



Commonwealth of Massachusetts  
Executive Office of Environmental Affairs

**Department of  
Environmental Protection**  
Western Regional Office

William F. Weld

Governor

Trudy Coxe

Secretary, EOE

David B. Struhs

Commissioner

June 16, 1995

Mr. David Archibald  
Specialty Minerals, Incorporated  
260 Columbia Street  
Adams, Massachusetts 01220

Re: BAPCD - Adams  
Regulations 310 CMR 7.19(8)  
and 310 CMR 7.19 (12)  
Application # 1-P-94-022  
Transmittal # 65843  
NOx RACT Emission Control Plan

**EMISSION CONTROL PLAN  
FINAL APPROVAL**

Dear Mr. Archibald:

The Department of Environmental Protection, Bureau of Waste Prevention, Western Regional Office ("Department"), has completed its review of your Emission Control Plan ("ECP") submitted for the proposed implementation of Reasonably Available Control Technology ("RACT") for oxides of nitrogen generated from Specialty Minerals, Incorporated ("Specialty Minerals"), 260 Columbia Street, Adams, Massachusetts. The ECP was submitted in accordance with Regulation 310 CMR 7.19(3) RACT for Sources of Nitrogen Oxides ("NOx") as contained in 310 CMR 7.00 "Air Pollution Control Regulations" adopted by the Department pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-E, Sections 4 and 6.

The Department has determined that Specialty Minerals' cogeneration system and Fluo Solids ("FS") Kilns No. 3 & 4 are subject to 310 CMR 7.19(8) and 7.19(12), respectively. These regulations require any person who owns, leases, operates, or controls an emission unit subject to the Stationary Reciprocating Internal Combustion Engines or Miscellaneous RACT category to submit a NOx RACT ECP, and have the ECP approved by the Department pursuant to 310 CMR 7.19(3). The emission control plan and the subsequent plan approval issued by the Department for a miscellaneous source under 7.19(12) must also be approved by the U.S.

Environmental Protection Agency ("EPA") as a Massachusetts State Implementation Plan revision.

The NOx RACT ECP application was signed by David Archibald, Plant Manager, Specialty Minerals. A stamped approved copy of the NOx RACT ECP application is enclosed.

### I. Process Description

#### Cogeneration System (Reciprocating Internal Combustion Engine)

The cogeneration system is powered by a 6710 HP dual fuel Cooper Bessemer, Model No. LSVB-16-GDT, reciprocating internal combustion engine. It is subject to Regulation 310 CMR 7.19(8)(c)3., which requires lean burn, oil-fired or dual fuel reciprocating internal combustion engines to comply with a NOx emission limit of 9.0 grams per brake horsepower-hour, based on a one hour average. For a stationary reciprocating internal combustion engine using a monitoring system that satisfies the requirements of 310 CMR 7.19(13)(b) to determine compliance, compliance will be based on a calendar day average.

Specialty Minerals uses a selective catalytic reduction ("SCR") NOx control system to convert at least 90% of NOx emissions in the combustion gas stream to nitrogen gas and water, in accordance with approval # B-87-C-006, issued July 13, 1987, and amendments issued September 10, 1987, March 28, 1988, June 16, 1988, and November 16, 1989. Guaranteed emission rates at maximum load before add-on control were 5 grams per horsepower-hour while operating on dual fuel and 12 grams per horsepower-hour while operating on only diesel oil (see amendment dated March 28, 1988). Based on this information the Department expects the cogeneration system to operate with emissions well below the NOx RACT standard without modification.

Specialty Minerals will continue to operate the cogeneration system under the requirements specified in the plan approval, in accordance with Regulation 310 CMR 7.19(2).

#### Kilns (Miscellaneous RACT)

FS Kilns No. 3 & 4 are Dorr-Oliver fluid bed lime kilns with 37.7 MMBtu/hour and 39 MMBtu/hour energy input capacities, respectively. Each kiln is a three compartment vertical steel shell divided by constriction plates into preheat, calciner, and cooling compartments. The plates consist of wedge shaped perforated masonry brick with metal orifice plates through which gasses rise from one compartment to the next. The upward flow of process gas is sufficient to prevent solids from dropping down through the orifices. The upper constriction plate

contains metal tuyeres (nozzles) which promote even gas distribution into the pre-heat chamber. A metal transfer pipe extends from the bottom of each constriction plate down to the lower bed. An automated control system maintains the bed level for each compartment.

Each calciner compartment contains 24 fuel injectors (1/2" carbon steel pipe) which project into the bed. Residual oil (1.5% sulfur, #6 oil) is pumped through the injectors into the bed where it volatilizes and ignites on the bed. Waste lubricating oil generated at the facility is blended in the residual oil and also burned in the reactor, as approved by the Department in an Approval issued December 2, 1985. A #2 fuel oil burner located in the freeboard of the cooling compartment is used for preheating the reactor and heating the bed to the ignition temperature of #6 oil during cold starts. It is also used to cure new or repaired refractory. The use of finely crushed limestone in this type of calciner allows the reaction to take place at lower temperatures (1500-1900°F) than found in the more common rotary kilns.

Specialty Minerals controls excess O<sub>2</sub> levels in the kiln exhaust at 1.0 - 2.0% (wet) to minimize NO<sub>x</sub> formation. Existing pollution controls include multiple cyclonic separators to remove particulate matter and a wet scrubber to remove fine particulate matter. Lime generated in the process reacts with sulfur dioxide (SO<sub>2</sub>) to remove 80-85% of the SO<sub>2</sub> from the gas stream. Part of the exhaust stream is used for its CO<sub>2</sub> content in other processes while the balance vents to the atmosphere through a 97 foot stack.

Specialty Minerals estimates the maximum NO<sub>x</sub> concentration at 120 ppmvd (corrected to 7% O<sub>2</sub>) or 1.5 lb/ton of produced lime, based on stack tests performed on FS Kilns No. 3 & 4. The EPA NO<sub>x</sub> emission factors for rotary kilns are listed below for comparison:

| <u>Emission Source</u>        | <u>Emission Factor</u>                    |
|-------------------------------|---|
| Rotary Lime Kiln, gas fired:  | 3.5 lb NO <sub>x</sub> /ton lime produced |
| Rotary Lime Kiln, coal fired: | 2.9 lb NO <sub>x</sub> /ton lime produced |

Specialty Minerals also noted that no NO<sub>x</sub> emission standard has been established for boilers with the same energy input capacity as the kilns. Potential NO<sub>x</sub> emissions from the kilns are 10.9 and 11.3 lb/hour, respectively, or a total of 97.3 tons NO<sub>x</sub>/year.

**Table I**  
**Kiln Description**

|                            | <b>Kiln No. 3</b>      | <b>Kiln No. 4</b>      |
|----------------------------|------------------------|------------------------|
| Type                       | Fluid Bed              | Fluid Bed              |
| Manufacturer               | Dorr-Oliver            | Dorr-Oliver            |
| Date in Service            | 1963                   | 1975                   |
| Max. Heat Input (MMBtu/hr) | 37.7                   | 39.0                   |
| <b>Fuel Injectors</b>      |                        |                        |
| Type                       | 1/2" carbon steel pipe | 1/2" carbon steel pipe |
| Number per Kiln            | 24                     | 24                     |
| Primary Fuel               | 1.5% S #6 oil          | 1.5% S #6 oil          |
| Max. Firing Rate           | 251 gph                | 260 gph                |
| Secondary Fuel             | none                   | none                   |
| <b>Preheat Burner</b>      |                        |                        |
| Type                       | 1/2" carbon            | 1/2" carbon            |
| Number per Kiln            | 1                      | 1                      |
| Primary Fuel               | 0.3% S #2 oil          | 0.3% S #2 oil          |
| Max. Firing Rate           | 85.7 gph               | 85.7 gph               |
| Secondary Fuel             | none                   | none                   |

## **II. Single Source NOx Control Technology Evaluation**

Specialty Minerals used the list of control options identified in 310 CMR 7.19(2) for alternative RACT and conducted a control technology search through the EPA BACT/LAER Clearing House. No technologies other than those listed in 310 CMR 7.19(2) were identified.

A number of the control options were not applicable to controlling NOx emissions from the kilns and were eliminated from consideration. The following control options were included in the NOx RACT evaluation and determined by Specialty Minerals not to represent RACT:

### Post Combustion Technologies

Selective catalytic reduction (SCR) & selective non-catalytic reduction (SNCR)

### Reason for Elimination as RACT

Insufficient space at site

### Combustion Modifications

Flue gas recirculation

Minimal reductions expected; requires major kiln windbox alterations  
\$17,800/ton NOx removed

Fuel switching (#6 oil to #2 oil)

Specialty Minerals has concluded that current operation procedures represent RACT.

It is the opinion of the Department that the modifications proposed by Specialty Minerals and referenced in this **FINAL APPROVAL** will achieve a level of control consistent with 310 CMR 7.19(12) requiring the implementation of RACT at the facility. The Department hereby grants **FINAL APPROVAL** for the installation described herein and in the submittal pursuant to the Regulations and 310 CMR 7.19(12) of the "Regulations for the Control of Air Pollution in the Berkshire Air Pollution Control District", subject to the following provisions:

**Operation Limits**

1. Specialty Minerals shall limit the NOx emissions from Kilns No. 3 & 4 to no more than 1.5 lb/ton lime produced, based on an hourly average. Maximum NOx emission from Kilns No. 3 & 4 shall not exceed 10.9 and 11.2 lb/hour, respectively.
2. Specialty Minerals shall maintain flue gas oxygen concentration from Kilns No. 3 & 4 and temperatures in Kilns No. 3 & 4 at or below the levels demonstrated to maintain compliance during the required compliance stack testing. The Department will use oxygen concentration and temperature as indicators of compliance with the NOx emission limits in provision 1.
3. Specialty Minerals shall limit the CO emissions concentrations from Kilns No. 3 & 4 to no more than 200 ppmvd, corrected to 3% oxygen. This CO emission limit is subject to change pending the outcome of kiln stack testing. The CO limit shall be based on an hourly average.

**Stack Testing Requirements**

4. Specialty Minerals shall perform compliance stack tests in accordance with Regulation 310 CMR 7.19(13)(c) on Kilns No. 3 & 4 to demonstrate compliance with the NOx and CO emission limits herein. A summary of the applicable requirements is provided below:
  - a. ***Specialty Minerals shall complete the required stack testing for CO and NOx by August 1, 1995.***
  - b. Specialty Minerals shall submit a pretest protocol for the required emission test for review and written approval at least 60 days prior to the anticipated date of testing. Include in the pretest protocol a description of sampling point locations, sampling equipment, sampling analytical procedures, and the operating conditions for the required testing. It shall

also include a procedure for establishing highest allowable oxygen and kiln temperature limits.

- c. Specialty Minerals shall conduct compliance stack testing in accordance with procedures set forth in Appendix A of 40 CFR Part 60 or another method approved by the Department and EPA.
  - d. Specialty Minerals shall submit the emission test report for the review and written Department approval within 45 days of the completion of the compliance stack testing.
5. Specialty Minerals shall, at any future time upon request from the Department, perform stack testing on Kilns No. 3 & 4 to demonstrate compliance with the emission limits established herein. Stack testing shall be conducted in accordance with the appropriate EPA test methods, as contained in 40 CFR 60, Appendix A.

**Monitoring, Recordkeeping and Reporting Requirements**

6. By May 31, 1995, Specialty Minerals shall install, operate and maintain a continuous oxygen monitor and recorder in Kilns No. 3 & 4 to track the percent excess oxygen in the flue gas from the kiln. The installation and operation shall be in accordance with 40 CFR Part 60, Appendix B, Performance specification 3, and Appendix F.
7. Specialty Minerals shall maintain a record of all measurements, performance evaluations, calibration checks, and maintenance or adjustments for each continuous oxygen monitor.
8. Specialty Minerals shall keep records of fuel use in Kilns No. 3 & 4 on at least a daily basis.
9. Specialty Minerals shall keep Kilns No. 3 & No. 4 records in house and available for inspection for a minimum of five years.
10. If any limits in the provisions of this **FINAL APPROVAL** are exceeded, Specialty Minerals shall submit a report to the Department in writing no later than the 15th day of the following month. This report shall include the exact period the limit was exceeded, the suspected reason for exceeding the limit, and the action taken to correct the problem. The report will further address any date and period during which either continuous recorder is inoperable and the outage is not directly attributable to routine checks and maintenance.

General Provisions

11. Specialty Minerals shall maintain continuous compliance with the terms of this ECP at all times. Kilns No. 3 & 4 shall be operated in strict accordance with the plans and specifications submitted as part of the ECP approved herein. Furthermore, Specialty Minerals shall demonstrate compliance with the applicable emission limitations contained in this Approval no later than May 31, 1995. Should there be any differences between the application materials and this approval letter, this approval letter shall govern. All notification and reporting requirements contained herein shall be directed to the Department of Environmental Protection, Bureau of Waste Prevention, Western Region unless otherwise specified.

This approval pertains only to the air quality control aspect of the proposal and does not negate the responsibility of the owners or operators to comply with other applicable State, Local, or Federal laws and regulations. This RACT determination under 310 CMR 7.19(12) is a revision to the Massachusetts State Implementation Plan and as such, shall be submitted for approval to the U.S. EPA.

The Department has determined that the filing of an Environmental Notification Form ("ENF") with the Secretary of Environmental Affairs, for air quality control purposes, was not required prior to this action by the Department. Notwithstanding this determination, the Massachusetts Environmental Policy Act and Regulation 301 CMR 11.00, section 11.03, provide certain "Fail-Safe Provisions" which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report at a later time.

This FINAL APPROVAL is an action of the Department. There are limited rights of appeal. For a description of these rights, read the enclosure "APPEAL RIGHTS".

If there are any further questions or comments please contact Richard Creswell or John Kirzec of this office at (413) 784-1100.

Very truly yours,



Mark Schleeweis  
Permit Section Chief  
Bureau of Waste Prevention  
Western Region

RNC/rnc  
Spminsip.ecp  
Enclosures

cc: Loretta Oi, Regional Engineer, BWP, Western Region  
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