BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

RINKER MATERIALS CORPORATION
MIAMI, DADE COUNTY, FLORIDA

Portland Cement Manufacturing Facility

VOC BACT Determination

DEP File No. 0250014-008-AC
PSD-FL-324

Department of Environmental Protection
Division of Air Resources Management
Bureau of Air Regulation

March 1, 2002

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

I. APPLICANT NAME AND ADDRESS

Rinker Materials Corporation
1200 NW 137th Avenue
Miami, Florida 33182

II. FACILITY INFORMATION

A. FACILITY LOCATION

Rinker Materials Corporation (Rinker) recently modernized the existing Miami Cement Plant by replacing the wet process cement plant with a 1.2 million tons per year (TPY) clinker dry-process cement production line [137 tons of clinker per hour (TPH)].

This site is approximately 8.2 kilometers to the Everglades National Park, a Class I Prevention of Significant Deterioration (PSD) Area, and in an ozone (O_3) maintenance area in Dade County.

B. FACILITY CLASSIFICATION CODE (SIC)

Major Group No. 32, Clay, Glass, and Concrete Products
Industry Group No. 324, Cement, Hydraulic
Industry No. 3241, Cement, Hydraulic

C. FACILITY CATEGORY

The Rinker Miami Cement Plant directly emits more than 100 TPY of several regulated air pollutants and emits over 10 TPY of at least one hazardous air pollutant (HAP). Therefore it is classified as a "Major Source of Air Pollution or Title V Source," per the definitions in Rule 62-212.200, Florida Administrative Code (F.A.C.).

This industry is listed in Table 212.400-1, "Major Facilities Categories", Rule 62-212.400, F.A.C. Therefore, stack and fugitive emissions of over 100 TPY of carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO_2), nitrogen oxides (NO_X), or particulate matter (PM/PM_{10}) characterize the existing installation as a Major Facility per the definitions in Rule 62-210.200, F.A.C. and subject to applicability review for the requirements of PSD per Rule 62-212.400, F.A.C.

Per Table 212.400-2, "Regulated Air Pollutants – Significant Emission Rates", modifications at the facility resulting in emissions increases greater than 40 TPY of NO_X or SO_2, 7 TPY of sulfuric acid mist (SAM), 25/15 TPY of PM/PM_{10}, 3 TPY of fluorides, 1200 pounds per year (lb/yr) of lead or 200 lb/yr of mercury require review per the PSD rules and a determination for Best Available Control Technology (BACT) per Rule 62-212.400, F.A.C.

The approved Rinker modernization project was not subject to New Source Review including the PSD provisions because the modernized plant was expected to result in less overall air pollution than the existing plant. This is primarily due to the lower fuel requirements per unit of product characteristic of the dry processes.

III. MODERNIZATION PROJECT

The Department issued a permit to Rinker on September 11, 1997 to modify the existing wet process plant by incorporating the modern dry process technology including a preheater and precalciner along with indirect firing. The dry process preheater/precalciner (PH/PC) kiln is the most fuel-efficient cement pyroprocessing technology currently available. Thermal efficiencies will be improved with the PH/PC kiln and the amount of fuel combusted per ton of clinker produced is expected to be reduced

The modernized cement plant will produce up to 137 TPH of clinker (highest maintained rate over a day). The annual potential production rate will not exceed 1.2 million TPY of clinker. The major equipment will include a PH/PC kiln, a clinker cooler, raw mill, finish mill, silos, conveyers, and particulate control/dust collection and recycling equipment. The cement product will be stored in silos and shipped in bags or in bulk by rail or truck.

A more complete project and process description was provided in the Technical Evaluation and Preliminary Determination issued for the modernization project on June 23, 1997. Rinker completed basic construction of the dry process kiln line in Spring of 2000. Compliance tests were conducted during the second half of the year. Following is a photograph of the constructed dry process plant taken in late June 2001.

Rinker Modernized Dry Process Cement Plant in Miami, Florida

IV. VOC BACT DETERMINATION REQUEST

On November 19, 2001, Rinker submitted a request that the Department perform a determination of BACT pursuant to the PSD rules (62-212.400, F.A.C.). The main reason for Rinker's request is that the VOC limit accepted by the company to avoid PSD during the modernization project is very difficult to meet for reasons that are discussed below.

V. PRESENT SITUATION

As of this time, all physical construction required to make cement at or near the permitted production limit is complete. A Title V Operation Permit with a Compliance Plan was issued in October 2000. Compliance testing has been conducted. Following are the results of tests for VOC.

Pollutant	Permit Limit	Result
VOC	0.1 lb/ton clinker	0.1 lb/ton clinker

The emissions of VOC are at the allowable limit based on lb/ton of clinker produced. However annual emissions are still less than the value that would have triggered PSD. The modernization permit required only an initial test for VOC and relied upon carbon monoxide testing as a surrogate for VOC.

VI. BACKGROUND ON VOC ISSUE

The following table is from the Technical Evaluation and Preliminary Determination in support of the modernization permit issued in 1997. The permit allowed an increase of only 32.9 TPY, of which 20.5 TPY were consumed by a contemporaneous soil remediation thermal unit project.

CONTEMPORANEOUS CREDITABLE CHANGES (TPY)*

Pollutants	Modernization Project	(+) Increases (Contemporaneous)	(-) Decreases (Shutdowns)	= Total	PSD Significance
VOC	60	20.5	47.6	32.9	40

* Sum of Contemporaneous Creditable Changes (TPY) detailed in Rinker's letter dated April 16, 1997.

As a result, an increase in kiln emissions from 47.6 actual TPY to 60 potential TPY was allowed despite a near doubling in cement output. Emissions of VOC from raw materials in the old wet process were masked by the fact that raw materials are slurried and then dried, calcined, and converted to clinker within the kiln. It was apparently believed that VOC would be evolved in the kiln and would be destroyed in the calciner that would act somewhat as an afterburner.

A similar assumption was made for the new preheater calciner kiln constructed by Florida Rock in Newberry, Florida. In that case, a BACT limit for VOC was set at 0.12 lb/ton of clinker. The company initially failed to achieve the permitted limit and was able to do so after an extensive program to diagnose the causes and potential remedies. Testing at Rinker was scheduled after the testing at Florida Rock and Rinker (with difficulty) met its more stringent limit of 0.1 lb/ton of clinker.

The Department would have issued a higher BACT limit than the limit necessary to avoid PSD if the request had been made at that time. It is noted that the modernization permit required only the initial test for VOC and that the Title V Operation specifies no further testing permit. Nevertheless, Rinker has requested both a new limit and permanent testing and monitoring requirements to be incorporated into the Title V Operation Permit.

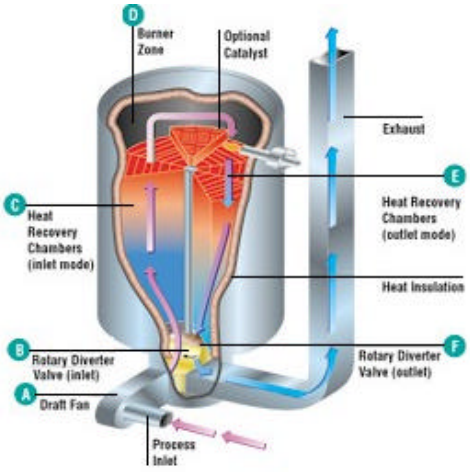
Rinker's request to increase the emission rate to 0.12 (matching the Florida Rock limitation) will result in annual VOC emissions of approximately 72 TPY. This would trigger PSD per the above table because emissions increases including contemporaneous increases and decreases would be approximately 45 TPY versus the PSD threshold of 40 TPY

VII. VOC LIMTATIONS AT OTHER FACILTIES

Following is a tabulation of some recent VOC emission limitations for new cement kiln projects. The approximate value determined by the U.S. Environmental Protection Agency (EPA) as Maximum Achievable Control Technology (MACT) for kilns at greenfield sites is included for comparison. There is no MACT requirement for new kilns or existing kilns at brownfield sites.

PLANT	YEAR	PSD?	VOC (lb/ton)	TECHNOLOGY
Rinker (Revision)	2001	Y	0.12	Process/Raw Materials
Rinker Modernization	1997	N	0.10	Process/Combustion
Fla. Rock Newberry	1996	Y	0.12	Process/Combustion
FCS Brooksville	1995/97	Y	0.085	Process/Combustion
Holnam Midlothian	1997	N	0.70	Process/Combustion
TXI Midlothian	1998	N	0.026	Regen Thermal Oxidation
Tarmac Miami	2000	N	0.19	Process/Combustion
Holnam Holly Hill	2000	Y	0.27	Process/Raw Materials
Suwannee American	2000	Y	0.12	Process/Combustion
St. Lawrence Cement	2001 (draft)	LAER	0.11	Process/Raw Materials
Rio Grande	2000	Y	0.05	Process/Combustion
All Greenfield Plants	Future	MACT	~0.3	Process/Raw Materials

TXI proposed a sophisticated regenerative thermal oxidation (RTO) system that cost about $17,500,000 (installed) and was able to net out of PSD for VOC and CO. In addition to the cost, additional NO_X results from burning natural gas in the RTO.[1] Eleven RTO modules of the type shown below were installed and cover an area approximately the "size of a football field."



A Top/Down BACT determination might not have required such a system at the TXI Midlothian site. However the company wanted to avoid protracted delays in their expansion that were likely if they tried to obtain a PSD permit with a BACT determination in Texas for their modernization/expansion project. No subsequent projects have required RTO systems as BACT or LAER.

Colorado specified an annual limit, based on a rolling 12-month total, for the Rio Grande Portland Cement plant outside Pueblo, Colorado. This annual limit is equivalent to about 0.05 lb VOC per ton of clinker. After the initial source compliance testing, however, the Rio Grande permit does not provide for additional VOC measurements, other than general language reserving the right to require testing of any emission source as requested by the State.

A special situation (not listed in the above table) caused Holnam to install an RTO for the purpose of VOC/odor control to abate problems associated with high levels of naturally occurring kerogens in the raw materials available for its plant in Michigan. VOC emissions from that plant were estimated in the "thousands of TPY" versus the 72 TPY foreseen for the Rinker plant.

An alternative to RTO is a carbon filter such as included in the Polysius Environmental Technology (POLVITEC).[2] Such a system was installed at the HCB Siggenthal Plant in Switzerland for multi-pollutant control from dried sewage sludge combustion.[3] The project was feasible because the City of Zurich put up a portion of the capital cost of $15 million for the installation and the plant recovers costs by burning a variety of other wastes.

VOC from raw materials can be controlled by judicious selection of the raw materials. Limestone, clay, and sand are the predominant components of the raw material feed stock. Controlling VOC only through careful selection of raw materials is therefore not a viable option if local, in-state sources of these components are high in VOC content.

There are some control options, however, if the primary materials are relatively free of VOC but the additives, such as mill scale, are high in VOC content. One option is to use mill scale that is free of or cleaned of lubricants.[4] Another is grinding and metering additives directly into the kiln.[5] The organic content of the mill scale is driven off in the preheater. By adding the VOC laden material directly into the hot zone of the kiln instead of the preheater system, the VOC are combusted before they can be emitted.[6]

VIII. VOC BACT DETERMINATION

The Department has determined that the top control for VOC is 0.026 lb/ton of clinker to be achieved by RTO or carbon adsorption. Reduction of emissions from 0.12 to 0.026 lb/ton would represent annual emission reductions of about 60 TPY. There is no way it can be cost-effective to accomplish such a small reduction through an RTO system or a carbon adsorption filter on a cement kiln. In any event, the plant is only requesting an increase of some 12 TPY.

In Florida, locally available limestone, sand, and clay typically have a low organic content. Mill scale and other additives can be high in VOC content. Adding the mill scale directly to the kiln is not cost-effective in relation to the increased heat consumption of the kiln, possible build ups at the injection point, and the difficulties in producing the homogeneous kiln feed needed for high quality clinker.[6]

Without judicious selection of raw materials, emissions from kilns such as Rinker and Florida Rock can easily be on the order of 0.2 lb/ton. Both Rinker and Florida Rock have implemented programs to ensure VOC content is minimized in the incoming raw materials in addition to having very effective pyroprocessing systems to burn out VOC emanating from the kilns.

By comparison with recent BACT determinations (including a draft LAER determination) with other kilns around the country, the Rinker and Florida Rock kilns have low VOC emissions. The Department believes that 0.12 lb/ton of clinker is the proper limit for the Rinker kiln and that this limit can be met through proper combustion controls and raw materials selection, without the need for additional control devices or direct firing of the additives.

To provide reasonable assurance that the facility will comply with the VOC emissions limit, the Department will require continuous emissions monitoring system (CEMS) for Total Hydrocarbons (THC) such as was installed at Florida Rock. Until the CEMS is installed, the Department will require quarterly stack testing and testing of hydrocarbon content in the incoming raw materials. After installation of the CEMS, the Department will require annual VOC testing; additional testing may be required by Miami-Dade County following review of the CEMS data. These requirements are established in the permit modification accompanying this BACT determination.

IX. DETAILS OF THE ANALYSIS MAY BE OBTAINED BY CONTACTING:

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Recommended By:

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3/1/2002
Date

Approved By:

Howard L. Rhodes, Director
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3/1/02
Date

References

1 Memorandum from Greer, W.L., Trinity Consultants, Inc., Olathe, KS, to Linero, A.A., Florida DEP. *Re: Draft AWMA Paper.* February 9, 2001.

2 Kupper, D. "Trends on Desulfurization and Denitrification Techniques in the Cement Industry," in *Proceedings of the 34th IEEE Cement Industry Technical Conference*. 1992. Dallas, TX.

3 de Quervain, B., Ph.D., "Umweltfreundliche Klarschlammverbrunnung am Beispiel des PCW Portand-Cement-Werks," *GWA des Schweizerichen Vereins des Gas und Wasserfaches,* 1992, Sonderdruck No. 1258.

4 Letter from Fred Cohrs, Florida Rock Industries, to Kirby Green, Florida DEP, re: VOC Emissions Testing, dated September 25, 2000.

5 Terry, Mark S. "BACT: What is available with Today's Technology," *Krupp Polysius Technical Seminar*. 1999.

6 Reference Document, "Best Available Techniques" for the Cement Industry," CEMBUREAU (The European Cement Association). December 1999.