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**VIA ELECTRONIC MAIL**

8 August 2002

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Mr. H. Patrick Wong, Chief  
Air Quality Management Division  
Miami-Dade County Environmental Resources Management  
33 SW 2<sup>nd</sup> Avenue  
Miami, Florida 33130-1540

RE: **Pennsuco Cement**  
**Dade County B AP**  
**Facility ID# 0250020**  
**Kiln #2 - Consent Agreement**

0250020 - 007 AC  
PSD-FL-142#

Dear Mr. Wong:

Please accept this letter as a proposal for a new interim NOx emission limit and a request for consideration of changes to the Consent Agreement between Tarmac and the DERM. Tarmac met with you and other DERM staff on November 8, 2001, to discuss an extension of the Consent Agreement under which kiln No. 2 operates regarding NOx emission limits. The DERM was responsive to possible changes and felt they could support such a request dependent on a reduction of NOx emission limits.

As a matter of historical content, Tarmac had opted to pursue § 23. of the Agreement, i.e., to change the manufacturing process to dry process technology. Construction of the new system was to be completed within 36 months after the required permits were issued. An air source construction permit was issued October 21, 1999. Subsequent to the permit issuance, Tarmac was sold and the project was placed on hold pending the completion of the sale. Titan Cement Company completed the sale in October 2000. Titan additionally requested revisions to the air source construction permit in November 2000 and the new permit was issued in May 2001. A letter of intent was signed with FLS/Fuller in August 2001 to supply the major equipment and related engineering for the new plant. Tarmac has expended \$15.0 million to date on engineering, equipment, and site preparation. An additional \$55.0 million is allocated for this year. Site development zoning and permitting along with infrastructure permitting is complete and the first phase of construction is slated for late August.

After the November 2001 meeting, Tarmac retained Environmental Quality Management, Inc. (EQM) to develop an engineering study on the feasibility of reducing NOx emission from the kiln No. 2 system. That study has looked at 57 existing wet process kilns and analyzed NOx

emission factors from those kilns and has compiled options for NOx emission reductions. The Eric Hansen Group, an expert on combustion technologies in kiln systems, has also been retained to review kiln No.2 process conditions and variables. Additionally, EPA data sources and technical literature was reviewed, most notably, the September 2000 Final Report from the Office of Air Quality Planning and Standards *NOx Control Technologies for the Cement Industry*. Two (2) key NOx control approaches applicable to wet process cement kiln operations are identified in the EQM study and the EPA report:

1. PROCESS CONTROL MODIFICATION

These modifications focus on increased energy efficiency and kiln operational stability with the emphasis on reducing NOx formation. NOx formation is directly related to the amount of energy consumed in the cement making, and improving fuel efficiency, and concurrently productivity, will reduce NOx emissions. The EQM study discusses the feasibility and applicability of process modifications specific to the kiln No. 2 system.

2. COMBUSTION CONTROL

These modifications focus on reducing NOx formation in the kiln system. The EQM study discusses the feasibility and applicability of process modifications specific to the kiln No. 2 system.

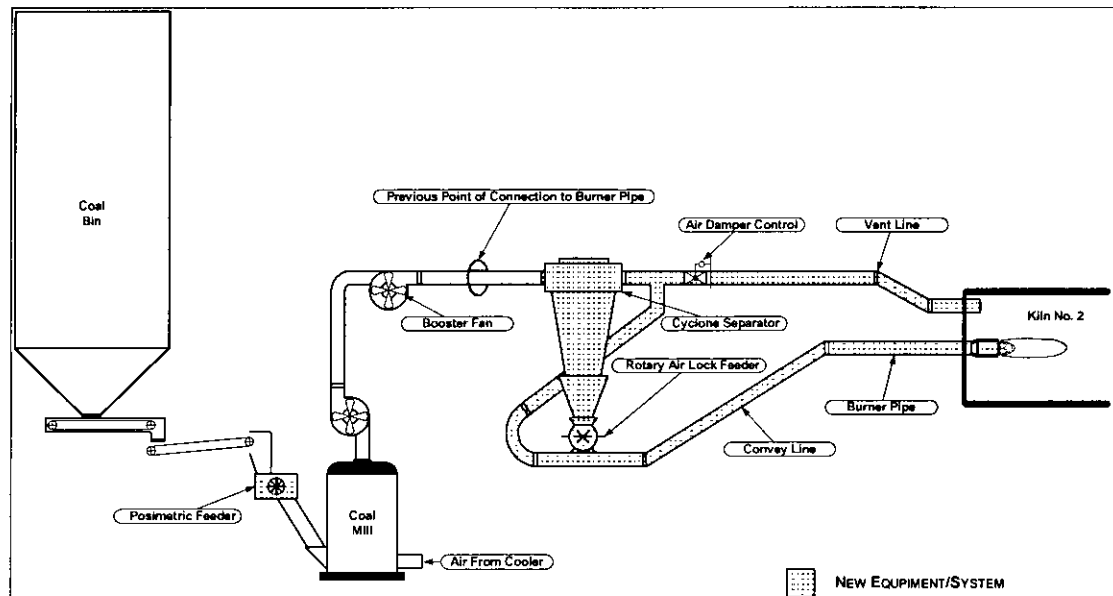
Based on these NOx control approaches, EQM and the Eric Hanson Group have formulated the following recommendations to reduce the NOx emission levels from the kiln No. 2 system:

1. PROCESS MODIFICATIONS

- 1.1 Changes in mix burnability – a hard burning mix requires a higher thermal threshold to promote the reaction of the mix components necessary for the formation of clinker. The burnability is hard due mainly to the crystalline silica (quartz) in the major component of the mix B limestone. Tarmac has implemented a tandem grinding process to reduce the size of crystalline silica in the mix.
- 1.2 Reduction in primary air – high concentrations of primary air to the kiln provides excess oxygen and increased thermal NOx. Kiln No. 2 is a direct-fired kiln where air is used for conveying pulverized coal from the coal mill to the kiln. The coal mill sweep volume is high primarily to prevent build-up on the mill table and control coal conveying gas temperatures to MSHA imposed limits. Tarmac has been able to decrease primary air and when coupled with item 2.2 below will further reduce NOx formation.
- 1.3 Changes in fuel properties – low volatile coal can increase NOx production in the kiln by lengthening the flame characteristics. A review of the volatility of the current coal supply indicates it to be a low volatile coal ["20%"]. Tarmac has ordered shipments of coal from a new supplier. The new coal supply is now on-site and the new coal has a volatility of "30%".

## 2. COMBUSTION MODIFICATIONS

- 2.1 Replace the existing burner pipe – low-NOx burners are designed to change flame characteristics for initial combustion and reduce thermal NOx formation. Tarmac has replaced the previous burner with an “Annular-Nozzle Burner” designed by the Eric Hanson Group. The burner will facilitate a reduction of NOx by maintaining the primary combustion area in a reducing atmosphere.
- 2.2 Mill air reduction/semi in-direct firing – as noted in item 1.2, high concentrations of primary air to the kiln provides excess oxygen and therefore increases thermal NOx. Separating the pulverized coal from the coal mill sweep air using a cyclone separator can reduce the amount of primary air. This system has similarities to both a mill air recirculation system and an in-direct fired coal system. The benefits are derived from a reduced volume of primary air from the exhaust of the cyclone being used to transport the coal from the cyclone separator to the burner pipe. The remainder of the coal mill sweep air bypasses the burner pipe and is directly vented to the kiln hood. Tarmac has installed the semi in-direct firing system as shown in the diagram.



Coupling the low-NOx burner with the semi in-direct firing, and operating the kiln with the process modifications, should reduce NOx emissions up to 50%. It is important to note that the installed system is un-demonstrated new technology with certain equivalence to the mill air recirculation systems noted in the EQM study. The installed system could represent the best available control for a wet process cement kiln. Initial CEM data for the new system has shown encouraging results, but a larger data set needs to be gathered.

Both the EPA *NOx Control Technologies for the Cement Industry* Final Report and the EQM study provide for comparison NOx emission factors for wet process cement kilns.

Cement Kiln Type	Heat Input Requirement (MM Btu/ton clinker)	Average NOx Emissions (lb/ton clinker)		Range of NOx Emissions (lb/ton clinker)	Kiln No. 2 Average NOx Emissions
		EPA Report	EQM Study		
Wet Kiln	6.0	9.7	9.1	3.6 -19.5	9.4
Long Dry Kiln	4.5	8.6	B	6.1 -10.5	
Preheater Kiln	3.8	5.9	B	2.5 -11.7	
Precalciner Kiln	3.3	3.8	B	0.9 -7.0	

I have included from the EPA Report data for other kiln types to show the correlation between NOx emission rates and heat input requirements. This is important to recognize in that the difference in NOx emission rates is attributed to the difference in the energy consumption rates of the types of kilns.

Further combining the process and combustion modifications in place, along with the understanding of potential NOx emissions correlated to the energy input of Kiln No. 2, Tarmac is proposing a new interim NOx emission limit of 150 lb/hour based on a monthly average. The new limit correlates to 6.0 lb/ton of clinker, which is significantly below the average NOx emissions of >9.0 lb/ton of clinker shown for wet process cement kilns. The new limit also represents over a 30% reduction from the current limit and achieves the desire of the DERM for a reduction of the NOx limit contained in the Consent Agreement. This new limit is requested for the duration of the operation of Kiln No. 2 through start-up of the new cement plant.

Tarmac respectfully requests the DERM review this proposal and asks for a meeting be set the week of August 19<sup>th</sup> to discuss this matter. Should you have any questions or need further information please contact me at the telephone number on the cover page.

Sincerely,



Scott Quaas  
Environmental Manager  
Environmental ServicesBFlorida Business

cc: A. Townsend  
R. Ferguson  
R. Hawks, EQM  
E. Hanson, Eric Hanson Group

Attachments

1. Batty, R., EC/R Incorporated, Chapel Hill, NC. *NOx Control Technologies for the Cement Industry*. Prepared for the U.S. EPA, RTP, NC, under contract No. 68-D98-026, work assignment No. 2-28. September 19, 2000
2. Environmental Quality Management, Inc. *Engineering Study on the Feasibility of Reducing NOx Emissions from No. 2 Kiln*. Prepared by Environmental Quality Management, Inc., Durham, NC for Tarmac America, Deerfield Beach, FL. August 6, 2002.