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May 31, 1995

Bureau of  
Air Regulation

Mr. John Reynolds  
Florida Department of  
Environmental Protection  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Subject: Rinker Materials Corporation  
Dade County, Florida  
NOx RACT Limit

Dear Mr. Reynolds:

As we have discussed and in response to Rule 62-296.570(4)(a)1, FAC, Rinker Materials Corporation (Rinker) is requesting a modification to the Reasonable Available Control Technology (RACT) rule as it applies to NOx emissions from cement plants. The applicability of this rule is codified at 62-296.570(1), FAC, and the technology requirement is codified at 62-296.570(4)(b)8, FAC. In summary, the referenced rules apply to cement plants classified as major sources of nitrogen oxides (sources emitting more than 100 tons per year) in Dade County and certain other counties. The RACT limit for NOx emissions from cement plants is 2.0 pounds of NOx per MMBtu heat input.

As we discussed, the RACT limit of 2.0 pounds per MMBtu does not have a sound technical basis. The limit was based upon a telephone conversation between the Department personnel and Rinker personnel during a time when the Department was rewriting Rule 62-296.570, FAC, to respond to comments by the Joint Administrative Procedures Committee. The Department had just a few weeks to rewrite the rule and incorporate comments by affected parties.

When the first draft of the rewritten rule was circulated for comment (under Department letter dated November 24, 1993), affected parties had approximately a week to respond. In that draft of the rule, NOx emissions from existing cement plants were limited to 0.5 pounds per MMBtu. Rinker discussed the proposed rule with Department staff and, based upon preliminary data that Rinker had available, a RACT limit of 2.0 pounds per MMBtu was proposed. This limit was eventually adopted for cement plants as 62-296.570(4)(b)8, FAC. *per*

The NOx limit suggested by Rinker and adopted as RACT by the Department was based upon a preliminary report to Rinker on the subject of converting the kilns from direct-fired to indirect-fired. The data in the report were based on theoretical considerations and an extrapolation of data from other plants. Given the time constraints that existed at the time, this limited information was the basis of the NOx limit of 2.0 pounds per MMBtu suggested by Rinker.

Since that time, Rinker has developed NOx emission data from their cement kilns and emission data have become available for another affected facility. Also, since the adoption of the RACT rule, Rinker has begun analyzing the viability of replacing their two existing wet process cement kilns with a single dry process kiln. An air construction permit application is being prepared for this project.

As a result of the new data that are available and Rinker's construction plans, we are proposing a NOx RACT limit for existing Portland cement plants in Dade, Broward and Palm Beach counties of 4.4 pounds per MMBtu heat input.

Under cover of our letter dated May 26, 1993 (copy attached), the existing Rinker facility is described, factors affecting NOx emissions are discussed, and alternatives for reducing NOx emissions are summarized. The alternatives included:

1. Retrofitting the existing direct fired system with a recirculating valve to reduce the primary combustion air from approximately 28 percent to approximately 23 percent.
2. Conversion to a semi-direct firing system. This conversion would reduce the primary combustion air from approximately 28 percent to approximately 15 percent.
3. Burner modification.
4. Conversion to indirect coal firing. The conversion to an indirect firing system in the two kilns with burner modifications would be expected to reduce the primary combustion air to about eight percent and reduce the NOx emission rate to approximately 1.5-1.6 pounds per MMBtu, average. The cost of this modification would be approximately \$2.6 million not counting production losses.

The only alternative that appeared viable for reducing NOx emissions from the existing kilns is the conversion to indirect firing. Currently, each of the two kilns is direct fired. The coal mills are each rated at a grinding capacity of approximately 14 tons of coal per hour however, the mills are operated at a grinding rate of 7.0-7.5 tons of coal per hour



(the coal firing rate to each kiln). The relatively large volume of air required to sweep the mills transports the coal directly to the kiln burners and is the primary combustion air for the kilns. Because of the size of the mills, the primary air accounts for approximately 28 percent of the total combustion air. By comparison, an indirect firing system with a low-NOx burner would operate at approximately eight percent primary combustion air.

The total combustion air to the Rinker kilns is controlled at 2-15 percent excess air (0.5-3.0 percent oxygen in the combustion gases discharged from the kiln). Further reduction in the excess air for NOx control is not practical and burner modification without a reduction in the primary air would be ineffective for NOx control. The only practical approach to reducing NOx emissions from the Rinker kilns is to reduce the primary combustion air and thus reduce the peak flame temperature, and the only practical approach to reducing the primary combustion air is to convert to an indirect firing system.

The NOx emission data developed by Rinker subsequent to the writing of the RACT standard was developed in January 1993 during tests to demonstrate the efficacy of using tire derived fuel in the cement kilns. During these tests, both of the Rinker kilns were operating and both were exhausted through a common stack as is normal. During the baseline tests, both kilns were fired with coal at a heat input rate of approximately 5.0 MMBtu per ton of clinker. During the tire derived fuel test, coal was fired exclusively to one of the kilns while a mixture of coal (70 percent heat input) and tire derived fuel (30 percent heat input) was fired to the second kiln.

The results of the NOx emission measurements are summarized in the attached table. These data show two trends:

1. There is a considerable variation in NOx emissions under both sets of operating conditions probably due to normal fluctuations in excess air (2-15 percent). When TDF was fired to one of the kilns, the NOx emissions from the two kilns combined ranged from 832 to 1033 pounds per hour and when both kilns were fired with coal, the NOx emissions from the two kilns ranged from 883 pounds per hour to 1431 pounds per hour. This variability in NOx emissions is not uncommon for either wet process or dry process cement kilns.
2. NOx emissions were not significantly lower when TDF was burned in one of the kilns even though the firing of TDF (at mid-kiln) and the reduction in coal firing would have been expected to lower the peak flame temperature. The fact that the primary air for coal combustion accounted for

Mr. John Reynolds  
Florida Department of  
Environmental Protection

May 31, 1995  
Page 4

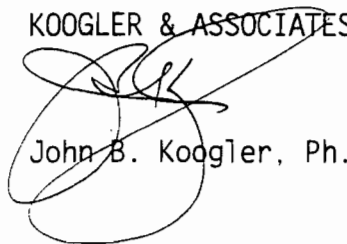
approximately 37 percent of the combustion air in the kiln firing TDF probably offset the effects of the lower coal firing rate.

In reviewing the data in the attached table and combining both data sets, the average NOx emission rate from the two kilns averaged 2.85 pounds per MMBtu (15.3 pounds of NOx per ton of clinker). Because of the variability in NOx emissions observed at Rinker and other cement plants, Rinker is proposing a NOx RACT limit of 4.4 pounds per MMBtu. This is the 95th percentile emission rate based upon the data set summarized in the attached table. This emission limit also appears to be in line with NOx emissions from other wet process cement kilns in Florida, and it is our understanding that this proposed limit will be supported by other affected facilities. It should also be noted when considering this request that the VOC emission rate from the Rinker cement kilns is only 0.03 pounds per MMBtu.

We appreciate your consideration of this request and will provide any additional information should it be required.

Very truly yours,

KOGLER & ASSOCIATES

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

JBK:wa  
Enc.

c: Mr. M. Vardeman, Rinker  
Mr. Scott Benyon, Rinker



**EMISSION MEASUREMENTS**

**RINKER MATERIALS CORPORATION  
DADE COUNTY, FLORIDA**

**JANUARY 1993**

	TDF Tests			Baseline Tests		
	1	2	3	1	2	3
<b>KILN 1</b>						
Clinker (tph)	34.3	33.7	33.8	36.1	35.5	35.9
Coal (MMBtu/hr)	144.28	143.25	142.99	177.41	177.96	176.87
TDF (MMBtu/hr)	60.60	60.01	60.34	0	0	0
Total Heat Input (MMBtu/hr)	204.88	203.26	203.33	177.41	177.96	176.87
(MMBtu/ton clinker)	5.97	6.03	6.02	4.91	5.01	4.93
<b>KILN 2</b>						
Clinker (tph)	34.0	34.1	33.7	36.0	35.5	35.3
Coal (MMBtu/hr)	190.83	187.31	194.10	176.20	174.57	174.30
Total Heat Input (MMBtu/ton clinker)	5.61	5.49	5.76	4.89	4.92	4.94
<b>KILNS 1 AND 2</b>						
Clinker (tph, total)	68.30	67.80	67.50	72.10	71.00	71.20
Total Heat Input (MMBtu/ton clinker)	5.79	5.76	5.89	4.90	4.97	4.93
(MMBtu/hr)	395.71	390.57	397.43	353.61	352.53	351.17
NOx (lb/hr)	1033.0	913.0	832.0	883.0	1233.0	1431.0
(lb/MMBtu)	2.61	2.34	2.09	2.50	3.50	4.08
(lb/clinker)	15.12	13.47	12.33	12.25	17.37	20.14
VOC (lb/hr)	10.2	14.4	17.8	11.3	12.2	11.0
(lb/MMBtu)	0.03	0.04	0.04	0.03	0.03	0.03
(lb/ton clinker)	0.15	0.21	0.26	0.17	0.11	0.15

Average NOx Emission Rate - 2.85 lb/MMBtu  
Std. Dev. - 0.77 lb/MMBtu

95th Percentile Emission Rate -  $\bar{x} + 1.96 \sigma$   
- 4.4 lb/MMBtu