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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-0682B
Plant ID No.: 003-00002
Applicant: Continental Brick Co.
Facility Name: Martinsburg
Location: Martinsburg, Berkeley County
NAICS Code: 327120
Application Type: Modification
Received Date: November 13, 2013
Engineer Assigned: Laura Jennings
Fee Amount: \$1,000.00
Date Received: November 18, 2013
Complete Date: January 24, 2014
Due Date: April 24, 2014
Applicant Ad Date: November 25, 2013
Newspaper: *The Journal*
UTM's: Easting: 245.4 km Northing: 4,368.9 km Zone: 18
Description: Modify the hydrogen fluoride emissions based on natural fluctuation of shale fluoride and add a proposed rotary sand dryer.

DESCRIPTION OF PROCESS

Continental Brick Company's Martinsburg Facility (Continental) is a face brick manufacturing operation which includes quarry to final brick production and storage. The weathered Martinsburg Shale is quarried by the use of pans, crushed, screened, wetted, mixed in a pug mill, vacuum extruded, trimmed and cut to form the final shape of the green face bricks. Green face bricks then pass through the warming room, drying room, and kiln to remove the moisture in a controlled manner and then to fire the bricks. Fired bricks are sorted and packaged for sale. Bricks not meeting the specifications (waste bricks) are disposed of on property and some of the off-specification bricks can be reground and reused in the brick-making process.

Hydrogen Fluoride Emissions:

This application requests a revision for hydrogen fluoride (HF) emissions recordkeeping and emissions. Naturally occurring fluoride is driven to HF in the kiln process. Continental samples for fluoride in both a dried brick and a fired brick (samples of the same brick). The samples are sent for testing to Clemson University's The Bishop Materials Laboratory (Clemson). While some of the fluoride stays within the brick, the rest is assumed to be turned into HF in the kiln and then released. The previous samples and the current samples have all been analyzed by Clemson.

Based on available data, at the time of the permit application review, it was anticipated that the resulting HF would not exceed 902.7 micrograms per gram on a twelve month rolling average. This was based on the available data on the fluoride content of the brick. Over the past years, more data has been gathered including operational fluctuation. With the overall average of the shale staying below the 902.7 micrograms per gram, the facility can exceed the limit on a rolling twelve month basis due to reduced operations (periods where there is no operation at all). It is proposed that the twelve month rolling average be increased to account for the fluctuation in operations. Typically, some higher readings would be averaged out over a year's time frame; however, without operating, the amount of data points is reduced and the twelve month average does not average out below the limit. Data is provided in the calculations on the brick testing from 2010 to 2013.

The proposed method of doing so is to reset the limit based on the data which is now available. HF original limit was based on the highest sample. We propose to set the limit at the new highest sample point of 1,150 micrograms per gram.

Rotary Sand Dryer:

Sand is used at this facility to produce sanded bricks. Sanded bricks are bricks which have the face of the brick sanded after the bricks are formed. The extruder extrudes a line of bricks and then sand is placed on the face of the brick. The dry sand sticks to the brick and the brick is called a sanded brick. The sand has to be dry to allow it to flow from the feed hoppers and stick to the brick properly.

Currently, the facility dries the sand in an old beehive brick kiln. A load of sand is placed inside the kiln, the kiln is closed up, and natural gas burners are turned on to heat up the inside of the kiln and dry the sand.

Continental is developing a Rotary Sand Dryer (RSD) which utilizes a natural gas burner from the beehive dryer. The RSD is fed sand by shovel. The sand is heated and dried in the barrel of the RSD and discharged through the other end of the RSD.

Emissions for the process are based on AP-42, Section 11.19.1, Sand and Gravel Processing and also AP-42, Section 1.4, Natural Gas Combustion (External Combustion Sources). Where the same pollutant is provided in both sections for PM and NO_x, the highest value is used between the two sections.

Emission Units Table:

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type and Date of Change	Control Device
Kiln 1	K1E	Tunnel Kiln No. 1	1966	8.25 ⁽¹⁾	Update Emissions	N
Kiln 2	K2E	Tunnel Kiln No. 2	1966	8.25 ⁽¹⁾	Update Emissions	N
P-Kiln	P-K3E	Periodic Kiln	2010	2 ⁽²⁾	Update Emissions	N
RSD	RSD	Rotary Sand Dryer	2013	1 ⁽³⁾ and 1.0 MMBTU/hr	New	N
⁽¹⁾ The design capacity shown is in tons per hour of fired product						
⁽²⁾ The design capacity shown is tons per cycle (3 day firing and cooling cycle)						
⁽³⁾ Tons per hour of material fed to dryer.						

SITE INSPECTION

A full on site targeted inspection was conducted by Joseph Kreger of DAQ's, Compliance and Enforcement Section on July 24, 2013. At the time of the inspection, the facility was found to be in compliance. A site visit by the writer is not planned for this permit modification application.

Directions to the facility: From Interstate 81, take Exit 12. Travel East on State Route 9 approximately 1.5 miles. The facility is located on the right side of State Route 9.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The hydrogen fluoride (HF) emission factor used in calculating the emissions from the kilns [K1, K2, and PK-3] is from material testing and is material specific instead of fuel specific. The existing HF emission factor was from the highest HF release value from multiple samples taken in October 2008 and October 2009. The proposed HF emission factor is the highest HF release value from monthly samples taken between August 2010 and October 2013. The highest value was obtained from a sample taken August 1, 2012.

The rotary sand dryer [RSD] emissions were calculated using the maximum calculated emissions from either AP-42, Section 11.19.1 (Sand and Gravel Processing) and AP-42, Section 1.4 (Natural Gas Fired External Combustion). The fugitive emissions associated with the rotary sand dryer were calculated using an equation from AP-42, Section 13.2.4

(Aggregate Handling and Storage Piles).

Emission calculations were reviewed and verified by the writer.

The emissions summary table below shows the changes in emissions that are associated with the proposed changes in this application.

Emissions Summary Table:

Emission Point ID	Emission Unit ID	Emission Unit Description	Regulated Pollutant	Maximum Potential Uncontrolled Emissions	
				lb/hr	tpy
K1E	Kiln 1	Tunnel Kiln No. 1	Hydrogen Fluoride (HF)	18.98	83.11
K2E	Kiln 2	Tunnel Kiln No. 2	Hydrogen Fluoride	18.98	83.11
P-K3E	P-Kiln	Periodic Kiln	Hydrogen Fluoride	4.60	0.08
RSD	RSD	Rotary Sand Dryer	PM	2.01	1.21
			PM ₁₀	2.00	1.20
			PM _{2.5}	2.00	1.20
			SO ₂	0.01	0.01
			NO _x	0.10	0.44
			CO	0.09	0.37
			VOC	0.01	0.03
			Total HAP	0.02	0.02
			Greenhouse Gas (CO ₂ e)	n/a	526

Facility Wide Emissions Increase Table:

Regulated Pollutant	Existing R13-0682A Emissions		Proposed R13-0682B Emissions		Emissions Increase	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Hydrogen Fluoride (HF)	33.48	130.87	42.56	166.30	9.08	35.43
PM	59.73	188.67	61.74	189.87	2.01	1.21
PM ₁₀	36.3	129.13	38.31	130.34	2.00	1.20
PM _{2.5}	19.68	73.98	21.68	75.19	2.00	1.20
SO ₂	29.21	122.18	29.22	122.19	0.01	0.01
NO _x	10.27	39.22	10.37	39.66	0.10	0.44
CO	22.67	88.61	22.76	88.98	0.09	0.37

VOC	0.50	1.88	0.51	1.91	0.01	0.03
Hydrogen Chloride (HCl)	3.14	12.29	3.14	12.29	0	0
non HF/HCl HAPs	0.21	0.70	0.23	0.72	0.02	0.02
Greenhouse Gas (CO ₂ e)	n/a	n/a	n/a	n/a	n/a	526

REGULATORY APPLICABILITY

A discussion regarding the regulatory requirements specific to the changes associated with this permit application is provided below. The regulations listed below were reviewed in consideration of the proposed changes addressed in the application.

State Regulations:

45CSR2 TO PREVENT AND CONTROL PARTICULATE AIR POLLUTION FROM COMBUSTION OF FUEL IN INDIRECT HEAT EXCHANGERS

The Rotary Sand Dryer [RSD] has a maximum design heat input of 1.0 MMBtu/hr and therefore is exempt from sections 4, 5, 6, 8, and 9 of this rule in accordance with the § 45-2-11.1.

The applicant is subject to the visible emissions standards (10% opacity based on a six minute block average) of section 3. The applicant stated in the regulatory section of the application that the RSD is designed to meet 10 percent opacity.

The applicant will demonstrate compliance with the opacity requirement by demonstrating compliance with the permit requirements.

45CSR7 TO PREVENT AND CONTROL PARTICULATE MATTER AIR POLLUTION FROM MANUFACTURING PROCESSES AND ASSOCIATED OPERATIONS

The Rotary Sand Dryer [RSD] is subject to this rule. The RSD is a type “a” source and will be subject to the 20% opacity requirement and the particulate matter emission rate. The PM emission rate based on the proposed process rate of 2,000 lbs/hr is 2.4 lbs/hr. The potential emission rate for PM is 1.92 lb/hr which demonstrates that the applicant will be in compliance.

The applicant will demonstrate compliance with the opacity requirement by demonstrating compliance with the more stringent opacity requirements of 45CSR2. The applicant has stated in the application that the RSD is designed to meet the 10% opacity requirement and burns only natural gas.

45CSR10 TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF SULFUR OXIDES

The Rotary Sand Dryer [RSD] has a maximum design heat input of 1.0 MMBtu/hr and therefore, it is exempt from the sulfur dioxide emission standard of section 3 and sections 6 through 8. Furthermore, the RSD combusts only natural gas and is exempt from the requirements of section 8.

The RSD is not subject to 45CSR10.

45CSR13 PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

The changes proposed in this application meet the definition of a modification to 45CSR §13 - 2.17.b. The change results in an increase of potential emissions of 2 lbs/hr or 5 tpy of hazardous air pollutants considered on an aggregated basis.

The applicant has met the requirements of 45CSR13 by placing a Class I legal notice in *The Journal* on November 25, 2013, providing a complete permit application, and paying the required \$1,000 application fee.

45CSR14 PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES FOR THE PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY

The definition of major modification according to 45CSR14 - 2.40 is provided below. The applicant does not meet the definition of a “major modification” because hydrogen fluoride is not included in the definition of a regulated NSR pollutant.

“Major modification” means any physical change in or change in the method of operation of a major stationary source which results in: a significant emissions increase (as defined in subsection 2.75) of any regulated NSR pollutant (as defined in subsection 2.66); and a significant net emissions increase of that pollutant from the major stationary source. Any significant emissions increase (as defined at subsection 2.75) from any emissions units or net emissions increase (as defined in subsection 2.46) at a major stationary source that is significant for volatile organic compounds or NOX shall be considered significant for ozone.

45CSR30 REQUIREMENTS FOR OPERATING PERMITS

The applicant is a major source and is currently operating under the Title V permit R30-003000002-2009 SM01. The applicant submitted a combined application to also update the Title V permit.

Federal Requirements:

40 CFR 60,
Subpart Dc

STANDARDS OF PERFORMANCE FOR SMALL INDUSTRIAL-COMMERCIAL-INSTITUTIONAL STEAM GENERATING UNITS

The applicant is not subject to this subpart. The Rotary Sand Dryer does not meet the definition of a steam generating unit.

40 CFR 63,
Subpart DDDDD

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS MAJOR SOURCES: INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL BOILERS AND PROCESS HEATERS

The Rotary Sands Dryer [RSD] does not meet the definition of “boiler” as defined in § 63.7575 nor does it meet the definition of “process heater” that is provided below for reference. The RSD is fed sand by shovel and utilizes a natural gas burner. The sand is heated and dried in the barrel of the RSD and discharged through the other end of the RSD. It is not an enclosed device and does not transfer heat indirectly.

“Process heater” means an enclosed device using controlled flame, and the unit's primary purpose is to transfer heat indirectly to a process material (liquid, gas, or solid) or to a heat transfer material (e.g., glycol or a mixture of glycol and water) for use in a process unit, instead of generating steam. Process heaters are devices in which the combustion gases do not come into direct contact with process materials. A device combusting solid waste, as defined in §241.3 of this chapter, is not a process heater unless the device is exempt from the definition of a solid waste incineration unit as provided in section 129(g)(1) of the Clean Air Act. Process heaters do not include units used for comfort heat or space heat, food preparation for on-site consumption, or autoclaves. Waste heat process heaters are excluded from this definition.

The applicant is not subject to this subpart.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There are no new hazardous air pollutants associated with this permit modification. Listed below is the hazard summary for hydrogen fluoride whose emission factor and potential emission limits are being revised.

Hydrogen Fluoride:

Hydrogen fluoride is used in the production of aluminum and chlorofluorocarbons, and in the glass etching and chemical industries. Acute (short-term) inhalation exposure to gaseous hydrogen fluoride can cause severe respiratory damage in humans, including severe irritation and pulmonary edema. Severe ocular irritation and dermal burns may occur following eye or skin exposure in humans. Chronic (long-term) exposure of humans to fluoride at low levels has a beneficial effect of dental cavity prevention and may also be useful for the treatment of osteoporosis. Exposure to higher levels of fluoride through drinking water may cause dental fluorosis or mottling, while very high exposures through drinking water or air can result in skeletal fluorosis in humans. The only developmental effect observed from fluoride exposure in humans is dental fluorosis which can occur in a child's teeth when a mother receives high levels of fluoride during pregnancy. EPA has not classified hydrogen fluoride for carcinogenicity.

AIR QUALITY IMPACT ANALYSIS

The proposed changes in this permit application do not meet the definition of a major modification according to the definitions in 45CSR14 and 45CSR19; therefore, modeling is not required for this permit application.

MONITORING OF OPERATIONS

The following monitoring requirements will be added to the permit:

- Visible emissions at the RSD will be monitored and recorded
- The amount of sand processed through the RSD will be recorded

CHANGES TO PERMIT R13-0682A

- Miscellaneous permit updates including: references to permit revisions, dates, description of change, changes to EPA mailing address, etc.
- 1.0 - Emission Units Table updated to add the Rotary Sands Dryer [RSD] as listed in the Emission Units Table of this evaluation.
- Updated 4.1.1 to add the emission limits for the RSD and revise the HF emissions as provided in the emissions summary table of this evaluation.
- Updated 4.1.2 to revise the total facility emissions as provided in the facility wide emissions increase table of this evaluation.

- Revised 4.1.7 to update the hydrogen fluoride emissions from 902.7 micrograms of HF per gram of material fired to 1,150 micrograms per gram as discussed in the emissions section of this evaluation.
- Added (inserted) 4.1.9 to limit the fuel type to natural gas for the RSD.
- Added (inserted) 4.1.10 for the 10% opacity requirement for the RSD.
- Renumbered the “operation and maintenance of air pollution control equipment” from 4.1.9 to 4.1.11.
- Added 4.2.3 for the opacity testing requirement for the RSD.
- Added 4.3.5 to record the sand processed through the RSD.
- Added 4.3.6 to record the fuel usage for the RSD.
- Added 4.3.7 to record the visible emissions and/or opacity monitoring for the RSD.
- Added 4.4.1 to report violations of the opacity requirement for the RSD.

RECOMMENDATION TO DIRECTOR

Based on the information provided in the application including any supplemental information received, the writer recommends that permit modification R13-0682B be granted to Continental Brick Company, Martinsburg Facility located in Berkeley County on the basis that they will be in compliance with all state and federal air regulations.

Laura Jennings
Permit Engineer

Date