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Via Email and USPS

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BUREAU OF AIR REGULATION

Ms. Trina Vielhauer, Bureau Chief
Florida Department of
Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RE: Florida Rock Industries (FRI)
Facility ID: 0010087
Thompson S. Baker Cement Plant
Additional Information in Support of an Air Construction Permit for Line No. 2

Dear Trina:

During our telephone conversation of February 25, 2005, you requested information related to the maximum expected 3-hour average SO_2 emission rate and the maximum expected 24-hour average NOx emission rate from the proposed Line No. 2 at the Florida Rock Industries, Inc. (FRI) Thompson S. Baker Cement Plant. The purpose of this letter is to provide you with our best estimates of what these emission rates might be.

SULFUR DIOXIDE

To determine the maximum expected 3-hour average SO_2 emission rate from proposed Line No. 2, eight months (7/1/2004 through 2/27/2005) of sulfur dioxide emission data from the FRI Line No.1 were reviewed. For this period, there were approximately 1600 3-hour events.

To supplement and/or confirm the FRI data, approximately six months of SO_2 emission data from the Rinker Miami Cement Plant were reviewed. The Rinker data were previously submitted to the Department in late 2004 in support of a production rate increase requested by Rinker.

From the review of these data, it appears that there are two sets of conditions that affect SO_2 emissions. There are the normal plant operating conditions which occur approximately 98 percent of the time and there are, what I will refer to as anomalous operating conditions that occur the remaining approximately two percent of the time. Under normal operating conditions, the sulfur dioxide emissions from all Florida Portland cement plants are generally less than 5.0 pounds per hour. This has been documented by several years of emission test data and continuous monitoring data from the Florida plants.

Under the anomalous operating conditions, the review of the FRI data showed a maximum 3-hour average SO_2 emission rate of about 57 pounds per hour. As a point of reference, the Rinker data showed a maximum 1-hour average SO_2 emission rate of approximately 70 pounds per hour.

I won't try to explain the reasons for the anomalous operations other than to say they occur during day-to-day operations of cement plants and are a result of some type of plant upset. Furthermore, it is apparent that these higher SO_2 emission rates are the result of fuel-sulfur as opposed to sulfur in the feed materials. This is stated as the transient periods of higher SO_2 emission rates are typically 6-8 hours or usually less in duration. If these higher sulfur dioxide emissions were the result of sulfur in feed material, there would be an entire blend silo full of material that would have to turn over before a change in SO_2 emissions became apparent.

Regarding the referenced sulfur dioxide emission rates observed at FRI and Rinker, all were recorded while the plants were burning 100 percent coal. At FRI, the sulfur content of coal is generally less than one percent. With the coal providing 100 percent of the heat input to the proposed Line No. 2, the fuel-sulfur input to the pyroprocessing system will be approximately 250 pounds per hour.

FRI is currently testing the co-firing of coal and pet coke and, if the coal/pet coke firing is successful, FRI will use this same fuel blend in Line No. 2. At the present time it appears that the maximum pet coke fraction that can be co-fired with coal will be about 30 percent, although experience may demonstrate a higher fraction of pet coke can be burned. Using the 30 percent fraction as an example and a nominal pet coke sulfur

content of six percent, the coal/pet coke mix will increase the fuel-sulfur to the pyroprocessing system to approximately 625 pounds per hour.

As a side note, FRI has not observed any increase in SO_2 emissions under normal operating conditions during the coal/pet coke testing.

Back to 3-hour SO_2 emission rates, the maximum emission rate observed at FRI over the eight month period while burning coal was 57.3 pounds per hour. Projected to an annual period and projected for firing a coal/pet coke blend, the maximum 3-hour SO_2 emission rate could be about 150 pounds per hour. It should be noted, that the proposed 24-hour SO_2 emission limit of 0.28 pounds per ton of clinker or 35 pounds per hour will still apply. This means that if there was an SO_2 excursion to 150 pounds per hour, 3-hour average, followed by an emission rate of 100 pounds per hour, 3-hour average, the sulfur dioxide emission rate for the remaining 18 hours in the 24-hour period would have to be 5.0 pounds per hour or less to comply with the proposed 24-hour SO_2 emission limit.

With this scenario in mind (i.e., six hours of high SO_2 emissions followed by 18 hours of normal emissions), if FRI experiences high fuel related sulfur SO_2 emissions while burning a coal/pet coke blend, the pet coke feed to the coal/coke grinding mill can be discontinued and the fuel bin will be full of 100 percent coal in five hours. This would still give FRI time to comply with the proposed 24-hour average SO_2 emission limit. On

the other hand, if the SO_2 emission limit is set at a 3-hour average limit, the short-term SO_2 excursion would result in a period of non-compliance.

Regarding the impacts of these higher SO_2 emission rates, we've conducted air quality modeling and determined that with a 3- hour average SO_2 emission rate from the kiln/raw mill stack of up to 218 pounds per hour, neither the impacts in Class I areas nor Class II areas will be significant. Thus, the maximum expected 3-hour average SO_2 emission rate of about 150 pounds per hour will not result in a significant impact in either Class I or Class II areas. With visibility, impacts are based on 24-hour average emissions and the proposed 24-hour average SO_2 emission rate (0.28 pounds per ton of clinker and 35.0 pounds per hour) will not be affected by the short-term SO_2 emission excursions.

NITROGEN OXIDES

The above referenced eight month record of data from FRI was reviewed for 24-hour average NOx emissions. There were approximately 200 valid 24-hour periods in this data set. NOx emission data expressed both as pounds per hour and pounds per ton of clinker were reviewed.

For purposes of analyzing air quality impacts, the most relevant NOx emission data are those expressed as pounds of NOx per hour. Before discussing these data, however, an interesting observation was made regarding the NOx emission expressed as

pounds per ton of clinker. Of the approximately 200 24-hour average NOx emission rates observed, only four were above 3.0 pounds per ton of clinker. (See Figure 1). Interestingly, these occurred at clinker production rates that were 50-75 percent of the maximum clinker production rate. This demonstrates the importance of having a 30-day averaging time to average out these artificially high short-term NOx emission rates. I use the term "artificial" as these same emissions expressed as pounds per hour are in the normal range of emissions and therefore do not have anymore than a normal impact on air quality.

Regarding the NOx emission data expressed as pounds per hour, the data set showed that of the approximate 200 24-hour average observations, only seven exceeded 250 pounds per hour. The 250 pounds per hour is the proposed 30-day average NOx emission limit for Line No. 2 (at 2.0 pounds of NOx per ton of clinker). These data are shown graphically in Figure 2.

From Figure 2 it will be noted, as with SO_2, that there appears to be two sets of conditions affecting NOx emissions; the normal plant operating conditions and the anomalous operating conditions. Under the normal operating conditions, which occur approximately 90 percent of the time with Multi-Stage Combustion (MSC), the maximum 24-hour average NOx emission rate appears to be approximately 230 pounds per hour. Approximately 3-4 percent of the time under the anomalous conditions, the 24-

hour average NOx emission rate exceeded 250 pounds per hour (with MSC operating conditions) and the maximum 24-hour NOx emission rate observed was approximately 300 pounds per hour.

Projecting the maximum expected 24-hour average NOx emission rate from the proposed Line No. 2 at FRI is difficult, as the line will operate with SNCR and no long-term operating data are available for SNCR at Florida cement plants. SNCR test data for short time periods from both FRI and SAC (both recently reported to the Department) demonstrated that with SNCR and a variable ammonia injection rate, it is possible to maintain a relatively constant, pre-set NOx emission rate. In the case of the FRI Line No. 2, the pre-set NOx emission rate will probably be about 1.9 pounds per ton of clinker (approximately 240 pounds per hour) in order to meet the proposed 30-day NOx emission limit of 2.0 pounds per ton of clinker, with some margin of safety.

Thus, if the SNCR system could operate 100 percent of the time, it would be relatively safe to say that the maximum expected 24-hour NOx emission rate would be in the range of 250 pounds per hour (or 2.0 pounds per ton of clinker). The fact is, however, the SNCR system, as with any other operating system, will have some unscheduled downtime.

The other factor to take into consideration is that with SNCR, FRI might elect to operate Line No. 2 without the reducing conditions in the calciner normally associated with MSC and to rely on SNCR to maintain the NOx emission rate below 2.0 pounds per ton of clinker (250 pounds per hour). Without the reducing conditions, the uncontrolled NOx emissions could be in the range of 3.0-3.5 pounds per ton of clinker or 375-440 pounds per hour.

Assuming Line No. 2 was operating under oxidizing conditions with SNCR and there was an unscheduled outage of the SNCR system, NOx emissions could hypothetically increase to around 400 pounds per hour. FRI operators at that time would begin to initiate MSC operating conditions for the kiln system. These are the same conditions that Line No. 1 currently operates under, so this mode of operation is not foreign to FRI operators.

Establishing the reducing conditions in the calciner using MSC can be accomplished rather quickly; in approximately 2-3 hours. If it is assumed that the hypothetical NOx emissions are reduced from approximately 400 pounds per hour to 250 pounds per hour and kiln operating conditions are stabilized in a three hour period, and if it is further assumed that the plant operates normally for the remainder of the 24 hour period with NOx emissions averaging 250 pounds per hour, the maximum 24-hour average NOx emission rate would probably be in the range 260-270 pounds per hour.

If the unlikely combination of events occurred where there was a simultaneous unscheduled outage of the SNCR system and an anomalous set of plant operating conditions with MSC, the maximum expected 24-hour NOx emission rate would probably be in about the same range as that observed in the Line No. 1 data set; or somewhere around 300 pounds per hour.

The air quality modeling that we've conducted has demonstrated that at a NOx emission rate of 300 pounds per hour, the impacts in both Class I and Class II areas will not be significant.

SUMMARY

Our best projection is that the maximum potential 3-hour average SO_2 emission rate from Line No. 2 will be in the range of 150 pounds per hour and the maximum expected 24-hour average NOx emission rate will be in the range of 300 pounds per hour.

The elevated SO_2 emissions would be associated with fuel-sulfur and the duration of the elevated emissions would generally be less than six hours. It should be noted that even with short-term elevated SO_2 emissions, the proposed 24-hour average SO_2 emission limit of 35 pounds per hour (0.28 pounds per ton of clinker) still remains in effect.

The maximum expected 24-hour average NOx emission rate would occur only if there is a simultaneous unscheduled outage of the SNCR system and the occurrence of anomalous plant operating conditions. Both of these conditions are considered upset conditions.

The air quality modeling that we've conducted has demonstrated that the short-term elevated SO_2 and NOx emission rates will not result in significant air quality impacts in either Class I or Class II PSD areas.

Regarding impacts on visibility (a 24-hour standard), the elevated short-term emissions are not expected to have an effect. In the case of the elevated 3-hour SO_2 emissions, FRI must still comply with the proposed 24-hour average SO_2 emission limit and modeling at this emission rate (35 pounds per hour and 0.28 pounds per ton of clinker) as demonstrated that there will not be a significant impact on visibility in Class I areas. Regarding the combined effect of SO_2 and NOx on visibility, the eight months of data from FRI Line No. 1 that were reviewed showed that the elevated SO_2 and NOx emissions did not occur during the same 24-hour period. In other words, the conditions that result in elevated short-term SO_2 emissions are independent of the conditions that result in elevated short-term NOx emissions. This fact coupled with the unlikely occurrence of the described events leading to the maximum expected 24-hour average NOx emission rate make adverse impacts on visibility very unlikely.

I trust that the information provided herein fully responds to the questions you asked. If clarification is required for any of the information provided herein, please do not hesitate to contact me by phone at 352-377-5822 or by email at jkoogler@kooglerassociates.com.

Very truly yours,

KOOGLER & ASSOCIATES

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

JBK/lt

cc: Mr. Jim Pennington, FDEP
Mr. Bobby Bull, FDEP
Mr. Gary Sauer, FRI
Mr. Chris Horner, FRI
Mr. Henry Gotsch, FRI
Mr. Segundo Fernandez, Oertel, Fernandez and Cole
Mr. Steve Cullen, K&A

FIGURE 1

NOx vs Production Rate

FRI Thompson S Baker Plant

7/1/04-2/27/05

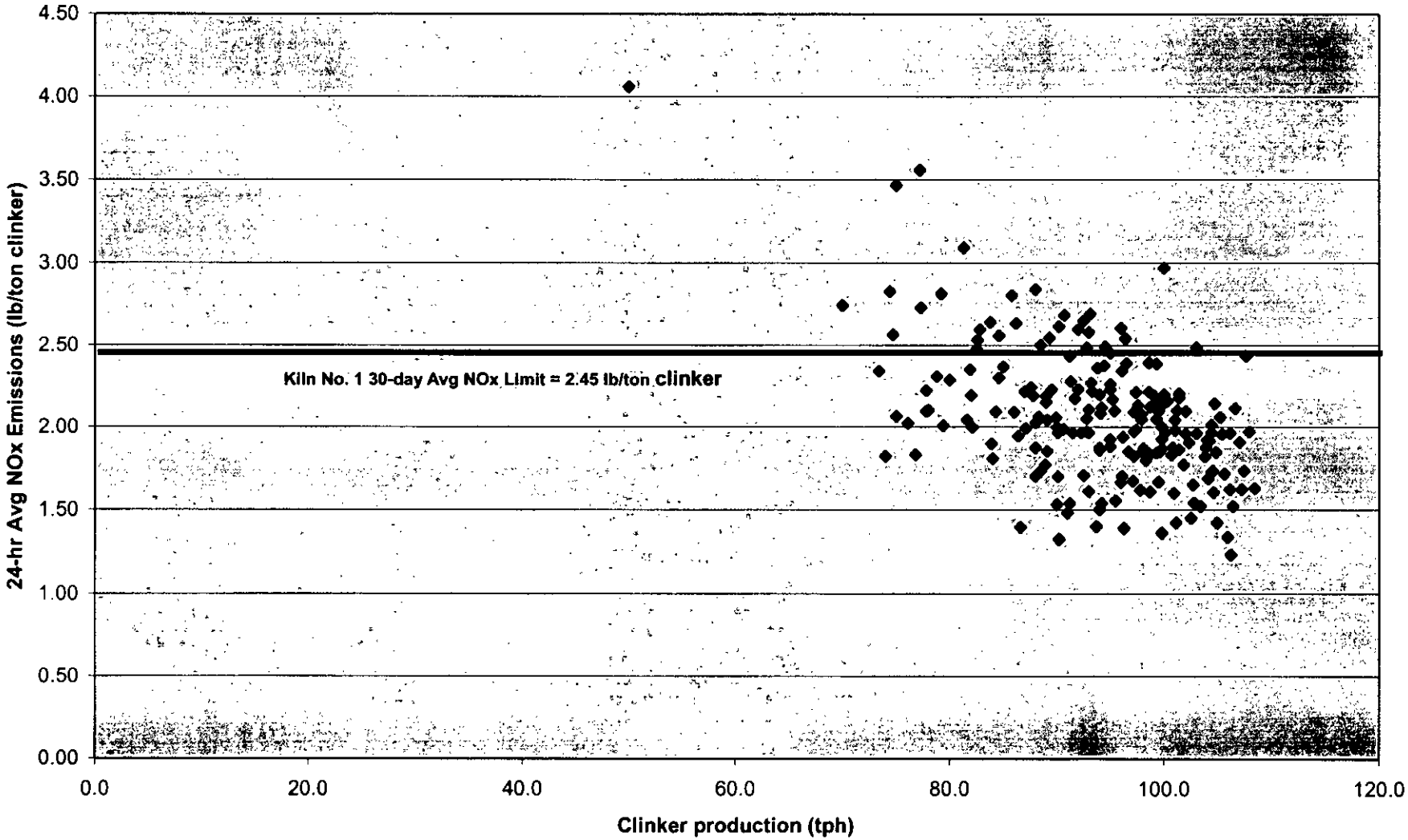

FIGURE 2

24-hr Average NOx Emission Rate

FRI Thompson S Baker Plant

7/01/2004 - 2/27/2005