. The preheater cyclones and ducts areas associated with Kilns 1 and 2 are designed to minimize pressure drop and to minimize the dust lost in the preheater.

Conversion to Multistage Preheater

The Cement Industry GHG White Paper recommends converting to multistage preheaters to allow higher energy transfer efficiency and lower fuel requirements. Kilns 1 and 2 are equipped with multi-stage preheaters consisting of several cyclones in suspension. The material is fed at the top of the calciner and exchange heat with hot gases from the kiln. The contact between the material and the hot gas in each cyclone explains the great efficiency of heat exchange between materials. Multi-stage preheaters are designed to preheat the material using the hot gas flow coming from the kiln. The material in suspension contacts the hot gas flow as the material is falling in each stage of the preheater.

Conversion of Long Dry Kiln to Preheater/Precalciner Kiln

The Cement Industry GHG White Paper recommends reducing energy consumption by converting a long dry kiln to a preheater/precalciner kiln. The CEMEX Kilns 1 and 2 are both preheater/precalciner kilns.

Kiln Drive Efficiency

The Cement Industry GHG White Paper recommends using high efficiency motors to rotate the kiln. The Balcones Kiln 1 has a direct current adjustable speed drive and Kiln 2 has an alternating current adjustable speed drive. The variable frequency drive installed at both kilns provides a high energy efficiency. Both kilns have a single pinion drive with a direct coupled gear coupling.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Adjustable Speed Drive for Kiln Fan

The Cement Industry GHG White Paper recommends installing adjustable speed drives on kiln fans for increased energy efficiency. Kilns 1 and 2 use variable frequency drives which allow for high efficiency of the kiln fans. The fan efficiency is maintained in different speeds using variable frequency drive instead of the damper operation where the fan efficiency is reduced while the damper is closing.

Mid Kiln Firing

The Cement Industry GHG Whiter Paper states that: "*Mid kiln firing, which is the practice of adding fuel (often scrap tires) at a point near the middle of the kiln, can result in reduced fuel usage thereby potentially reducing overall CO_2 emissions. This practice is most often used with long wet or long dry kilns.*" Mid-kiln firing is proven for long dry kilns but results are not the same for calciner kilns. In a long, dry kiln with mid-kiln firing, the combustion efficiency increases for two reasons: (1) the fuel at the main burner is reduced and (2) hot flame at mid-kiln firing will destroy and ensure complete combustion of the main fuel. The kiln in a calciner system, like Kilns 1 and 2, is shorter than long dry or wet kilns and therefore do not have the adequate conditions for mid-kiln firing.

Air Mixing Technology

The Cement Industry GHG White Paper states that: "Mixing air is the practice of injecting a high pressure air stream into a kiln to break up and mix stratified layers of gases within the kiln. Mixing the air improves the combustion efficiency. Due to the increased efficiency, less fuel is required, leading to lower CO_2 emissions."

The type of mixing air technology discussed in the Cement Industry White Paper is only needed if there is poor mixing at the burner pipe. CEMEX Kilns 1 and 2 have multichannel burners that allow for necessary mixing of fuel and air to complete combustion. Multichannel burners allow for adjustment of multiple streams of mixing air to complete combustion.

Preheater Duct Rising

The Cement Industry GHG White Paper states that: "The operation of cement manufacturing operations that include a preheater prior to the kiln can be improved by firing a portion of the fuel in the riser duct to increase the degree of calcination in the preheater." In the CEMEX Kilns 1 and 2, a portion of the fuel is fired in the riser duct to increase the degree of calcinations in the preheater. Firing at the riser serves two functions: (1) more mixing and longer residence time for the fuel to complete combustion and (2) generate enough CO to destroy NOx from the kiln by the reaction NO + CO ➔ N2 + CO2. This reaction has been reported to be catalyzed by limestone present in the hot meal.

US EPA ARCHIVE DOCUMENT

5.1.1.2 Use of Lower GHG Emitting Fuel

Kilns 1 and 2 are currently authorized by Air Permit 6048/PSD-TX-74M1 to fire the following fuels in the kiln/preheater system: natural gas, coal, petroleum coke, wood, tire derived fuel, other rubber products, and other alternative fuels including carpet products, non-asbestos containing shingles, construction and demolition waste, oil filter fluff, oily rags, oily wood, paper, cardboard, rick husks, and cotton gin residue.

Fuel costs, fuel availability, and fuel reliability have primarily dictated the fuel mix used in the kilns. The use of natural gas in the kilns is increasing as the price of natural gas becomes more competitive with petroleum coke and coal.

The EPA PSD and Title V Permitting Guidance for Greenhouse Gases states that "…permitting authorities might determine that, with respect to the biomass component of a facility's fuel stream, certain types of biomass by themselves are BACT for GHGs." This is based on the premise that CO_2 emissions from burning biomass are the result of carbon that has relatively recently been removed from the atmosphere through uptake by plants and thus does not have the global warming impact that burning fossil fuel has. Potential types of biomass that can be burned in the Balcones cement kilns include:

- Wood
- Paper
- Cardboard
- Rice Husks,
- Pecan shells, and
- Cotton gin residue.

This permit application includes upgrades to the main kiln burners in Kiln No. 1 and Kiln No. 2 to multipath adjustable units. The upgrades will increase flexibility in the amount and kind of fuels that can be burned in the main kiln. The use of biomass is limited by cost, availability, and kiln process variables including high moisture or high chlorides content. Because biomass wastes have heating values that are typically lower than heating values for coal and petroleum coke, more biomass is needed to provide the same heating value as a given weight of coal or petroleum coke. In combustion systems any water content in the fuel must be driven off before the first stage of combustion can occur, requiring energy, and thus reducing overall system efficiency. Higher chlorides contents of fuels can negatively affect the quality of the cement product from the kiln.

5.1.1.3 Add On Controls

In addition to the cement production process technology options discussed above, it is appropriate to consider add-on technologies as possible ways to capture GHG emissions that are emitted from combustion and calcination, and to prevent them from entering the atmosphere. These emerging CCS technologies generally consist of processes that separate CO_2 from combustion process flue gas, and then inject it into geologic formations such as oil and gas reservoirs, un-mineable coal seams, or underground saline formations.

Post-combustion technologies include the Calera process, which captures carbon dioxide from flue gas and converts the gas to stable solid minerals. The process employs a scrubber with high pH water containing calcium, magnesium, sodium, and chloride as the scrubbing liquid. The CO_2 is absorbed by the water, converting it to a dissolved carbonic acid species. However, this technology has not been on a full scale basis and pilot plant testing has only been in relation to the electric utility industry.

Membrane technology is being research as a means to separate or adsorb CO_2 in the kiln exhaust. The captured CO_2 would then be purified and compressed for transport. This technology is still primarily in the research stage, with industrial application at least 10 years away. There are significant problems to overcome designing membrane reactors large enough to handle the kiln exhaust.[6]

A superheated Calcium Oxide (CaO) process has also been noted as potential CO_2 control technology. The superheated CaO process separates the calcination and combustion reactions into independent chambers. The heat necessary to run the calciner is provided by circulating a stream of superheated CaO particles between a fluidized bed combustor and a fluidized bed calciner. Retrofits of an existing kiln would involve removal of existing preheaters and precalciners, construction of the fluidized beds, cyclones, heat exchangers, and compressors associated with the process. Superheated CaO simulations have shown that the superheated CaO process is theoretically feasible; however, the system remains theoretical with no systems yet built.[7]

Of the emerging CO_2 capture technologies that have been identified, only amine absorption (post-combustion solvent capture and stripping) is currently commercially used for state-of-the-art CO_2 separation processes. Amine absorption has been applied to processes in the petroleum refining and natural gas processing industries and for exhausts from gas-fired industrial boilers but there has been little work discussing its feasibility at cement plants.

If CO_2 capture can be achieved at a cement plant at full scale, it would need to be routed to a geologic formation capable of long-term storage. The long-term storage potential for a formation is a function of the volumetric capacity of a geologic formation and CO_2 trapping mechanisms within the formation, including dissolution in brine, reactions with minerals to form solid carbonates, and/or adsorption in porous rock. The U.S. Department of Energy's National Energy

---

6 EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions From the Portland Cement Industry*, Page 38, (Oct. 2010).

7 EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions From the Portland Cement Industry*, Page 38, (Oct. 2010).

US EPA ARCHIVE DOCUMENT

Technology Laboratory (DOE-NETL) describes the geologic formations that could potentially serve as CO_2 storage sites as follows:

"Geologic carbon dioxide (CO_2) storage involves the injection of supercritical CO_2 into deep geologic formations (injection zones) overlain by competent sealing formations and geologic traps that will prevent the CO_2 from escaping. Current research and field studies are focused on developing better understanding of 11 major types of geologic storage reservoir classes, each having their own unique opportunities and challenges. Understanding these different storage classes provides insight into how the systems influence fluids flow within these systems today, and how CO_2 in geologic storage would be anticipated to flow in the future. The different storage formation classes include: deltaic, coal/shale, fluvial, alluvial, strandplain, turbidite, eolian, lacustrine, clastic shelf, carbonate shallow shelf, and reef. Basaltic interflow zones are also being considered as potential reservoirs. These storage reservoirs contain fluids that may include natural gas, oil, or saline water; any of which may impact CO_2 storage differently…"[8]

5.1.2 Step 2: Eliminate Technically Infeasible Options

5.1.2.1 Energy Efficiency Improvements in Clinker Production

CEMEX conducted a test using fluoride in a kiln at one of its other U.S. cement plants. Based on the test results, CEMEX evaluated the use of fluoride in kilns and determined the benefit in fuel savings does not offset the cost of the fluoride. There were also site specific impacts in quality of cement and concrete physical properties that prohibited the use at some plants. Therefore, CEMEX does not use fluxes and mineralizers in Kilns 1 and 2.

Mid-kiln firing is not conducted at Kilns 1 and 2. The kiln in a calciner system, like Kilns 1 and 2, is shorter than long dry or wet kilns and therefore do not have the adequate conditions for mid-kiln firing.

5.1.2.2 Post-combustion CO_2 Capture and Compression

Though amine absorption technology for CO_2 capture has been applied to processes in the petroleum refining and natural gas processing industries, it has not been commercially applied to cement kiln exhausts. The Cement Industry GHG White Paper lists the following major additions to a cement plant to retrofit this technology include:

- A CO_2 capture plant which includes a solvent scrubber and regenerator
- A compressor to increase the pressure of the CO_2 product for transport by pipeline
- High efficiency flue gas desulfurization and De-NOx (a NOx removal process) to satisfy the flue gas purity requirements of the CO_2 capture process

[8] DOE-NETL, *Carbon Sequestration: Geologic Storage Focus Area,* http://www.netl.doe.gov/technologies/carbon_seq/corerd/storage.html (last visited Feb. 27, 2012)

US EPA ARCHIVE DOCUMENT

- A boiler to provide the steam required for regeneration of the CO_2 capture solvent.[9]

While post-combustion capture of CO_2 has been studied extensively for combustion sources at gas-fired power stations, there has been little work to address feasibility at cement plants. The Cement Industry GHG White Paper listed the following technical issues associated with using post-combustion amine scrubbing at a cement kiln:

- Additional Steam Requirements. One of the major issues with using MEA CO_2 capture is the large steam requirement for solvent regeneration. The CEMEX Balcones plant currently does not have steam generation capabilities.
- Sulfur Dioxide (SO2). The concentration of SO2 in the flue gas from the cement process is important for post-combustion capture with amines because amines react with acidic compounds to form salts that will not dissociate in the amine stripping system.
- Nitrogen Dioxide (NO2). NOx within the flue gas is problematic for MEA absorption as this result in solvent degradation.
- Dust. The presence of dust reduces the efficiency of the amine absorption process. The dust level must be kept below 15 mg/Nm^3.
-
- Reducing Conditions. The clinker must not be generated in reducing conditions and an excess of oxygen must be maintained in the process.
- Heat Reduction for MEA Absorption. The flue gas must be cooled from about 110°C to about 50°C to meet the ideal temperature for CO_2 absorption with MEA.
- Other Gases. The presence of any acidic components will reduce the efficiency of the MEA absorption process.[10]

In addition to the technical issues addressed in the Cement Industry GHG White Paper, construction of a carbon capture facility will affect the footprint of the plant and may require a larger site.

5.1.2.3 CO_2 Transport

Even if it is assumed that CO_2 capture and compression could feasibly be achieved for the proposed project, the high-volume CO_2 stream generated would need to be transported to a facility capable of storing it. Potential geologic storage sites in Texas, Louisiana, and Mississippi to which CO_2 could be transported if a pipeline was constructed are delineated on the map found at the end of Section 5.[11] The potential length of such a CO_2 transport pipeline is

[9] EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions From the Portland Cement Industry*, Page 37, (Oct. 2010).

[10] EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions From the Portland Cement Industry*, Page 37, (Oct. 2010).

[11] Susan Hovorka, University of Texas at Austin, Bureau of Economic Geology, Gulf Coast Carbon Center, *New Developments: Solved and Unsolved Questions Regarding Geologic Sequestration of CO_2 as a Greenhouse Gas*

US EPA ARCHIVE DOCUMENT

uncertain due to the uncertainty of identifying a site(s) that is definitively suitable for large-scale, long-term CO_2 storage. The hypothetical minimum length required for any such pipeline(s) will be the distance to the closest site with recognized potential for some geological storage of CO_2, which is an enhanced oil recovery (EOR) reservoir site located approximately 50 miles to the south-southeast of the plant in Karnes County. However, the reservoir site in Karnes County has not been technically demonstrated for large-scale, long-term CO_2 storage.

In comparison, the closest site that is currently being field-tested to demonstrate its capacity for large-scale geological storage of CO_2 is the Southeast Regional Carbon Sequestration Partnership's (SECARB) Cranfield test site, which is located in Adams and Franklin Counties, Mississippi over 260 miles away (see the map at the end of Section 5 for the test site location). Therefore, to access this potentially large-scale storage capacity site, assuming that it is eventually demonstrated to indefinitely store a substantial portion of the large volume of CO_2 generated by the proposed project, a very long and sizable pipeline would need to be constructed to transport the large volume of high-pressure CO_2 from the plant to the storage facility, thereby rendering implementation of a CO_2 transport system infeasible.

5.1.2.4 CO_2 Storage

Even if it is assumed that CO_2 capture and compression could feasibly be achieved for the proposed project and that the CO_2 could be transported economically, the feasibility of CCS technology would still depend on the availability of a suitable sequestration site. The suitability of potential storage sites is a function of volumetric capacity of their geologic formations, CO_2 trapping mechanisms within formations (including dissolution in brine, reactions with minerals to form solid carbonates, and/or adsorption in porous rock), and potential environmental impacts resulting from injection of CO_2 into the formations. Potential environmental impacts resulting from CO_2 injection that still require assessment before CCS technology can be considered feasible include:

- Uncertainty concerning the significance of dissolution of CO_2 into brine,
- Risks of brine displacement resulting from large-scale CO_2 injection, including a pressure leakage risk for brine into underground drinking water sources and/or surface water,
- Risks to fresh water as a result of leakage of CO_2, including the possibility for damage to the biosphere, underground drinking water sources, and/or surface water,[12] and
- Potential effects on wildlife.

Potentially suitable storage sites, including EOR sites and saline formations, exist in Texas, Louisiana, and Mississippi. The closest EOR sites with such recognized potential for some

Reduction Method (GCCC Digital Publication #08-13) at slide 4 (Apr. 2008), available at: http://www.beg.utexas.edu/gccc/forum/codexdownloadpdf.php?ID=100(last visited Aug. 8, 2011).

[12] *Id.*

US EPA ARCHIVE DOCUMENT

geological storage of CO_2 are located within 50 miles of the proposed project, but such nearby sites have not yet been technically demonstrated with respect to all of the suitability factors described above. In comparison, the closest site that is currently being field-tested to demonstrate its capacity for geological storage of the volume of CO_2 that would be generated by the proposed power unit, i.e., SECARB's Cranfield test site, is located in Mississippi over 260 miles away. It should be noted that, based on the suitability factors described above, currently the suitability of the Cranfield site or any other test site to store a substantial portion of the large volume of CO_2 generated by the proposed project has yet to be fully demonstrated.

5.1.3 Step 3: Rank Remaining Control Technologies

As documented above, CEMEX believes that implementation of CCS technology is currently infeasible, leaving energy efficiency measures as the only technically feasible emission control options. As all of the energy efficiency related processes, practices, and designs discussed in Section 5.1.1 of this application are being proposed for this project, a ranking of the control technologies is not necessary for this application.

5.1.4 Step 4: Evaluate Most Effective Controls and Document Results

As all of the energy efficiency related processes, practices, and designs discussed in Section 5.1.1 of this application which are technically feasible are being proposed for this project, an examination of the energy, environmental, and economic impacts of the efficiency designs is not necessary for this application.

Based on the reasons provided in Section 5.1.2 above, CEMEX believes that CCS technology should be eliminated from further consideration as a potential feasible control technology for purposes of this BACT analysis. However, to answer possible questions that the public or the EPA may have concerning the relative costs of implementing hypothetical CCS systems, a cost estimate for implementing a CCS system is provided below.

The International Energy Agency (IEA) Greenhouse Gas R&D Programme conducted a study to assess the technologies that could be used to capture CO_2 in cement plant and their associated performance and costs.[13] The technical and economic assessments were based on a new preheater/precalciner cement plant in the United Kingdom producing 1 million tonnes/year of cement (910,000 ton/yr of cement). The post combustion CO_2 capture technology chosen for the study was CO_2 absorption using monoethynolamine. The study listed the main additions to the plant for post combustion CO_2 capture as: a CO_2 capture plant including a solvent scrubber and regenerator; a compressor to increase the pressure of the CO_2 product for transport by pipeline; high efficiency flue gas desulfurization and de-NOx to satisfy the flue gas purity requirements of the CO_2 capture process; and a plant to provide the steam required for

[13] CO_2 Capture in the Cement Industry, Final Report, July 2008, Mott MacDonal, International Energy Agency Greenhouse Gas R&D Programme

US EPA ARCHIVE DOCUMENT

regeneration of the CO_2 capture solvent. The initial capital cost for a CO_2 capture system was estimated to be $295 €/tonne cement ($401.44/ton cement at the 1.5 $/€ exchange rate used in the study). At this rate, the projected costs for installation of CO_2 capture equipment for the Balcones Kiln 1 and 2 would be $1,013,000,000. For comparison purposes, the estimated capital cost for the upgrades to the main kiln burners in Kiln No. 1 and Kiln No. 2 to multipath adjustable units is $750,000. Implementation of post combustion carbon capture system for Kilns 1 and 2 would result in initial capital costs of approximately 1,350 times higher than the projected project costs which would make the project not viable.

The average annual cost per tonne of CO_2 emissions avoided in the IEA study for CO_2 capture and compression was calculated to be 118.15 €/tonne ($146.15/ton at the 1.5 $/€ exchange rate used in the study). It was reported in the "Report of the Interagency Task Force on Carbon Capture and Storage"[14] that recent studies have shown that CO_2 pipeline transport costs for a 100 kilometer (62 mile) pipeline transporting 5 million tonnes per year range from approximately $1 per tonne to $3 per tonne ($0.91 per ton to $2.72 per ton). The distance from the CEMEX Balcones Plant to the nearest enhanced oil recovery site with a recognized potential for some geological storage of CO_2 is 50 miles. Conservatively assuming that the pipeline cost is linear, the estimate average annual cost for CO_2 transport would be $1.46/ton CO_2 avoided. It was reported in "Report of the Interagency Task Force on Carbon Capture and Storage"[15] that the costs associated with CO_2 storage have been estimated to be approximately $0.4 – 20/tonne plus $0.16 – 0.30/tonne CO_2 stored for monitoring. The average annual cost on a $/ton CO_2 storage basis for storage and monitoring would be $9.33/ton. A summary of the calculated annual costs associated with a CCS system is shown in the following table. This is a very high annual cost and would make the proposed project economically unviable if selected.

Economic Feasibility Analysis for CCS

	Cost ($/ton CO_2 Avoided)	Potential Tons of CO_2 Avoided Per Year	Total Projected Annual Cost (Million $ per Year)
Capture and Compression	$146.15/ton	2,157,593 tons/yr	$315.2
Transport	$1.46/ton	2,157,593 tons/yr	$3.2
Storage	$9.33/ton	2,157,593 tons/yr	$20.1
Total CCS System Cost	$157.04/ton		$338.1

[14]Report of the Interagency Task Force on Carbon Capture and Storage, p. 37 (Aug. 2010) (http://www.epa.gov/climatechange/policy/ccs_task_force.html)

[15]Report of the Interagency Task Force on Carbon Capture and Storage, p. 44 (Aug. 2010) (http://www.epa.gov/climatechange/policy/ccs_task_force.html)

US EPA ARCHIVE DOCUMENT

In summary the high initial capital costs for CO_2 capture equipment and high annual average operating costs for CO_2 capture, transport, and storage would make the proposed project not economically feasible. Therefore, CCS is eliminated as a potential control option in this BACT analysis for CO_2 emissions.

5.1.5 Step 5: Select BACT

CEMEX proposes as BACT for this project, the following energy efficiency processes, practices, and designs for the proposed combined cycle combustion turbine:

- Cement Kiln Energy Efficiency
    - Kiln process control and management system
    - Kiln seal maintenance program
    - Kiln combustion system optimization
    - Kiln/Preheater insulation inspection program
    - Use of reciprocating grate clinker coolers
    - Use of in-line raw mills which recover heat from the kiln exhausts
    - Use of clinker cooler exhaust as secondary air to provide oxygen and heat to the kilns
    - Use of suspension preheater low pressure drop cyclones
    - Use of preheater/precalciner kilns
    - Use of efficient, variable frequency drives for kilns
    - Use of efficient, variable frequency drives for kiln fans
    - Use of multichannel kiln burners that allow for necessary mixing of fuel and air to complete combustion
    - Firing a portion of the fuel in the preheater riser duct
- Use of Lower GHG Emitting Fuels Including Natural Gas
- Use of Biomass Fuels

CEMEX proposes a combined BACT limit for Kilns 1 and 2 of 0.95 tons CO_{2e} per ton of clinker, rolling 12 month average. Compliance will be determined with the annual reporting of GHG emissions in accordance with 40 CFR Part 98.

CEMEX performed a search of the EPA's RACT/BACT/LAER Clearinghouse for Portland cement kilns and found no entries which address BACT for GHG emissions.
Although not listed in the RACT/BACT/LAER Clearinghouse, a GHG BACT analysis was performed by the following Portland Cement Plants: LaFarge Building Materials, Inc., Town of Coeymans, New York (commonly known as the Ravena Plant) and Universal Cement, Chicago, Illinois. A discussion of CEMEX's proposed BACT as compared to those projects is provided below:

LaFarge Ravena Plant

The proposed LaFarge project would replace the existing "wet" cement-making process at the Ravena Plant with a preheater/precalciner "dry" cement-making process. The proposed

US EPA ARCHIVE DOCUMENT

capacity of the modified plant was 2.81 million tons of clinker per year. The kiln system was designed to fire coal, petroleum coke, oil, and tire derived fuel. PSD Permit 4-0124-00001/00112 was issued on July 19, 2011. The permit included a GHG emission limit for the kiln system of 1900 pounds (0.95 tons) of CO_2 equivalent per ton of clinker, rolling 12 month average.

Universal Cement

Universal Cement proposed construction of a new preheater/precalciner kiln system capable of producing about 1 million tons per year of clinker. The clinker production train consists of an in-line raw mill, a blending silo, kiln system (preheat tower, precalciner, rotary kiln), clinker cooler and a solid fuel mill. Other equipment in the project includes clinker storage silos, a finish mill, and the associated raw material, solid fuel and finished product handling equipment. The kiln system was designed to fire coal and petroleum coke in the kiln and the precalciner; scrap tires, as available, in the precalciner; and natural gas or propane during kiln startup. Permit 031600GVX was issued by the Illinois Environmental Protection Agency on December 20, 2011. The permit included a GHG emission limit for the kiln system of 1860 pounds (0.93 tons) of CO_2 equivalent per ton of clinker, rolling 12 month average.

Carolinas Cement Company

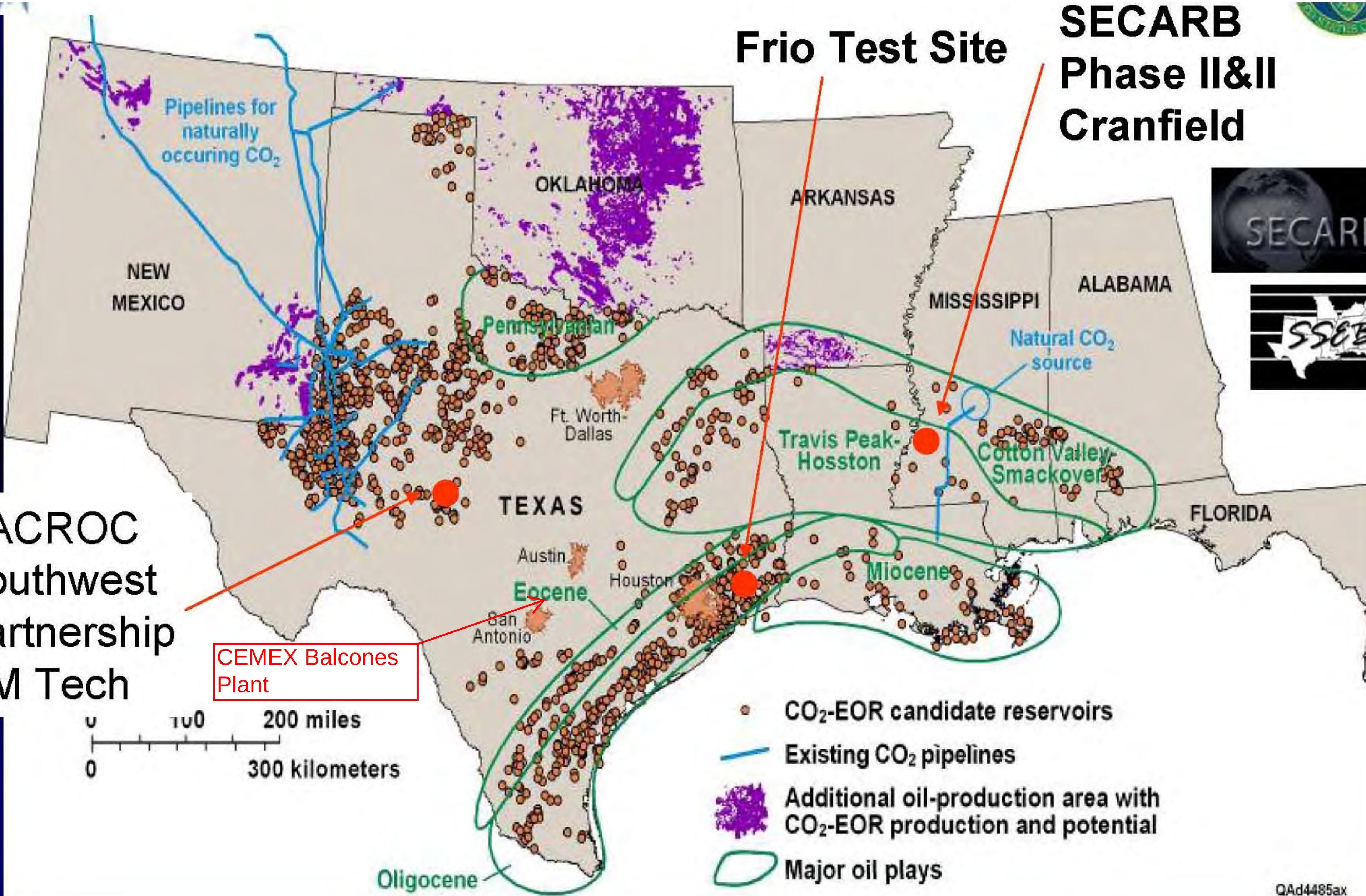
Carolinas Cement Company proposed to construct a new Portland cement manufacturing facility at the site of an existing cement storage terminal near Castle Hayne, North Carolina. The proposed plant consisted of a multistage preheater-precalciner kiln with an in-line raw mill, coal mill, alkali bypass and clinker cooler venting through the main stack. Production was proposed to be 6000 tons per day (tons/day) and 2,190,000 tons per year (tons/yr) of clinker. Fuels included coal, petroleum coke, biomass fuels (organic material that is available on a renewable or recurring basis), and distillate fuel oil. Coal and petroleum coke was proposed as the primary fuels. Biomass was proposed to be utilized to the extent practical depending on performance, availability, and economic viability. Fuel oil was proposed to be used mainly for kiln startup. Permit O7300R09 was issued by the North Caroline Department of Environment and Natural Resources on February 29, 2012. The permit included a GHG emission limit for the kiln system of 0.91 tons of CO_2 equivalent per ton of clinker, rolling 12 month average, determined with procedures used for reporting GHG emissions pursuant to 40 CFR Part 98.

CEMEX's proposed BACT limit of 0.95 ton CO_2e/ton clinker is equivalent to the BACT limit for the Ravena Plant modification but slightly higher than the BACT limit for the new Universal Cement Plant and the new Carolinas Cement Company Plant. Since the CEMEX kilns are existing, it is more appropriate to compare the BACT limit to the LaFarge Plant modification rather than the new plants being proposed by Universal Cement and Carolinas Cement Company. The CEMEX Kilns 1 and 2 incorporates a lower GHG emitting fuel, natural gas, and biomass into the fuel mix for the kilns and precalciner. The LaFarge Plant is not authorized for natural gas. The Universal Plant is authorized for natural gas or propane only during kiln startup. The Carolinas Cement Plant is not authorized for natural gas. Neither the LaFarge Plant nor the Universal Plant are authorized to fire biomass. The Carolinas Cement Plant

US EPA ARCHIVE DOCUMENT

proposed to utilize biomass to the extent practical depending on performance, availability, and economic viability.

US EPA ARCHIVE DOCUMENT



Frio Test Site
SECARB
Phase II&II
Cranfield
SACROC
Southwest
Partnership
NM Tech
CEMEX Balcones
Plant
Pipelines for
naturally
occuring CO_2
NEW
MEXICO
OKLAHOMA
ARKANSAS
MISSISSIPPI
ALABAMA
FLORIDA
TEXAS
Ft. Worth-
Dallas
Austin
San
Antonio
Houston
Pennsylvanian
Eocene
Oligocene
Miocene
Travis Peak-
Hosston
Cotton Valley-
Smackover
Natural CO_2
source
200 miles
300 kilometers
0
CO_2-EOR candidate reservoirs
Existing CO_2 pipelines
Additional oil-production area with
CO_2-EOR production and potential
Major oil plays
QAd4485ax
SECARB
SSEB

6.0 OTHER PSD REQUIREMENTS

6.1 IMPACTS ANALYSIS

An impacts analysis is not being provided with this application in accordance with EPA's recommendations:

> *Since there are no NAAQS or PSD increments for GHGs, the requirements in sections 52.21(k) and 51.166(k) of EPA's regulations to demonstrate that a source does not cause contribute to a violation of the NAAQS are not applicable to GHGs. Therefore, there is no requirement to conduct dispersion modeling or ambient monitoring for CO_2 or GHGs.*[16]

6.2 GHG PRECONSTRUCTION MONITORING

A pre-construction monitoring analysis for GHG is not being provided with this application in accordance with EPA's recommendations:

> *EPA does not consider it necessary for applicants to gather monitoring data to assess ambient air quality for GHGs under section 52.21(m)(1)(ii), section 51.166(m)(1)(ii), or similar provisions that may be contained in state rules based on EPA's rules. GHGs do not affect "ambient air quality" in the sense that EPA intended when these parts of EPA's rules were initially drafted. Considering the nature of GHG emissions and their global impacts, EPA does not believe it is practical or appropriate to expect permitting authorities to collect monitoring data for purpose of assessing ambient air impacts of GHGs.*[17]

6.3 ADDITIONAL IMPACTS ANALYSIS

A PSD additional impacts analysis is not being provided with this application in accordance with EPA's recommendations:

> *Furthermore, consistent with EPA's statement in the Tailoring Rule, EPA believes it is not necessary for applicants or permitting authorities to assess impacts from GHGs in the context of the additional impacts analysis or Class I area provisions of the PSD regulations for the following policy reasons. Although it is clear that GHG emissions contribute to global warming and other climate changes that result in impacts on the environment, including impacts on Class I areas and soils and vegetation due to the global scope of the problem, climate change modeling and evaluations of risks and impacts of GHG emissions is typically conducted for changes in emissions orders of magnitude larger than the emissions from individual projects that might be analyzed in PSD permit reviews. Quantifying the exact impacts attributable to a specific GHG source obtaining a permit in specific places and points would not be possible with*

[16] EPA, *PSD and Title V Permitting Guidance For Greenhouse Gases* at 48-49.

[17] *Id.* at 49.

US EPA ARCHIVE DOCUMENT

current climate change modeling. Given these considerations, GHG emissions would serve as the more appropriate and credible proxy for assessing the impact of a given facility. Thus, EPA believes that the most practical way to address the considerations reflected in the Class I area and additional impacts analysis is to focus on reducing GHG emissions to the maximum extent. In light of these analytical challenges, compliance with the BACT analysis is the best technique that can be employed at present to satisfy the additional impacts analysis and Class I area requirements of the rules related to GHGs.[18]

US EPA ARCHIVE DOCUMENT

[18] *Id.*

7.0 PROPOSED GHG MONITORING PROVISIONS

Kilns 1 and 2 currently have CO_2 continuous emission monitors that measure CO_2 emissions in the kiln stacks. Emissions of CH_4 and N_2O are calculated based on measured fuel inputs for each of the authorized fuels and multiplying by fuel specific emission factors from Table C-2 of the Mandatory Greenhouse Gas Reporting Rules, 40 CFR 98, Appendix C.

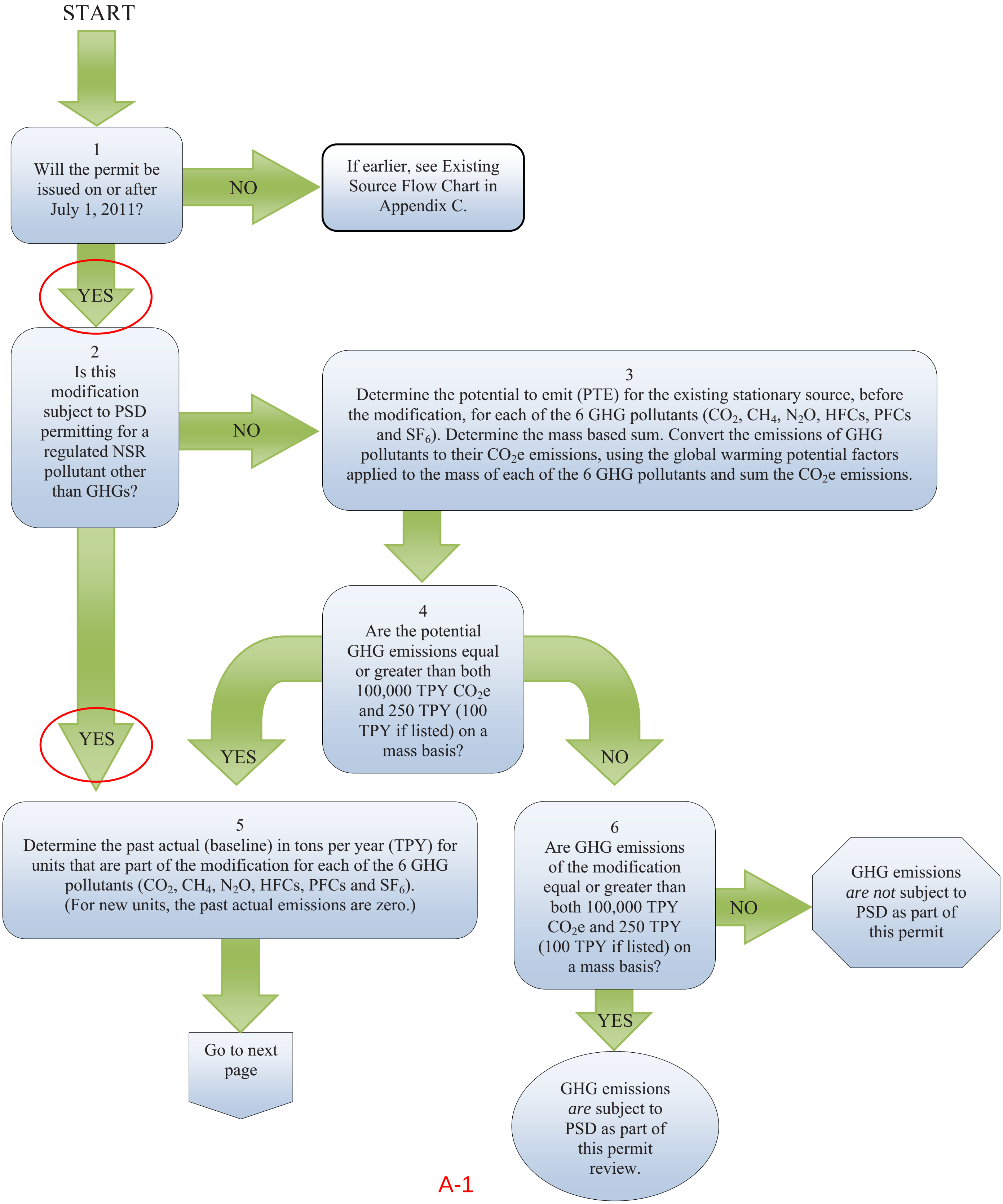
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX A

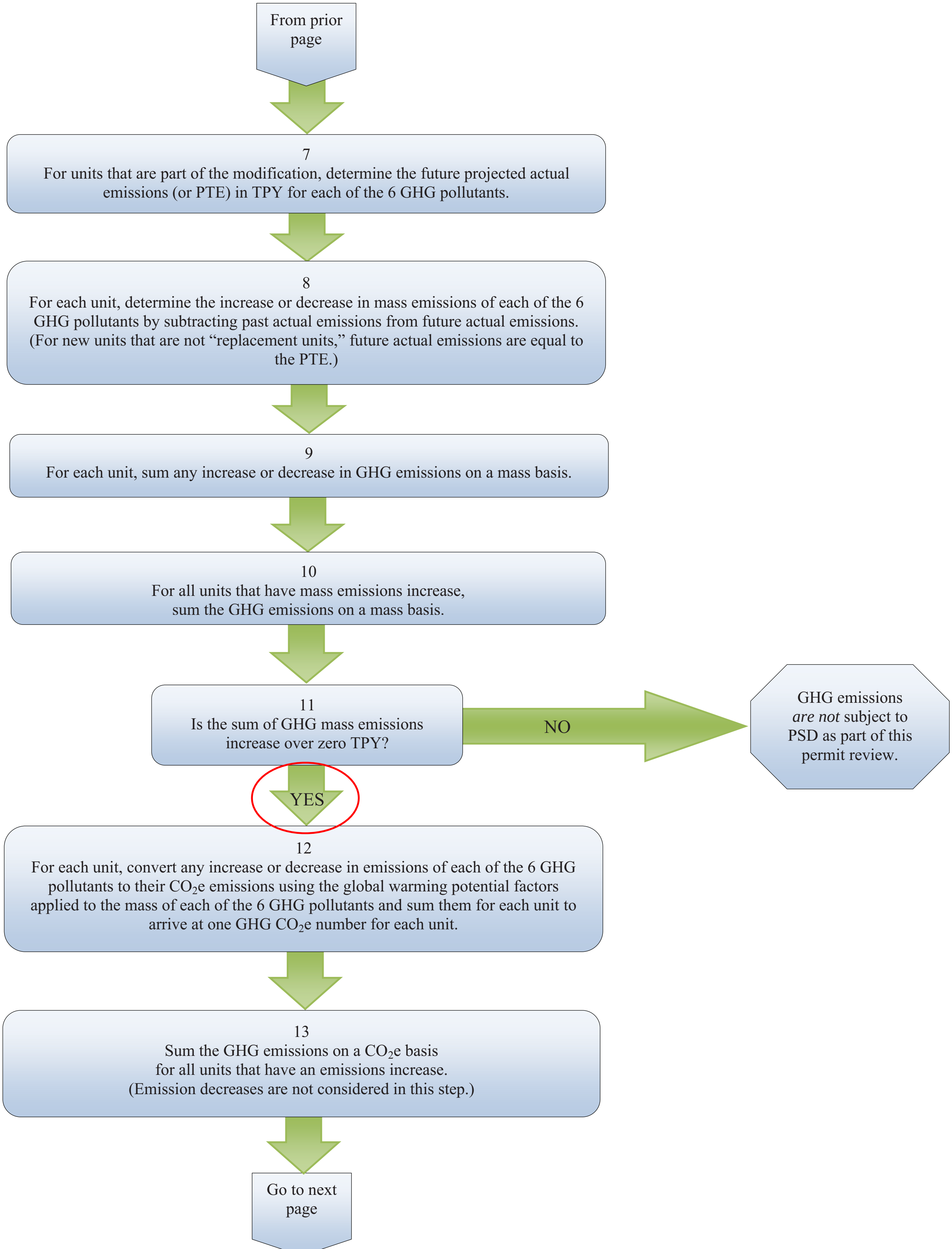
GHG PSD APPLICABILITY FLOWCHART – EXISTING SOURCES

GHG Applicability Flowchart – Modified Sources
(On or after July 1, 2011)

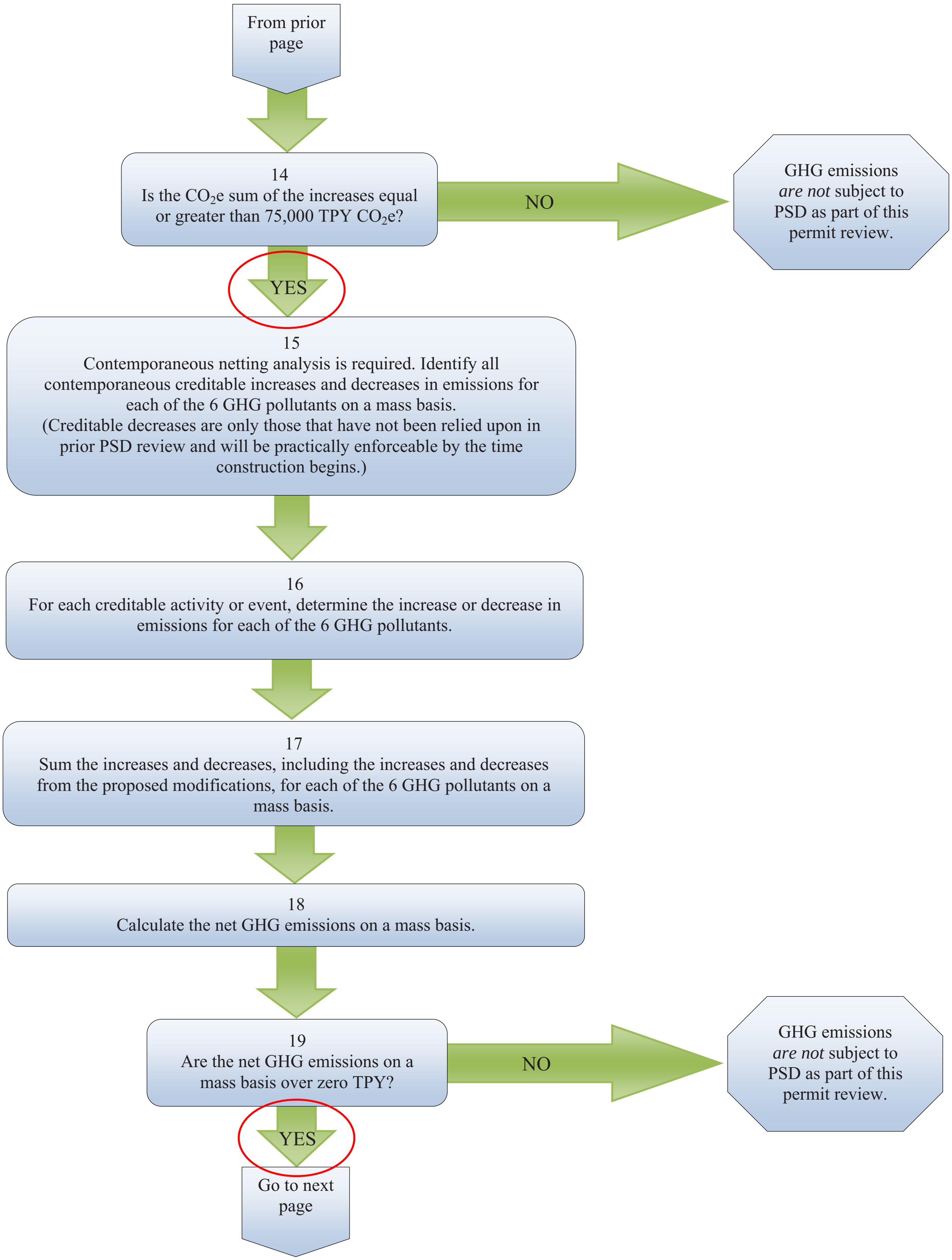


US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT



US EPA ARCHIVE DOCUMENT



US EPA ARCHIVE DOCUMENT