KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
352/377-5822 • FAX/377-7158

KA 187-04-12
September 1, 2005

Via UPS Ground Delivery

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SEP 02 2005
BUREAU OF AIR REGULATION

Mr. Al Linero, P.E.
Division of Air Resources
Dept. of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJECT: ***Florida Rock Industries, Inc.***
Thomas S. Baker Cement Plant - Newberry
DEP File No. 0010087-018-AC
Finish Mill Throughput Increase

Dear Al:

In response to your Request for Additional Information dated August 26, 2005, the following information is provided:

1. **Regarding additional limestone transported from quarry to gypsum storage area:**

Limestone is already transported to this storage area, which is known as the "Covered Limestone and Gypsum Storage Area" that appeared on drawing page 8 of 14 submitted with the original Line 1 application. A copy of that page is attached. There is no silo.

At present, about one truckload of limestone is transported to the storage area each day. To be conservative, as more ASTM-type cement is produced, the increased use of limestone (FRI has always made masonry cement with 20% limestone and AASHTO-type cement with 1 % limestone) could eventually add an average of five truckloads per day of limestone to what is already moved from the quarry to the gypsum/limestone storage area.

Road dust is controlled by sweepers and water sprinkling. During the permitting of Kiln 2, measurements of road silt were made at the plant demonstrating a silt loading of 0.14 grams per square meter. This factor can be used in conjunction with the vehicle miles traveled (VMT) to deliver the additional limestone to estimate the fugitive particulate matter emissions generated.

The travel distance from the quarry to the covered storage area is about 850 feet. Assuming five trucks per day, 365 days per year, the one-way travel distance will be about 300 miles per year. The fugitive emissions from a loaded truck (at 40 tons), using the EPA emission factor equation, will be 0.709 lb/VMT and emissions from an empty truck (at 16 tons) will be 0.179 lb/VMT. At 300 miles per year for full trucks and 300 miles per year for empty trucks, the annual fugitive particulate matter emissions will be about 0.13 tons per year; a negligibly increase.

Limestone is mined below or near the groundwater interface at this cement plant. The material is received in the plant with about 10% moisture. As shown by the attached drawing, the material is dumped from the truck into the storage area and out-loaded from storage into a hopper by front-end loader. No appreciable emissions will result from the handling as the result of the 10% moisture.

2. Regarding the "change in the cement produced by FRI...":

The cement produced by FRI is of AASHTO, ASTM, and masonry types. ASTM allows up to 5% limestone, versus the 1 % AASHTO allows. The slight decrease in the clinker fraction with the ASTM cement makes it easier for the mill to grind. Also, better kiln operation minimizes the size of the calcium-silicate crystals produced in the sintering process, which makes the clinker easier to grind. (See attached article from Cement Americas)

3. Regarding "emissions from the finish mill":

The particulate matter emissions from the finish mill are a function of the particulate matter concentration in the gas streams discharged from the baghouses (0.01 grains per dry standard cubic foot) and the air flow through the baghouses which is controlled by fans. The fans associated with the finish mill will not change, hence there will be no change in the air flow rate through the associated baghouses regardless of the planned change in material throughput of the finish mill.

Regarding the expected particulate matter concentration in the gas stream discharged from the baghouse, this concentration is not a function of the particulate matter loading to the baghouse. This of course assumes that the characteristics of the particulate matter in the gas air stream going to the baghouse remain essentially the same, that the air-to-cloth ratio of the baghouse is in an acceptable range, and that the baghouse is properly maintained. In this case, the characteristics of the particulate matter in the air stream to the baghouses are unchanged, the air-to-cloth ratio of the baghouses are in an acceptable range (as demonstrated by the initial compliance test on the baghouses and the ongoing performance of these baghouses), and FRI has demonstrated a very effective O/M program.

Regarding the fact that the expected particulate matter concentration in the stack gas stream discharge from a baghouse is independent of the inlet dust loading (0.01 grains per dry standard cubic foot, in this case), baghouse suppliers will guarantee a particulate matter discharge concentration (grains per dry standard cubic foot) at a specified air-to-cloth ratio (a measure of the baghouse size) without having information on the particulate matter concentration on the air stream entering the baghouse. This, and many, many compliance tests on baghouses, is demonstration that the particulate matter concentration at the discharge of a baghouse is independent of the dust loading at the baghouse inlet. Also, see the attached letter from the BHA division of General Electric.

Given the facts that the air flows through the baghouses will remain unchanged, the characteristics of the particulate matter in the air streams to the baghouses remain unchanged and the air-to-cloth ratio of the baghouse is in an acceptable range, it can be concluded that there will be no change in the particulate matter emissions from the baghouses.

To the best of my knowledge, there is reasonable assurance that the air pollution emission unit and the air pollution control equipment described in this letter when properly operated and maintained, will comply with all applicable standards for control of air pollution emissions found in the Florida statutes and rules of the Department of Environmental Protection.

If there are questions regarding this information, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES, INC.

John B. Koogler, Ph.D., P.E.

JBK/lt

cc: Cindy Malkey, FDEP (Tallahassee)
Henry Gotsch, FRI Newberry
Bill Proses
C. Kutz, NED

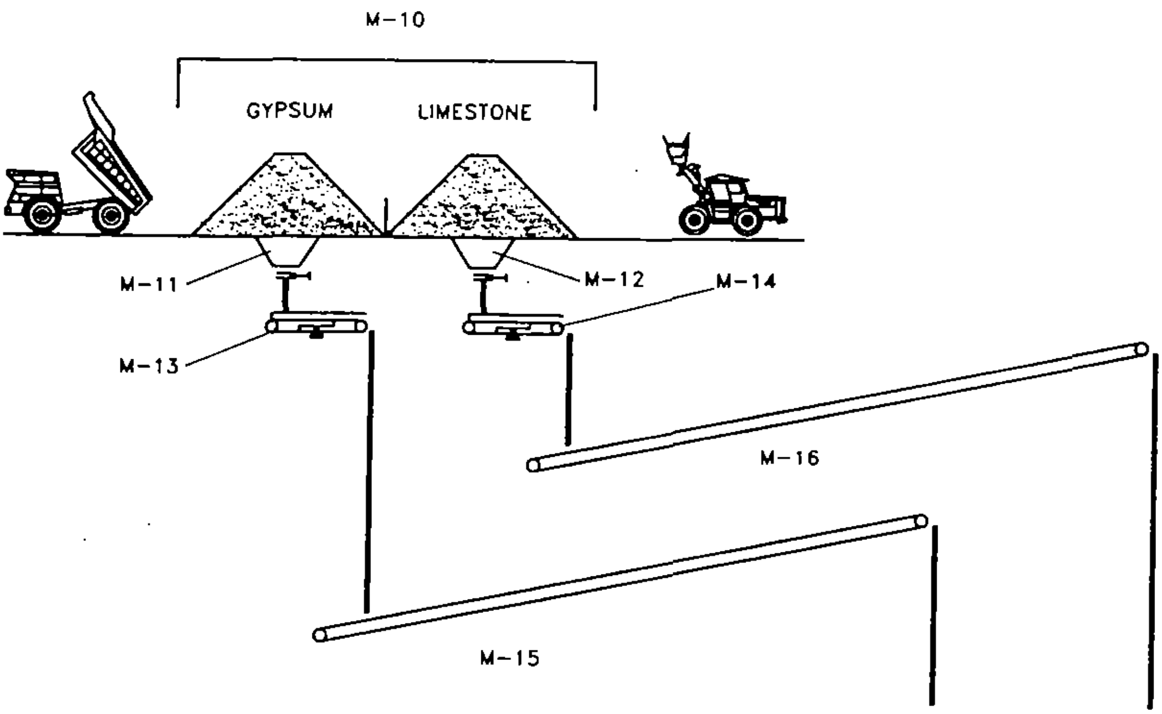
ENVIRONMENTAL SERVICES

Attachments

ENVIRONMENTAL SERVICES

POLYSIUS DIVISION OF KRUPP USA, INC. ATLANTA, GA	FLORIDA ROCK CEMENT PLANT – NEWBERRY , FLORIDA –	PROJECT No.: 6823–2200 PAGE: 8 of 14 DATE: 11–29–94	
CAPACITY: 750,000 STPY		No.	REVISION DATE
		1	01–15–95
– COVERED ~~CLINKER~~ AND GYPSUM STORAGE –		2	02–07–95
		3	

FLOW CHART



DESCRIPTION

GYPSUM PILE CAPACITY : 3,000 ST
LIMESTONE PILE CAPACITY : 3,000 ST

I/CONTRCTS/PROJECTS/ACAD/PLANT//FLOWSHTS/337487-8

A Perpect Model?: The correct modeling of the combustion process in rotary kilns can help lower costs, increase profits, and reduce the environmental impact

Jan 1, 1998 12:00 PM
Dr. J.P. Smart, Dr. P.J. Mullinger, and Dr. Barrie Jenkins

Whatever the plant, kiln configurations are process dependent and vary greatly. The required process temperatures differ considerably, and secondary air temperatures are highly variable as is the firing system employed. This also is often in combination with a wide range of fuel types.

Optimizing the energy consumption of the kiln involves both fossil fuel and electrical energy, and this article is principally concerned with the former. Optimization encompasses minimizing fuel consumption, unburnts, NOx, SO2, and clinker grinding energy.

Clinker with small crystals and sharp boundaries is easy to grind and gives the cement higher early strength. Crystal growth is influenced strongly by the heat transfer from the flame, favorable conditions being rapid heating from calcining to sintering temperature and sudden quench in the cooler to freeze the crystal structure. These conditions are produced by a flame with a high heat flux close to the burner nozzle. Flames with very flat heat transfer profiles give slow rates of heating and large crystals. The resultant clinker is harder to grind and produces cement with poor early strength.

To compensate and meet market requirements, the raw mix is sometimes adjusted, the kiln burnt harder, and the cement ground finer, thus increasing the energy consumption in both the kiln and the grinding mill.

The difference in energy consumption in the kiln and grinding mill between clinker produced by an optimized flame and that produced by a poor flame can be as much as 10%. A poor flame heat flux profile, therefore, imposes a high economic cost as well as a significant increase in atmospheric emissions.

Physical modeling of flames Despite the growth in computer modeling, physical modeling is still the most effective method for determining flame length and shape in rotary kilns. Acid/alkali modeling was developed by Sir William Hawthorne at MIT in the late 1930s and is used to model the combustion process in rotary kilns where fuel/air mixing determines the flame characteristics.

A physical model of the cooler, hood, and kiln is constructed to an appropriate scale in clear acrylic plastic. The fuel is represented by dilute caustic soda solution containing phenolphthalein indicator, while the combustion air is represented by dilute hydrochloric acid. The concentration of the alkali and the stoichiometric ratio of alkali to acid is chosen to represent the correct air:fuel requirement for the particular fuel. The flow of acid is adjusted to simulate different excess air levels, hence determining the relationship between flame length and excess air. The phenolphthalein becomes colorless at the boundary where the mixing is complete, thus the model flame envelope is defined by the colored region. The aerodynamics of the full-size system are reproduced on the physical model thus allowing an accurate simulation of the fuel/air mixing characteristics, and hence the flame length, under representative conditions.

These model results must be corrected since the model is run under isothermal conditions. However, in kilns, considerable changes in temperature usually occur as combustion takes place. This results in a reduction in the gas density and an increase in volume, giving a longer flame in the kiln than in the model. For most practical purposes, the model flame length has only to be corrected for the density changes

NOx assessments The NOx formation in kiln flames is generally via both thermal and fuel routes (for coal, oil, and petroleum coke, all of which contain fuel nitrogen). Owing to the high flame temperatures that often occur above 2,000 degrees C, thermal NOx is generally the dominant mechanism and typically accounts for around 70% of the total NOx emission dependent on secondary air preheat temperature

In gas-fired kilns, fuel NOx is absent, so all the NOx is thermal. However, the absence of the fuel variety in gas-fired kilns does not necessarily lead to a reduction in emissions, since gas-flame oxygen concentration and the residence time in the high-temperature zones influence the final thermal NOx emissions.

The formation of NOx is complex and still not a well understood process. Consequently, the modeling of this process is very difficult. Some of the models currently available are capable of predicting the trends in NOx formation with change in flame conditions and fuel type, but the accuracy is poor and sometimes little better than order of magnitude. Currently, the most reliable of methods of predicting NOx emissions from full-scale flames is by empirical scale up from test flames. Fuel and Combustion Technology (FCT) has achieved good results using the data from the test work undertaken by The International Flame Research Foundation for the CEMFLAM 1 Consortium.

In addition, for prediction of NOx in rotary kilns, FCT utilizes a customized version of the FACSIMLE kinetic package produced by AEA Technology. This version consists of a suite of closely related programs for the modeling of complex steady-state and time-dependent chemical reactions, including an extensive NOx modeling capability

To allow for acceptable predictions to be made in industrial combustion processes, the company has modified the code to take account of gas temperature-time history and fuel air mixing, which is generated from the associated physical and heat transfer modeling. To date, results have been encouraging, with predictions of emissions from an existing "dead-burned" dolomite kiln being within 10% of measured values. Further validation of this program over a broad range of combustion processes is currently being undertaken.

Validation of modeling It is one thing to produce an effective method and quite another to ensure that its predictions are correct and in agreement with experimental observations. Consequently, considerable effort has been made to validate these computer models. The method is to make detailed comparisons between predictions and experiments, to interpret whatever discrepancies are discovered in terms of computational inaccuracies, inadequacies of the assumptions and imprecisions of measurement; and then to implement improvements that result finally in the reduction of the discrepancies to acceptably small values.

In the real world Modeling can be used to solve problems with existing kilns, optimize the performance of existing kilns, assess the effect of fuel or other process changes in advance of the changes being made or optimize the design of a new plant

Typically more than one modeling technique is used for a particular application because each technique provides only part of the answer. Within the kiln itself, acid/alkali modeling is used to simulate the combustion, while the zone method of heat transfer is used to predict heat transfer from the flame to the product

For flash calciners, both techniques can be used together with CFD modeling of the particle trajectories and residence times. The major benefits are reduced costs and increased profits for the kiln operator with reduced environmental impact. The former is attributable to reduced fuel consumption, improved refractory life, and shorter downtime, with potentially greater sales resulting from longer production runs and improved product quality. The reduced emissions are the result of reduced flue gas volumes and less unburned fuel.

GE Energy

8800 East 63rd Street
Kansas City, Missouri 64133
USA

T 800 821 2222
T 816 356 8400
F 816 353 1873

August 31, 2005

Florida Rock
4000 New CR 235
Newberry, Fl. 32669

Attn: Henry Gotsch
Subj: Filter Bag Efficiency

Dear : Henry

The following will confirm or conversation earlier today. The finish mill/ separator dust collector at your Newberry, Florida plant equipped with 16 oz. Duo-Density Polyester felt filter bags will meet or exceed .01 gr/dscf. This achievement is based on good maintenance, control and operating practices.

Increase in inlet grain loading does not mean an increase in outlet grain loading. When grain loading increases the efficiency of the fabric can be manipulated by changes in cleaning controls. Although efficiencies can be maintained filter bag life may suffer slightly.

Sincerely,
Andy Winston

GE ENERGY

Jeb Bush
Governor

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

August 26, 2005

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Chris Horner, Plant Manager
Florida Rock Industries, Inc.
4000 NW CR 235
Newberry, Florida 32669

Re: Request for Additional Information
DEP File No. 0010087-018-AC
Finish Mill Throughput Increase

Dear Mr. Horner:

On July 29, 2005 the Department received Florida Rock Industries' (FRI) application for an air construction permit modification to allow the use of natural gas, upgrade the kiln burner, and to allow a finish mill throughput increase. The requests to use natural gas and upgrade the kiln burner are being processed in another permit (0010087-015-AC). The Department requests the additional information below regarding the finish mill throughput increase.

Pursuant to Rules 62-4.055, and 62-4.070 F.A.C., Permit Processing, the Department requests submittal of the additional information prior to processing the application. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

Some amount of limestone will now be transported from the quarry to a silo in the gypsum storage area. The limestone, reportedly, will be "wet" coming from the quarry and FRI has assumed no added emissions of unconfined particulates associated with this activity. Estimate the amount of limestone to be transported and stored in the gypsum silo, and estimate the number of trucks needed for the movement of the limestone. Will there be appreciable amounts of fugitive dust as a result of the additional truck traffic and handling of the limestone? Describe in more detail the process by which the limestone will be transferred from the trucks to the gypsum silo. Describe how the existing gypsum silos will handle the "wet" limestone. Please provide diagrams of this process.

Describe the change to the cement produced by FRI and explain why it is easier to grind.

According to the application, emissions from the finish mill will not increase as a result of the finish mill throughput increase. It seems logical that if there is no overall increase in clinker or cement production that, on an annual basis, no increase in PM emissions would result with an increase in throughput to the finish mill. However, PM emissions from the finish mill are estimated based on an emission factor (0.01 gr/dscf) and the flow through the system (dscfm). Assuming that this emission factor is related to the maximum loading on the baghouse, it would seem that the emission factor may require adjustment with an increase in maximum throughput. Please explain the method of selection of this emission factor. Explain why the emission factor should remain unchanged with an increase in throughput and possible change in maximum loading to the baghouse.

We will forward any comments received from other agencies as soon as we receive them. Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. Permit applicants are advised that Rule 62-4.055(1), F.A.C. now requires applicants to respond to requests for information within 90 days. If there are any questions, please call Cindy Mulkey at 850/921-8968.

Sincerely,

A.A. Linero 8/26

A.A. Linero, Program Administrator
Bureau of Air Regulation
New Source Review Section

AAL/cm

cc: Henry Gotsch, FRI
Chris Kirts, DEP NED
William Proses, Koogler and Associates
Chair, Alachua County Commission

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Chris Horner
Florida Rock Industries, Inc.
4000 NW CR 235
Newberry, Florida 32669

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X [signature] ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) [handwritten] C. Date of Delivery AUG 8 1 2005

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Mr. Chris Horner
Florida Rock Industries, Inc.
4000 NW CR 235
Newberry, Florida 32669

PS Form 3800, January 2001 See Reverse for Instructions

FLORIDA ROCK INDUSTRIES INC
CEMENT GROUP / 4000 N.W. CR 235 / P.O. Box 459 / Newberry, FL 32669 / (352) 472-4722

July 28, 2005

Ms. Cindy Mulkey
Division of Air Resources
Department of Environmental Protection
2600 Blair Stone Road, MS #5505
Tallahassee, FL 32399-2400

RECEIVED
JUL 29 2005
BUREAU OF AIR REGULATION

RE: Application for construction-modification permit to allow use of natural gas, upgrade of burner, and finish-mill throughput increase.
Facility 0010087, Permit no. 0010087-009-AV
Florida Rock Industries, Inc.—Thompson S. Baker Cement Plant

Dear Ms. Mulkey:

Florida Rock Industries, Inc., is submitting an application for construction-modification permit to allow use of natural gas, upgrade of burner, and finish-mill throughput increase.

Thank you for your consideration of this application. If you have any questions, please call me at (352) 472-4722, ext. 121.

Sincerely,
FLORIDA ROCK INDUSTRIES, INC.

Henry Gotsch

Henry Gotsch
Environmental Manager

cc: Chris Kirts, NED