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INDEPENDENT REGULATORY
REVIEW COMMISSION

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LEHIGH
HEIDELBERGCEMENT Group

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June 4, 2008

Environmental Quality Board
Department of Environmental Protection
Rachel Carson State Office Building
16th Floor
400 Market Street
Harrisburg, PA 17101-2301

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JUN 10 2008

ENVIRONMENTAL QUALITY BOARD

RE: Proposed Rulemaking – Doc. No. 08-730
"Control of NOx Emissions from Cement Kilns"

Dear Sir or Madam:

Lehigh Cement Company (Lehigh) welcomes and appreciates the opportunity to provide comment on the proposed rulemaking for "Control of NOx Emissions from Cement Kilns".

The purpose of the proposed rulemaking is to reduce emissions of nitrogen oxide (NOx), a precursor to ozone, so as to reduce levels of ground-level ozone. These measures are part of a specific action plan of the Commonwealth and are stated as being necessary to achieve and maintain the National Ambient Air Quality Standard (NAAQS) for ozone, both within the Commonwealth and regionally. Lehigh supports efforts in reducing NOx and ozone related pollutants to reduce ground-level ozone.

This submittal is a determination that both kilns operated by Lehigh's Evansville Plant (Facility ID: 632111) are long dry-process cement kilns and are subject to the allowable emissions of 3.44 pounds of NOx per ston of clinker produced. The Evansville kilns *are* ***not*** preheater cement kilns because the systems do not contain a series or multiple cyclones.

The kilns systems *are not* preheater cement kilns as defined by EPA in their 1993 NOx ACT documents (Updated September 2000), which was one of the first EPA documents to address control of NOx emissions in cement kiln systems.

> 3.3.4.3 **Suspension Preheaters**. In systems with suspension preheaters, the dry pulverized feed passes through a series of cyclones where it is separated and preheated several times, typically in a four-stage cyclone system. The partially (40 to 50) percent calcined feed exits the preheater tower into the kiln at about 800 to 900 °C (1500 to 1650 °F). The kiln length required for completion of the cement formation is considerably shorter than that of conventional and heat exchange is very good. Suspension preheater kilns are very energy efficient (as low as 3.1 MJ/kg or 1334 BTU/lb clinker in large installation ....

Likewise, EPA in their NOx ACT document describes Dry Process Kilns as:

> 3.3.4.2 **Dry Process Kilns** The dry process utilizes a dry kiln feed rather than a slurry. Early dry process kilns were short, and the substantial quantities of waste heat in the exit gases from such kilns were frequently used in boilers to generate electrical power from which often satisfied all electrical needs of the plant. In one modification, the kiln has been lengthened to nearly the length of the long wet-process kilns and chains were added. The chains serve almost exclusively a heat exchanger function ....

Each Evansville kiln system produces approximately 1550 mtpd clinker with a fuel consumption of 4.7 MJ/kg clinker. The kilns are 4.57m dia. x 5.18m dia. x 158.5m length (the kiln expands to the second diameter at the inlet of the chain system). The kiln system contains a single cyclone and a chain system.

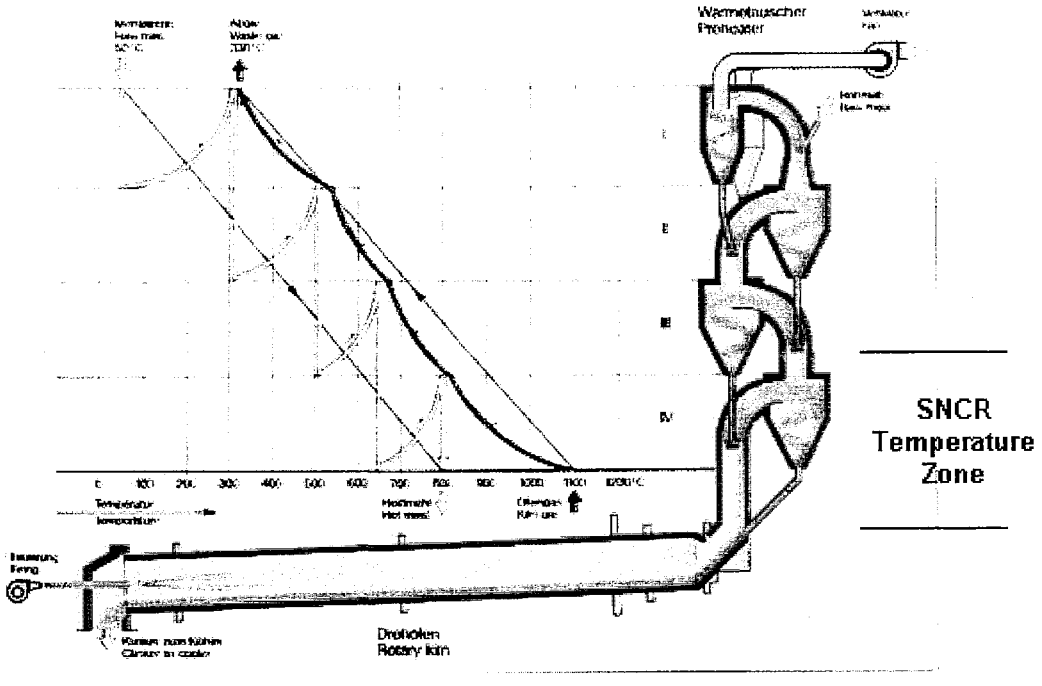
A typical 1550 mtpd suspension preheater kiln, as described above, would be 4.4m dia. by 64m length, consist of at least 4 stages of preheat and does not contain a chain system.

Therefore, under the EPA definitions as generated in their NOx ACT Document, the Evansville kilns clearly do not fit into the category of a suspension preheater, due to the following physical characteristics:

1. The Evansville kilns are approximately 2.5 times longer than a preheater kiln.
2. The Evansville kilns contain a chain system, which preheater kilns do not.
3. The Evansville kiln fuel consumption is approximately 50% higher than a preheater kiln.
4. The Evansville kiln system does not contain multiple stages of preheat as define above. It only contains one cyclone and a chain system.

The importance of this is the temperature profile difference between a long dry kiln and a preheater kiln system with the use of SNCR technology. SNCR was developed for preheater kilns in Europe to be deployed or used in a gas temperature zone of 840 to 980°C (1550 to 1800°F). This temperature zone for a preheater kiln is located between the kiln exit (gas) and the inlet to the lowest stage of preheat. Typically, ammonia is injected in the kiln riser duct, inlet to the lowest stage of preheat and sometimes in the exhaust of the lowest stage of preheat where these temperatures are conducive for the NOx reduction reaction to occur. These are all stationary locations and are **not** rotating.

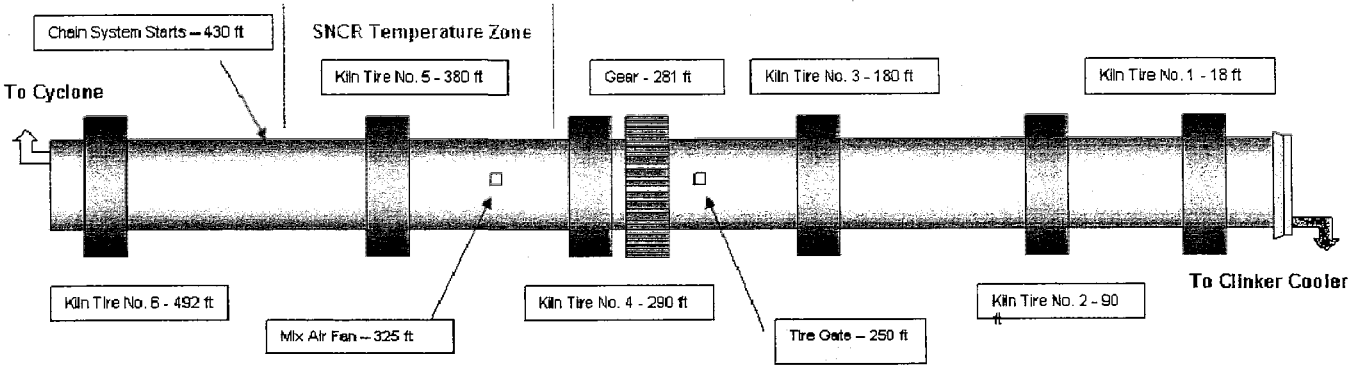
Temperature Profile of a Typical Four Stage Preheater



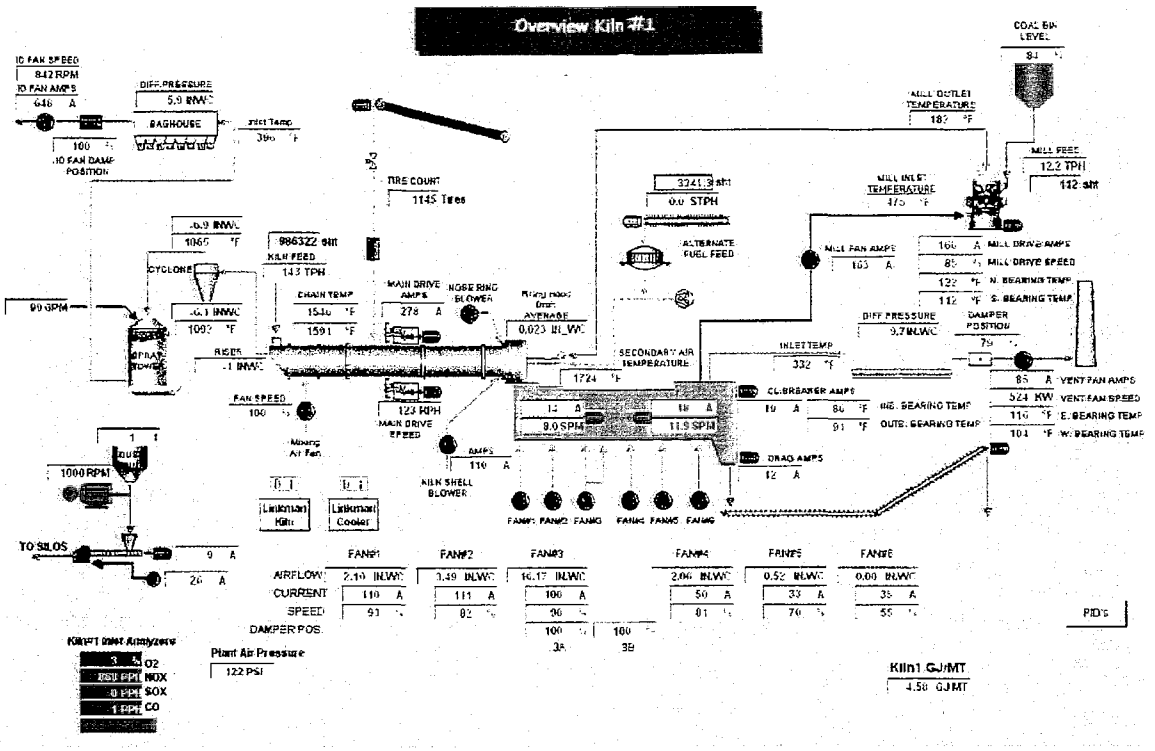
Each Evansville kiln system is composed of a long dry kiln, which is over 158.5m long and includes a single cyclone. The temperature range at the exit of each kiln, prior to the cyclone, is about 540 to 650°C (1000 to 1200°F), which is too low for SNCR to reduce NOx emissions. SNCR needs a temperature zone between 840 to 980°C (1550 to 1800°F) to reduce NOx emissions and minimize ammonia slip. If SNCR would be employed in the kiln riser duct of the Evansville kiln systems, minimum NOx reduction would be achieved with high levels of ammonium slip. For the Evansville kiln systems, this critical temperature zone is located above the inlet section of the chain system or in the rotating portion of the kiln.

The following diagram is a typical temperature profile of the Evansville kiln system.

Evansville Kiln Layout Diagram



Control Room Screen Print of Kiln #1 at the Evansville Facility



(The above is only a graphical representation of the system. In reality, the kiln contains 5 support stations.)

Lehigh will be pursuing new and developing technology to deploy SNCR within the rotating body of the kiln shell. Ammonia and atomizing air piping will be strapped to the kiln shell from the kiln feed end, past the chain system and several layers of spray nozzles will be inserted into the kiln between the chain system and the kiln burning zone. Unlike a preheater kiln where the nozzles are located in the stationary section of the preheater, these nozzles will be located on the rotating surface and can only be maintained while the kiln is not rotating.

For the numerous reasons discussed above, Lehigh has determined that the Evansville kiln systems are classified as long dry-process cement kilns. Therefore, we request DEP to establish our new NOx limit during the ozone season at 3.44 lbs NOx per ston clinker starting with the 2009 Ozone Season.

LEHIGH
HEIDELBERGCEMENT Group

Lehigh appreciates the opportunity to provide comment on the proposed rulemaking. If there are any questions, please direct them to me at the above address.

Sincerely,

Christoph Streicher
Plant Manager
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cc: R. Fitterling – PADEP