ESSROC- San Juan- Update
Umesh Dholakia
to:
Umesh Dholakia
07/12/2011 07:11 AM
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From: Umesh Dholakia/R2/USEPA/US

To: Umesh Dholakia/R2/USEPA/US@EPA

1 Attachment

ESSROC description 0711.doc

----- Forwarded by Umesh Dholakia/R2/USEPA/US on 07/12/2011 07:11 AM -----

From: Francisco Claudio/R2/USEPA/US
To: Keith Barnett/RTP/USEPA/US@EPA
Cc: Harish Patel/R2/USEPA/US@EPA, Umesh Dholakia/R2/USEPA/US@EPA
Date: 07/11/2011 07:44 AM
Subject: Re: CEMEX- Puerto Rico

Hi, Keith:

I received your message. Since 1991, ESSROC operated two kilns and two baghouses. One baghouse had 22 stacks and the other a single stack. After they changed their process from wet to dry, they discontinue the operation of one kiln and the remaining kiln was operated with two baghouses in parallel. ESSROC disconnected their 22 stack baghouse back in June 2007 after several enforcement actions initiated by EPA and the state agency. We refer the case to DOJ since they failed to conduct the initial performance tests under the Portland Cement MACT on the 22 stack baghouse. They selected some of the stack and EPA was not satisfied. After a second test requested by EPA and that they will require to meet the 10% opacity limit for commingled discharges from the kiln and the clinker cooler, ESSROC revised their operations and combined their emissions into their single stack baghouse.

(See attached file: ESSROC description 0711.doc)

Please, call me if you need any additional information.

Francisco Claudio
Environmental Engineer
Multimedia Permits and Compliance Branch
(787)-977-5841
Fax- (787)-289-7104
AWL-(Tuesday/Thursday Afternoon)-(787)-524-0933

Umesh Dholakia---07/08/2011 01:24:25 PM---Hi! Keith: EPA Region 2 takes lead for major sources in Puerto Rico and VI- therefore, please contac

From: Umesh Dholakia/R2/USEPA/US
To: Keith Barnett/RTP/USEPA/US@EPA
Cc: Harish Patel/R2/USEPA/US@EPA, Francisco Claudio/R2/USEPA/US@EPA
Date: 07/08/2011 01:24 PM
Subject: CEMEX- Puerto Rico

Hi! Keith:

EPA Region 2 takes lead for major sources in Puerto Rico and VI- therefore, please contact Francisco Claudio [787-977-5841] or Harish Patel [212-637-4046] for any baghouse issues that you may have. CEMEX decided to install baghouse (replacing an ESP) in 2006- Region 2 had issued a PSD permit. A copy of the PSD permit is attached-FYI.

Umesh

[attachment "CEMEX PSD Permit Enclosure III_July10_2006.pdf" deleted by Francisco Claudio/R2/USEPA/US]
[attachment "CEMEX PSD Permit Cover letter_July10_2006.pdf" deleted by Francisco Claudio/R2/USEPA/US]
[attachment "CEMEX PSD Permit Enclosure 1_July10_2006.pdf" deleted by Francisco Claudio/R2/USEPA/US]
[attachment "CEMEX PSD Permit Enclosure II_July10_2006.pdf" deleted by Francisco Claudio/R2/USEPA/US]

Background:

ESSROC, formerly known as San Juan Cement, owns a cement manufacturing industry located in PR-2 Km. 26.7, Punto Cubano, Espinosa Ward in Dorado, Puerto Rico and is dedicated to the production of portland cement since July 1972. ESSROC originally operated two (2) wet-process rotary cement kilns Nos. 1 & 2. In 1974, a third kiln, No. 3, was added to the wet process. In March 1990, ESSROC modified their process from a wet to dry process. Kiln Nos. 1 and 2 were shut down when the plant switched from wet to dry process to qualify for emissions offsets to avoid being subject to 40 CFR Part 52 also known as Prevention of Significant Deterioration (PSD) pre-construction permit. Since July 26, 1991, ESSROC operated one rotary F.L. Smith kiln, No.3, for heating raw material (limestone, clay, gypsum and clinker) to manufacture portland cement. Presently, ESSROC's operation is limited to 850,000 tons per year of cement. The rotary kiln burns coal and used oil derived fuel (UODF) to produce the heat needed for drying, decarbonating, calcining, and clinkering the materials for the manufacture of cement. Emissions from the kiln are controlled by two (2) baghouse: one baghouse has one stack and the second baghouse has twenty (22) stacks. ESSROC is classified as a major source and kiln No. 3 is one of the few of the existing air emission sources regulated by 40 CFR Subpart LLL-Portland Cement Manufacturing Industry ("Portland Cement MACT") and by local air regulations. ESSROC operates also an on-site and off-site quarry to provide limestone and clay as a raw material for the manufacturing of cement subject to 40 CFR Part 60 Subpart OOO- Non-Metallic Mineral Processing Plants. ESSROC also operates a Coal Processing Plant subject to 40 CFR Part 60 Subpart Y.

Presently, all stakeholders belong to ESSROC Materials, Inc. and both Pennsylvania Cement Francais and Ital Chimenesty-Italia to Ital Mobiliari.

Quarry Operation:

The cement plant operation starts with the processing of raw material extracted from their quarry. The limestone material extracted is crush by three main crushers, and then fed to a silo for storage. They also received rejected material from other cement batch plants. Gypsum and iron are import from Columbia or Venezuela. This portion of the quarry is subject to Subpart OOO requirements. The main requirement is to control fugitive dust and to avoid particulate matter to become airborne. Once the material crushed is fed to the raw mill is when it becomes subject to the requirements of the portland cement MACT. We observed that no operation was taking place at the crushers since the plant already had some material stored and was feeding the raw mill at a lower rate once the kiln restarted operation. We were informed by Eng. Ayala that ESSROC has been evaluating the use of fly ash generated at AES, Inc. Co-generation plant located in Guayama. However, so far the material does not meet the minimum specifications. ESSROC is also considering mixing the fly ash with dust collected in their baghouse to be added to their two (2) cement mills.

Raw Milling:

Limestone, clay, iron ore and occasionally small quantities of silica sand are metered to the raw mill for drying and grinding. The raw mix is ground to mill fineness (80% < 200 mesh) at a rate of approximately 180 short tons per hour. The kiln off gases are passed through the roller mill, to dry the raw material, while the mill is in operation (the mill operates approximately 85 to 90 percent of the kiln system up-time). After the kiln gases have passed through the mill, they are drawn through four cyclones for collection of the raw mill; the raw mill fan is rated at a gas quantity of 241,000 ACFM at 2050 F. The raw mill off gases are drawn into Baghouse, with flow being split between Baghouse 2 and Baghouse 3. Depending on raw material moisture, some hot air exhausted from the clinker cooler can be mixed with kiln exit gases and used in the raw mill. When the mill is not operating (by-pass mode), kiln off gases are cooled by an evaporative cooling system installed in the conditioning tower. After this tower, the gases are ducted around the raw mill and into Baghouse 2 and 3.

Raw Mill collected in the cyclones and raw meat fines collected in the Baghouse is conveyed to a raw mill storage silo where mixing and homogenization are performed. From the raw mill silo, the mill is transported, by means of pneumatic conveying equipment, into the gas duct leading to the top cyclone stage of the suspension preheater. In dispersing the raw mill in the gas duct, heat transfer occurs very quickly. This heat transfer along with the collection of the mill in the cyclones is repeated four times in the four stages of the suspension preheater. The final stage of the raw mill preheating takes place in the precalciner where 50% of the total fuel used in the system is combusted to raise temperatures to 1600^0F and cause rapid decarbonation of the raw mill. This counter-current flow causes a cooling of the rotary kiln exit gases from about 2000° F down to 700^0F. At the same time, the raw mill is heated from approximately 1500° F to 1600° F at the bottom stage of the suspension preheater.

Kiln Operation:

Inside the kiln, the material is heated to sintering temperatures, approximately 2600° F - 2850° F, with the gases from the combustion zone, flowing counter currently. At this point, the gas or flame temperature is well above 3500°F. At the discharge end of the rotary kiln, a short distance serves as pre-cooling zone. From the rotary kiln, the clinker drops into a reciprocating grate clinker cooler. Cooling air is blown through the grates and the clinker bed by undergrate fans. The heated air from the front section of the clinker cooler (secondary air) is drawn into the kiln and provides preheated combustion air. Air from the middle portion is drawn back to the preheater/precalciner and is used to as preheated combustion air for the precalciner (tertiary air). A portion of the hot air is also drawn to the coal mill for drying the coal while it is being ground. The coal mill system is then vented to the atmosphere through a Baghouse. However, fuel derived from used oil can be used to fire the kiln and the precalciner as an alternative fuel. The balance of the air needed to cool the clinker is drawn through cyclones and is directed to

Baghouse 2 and Baghouse 3. From the clinker cooler, the clinker is conveyed by means of enclosed apron conveyor and bucket elevators to the clinker storage.

The material sent to cement mill no. 2 is mainly used for cement bags. Only one packing line out of two lines is operated. Material from cement mill no. 3 is used for bulk cement. The bulk cement is downloaded through double spouts to the cement trucks.

Kiln Control Room:

At the Control Room, they monitor the operation of the kiln temperature, rotation, velocity, feeding process and baghouse No. 2 opacity emission recorded through a continuous emission monitor (COM). The rolling average temperature for BH No. 2 was 431.08°F for 1 hr and 432°F for 3-hrs. Subpart LLL mandates that the inlet temperature for the baghouse be determined during the initial performance tests and the rolling average be maintained during normal operation.

Control Equipment Description

The ESSROC Plant operates three separate air pollution control devices (APCD). One for each of three exhausts gas emission sources. The gas flow exiting the preheater is split between the other two baghouses. In the raw mill on mode, the gas flow is approximately 337,000 ACFM. The flow split is typically Baghouse #3: 30 to 40% and Baghouse #2: 60 to 70%. These Baghouse are downstream of the raw mill, therefore, the dust collected from these Baghouse is recycled to the system. With the raw mill operating, the gases enter Baghouse 2 and 3 at approximately 300° F. These gases are quenched as they pass through the raw mill. When the raw mill is not operating, the gases exiting the preheater are quenched by the evaporative cooling system too less than 500°F before entering the Bag houses.

The Baghouse on the alkali bypass duct collects 'waste dust". This is dust that is removed from the system. The alkali bypass Baghouse is equipped with 80 bags, and a gross cloth area of 11,312 square feet. The bypass gases entering the Baghouse are quenched with ambient air prior to entering the Baghouse. The inlet temperature is normally controlled at 350 - 450° F. Note: The alkali bypass and associated Baghouse are not being utilized at the present time.

Baghouse 2 is a Fuller 16 BHS 96 reverse air fabric filter equipped with 1,536 bags and a gross cloth area of 143,232 square feet. The gases are drawn through the Baghouse by a 1,250 HP I.D fan. This is a single exhaust stack.

Baghouse 3 is a Wheelabrator 96R-46-126 reverse air fabric filter equipped with 12~144 bags and a gross cloth area of 170,016 square feet. The gases are drawn through the Baghouse by 22 fans each with its own stack and a total power used of 1,650 HP.

The clinker cooler is a Polysius Model 2421/ll reciprocating grate cooler with seven compartments and two grates. It has a total rating of 146,000 ACFM. The cooler air flow is split fiver ways: (1) secondary combustion air to the kiln, (2) tertiary combustion air to the precalciner, (3) drying air to the roller mill for drying raw feed as it is ground, (4) drying air to the coal mill for drying coal as it is ground, and (5) finally some cooler exhaust air is sent direct to Bag houses 2 and 3. The only direct discharge of cooler air is when the roller mill is down for maintenance. The stream that is used to dry the ground raw material is vented directly to Bag house 2 and 3.

Fuel Characteristics:

Kiln no 3 is permitted to use coal and used oil derived fuel (UODF) under normal operating conditions. Diesel Fuel is used for start-up and preheating conditions for the kiln. The coal is imported primary from Colombia and Venezuela. The used oil derived fuel is supplied by an independent fuel broker.

The consumption of fuel in a dry process cement plant is apportioned to the following operations[1]:
83 -- 100% kiln operation
Up to 14% raw material drying
Up to 3% coal drying

Generally, the fuel used represents between 5-10% of the total amount of raw materials consumed to make clinker. Generally, about 1.7 tons of nonfuel raw materials are needed to make 1 ton of clinker. Limestone and other calcareous materials account for about 87% of the total raw materials required to make clinker.[2]

In the case of ESSROC San Juan, they used 100% of our fuel in the kiln operation. Specifically for their process the raw material to clinker ratio is 1.78, and the coal consumption represents approximately 9 % of the total raw material required to make clinker. The coal to clinker ratio is 0.14. For the used oil derived fuel the fuel to clinker ratio is 0.10, and the used oil derived fuel consumption represents approximately 6.4% of the total raw material required to make clinker.

The main characteristics that we consider for the use of both fuels are: Heating Value (BTU), Ash Content (%) and Sulfur Content (%)

The following table represents typical values for both fuels:

Parameter	Coal	Used Oil derived Fuel	Difference
Heating Value (BTU)	13,298	18,225	+ 4,927

Ash Content (%)	5.79	0.72	More than 8 times less
Sulfur Content (%)	0.70	0.46	52% less

typical Values of ash content and heating value in coal varies significantly, depending on the coal mine and generally are between 5-15% and 7,000 -15,000 BTU. Respectively. The rate of used oil is 57,000 gallons per day. The storage tank has a capacity of 1.5 million gallons. Alternative Fuels, Inc. operated their tank and supplies the fuel around four times a year. Once they switch to used oil, they could only operate for 12 days with the amount provided. Alternative Fuels leased the property to ESSROC and transfer the oil by pipe.