# Construction Permit
# Source Analysis & Technical Review

| | | | |
|---|---|---|---|
| Company | **Texas Lehigh Cement Company LP** | Permit Numbers | **154671, PSDTX1552, and GHGPSDTX189** |
| City | **Buda** | Project Number | **293888** |
| County | **Hays** | Regulated Entity Number | **RN102597846** |
| Project Type | **Initial** | Customer Reference Number | **CN600127666** |
| Project Reviewer | **Bill Moody, P.E.** | | |
| Site Name | **Portland Cement Production Plant** | | |

**Project Overview**

Texas Lehigh Cement Company LP submitted an application to authorize a new Kiln 2 (Emission Point No. [EPN] DC-38) and associated equipment at their Portland cement production plant in Buda, Hays County. The proposed clinker production rate will be 1,314,000 short tons per year.

1. New kiln support equipment will include: new raw material storage and transport equipment, new clinker storage and transport equipment, a new finish mill, a new inline raw mill, new finished product and loadout facilities, and a new emergency engine;
2. In addition to the currently authorized fuels for existing Kiln #1, alternative fuels are proposed for the new kiln including certain Non-Hazardous Secondary Materials as identified in 40 CFR 241.3 and 241.4, which are not considered solid wastes when combusted. Equipment for handling these fuels will also be authorized; and
3. Planned maintenance, startup, and shutdown (MSS) emissions related to Kiln 2 and its supporting equipment will be authorized.

The proposed increases for the new rotary kiln line are significant for PM, $PM_{10}$, $PM_{2.5}$, $NO_x$, VOC, CO, $SO_2$, $H_2SO_4$, and $CO_2e$ and will require PSD review.

The existing plant is currently a major source and is authorized by NSR Permit No. 3611D and PSD Permit No. PSDTX194M5, and various Permit by Rule (PBR) and standard permit registrations. However, the proposed 2$^{nd}$ kiln line and associated equipment will be authorized by separate permits: NSR Permit No. 154671, PSD Permit No. PSDTX1552, and Greenhouse Gas Permit No. GHGPSDTX189.

**Table 1: Emission Summary**

| Air Contaminant | Proposed Allowable Emission Rates (tpy) |
|---|---|
| PM | 155.39 |
| $PM_{10}$ | 150.98 |
| $PM_{2.5}$ | 118.15 |
| VOC | 184.53 |
| $NO_X$ | 1100.90 |
| CO | 1973.21 |
| $SO_2$ | 264.01 |
| $H_2SO_4$ | 91.51 |
| HCl | 14.79 |
| Hg | 0.01 |
| $NH_3$ | 34.35 |
| Pb | 0.05 |

**Table 2: GHG PSD Applicability**

| Air Contaminant | Proposed Allowable Emission Rates (tpy) | PSD Significant Emission Levels (tpy) | PSD Review Required |
|---|---|---|---|
| $CO_2$ Equivalents ($CO_2e$) | 1,281,936.03 | 75,000 | Yes |

The plant will emit the GHG contaminants listed in Table 3.

**Table 3: Greenhouse Gas Emission Summary**

| Air Contaminant | Proposed Allowable Emission Rates (tpy) | $CO_2e$ Calculations Using Global Warming Potential (GWP) |
|---|---|---|
| $CH_4$ | 1,597 | 25 x (63.85 + 0.03 +1.09E-06) = 1,597 |
| $N_2O$ | 2,767.23 | 298 x (9.28 + 0.006 + 2.18E-07) = 2,767.23 |
| $CO_2$ | 1,277,571.80 | 1 x (1,276,824.33 + 747 + 0.47) = 1,277,571.80 |
| $CO_2e$ | 1,281,936.03 | 1,597 + 2,767.23 + 1,277,571.80 |

**Compliance History Evaluation - 30 TAC Chapter 60 Rules**

| | |
|---|---|
| A compliance history report was reviewed on: | **12/20/2018** |
| Site rating & classification: | **0.00 / High** |
| Company rating & classification: | **0.00 / High** |
| If the rating is 50<RATING<55, what was the outcome, if any, based on the findings in the formal report: | **N/A** |
| Has the permit changed on the basis of the compliance history or rating? | **No** |

**Public Notice Information - 30 TAC Chapter 39 Rules**

| Rule Citation | Requirement | |
|---|---|---|
| 39.403 | Date Application Received: | **12/3/2018** |
| | Date Administratively Complete: | **12/12/2018** |
| | Small Business Source? | **No** |
| | Date Leg Letters mailed: | **12/12/2018** |
| 39.603 | Date Published: | **12/19/2018** |
| | Publication Name: | ***Hays Free Press*** |
| | Pollutants: | **carbon monoxide, nitrogen oxides, organic compounds, particulate matter including particulate matter with diameters of 10 microns or less and 2.5 microns or less, lead, sulfur dioxide, sulfuric acid, ammonia, hazardous air pollutants, and greenhouse gases** |
| | Date Affidavits/Copies Received: | **12/28/2018** |
| | Is bilingual notice required? | **Yes** |
| | Language: | **Spanish** |
| | Date Published: | **12/21/2018** |
| | Publication Name: | ***El Mundo*** |
| | Date Affidavits/Copies Received: | **12/28/2018** |
| | Date Certification of Sign Posting / Application Availability Received: | **1/24/2019** |
| 39.604 | Public Comments Received? | **No** |
| | Hearing Requested? | **No** |
| | Meeting Request? | **No** |
| | Date Response to Comments sent to OCC: | **N/A** |
| | Consideration of Comments: | **N/A** |

| | | |
|---|---|---|
| | Is 2nd Public Notice required? | **Yes** |
| 39.602(c) | Date SB 709 Legislative Notification Sent: | **1/25/2019, 8/27/2019** |
| 39.419 | Date 2nd Public Notice/Preliminary Decision Letter Mailed: | **9/4/2019 (amended notice)** |
| 39.413 | Date Cnty Judge, Mayor, and COG letters mailed: | **9/4/2019** |
| 39.603 | Date Published: | **9/11/2019** |
| | Publication Name: | ***Hays Free Press*** |
| | Pollutants: | **In a significant amount: carbon monoxide, nitrogen oxides, organic compounds, particulate matter including particulate matter with diameters of 10 microns or less and 2.5 microns or less, sulfur dioxide, sulfuric acid mist, and greenhouse gases. In addition, the facility will emit the following air contaminants: ammonia, hazardous air pollutants, and lead.** |
| | Date Affidavits/Copies Received: | **9/27/2019** |
| | Is bilingual notice required? | **Yes** |
| | Language: | **Spanish** |
| | Date Published: | **9/12/2019** |
| | Publication Name: | ***El Mundo*** |
| | Date Affidavits/Copies Received: | **9/27/2019** |
| | Date Certification of Sign Posting / Application Availability Received: | **10/17/2019** |
| | Public Comments Received? | **No** |
| | Meeting Request? | **No** |
| | Hearing Request? | **No** |

**Construction Permit & Amendment Requirements - 30 TAC Chapter 116 Rules**

| Rule Citation | Requirement | |
|---|---|---|
| 116.111(a)(2)(G) | Is the facility expected to perform as represented in the application? | **Yes** |
| 116.111(a)(2)(A)(i) | Are emissions from this facility expected to comply with all TCEQ air quality Rules & Regulations, and the intent of the Texas Clean Air Act? | **Yes** |
| 116.111(a)(2)(B) | Emissions will be measured using the following method: | **Recordkeeping; $NO_x$, $SO_2$, and CO CEMs; and stack testing** |
| 116.111(a)(2)(D) | Subject to NSPS? | **Yes** |
| | Subparts **A, F (Portland Cement Plants), Y (Coal Preparation Plants), OOO (Nonmetallic Mineral Processing Plants), & IIII (Stationary Compression Ignition Internal Combustion Engines)** | |
| 116.111(a)(2)(E) | Subject to NESHAP? | **No, the site does not emit any air contaminants regulated under 40 CFR Part 61.** |
| 116.111(a)(2)(F) | Subject to NESHAP (MACT) for source categories? | **Yes** |
| | Subparts **A, LLL (Portland Cement Industry), & ZZZZ (Stationary Reciprocating Internal Combustion Engines)** | |
| 116.111(a)(2)(H) | **Nonattainment review applicability: Hays County is in attainment or unclassified for all pollutants. Therefore, nonattainment review is not applicable.** | |

| | | | |
|---|---|---|---|
| 116.111(a)(2)(I) | **PSD review applicability: The cement plant is a named source (Portland Cement Plant) with a major source threshold of 100 tons per year. The existing plant is currently major and is authorized by NSR Permit No. 3611D and PSD Permit No. PSDTX194M5, and various Permit by Rule (PBR) and standard permit registrations.**<br><br>**The proposed increases for the new rotary kiln line and associated equipment are significant for PM, $PM_{10}$, $PM_{2.5}$, $NO_x$, VOC, CO, $SO_2$, $H_2SO_4$, and $CO_2e$ and require PSD review.** | | |
| 116.111(a)(2)(L) | Is Mass Emissions Cap and Trade applicable to the new or modified facilities? | | **No, the site is not located in the Houston-Galveston-Brazoria nonattainment area.** |
| 116.140 - 141 | Permit Fee: $ **75,000** | Fee certification: | **Yes** |
| | Applicable Outstanding Fees: | | **None as of 8/23/2019** |

**Title V Applicability - 30 TAC Chapter 122 Rules**

| Rule Citation | Requirement |
|---|---|
| 122.10(13) | **Title V applicability: The site is subject to Title V and operates under Title V Permit No. O-1132.** |
| 122.602 | **Periodic Monitoring (PM) applicability: Periodic monitoring will be conducted for visible fugitive emissions. Continuous Emissions Monitoring Systems (CEMS) will be used to demonstrate compliance with the $NO_x$, $SO_2$, CO, VOC (total hydrocarbon), and HCl emission limits for EPN DC-38. Sorbent tube testing will be conducted for mercury and periodic monitoring options are included for monitoring of ammonia. In addition, periodic recordkeeping will be performed to demonstrate compliance with emission limits. CAM requirements described below will also be included in the permit.** |
| 122.604 | **Compliance Assurance Monitoring (CAM) applicability: CAM requirements are included for Kiln #2 in the form of a Continuous Emissions Monitoring System (CEMS) for NOx and a Continuous Parametric Monitoring System (CPMS) for PM. These systems satisfy CAM.**<br><br>**CAM requirements are also included for the Finish Mill and Finish Mill Sweep baghouses. These baghouses will be monitored according to the requirements of MACT LLL. MACT LLL requires either daily visible emissions observations, installation of a continuous opacity monitoring system (COMS), or installation of a bag leak detection system. All of these options satisfy CAM. No other sources affected by this project are subject to CAM.** |

**Request for Comments**

| Received From | Program/Area Name | Reviewed By/Date | Comments |
|---|---|---|---|
| Region: | **11** | **N/A** | |
| ADMT: | **APD** | **Chad Dumas / 8/21/2019** | **Acceptable for all review types and pollutants** |
| Toxicology: | **EXEC** | **Nnamdi Nnoli / 8/22/2019** | **Does not anticipate that any short- or long-term adverse health effects will occur among the general public as a result of exposure to the proposed emissions from this facility** |
| Comment resolution and/or unresolved issues: | **None** | | |

## Process/Project Description

### *Raw Material Crushing, Conveying, and Storage*
A new limestone crushing plant will be built for the new kiln system. A new crusher will process limestone from the existing quarry and will be controlled by a baghouse (EPN DC-25). The crushed limestone conveying system will be controlled by a baghouse (EPN 26).

The new emission sources associated with the purchased raw materials additives conveying system include fugitive emissions associated with a front-end loader unloading into a bin (EPN K2FUG1) and emissions generated from the conveying which will be routed to a baghouse (EPN DC-27). A new additives storage building will be constructed for the storage of purchased raw materials additives including alumina, silica, and iron sources (EPNs K2ALUMINA1, K2ALUMINA2, K2SILICA1, and K2IRON1). The conveying of raw materials additives to and from the additives storage building will be controlled by baghouses (EPNs DC-28 and DC-28-1).

A new raw materials storage building will be constructed for the storage of limestone and marl (EPNs K2MARL1, K2MARL2, K2LIMESTN1 and K2LIMESTN2). The raw materials will be conveyed from the raw material storage building to the feed bins by a reclaim belt.

New feed bins will be constructed for the storage of limestone, marl, iron additive, silica additive, and alumina additives. The feed bins will be controlled by baghouses (EPNs DC-29-1 and DC-29-2). The conveyors transferring raw materials from the feed bins to the Kiln 2 Raw Mill be controlled by baghouses (EPN DC-30-1, DC-30-2, and DC-30-3).

### *Solid Fuel Processing*
Solid fuel will be delivered to the site by truck and rail and dumped into a below-grade Coal Bin (EPN K2FUG7). The solid fuel will be conveyed to Raw Fuel storage bins which will be controlled by a baghouse (EPNs DC-55). The solid fuel will be conveyed from the bins to the Fuel Grinding Plant. The conveying system will be vented to a baghouse (EPN DC-56). The Solid Fuel Crusher will be vented to a baghouse and then vented to the Main Kiln Stack (EPN DC-38). The solid fuel will be conveyed to two solid fuel hoppers which are controlled by baghouses (EPNs DC-57-1 and DC-57-2). The solid fuel will be conveyed from the solid fuel hoppers to the Kiln 2 Pre-calciner Burner and Kiln Burner. Solid alternative fuels will be dropped into a bin by front-end loader (EPN K2FUG8) and conveyed (EPN K2FUG8) to the Kiln 2 Pre-calciner.

### *In-Line Raw Mill*
Raw material will be transferred from the dry feed bins to a roller mill feeder belt. The enclosed roller mill system will be controlled by baghouses (EPNs DC-31, and DC-32). From the enclosed roller mill, raw feed material will be sent to the raw feed blend tanks which will be controlled by baghouses (EPNs DC-33, DC-34, DC-35-1, DC-35-2, and DC-36). From the blend tanks, the material will be stored in enclosed kiln feed storage bins until pneumatically fed to the dry process kiln preheater which will be controlled by baghouses (EPNs DC-35-1, DC-35-2, and DC-36).

### *Pyro Processing*
The finely ground and blended kiln feed will enter the suspension preheater through the top into the first of the cyclone type stages. As the material makes its vertical descent down the different stages of the preheater, material passes counter current to kiln and calciner exhaust gases. The kiln exhaust gases will vent from the preheater through a baghouse to the main exhaust stack (EPN DC-38). Alkali metals (i.e., sodium and potassium) will recirculate and build-up in the kiln system as they volatize and reform, but levels in the system are controlled by the alkali by-pass system. The alkali by-pass system pulls off a small volume of combustion gases at the kiln feed hood, and thereby, removes excess alkali metals in the form of by-pass dust from the pyro process system. The alkali by-pass system is controlled by a baghouse and will exhaust into the main kiln baghouse stack. The preheated kiln feed flows from the preheater tower into the rotary kiln where the high temperatures sinter and calcine the material. As the material moves counter-current to the air flow through the declined kiln, the kiln completes calcination and sinters material and forms small nodules called clinker.

Kiln 2 will include a selective non-catalytic reduction (SNCR) $NO_x$ control system. The SNCR system will utilize 19% aqueous ammonia stored in a pressure vessel with no routine emissions to the atmosphere. Ammonia emissions associated with the tank and ammonia piping valves, flanges and pumps are designated as EPN K2NH3FUG.

The Kiln 2 system will also have a system to inject lime into the Kiln 2 exhaust stream ahead of the main baghouse for additional $SO_2$ removal, as necessary. The lime will be delivered by truck and pneumatically conveyed to the Lime Bin which will be controlled by a baghouse (EPN DC-37). The Kiln 2 system will also have a system to inject activated carbon into the Kiln 2 exhaust stream ahead of the main baghouse for additional mercury (Hg) removal and/or hydrocarbon removal, as necessary to meet the MACT Subpart LLL Hg and the total hydrocarbon or the alternate total organic HAP limits. The dust collected by the main exhaust stack baghouse will be conveyed by screw conveyor from the baghouse to a kiln dust bin. The kiln dust bin will be controlled by a baghouse (EPN DC-39). The dust from the bin will be conveyed to either a feed bin, blend silo, or the finish mill kiln dust bin. The conveyors for the baghouse dust are controlled by a baghouse (EPN DC-40). The finish mill kiln dust bin will be controlled by a baghouse (EPN DC-47). The kiln dust from the finish mill kiln dust bin will be either conveyed to the Finish Mill or will be loaded into trucks. The kiln dust truck loading station will be controlled by a baghouse (EPN DC-52). The alkali by-pass dust collected from the Alkali by-pass baghouse will be transferred to the by-pass dust bin. The by-pass dust bin will be controlled by a baghouse (EPN DC-41). The dust will be conveyed from the by-pass dust bin to a truck loading station. The truck loading process will be controlled by a baghouse (EPN DC-53).

The new kiln system will be fueled with coal, a coal or petroleum coke blend, and/or natural gas. Texas Lehigh is proposing to authorize the use of the same alternative fuels that are currently authorized for Kiln 1 in Permit 3611D Special Conditions 6 and 7 including:

- untreated and unpainted waste wood (sawdust, wood chips, pallets, crates, and carpenter shop waste);
- construction and demolition waste including oriented strand board, particle board, medium density fiberboard, and laminated veneer lumber;
- Tire-derived fuel (TDF) as whole or chipped tires;
- Oil filter fluff; and
- shop rags, used absorbent, office trash, waste lubricants, and scrap high density polyethylene (HDPE) tubing, when introduced at the riser duct between the calciner and kiln.

In addition, Texas Lehigh proposes to utilize any fuels in Kiln 2 including certain Non-Hazardous Secondary Materials as identified in 40 CFR 241.3 and 241.4, which are not considered solid wastes when combusted. These include materials which are processed to produce a fuel, and which are managed as valuable commodities, have meaningful heating value, and contain contaminants or groups of contaminants at levels comparable in concentration to or lower than those in traditional fuel.

The use of the other alternative fuels beyond those specifically identified in this application is not expected to result in any increase in the amount of any air contaminant emitted by the facility into the atmosphere or result in the emission of any air contaminant not emitted by the kiln from the combustion of traditional fuels such as coal or petroleum coke. The organic constituents are not expected to result in increased emissions as the very high temperatures and long residence time assure complete disassociation of organics into their constituent elements, as with traditional fuels. Alternative fuels will not be combusted during periods of startup and shutdown.

The intermediate product clinker falls from the rotary kiln into the clinker cooler. The clinker cooler consists of a porous grate through which ambient air is blown to cool the clinker. The clinker cooler will be controlled by a baghouse (EPN DC-58).

***Clinker Handling and Storage***

The project will include a new clinker storage structure. Clinker produced in the dry process kiln will be delivered from the cooler to the clinker storage structure via an enclosed pan conveyor which will be controlled by baghouses (EPNs DC-42-1 and DC-42-2). The clinker storage structure will be controlled by a baghouse (EPN DC-43). The conveying of the clinker from the clinker storage structure to the Finish Mill will be controlled by baghouse (EPNs DC-44-1 and DC-44-2). An Off-spec Silo will be controlled by a baghouse (EPN DC-43). Fugitive emissions associated with transferring the off-spec product from the silo to a truck will be designated as EPNs K2FUG2 and K2FUG3.

***Finish Mills, Cement Storage, and Loadout***

The project will include the addition of a new Kiln 2 Finish Mill where a sequence of blending and grinding operations will be conducted that transforms clinker to finished Portland cement. Gypsum, fly ash, slag, limestone, synthetic gypsum, and other typical materials are added to the clinker during grinding to control the cement properties as required to meet cement type and customer specifications. A limestone truck unloading station will be constructed which will transfer limestone to a limestone feed bin. The limestone truck unloading will be controlled by a baghouse (EPN DC-46) and the limestone feed bin will be controlled by a baghouse (EPN DC-45). Feed bins for clinker, slag, and fly ash will also be controlled by a baghouse (EPN DC-45). Gypsum will be transferred from storage by front-end loader to a gypsum bin and then conveyed to the Finish Mill feed. Fugitive emission sources associated with the gypsum transfer will be EPNs K2FUG4, K2FUG5, and K2FUG6. The Finish Mill grinding and conveying operations will be controlled by baghouses (EPNs DC-48, DC-49, and DC-50).

The cement product will be stored in six new cement silos. The cement silos will be controlled by baghouses (EPNs DC-51-1 and DC-51-2). The cement product will be loaded from the storage silos to trucks and railcars. The truck/railcar loading systems will be controlled by baghouses (EPNs DC-54-1 and DC-54-2).

***Diesel Engine and Diesel Storage Tank***
One 750-horsepower (hp) diesel engine (EPN K2ENG) will be installed to provide emergency backup power generation for the new kiln system and to assist in turning Kiln 2 at reduced speeds during startup and shutdown. The engine will have a 500-gallon diesel storage tank to supply fuel for the engine. Emissions from the diesel storage tank will be designated as EPN DIESELTK1.

***General Equipment Startup/Shutdown Activities (Other Than Kiln)***
Most startup and shutdown activities for plant equipment which utilize baghouses occur under normal operation control conditions. Thus, particulate emissions will not exceed permitted emissions for normal operation during these activities.

***Kiln Startup/Shutdown***
Startup and shutdown of Kiln 2 will be a regular and planned operation at the Texas Lehigh Cement Plant. Startup means the time from when a shutdown kiln first begins firing fuel until it begins producing clinker. Startup of the kiln is defined by 40 CFR Subpart LLL as beginning when a shutdown kiln turns on the induced draft fan and begins firing fuel in the main burner. The startup period ends when feed has been fed continuously to the kiln for a period of at least 120 minutes or when the kiln feed rate exceeds 60 percent of the kiln design limitation rate, whichever occurs first. Typically, “cold starts” will take approximately 24 - 48 hours to reach the end of startup operations. Occasionally, startups occur following a kiln trip or kiln maintenance where the system is still warm, and the startup time is less than the “cold start” time. During these periods, emissions will mostly be products of combustion from fuel fired to heat the kiln prior to the start of clinker production.

Shutdown means the cessation of kiln operation. Shutdown begins when feed to the kiln is halted and ends when continuous kiln rotation ceases. Combustion may continue for a brief period following cessation of kiln feed to assist in moving the remaining material out of the kiln. The ID fan may also continue to run during MSS activities to draft the process. Additionally, it is necessary for the kiln to continue to turn in order to protect the shell and refractory. Shutdowns typically take approximately 24-48 hours.

During startup and shutdown periods, $NO_x$, CO, VOC, and $SO_2$ emissions are not expected to exceed the proposed short-term emission allowables. In addition, controls for particulate matter (PM) emissions are still in place during kiln start-up and shutdown, thus PM emissions are not expected to exceed their proposed normal operation hourly emission rates. Accordingly, Texas Lehigh is not proposing any increase above normal operation short term emissions from the kiln during start-up and shutdown operations.

***Inherently Low Emitting Activities***
Maintenance activities that generate emissions include vacuum truck unloading; refractory removal emissions; miscellaneous particulate filter maintenance emissions; kiln particulate filter maintenance emissions; and equipment heating. The maintenance related emissions associated with the Kiln 2 system are designated as EPN K2MSSFUG1.

***Plant-Wide Fugitive Dust Best Management Practices***
Plant roads at the Buda Cement Plant will be paved and cleaned, as necessary, to minimize the emissions of dust. Haul roads will be sprinkled with water and/or chemicals, as necessary, for dust abatement. An onsite water truck will be utilized as needed.

**Pollution Prevention, Sources, Controls and BACT- [30 TAC 116.111(a)(2)(C)]**

***BACT for Kiln 2***

$NO_x$ Emissions

$NO_x$ is formed in the cement kiln through thermal $NO_x$ formation and fuel $NO_x$ formation. Thermal $NO_x$ is produced by the reaction of oxygen and nitrogen at elevated temperatures. Fuel $NO_x$ arises from the reaction of the organically bound nitrogen in the fuel with oxygen.

A search of the EPA's RBLC for $NO_x$ emissions from cement kilns returned six cement kilns permitted in the past 10 years. The $NO_x$ BACT determinations for these kilns ranged from 1.50 to 1.95 lb ton clinker produced, 30-day rolling average.

Since Kiln No. 2 is commencing construction after June 16, 2008, it will be required to meet a limit of 1.50 pounds of $NO_x$ per ton of clinker on a 30-operating day rolling average under 40 CFR 60 Subpart F. Texas Lehigh is proposing 1.50 lb/ton clinker for a short term (30-day rolling average) or 1.67 lb/ton clinker for a short term (30-day rolling average) including alkali bypass as BACT for Kiln 2.

The $NO_x$ limit will be met with staged combustion in the precalciner and kiln and through installation of a SNCR $NO_x$ control system. The SNCR process basically consists of the injection of aqueous ammonia in the kiln flue-gas, at a location in the in-line precalciner where the temperature is in the range of 1550°F and 2000°F. An SNCR system's performance depends on temperature, residence time, turbulence, oxygen content, and a number of factors specific to the given gas stream. The aqueous ammonia solution is pumped through pipes and delivered into the precalciner or preheater tower through an injection lance. Compliance with the $NO_x$ BACT limit will be determined through an initial performance test and with $NO_x$ CEMs on the kiln main stack (EPN DC-38).

$SO_2$ and Acid Gas Emissions

Emissions of $SO_2$ are dependent on the concentration of pyritic sulfur in the limestone, sulfur content of the kiln fuels, and process conditions. $SO_2$ control is provided by the alkali absorption inherent in the pre-calciner kiln and by the baghouse abatement device's alkali filter cake. The Kiln 2 system will also have a system to inject lime into the Kiln 2 exhaust stream ahead of the main baghouse for additional $SO_2$ removal, as necessary.

A search of the EPA's RBLC for $SO_2$ emissions from cement kilns returned 8 cement kilns permitted in the past 10 years. Four of the cements kilns had a $SO_2$ BACT limit of 0.4 lb/ton clinker (30- day rolling average); one had a $SO_2$ BACT limit of 1.0 lb/ton clinker (30-day rolling average); one had a $SO_2$ BACT limit of 0.16 lb/ton clinker (30-day rolling average); and one had a tons per year limit and the information was not available to determine the lb/ton clinker limit.

Since Kiln No. 2 is commencing modification and construction after June 16, 2008, it will be required to meet a limit of 0.4 pounds of $SO_2$ per ton of clinker on a 30-operating day rolling average under 40 CFR 60 Subpart F. Thus, Texas Lehigh proposes a BACT limit for $SO_2$ of 0.4 lb/ton of clinker for a short term (30-day rolling average) and as a 12-month rolling average. Compliance with the $SO_2$ BACT limit will be determined with an initial performance test and a $SO_2$ CEMs on the Kiln 2 main stack (EPN DC-38).

The alkali absorption inherent in the pre-calciner kiln also provides control of acid gases, including hydrochloric acid (HCl) and sulfuric acid ($H_2SO_4$). Since $H_2SO_4$ is a PSD pollutant, a search of the EPA's RBLC was conducted for $H_2SO_4$ emissions from cement kilns. There were two entries for $H_2SO_4$ emissions from cement kilns and the reported BACT limits were 0.203 lb/ton clinker annual average for the Capitol Aggregates kiln and 0.11 lb/ton clinker 30-day rolling average for the Holcim Texas Limited Partnership cement kiln. Similar to $SO_2$, emissions of $H_2SO_4$ are dependent on the concentration of pyritic sulfur in the limestone, sulfur content of the kiln fuels, and process conditions.

Texas Lehigh proposes a BACT limits for $H_2SO_4$ of 1.1 lb/ton clinker (short-term) and 0.14 lb/ton clinker, 12-month rolling average, which is within the range of the two cement kilns listed in the RBLC. BACT will be met for HCl emissions from Kiln 2 by meeting the MACT LLL limit of 3 ppmvd @ 7% $O_2$. Compliance with the BACT limits for $H_2SO_4$ and HCl will be determined with an initial performance test.

VOC Emissions

VOC is formed by the incomplete combustion of fuel and from organic carbon contained in the raw materials. The low organic compound content of the limestone results in relatively low VOC emissions.

A search of the EPA's RBLC for VOC emissions from cement kilns returned seven cement kilns permitted in the past 10 years. The VOC BACT determinations for these kilns ranged from 0.1 to 0.5 lb ton clinker produced. One of the kilns listed the MACT LLL total hydrocarbon limit of 24 ppmvd @ 7% $O_2$ as the BACT limit.

To account for natural variation of organic carbon contained in the limestone in its on-site quarry, Texas Lehigh is proposing a VOC BACT that is not the lowest but is within the range of recently permitted cement kilns in the last 10 years. Texas Lehigh proposes BACT for VOC emissions from Kiln No. 2 as good combustion practices and combustion unit design with limits of 0.51 lb/ton clinker for a short term (30-day rolling average) and a level of 0.28 lb/ton clinker for a 12-month rolling average. These limits are within current BACT standards for recent permitting actions. The proposed VOC emissions from Kiln 2 will meet the MACT LLL total hydrocarbon limit of 24 ppmvd @ 7% $O_2$ (30-day rolling average) or the alternative limit of 12 ppmvd total organic HAP (30-day rolling average). The Kiln 2 system will also have a system to inject activated carbon into the Kiln 2 exhaust stream ahead of the main baghouse for additional THC removal, as necessary to meet the MACT Subpart LLL total hydrocarbon limit or the alternate total organic HAP limit. Compliance with the VOC BACT limit will be determined in the initial performance test and ongoing compliance will be determined with a Total Hydrocarbons CEMs on the Kiln 2 main stack (EPN DC-38).

PM/$PM_{10}$/$PM_{2.5}$ Emissions
Particulate emissions from the cement kiln can consist of dust from the clinker production process, ash from the combustion of fuel, and various condensables. Baghouse filters are the industry preferred devices for particulate control for the filterable PM emissions. A search of the RBLC for the last six years returned nine Portland cement facilities where a BACT determination was made for PM. The BACT determinations were on either a baghouse outlet grain loading (gr/dscf) basis or a lb PM (filterable) per ton clinker production basis. The BACT determination ranged from 0.003 – 0.01 gr/dscf basis and 0.02 – 0.58 lb/ton clinker produced basis.

PM, $PM_{10}$, and $PM_{2.5}$ (filterable) from the new Kiln 2 exhaust will be controlled with a baghouse. The filterable PM emissions will meet requirements under 40 CFR Part 63 Subpart LLL of 0.02 lb PM (filterable)/ton of clinker (30-day rolling average) for Kiln No 2 (as a new source). PM, $PM_{10}$, and $PM_{2.5}$ (filterable) for the Kiln 2 baghouse on an outlet grain loading basis will be no greater than 0.002 gr/dscf, based on baghouse vendor information. An additional 0.16 lb/ton clinker condensable PM (AP-42, Table 11.6-2) is also proposed for the Kiln 2 emissions. The total PM (filterable plus condensable) emission rate of 0.19 lb/ton clinker is within the range of PM BACT determinations for kilns permitted within the last 10 years. The baghouse also controls constituents of particulate matter, including lead (Pb) and mercury (Hg). Texas Lehigh proposes BACT for PM, $PM_{10}$, and $PM_{2.5}$ emissions as control with a baghouse. The proposed Hg emissions from Kiln 2 will also meet the MACT LLL emission limit of 21 pounds per million tons of clinker. The Kiln 2 system will have a system to inject activated carbon into the Kiln 2 exhaust stream ahead of the main baghouse for additional Hg removal, as necessary to meet the MACT Subpart LLL Hg limit. Compliance with the BACT level for PM will be determined by the initial performance test and ongoing compliance with the MACT LLL filterable particulate matter limit will be determined with a particulate matter Continuous Parametric Monitoring System. Compliance with the Hg MACT LLL limit will be determined through the use of a Hg sorbent trap monitoring system.

CO Emissions
CO is formed by the incomplete combustion of fuel, from hydrocarbons contained in the mineral materials that are released during the heating process, and from calcination reactions. The concentration of organic carbon in the limestone used (site dependent) can affect the CO emissions. A search of the RBLC for the last ten years returned nine Portland cement facilities where a BACT determination was made for CO. Of those facilities, all listed good combustion practices and/or proper design as BACT control for the CO emissions. BACT emission limitations ranged from 1.38 to 6 pounds of CO per ton of clinker produced (lb CO/ton clinker) on a 30-day rolling average with four of the facilities listing 2.0-3.0 lbs CO/ton clinker as BACT.

Texas Lehigh proposes BACT for CO emissions from Kiln No. 2 as good combustion practices and combustion unit design. Texas Lehigh proposes CO emissions from Kiln No. 2 as an annual average CO emission rate of 3.0 lb/ton clinker, achieved with good combustion practices and proper design of the preheater, precalciner kiln. The proposed CO BACT emission level is within the range of recently issued air permits for preheater, precalciner kilns. Compliance with the CO BACT limit will be determined through an initial performance test and through the use of a CO CEMs on the Kiln 2 main stack (EPN DC-38).

$NH_3$ Emissions
$NH_3$ emissions from a kiln can occur from the pyrolysis of nitrogen-bearing compounds in fossil fuels and in the limestone raw materials and from unreacted $NH_3$ from the SNCR $NO_x$ emission control system. Texas Lehigh will operate the SNCR system in a manner that ammonia slip (i.e., the emission of unreacted ammonia to the atmosphere) is minimized while ensuring that the $NO_x$ emissions limits are met. Control of the ammonia injection system and operating parameters will be maintained to control ammonia slip emissions in the kiln exhaust stream to levels not exceeding 65 ppmvd on a 30- day rolling average and 11 ppmvd on an annual basis. These ammonia emission rates are equivalent to 0.272 lb/ton clinker (30-day rolling average) and 0.05 lb/ton clinker (annual average). The higher short-term $NH_3$ limit is necessary for periods when the in-line raw mill is not operating, and the kiln exhaust is not getting gas scrubbing action with the mill and for periods when higher nitrogen-bearing raw bearing raw materials are encountered from the on-site quarry. BACT for ammonia emissions from other recent cement plant air permits in Texas include: Buzzi Unicem 2009 permit for a new preheater, precalciner kiln – 0.24 lb/ton clinker hourly average, 0.22 lb/ton clinker, annual average; TXI Hunter 2013 permit amendment for a new preheater, precalciner kiln – 0.059 lb/ton clinker, annual average; CEMEX Balcones 2013 permit amendment 0.01 lb/ton clinker; Capitol Cement 2017 permit for a new preheater, precalciner kiln – 0.5221 lb/ton clinker (30- day rolling average); Alamo Cement 2017 Permit for a new preheater, precalciner Kiln – 35 ppmvd @ 7% $O_2$, and U.S. Cement Brady Plant, pending permit for a new white cement kiln, 0.027 lb/ton clinker (annual). The proposed ammonia BACT emission level is within the range of recently issued air permits for preheater, precalciner kilns. Compliance with the $NH_3$ BACT limit will be determined through an initial performance test and through the use of one of the $NH_3$ monitoring options on the Kiln 2 main stack (EPN DC-38) that will be prescribed in the air permit.

GHG Emissions
$CO_2$ is generated as a byproduct of the calcination process and as a result from fuel combustion. GHG species directly emitted by the combustion of natural gas, coal and petroleum coke from this project are $CO_2$, $N_2O$, and $CH_4$. In the production of Portland cement, the calcium carbonate in limestone dissociates in the presence of heat into $CO_2$ and calcium oxide in a process called calcination. The $CO_2$ emissions generated as a byproduct of the calcination process is inherent in the production of Portland cement and there is no alternate production method that could minimize those emissions. The emissions of GHG emissions from the combustion of fuel will be minimized through the use of an energy efficient kiln. Kiln 2 will be a 4-stage preheater, precalciner kiln preheater consisting of low pressure drop cyclones in suspension. The purpose of the preheater is to transfer heat from the kiln exhaust to the incoming kiln feed, thereby reducing the energy needed from the combustion of fuels. GHG emissions from cement kilns can potentially be lowered through the use of lower GHG emitting fuels. Kiln 2 will have the inherent design capability of combusting the following fuels in the kiln/precalciner system: coal, petroleum coke, natural gas and alternative fuels described previously in the Process Description. This intrinsic fuel flexibility is common in cement plants that often rely on solid fuels for their primary fuel. The ability to match kiln operation to the most cost efficient fuel available is essential to the sustainable operation of a cement kiln which produces a commodity product in a market with other kilns of similar capabilities. Fuel costs, availability, reliability, and kiln process variables will primarily dictate the fuel mix that will be used in the kiln.

A search of the EPA's RBLC for GHG emissions from cement kilns returned six cement kilns permitted in the past 10 years. The GHG BACT determinations for these kilns ranged from 0.92 to 0.97 tons of $CO_2e$ per ton of clinker produced, 12-month rolling average. Three of the entrees list good combustion practices as the control method description and two list the use of a multi-stage preheater, precalciner kiln as the control method description. Five of the entries on the RBLC list, GCC Permian, LLC, Capitol Aggregates, Inc., Alamo Cement Company, and Rio Grande Cement Plant make regular grey Portland Cement while one entry on the RBLC list, US Cement LLC, proposes to make white Portland Cement. Grey cement is primarily used in concrete for construction purposes while white cement, due to its color, is primarily used for architectural interior and exterior decorations, floorings, and ornamental concrete products. All five of the grey Portland Cement Plants utilize a similar fuel mix as the proposed Texas Lehigh Kiln 2, a solid fuel consisting of coal and/or petroleum coke, along with natural gas, tire derived fuels, and various alternative fuels. The GHG BACT determinations for the grey Portland Cement kilns ranged from 0.92 to 0.97 tons of $CO_2e$ per ton of clinker produced, 12-month rolling average. The white Portland Cement Plant proposed natural gas as the only fuel for the kiln. While GHG emissions associated with the combustion of natural gas are lower than GHG emissions associated with the combustion of coal and/or petroleum coke, the production of white Portland Cement requires approximately 40% more heat input from fuel per ton of clinker than the production of grey Portland Cement. The GHG BACT limit in the draft permit for the white Portland Cement plant is 0.95 tons of $CO_2e$ permit ton of clinker produced, 12-month rolling average which is within the range of the grey Portland Cement Plants.

Texas Lehigh is proposing a GHG limit of 0.97 tons $CO_2e$ per ton clinker produced, 12-month rolling average, as BACT for this project. This is within the range of accepted BACT for new cement kilns. Compliance with the GHG BACT limit will be determined by the use of a $CO_2$ CEMs on the main Kiln 2 main stack (EPN DC-38) and through the GHG reporting methods prescribed in 40 CFR 98, Subpart H.

<u>Kiln Startup/Shutdown</u>
Startup and shutdown periods from Kiln 2 are minimized such that there will be no emissions higher than normal operation emission levels for the kiln. Texas Lehigh also proposes to limit the duration of kiln startups and shutdowns as described in the Process Description. Texas Lehigh proposes that minimizing the kiln startup and shutdown periods represents BACT for this unit.

***BACT for Kiln 2 Clinker Cooler***
The new Kiln 2 Clinker Cooler will be controlled by a new baghouse. Current TCEQ BACT for baghouses is emissions no greater than 0.01 grains per dry standard cubic foot (gr/dscf). Because the Kiln 2 Clinker Cooler is commencing construction after June 16, 2008, emissions will be required to meet a limit of 0.02 pounds of filterable PM per ton of clinker on a 30-operating day rolling average under 40 CFR 63, Subpart LLL.

A search of the RBLC for the last ten years returned four Portland cement facilities where a BACT determination was made for PM from clinker coolers. BACT emission limitations were listed on a baghouse outlet grain loading limit basis. Three of the entries listed 0.01 gr/dscf BACT limit and one listed 0.005 gr/dscf BACT limit.

Texas Lehigh is proposing total particulate emissions based on an outlet grain loading of 0.002 gr/dscf. The proposed emission rate is lower than the MACT LLL emission limit of 0.02 lb PM/ton clinker for new Clinker Coolers and is lower than the TCEQ BACT guidance of 0.01 gr/dscf for baghouses and the BACT emission limitations listed in the RBLC. Compliance with the BACT level for PM from the Clinker Cooler will be determined by the initial performance test required by the MACT and ongoing compliance with the MACT Subpart LLL filterable particulate matter limit will be determined with a particulate matter Continuous Parametric Monitoring System.

***BACT for Material Handling Operations/Storage Piles***
Current TCEQ BACT for material handling operations/storage piles is a minimum of 70% reduction of emissions. This can be accomplished through water sprays, partial enclosure, full enclosure, or a combination of controls. Note that partial enclosure generally means 3 sides and a roof, while full enclosure usually means 4 sides and a roof and minimal gaps (some passive venting and some doors may be intermittently open).

All of the proposed new stockpiles will be located within a building, which provides a 90% control efficiency. Therefore, the stockpiles meet the BACT requirement of 70% reduction.

Current TCEQ BACT for baghouses is emissions no greater than 0.01 grains per dry standard cubic foot (gr/dscf) or 99% control.

- The control efficiency of the following baghouses controlling material handling operations prior to the Raw Mill will be at least 99% or no greater than 0.01 gr/dscf: DC-25, DC-26, DC-27, DC-28, DC-28-1, DC-29-1, DC-29-2, DC-30-1, DC- 30-2, DC-30-3, DC-31, DC-32, DC-42-1, DC-43, DC-44-1, DC-44-2, DC-45, DC-46, DC-55, and DC-56.
- The outlet grain loading of the following baghouses will be no greater than 0.0044 gr/dscf: DC-33, DC-34, DC-35-1, DC-35-2, DC-36, DC-37, DC-39, DC-40, DC-41, DC-42-2, DC-47, DC-50, DC-51-1, DC-51-2, DC-52, DC-53, DC-54-1, DC-54-2, DC-57-1, and DC-57-2.
- The outlet grain loading of the following baghouses will be no greater than 0.002 gr/dscf: DC-48 and DC-49.

Therefore, all proposed baghouses meet the current TCEQ BACT requirements for baghouses. Compliance with the opacity limits associated with the baghouses will be determined through periodic visual emission observations.

All other proposed material transfers associated with the Kiln 2 system will be either partially (85% control) or fully (90% control) enclosed. Therefore, all of the material transfers will meet the BACT requirement of 70% reduction. Compliance with the opacity limits associated with the material transfers will be determined through periodic visual emission observations.

***BACT for Miscellaneous ILE Maintenance Activities***
BACT for ILE maintenance activities included in this application will consist of best management practices to minimize

emissions.

***BACT for Ammonia Storage and Piping***
19% aqueous ammonia will be used for the SNCR $NO_x$ control system for Kiln 2. The aqueous ammonia will be stored in a pressure vessel with no routine emissions to atmosphere. Ammonia emissions associated with fugitive emissions from the piping components in ammonia service will be minimized by utilizing a low concentration (19 wt%) aqueous ammonia solution. The use of a pressure vessel for ammonia storage and the use of low concentration aqueous ammonia will meet the requirements of BACT.

***BACT for Diesel-Fired Equipment***
BACT for the diesel-fired engine will be achieved through the installation of an engine that meets the vendor certification requirements of 40 CFR 60, Subpart IIII, through the proper operation and maintenance of the engine, and through the burning of diesel fuels meeting the sulfur requirements of 40 CFR 80.510(c).

The horizontal fixed roof diesel storage tank associated with the engine meet the current TCEQ BACT requirements for storage tanks since the tanks will be less than 25,000 gallons and the vapor pressure for diesel is much less than 0.5 psia (< 0.01 psia). BACT for GHG emissions from the engine is proposed as appropriate operation of the engine through proper fuel to air ratios and maintenance based on recommended readiness testing and low annual hours of operation are selected as BACT for the proposed engine.

From the RBLC, several facilities had GHG BACT items stated for diesel fuel-fired emergency engines. All of the RBLC results for diesel fuel-fired emergency engines included annual GHG emission limits and annual operating hour limits. The BACT for the diesel fuel-fired engine proposed is comparable to recently issued permits for similar diesel fuel-fired engines.

***BACT for Equipment Heating MSS Activity***
BACT for the equipment heating MSS activity will be achieved through the use of a lower emitting fuel, propane, and by minimizing the duration and occurrence of the MSS activity.

**Impacts Evaluation - 30 TAC 116.111(a)(2)(J)**

| | | | |
|---|---|---|---|
| Was modeling conducted? **Yes** | | Type of Modeling: | **AERMOD** |
| Will GLC of any air contaminant cause violation of NAAQS? | | | **No** |
| Is this a sensitive location with respect to nuisance? | | | **No (low)** |
| [§116.111(a)(2)(A)(ii)] Is the site within 3000 feet of any school? | | | **No** |
| Additional site/land use information: According to the TCEQ Regional Office site review, the surrounding land use is residential and commercial. However, according to the City of Buda zoning map, the site and surrounding land is mostly zoned as industrial. The distance to the nearest off-property receptor, a commercial building, is 311 feet. | | | |

**Summary of Modeling Results**
An Air Quality Analysis (AQA) was performed by the company for $PM_{10}$, $PM_{2.5}$, $NO_x$, CO, $SO_2$, ozone, Pb, and $H_2SO_4$. A health effects review was conducted for speciated PM including Portland cement and silica, mercury, hydrogen chloride, and speciated VOCs. The site-wide modeling demonstration included changes proposed in a concurrent amendment project for the same site for Kiln 1 (Project No. 296745). The AQA was audited by the Air Dispersion Modeling Team and was found to be acceptable for all review types and pollutants. Details can be found in the modeling audit memo (Groupwise NSRP Document No. 620284).

Since the modeling predicted exceedances of Portland cement and silica, a request for comments was submitted to the TCEQ Toxicology Division (TD). The TD determined that considering the magnitude and frequency of ESL exceedances, the predicted chemical emissions are allowable. As a result, the TD does not anticipate that any short- or long-term adverse health effects will occur among the general public as a result of exposure to the proposed emissions from this facility.

In regards to GHG emissions, the TCEQ Executive Director has determined that air dispersion modeling is not required for GHG emissions as it would not determine air quality impacts from the proposed new facility or source modification. The impacts review for individual air contaminants classified as part of GHGs will continue to be addressed, as applicable, in the state's traditional minor and major NSR permits program per 30 TAC Chapter 116.

In summary, no adverse health effects or violations of the NAAQS are expected as a result of this project.

**Permit Concurrence and Related Authorization Actions**

| | |
|---|---|
| Is the applicant in agreement with special conditions? | **Yes** |
| Company representative(s): | **Larry Moon, Power Engineers** |
| Contacted Via: | **Email** |
| Date of contact: | **5/21/2019** |
| Other permit(s) or permits by rule affected by this action: | **No** |

| | | | |
|---|---|---|---|
| | 10/21/2019 | | 10/21/2019 |
| Project Reviewer<br>Bill Moody, P.E. | Date | Section Manager<br>Bonnie Evridge | Date |