

217/782-2113

CONSTRUCTION PERMIT - PSD APPROVAL - NSPS SOURCE - REVISED

PERMITTEE

Vulcan Materials Company
Attn: C. R. Herro
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Application No.: 96020014 I.D. No.: 091806AAB
Applicant's Designation: MANTENO-01 Date Received: August 27, 1998
Subject: Manteno Lime Plant
Date Issued:
Location: 6141 North Route 50, Manteno

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of one 600 tons/day rotary lime kiln controlled by baghouse and double alkali packed scrubber with mist eliminator, coal storage pile, petroleum coke storage pile, dolomitic limestone storage pile, product loadout, product conveying, and lime storage bins with filter as described in the above referenced application. This Permit is granted based upon and subject to the findings and conditions which follow:

In conjunction with this permit, approval is given with respect to the Prevention of Significant Deterioration of Air Quality Regulations (PSD) to construct the above referenced equipment, in that the Illinois Environmental Protection Agency (Illinois EPA) finds that the application fulfills all applicable requirements of 40 CFR 52.21. This approval is issued pursuant to the Clean Air Act, as amended, 42 U.S.C. 7401 et seq., the Federal regulations promulgated thereunder at 40 CFR 52.21 for Prevention of Significant Deterioration of Air Quality (PSD), and a Delegation of Authority agreement between the United States Environmental Protection Agency and the Illinois EPA for the administration of the PSD Program. This approval becomes effective in accordance with the provisions of 40 CFR 124.15 and may be appealed in accordance with the provisions of 40 CFR 124.19. This approval is also based upon and subject to the findings and conditions which follow:

Findings

- 1a. Vulcan Materials Company has requested a revision to the permit for its lime manufacturing plant in Kankakee County. The plant includes one 600 tons/day rotary lime kiln controlled by baghouse. The request addresses the requirements for control of emissions of sulfur dioxide (SO₂), nitrogen oxides (NO₂) and carbon monoxide (CO) from the kiln. Vulcan is proposing to add a scrubber and mist eliminator to the kiln to enhance control of SO₂. It has also requested higher emission limits for NO_x and CO, which are consistent with processing of dolomitic limestone. The lime plant is located at an existing limestone quarry operated by Vulcan Materials Company, converting some of the limestone excavated at the quarry to lime. While Vulcan originally obtained a permit to build two kilns, it only built one kiln as addressed by this permit.

2. The lime plant is located in Manteno Township in Kankakee County. The area is currently designated attainment for all criteria pollutants.
- 3a. The plant emits more than 100 tons per year of NO_x, SO₂ and CO as listed in Table II. The project is therefore subject to PSD review as a major source of SO₂, NO_x, and CO emissions.
- b. The plant also emits significant amounts of particulate matter (PM) and is subject to PSD for PM. Requirements related to emissions of fugitive dust are being added to the permit. However, requirements for PM from the kiln, which is controlled by a baghouse, are not being revised, other than arithmetic adjustment to account for one kiln, rather than two.
4. After reviewing all the materials submitted by Vulcan Materials Company, the Illinois EPA has determined that the plant, as now proposed, will (i) be in compliance with all applicable Board emission standards, (ii) utilize Best Available Control Technology (BACT) on emissions of SO₂, NO_x, and CO, (iii) be in compliance with all applicable Federal New Source Performance Standards (NSPS), and (iv) be in compliance with other limits as set in Conditions of this permit. Note: This permit does not revise requirements established as BACT for PM emissions.
5. The air quality analysis submitted by Vulcan Materials Company and reviewed by the Illinois EPA shows that the plant, as now proposed, will not cause violations of the ambient air quality standards for PM₁₀, SO₂, NO_x, and CO. The air quality analysis also shows compliance with the allowable PM₁₀, SO₂, and NO_x increment.

Note: Because the installation of the scrubber affects the character of the kiln stack, the air quality analysis also addresses PM/PM₁₀.
6. The Illinois EPA has determined that the plant, as now proposed, would comply with standards for permit issuance under applicable Illinois Air Pollution Control Board Regulations and the federal Prevention of Significant Deterioration of Air Quality Regulations (PSD), 40 CFR 52.21.
7. A copy of the application, the Illinois EPA's project summary, the application and a draft of this permit were placed in a location in the vicinity of the project, and the public was given notice and opportunity to examine this material and to submit comments and to request a public hearing on this matter.

The Illinois EPA is issuing approval to construct the proposed project subject to the following conditions and consistent with the specifications and data included in the application. Any departure from the conditions of this approval or terms expressed in the application would need to receive prior written authorization of the Illinois EPA.

Conditions

1. Standard conditions for issuance of construction permits, attached hereto and incorporated herein by reference, shall apply to this project, unless superseded by the following special conditions.
- 2a. Stone feed to the kiln shall not exceed 1,296 tons/day.
- b. Usage of fuel in the kiln shall not exceed 8.2 tons/hour, daily average.
- c.
 - i. Organic liquid by-products or waste materials shall not be used as fuel in the kiln without written approval from the Illinois EPA.
 - ii. The Illinois EPA shall be allowed to sample all fuels stored at the plant.
- 3a. The emissions from the kiln shall be controlled through good combustion practices, the use of a baghouse, the natural tendency of the lime product to absorb SO₂, and the use of a SO₂ scrubber.
- b.
 - i. The emissions from the kiln, expressed in terms of pounds of pollutant per ton of stone feed material other than fuel, shall not exceed the limits in Table I except during startup, shutdown, or malfunction as addressed by Condition 7.

Note: The emission limits for SO₂ become effective 180 days after initial startup of the scrubber.
 - ii. Alternatively for PM or NO_x, the kiln may comply with the following:
 - A. The PM emissions shall not exceed 0.02 gr/dscf.
 - B. The level of excess air shall be controlled to minimize NO_x emissions such that the oxygen content in the flue gases leaving the kiln does not exceed 1.0 percent, hourly average.
- c.
 - i. The kiln, baghouse and scrubber shall be operated in conformance with good air pollution control practices to minimize emission as further addressed by Condition 7.
 - ii. During startup of the kiln, the exhaust from the kiln may bypass the baghouse and scrubber until the temperature in the control device is above the dew point. This authorization applies to both "cold" and "hot" startups.
 - iii. Upon occurrence of a malfunction that will result in emissions in excess of the applicable limits in Condition 3(b), the Permittee shall, as soon as practicable, reduce the operating rate of the kiln or remove the kiln from service so that the excess emissions cease.

Consistent with the above, if the Permittee has maintained and operated the kiln and air pollution control equipment so that malfunctions affecting emissions are infrequent, sudden, not caused by poor maintenance or careless operation, and in general are not reasonably preventable, the Permittee shall begin shutdown of the kiln within 2 hours of a malfunction that requires the scrubber to be bypassed unless the scrubber malfunction is expected to be repaired within 16 hours. If the malfunction results in outage of the scrubber for more than 16 hours, determined from the start of the malfunction incident, the kiln shall be promptly shut down and a cold start-up undertaken once repairs have been made to the kiln and scrubber.

- 4a. Emissions of particulate matter from the product conveying and lime storage bins shall be controlled by enclosure and filter system.
- b. Emissions of fugitive particulate matter from vehicle traffic on plant roadways shall be controlled by truck wheel wash and water truck spraying, unless significant precipitation has occurred during the previous 24 hours or there is snow or ice buildup on the road. [See also Condition 15]
- c. If the natural wind block action from the pit fails to prevent material from coal/coke/limestone storage piles from becoming airborne, the storage piles shall be treated with water, or other substance approved by the Illinois EPA, to minimize fugitive dust.
- d. Emissions of fugitive particulate matter from product loadout shall be controlled by partial enclosure and loadout practices to minimize breakage.

Conditions 3 and 4 represent the application of the Best Available Control Technology (BACT) as required by Section 165 of the Clean Air Act.

- 5a. This lime manufacturing plant is subject to a New Source Performance Standard (NSPS), 40 CFR 60, Subparts A and HH. The Illinois EPA is administering NSPS in Illinois on behalf of the United States EPA under a delegation agreement.
- b. The particulate matter emissions from the kiln shall not exceed 0.30 kilogram per megagram (0.60 lb/ton) of stone feed and shall not exceed 15% opacity when exiting from a dry emission control device, pursuant to the NSPS.

Note: After initial startup of the scrubber, this opacity standard does not apply when the kiln is exhausted through the scrubber as the standard only applies to discharges exiting from a dry emission control device.

- c. At all times, the Permittee shall also maintain and operate the kiln, including associated air pollution control equipment, in a manner

consistent with good air pollution control practice for minimizing emissions.

- 6a. Visible emissions of fugitive particulate matter from any process, including any material handling or storage activity, shall not be present beyond the property line of the source, pursuant to 35 IAC 212.301.
- b. The Permittee shall follow good air pollution control practices to minimize nuisance fugitive dust from plant roads, parking areas, storage piles and other open areas of the plant. These practices shall provide for pavement on all regularly traveled entrances and exits to the plant and treatment (flushing, vacuuming, dust suppressant application, etc.) of paved and unpaved roads and areas that are routinely subject to vehicle traffic in order to achieve very effective and effective control of dust, respectively (nominal 90 percent for paved roads and areas and 80 percent control for unpaved roads and areas).
- 7a. The Permittee shall operate the kiln and associated air pollution control equipment in accordance with detailed written operating procedures as it is safe to do so; such procedures shall, at a minimum:
 - i. Address startup, normal operation, and shutdown and malfunction events, establish target ranges for relevant operating parameters, and provide for review of these parameters during startup, shutdown and malfunction as necessary to make adjustments to reduce or eliminate any excess emissions.
 - ii. With respect to startup, address readily foreseeable startup scenarios, including so called "hot startups" when the operation of a kiln is only temporarily interrupted and provide for appropriate operating review of the operational condition of a kiln prior to initiating startup of the kiln. These measures shall include all reasonable measures to minimize the number of startups, their duration and their frequency, as required by 35 IAC 201.160(b)(4).
 - iii. With respect to malfunction, identify and address likely malfunction events with specific programs of corrective actions and provide that upon occurrence of a malfunction that will result in emissions in excess of the applicable limits in Tables I and II, the Permittee shall, as soon as practicable, repair the affected equipment, reduce the operating rate of the kiln or remove the kiln from service so that excess emissions cease.
- b. The Permittee shall use reasonable practices to minimize emissions during startup, malfunction/breakdown and shutdown of the kiln. Following the shakedown period allowed by Condition 9, these procedures must include the following:
 - i. A. Use of natural gas or fuel oil, during startup to heat the kiln prior to initiating firing of solid fuel.

- B. While using these fuels to preheat the kiln during startup, opacity shall not exceed 15% opacity except for the initial 12 minute period following ignition of fuels.
- ii. Management of the stone feed rate to the kiln during startup and shutdown;
- iii. Reduction of stone feed rate to the kiln upon malfunction or breakdown to the minimum level for stable operation; and
- iv. Timely shutdown and overhaul of the kiln upon occurrence of chronic malfunctions, that result in excess emissions.
- c. The Permittee shall maintain the kiln and associated air pollution control equipment in accordance with good air pollution control practice to assure proper functioning of equipment and minimize malfunctions, including performing maintenance in accordance with written procedures developed for this purpose.

The procedures may rely upon the manufacturer's instructions for maintenance of equipment, provided a copy of these instructions are attached to the procedures. These procedures may also be combined with the operating procedure required by Condition 7(a).
- d. The Permittee shall review its operating and maintenance procedures as required above on a regular basis and revise them as needed consistent with good air pollution control practice based on actual operating experience and equipment performance.
 - i. This review shall occur at least annually if not otherwise initiated by occurrence of a startup, shakedown, or malfunction event that is not adequately addressed by the existing plans.
 - ii. This review shall also be performed if, following the shakedown period allowed by Condition 9, the kiln experiences chronic malfunctions that result in excess emissions or a specific request by the Illinois EPA for such review.
- e. The Illinois EPA may enhance these requirements through action in a CAAPP permit for the source based on the actual operating experience with the kiln.
- 8a. The annual emissions of PM, SO₂, NO_x, and CO from the kiln shall not exceed the limits shown in Table II. Compliance with annual limits shall include emissions generated during all operations, including start-up, malfunction and breakdown, and be determined based on the current month's records plus the preceding 11 months.

Note: The limits on SO₂ emissions become effective 180 days after initial startup of the scrubber. Compliance with the SO₂ limitation established in Table I shall be determined by the use of a continuous emissions monitoring system.

- b. i. Total particulate matter emissions from material handling at the lime plant, other than the kiln, shall not exceed 12 tons/year, as PM₁₀, from the coal storage pile, petroleum coke storage pile, dolomitic limestone storage pile, flue dust storage pile, limestone conveying, lime conveying, lime storage bins with filter, lime loadout, flue dust loadout, vehicle traffic on roadways, and storage pile loading.
 - ii. Compliance with these limits shall be determined using standard USEPA calculation methodology for fugitive particulate matter emissions.
 - c. This permit is issued based on at most incidental emissions of particulate matter and sulfur dioxide from the lime slaker and other emission units associated with the scrubber. For this purpose, emissions shall not exceed 0.5 pound/hour and 2.2 tons/year.
9. This permit authorizes an initial operation period of one year for the kiln to operate with the new scrubber, during which period equipment shakedown and emission testing must be performed. If this period is an insufficient time period for equipment shakedown, testing, and the Illinois EPA evaluation of operation, the Permittee may request, and the Illinois EPA may approve in writing an extension of the initial operation period for a further 12 months.
- 10a. i. Within 180 days after the start of initial operation of the scrubber, the emissions of PM, SO₂, NO_x, CO and VOM from the kiln shall be measured by an approved testing service. The PM test shall include separate measurements of PM, PM₁₀, and condensable particulate.- ii. Emissions of the lime kiln shall be tested within 90 days of any written request from the Illinois EPA, as specified by the request.
- b. These tests shall be performed by an approved independent testing service during conditions which are representative of maximum emissions of the pollutant being measured.
- c. The following methods and procedures shall be used for testing of emissions, unless another method is approved by the Illinois EPA: Refer to 40 CFR 60, Appendix A for USEPA test methods.

Location of Sample Points	USEPA Method 1
Gas Flow and Velocity	USEPA Method 2
Molecular Weight	USEPA Method 3
Moisture Content	USEPA Method 4
Sulfur Dioxide	USEPA Method 6C
Nitrogen Oxides	USEPA Method 7E
Carbon Monoxide	USEPA Method 10
Volatile Organic Material	USEPA Method 25A
Particulate Matter (PM)	USEPA Method 5 or 5D

PM ₁₀	USEPA Method 201A
Condensable PM ₁₀	USEPA Method 202
Opacity	USEPA Method 9

- d. The Illinois EPA shall be notified prior to these tests to enable the Illinois EPA to observe these tests. Notification and test protocol for the expected date of testing shall be submitted a minimum of sixty days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of 5 working days prior to the actual date of the test. The Illinois EPA may at its discretion accept notifications with shorter advance notice provided that the Illinois EPA will not accept such notifications if it interferes with the Illinois EPA's ability to observe testing.
- e. Three copies of the Final Report for these tests shall be promptly submitted to the Illinois EPA and in no case later than 60 days after the test and shall include as a minimum:
 - i. A tabular summary of results which includes:
 - Process weight rates (i.e., weight of stone, coal/coke
 - Measured emission rate
 - Emission factor, calculated using the average test results in the terms of the applicable limits, for example, in units of lbs pollutant emitted per ton of stone feed
 - Compliance demonstrated - Yes/No
 - ii. Description of test methods and procedures used, including description of sampling train, analysis equipment, and test schedule.
 - iii. Detailed description of test conditions, including:
 - Pertinent process information (e.g. fuel, raw material analysis)
 - Control equipment information, i.e. equipment condition and inlet temperatures, flow rates, pH levels, and other operating parameters at various points in the scrubber during testing
 - iv. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration.
- 11a. i. The Permittee shall install, calibrate, maintain and operate a continuous monitoring system on the kiln stack for SO₂ and CO emissions in accordance with 40 CFR 60, Appendix B, Performance Specification 2 and 4, respectively and Appendix F. This system shall be operated during all periods of operation of the lime

kiln except for continuous monitoring system breakdowns and repairs. Data is to be recorded during calibration checks, and zero and span adjustments.

- ii. The Permittee shall submit reports of excess SO₂ and CO emissions to the Illinois EPA quarterly in accordance with 35 IAC 201.405. For this purpose SO₂ emissions may be determined as a three-hour average.
 - iii. The Permittee shall maintain records for the continuous monitoring systems, including recorded emission concentrations and records of maintenance, calibration, and operational activity associated with the system. [See also Condition 14(b)]
 - iv. The Illinois EPA may revise or eliminate requirements for CO emissions monitoring through action on a CAAPP permit for the source based on a showing from the Permittee that such monitoring does not facilitate practices to minimize CO emissions or is not appropriate given actual levels of CO emissions achieved by the kiln.
- b. i. The Permittee shall install, calibrate, maintain and operate a continuous opacity monitoring system to measure the opacity of the exhaust from the kiln when it is not using the scrubber as required by the NSPS (40 CFR 60, Appendix B, Performance Specification 1).
- ii. The Permittee shall submit reports of excess opacity emissions to the Illinois EPA quarterly in accordance with 40 CFR 60.7(c) and 40 CFR 60.434(e).
- iii. These requirements related to opacity monitoring shall not apply if the United States EPA determines that opacity monitoring is no longer required under the NSPS once a scrubber is installed and operated on a kiln. In such case, the Permittee shall comply with the alternative requirements established by USEPA.
- 12a. The Permittee shall install, calibrate, maintain, and operate a device for measuring the mass rate of stone feed to the kiln. The measuring device used must be accurate to within plus or minus 5% of the mass rate over its operating range. The device is required to be operated during compliance emission tests. [40 CFR 60.343(d)]
- b. The Permittee shall perform monthly sampling for the coal/coke used in the kiln using the procedures in ASTM D2234, which result in data at least as reliable as classification II - D-2, defined in ASTM D2245 as manual sampling - stationary coal/coke sampling - random spacing and analyze these samples for ash content, sulfur content, and heat content according to the applicable methods and procedures in 35 IAC 214.101(c).
- c. The Permittee shall monitor the operating pressure drop across the kiln baghouse.

- d. i. The Permittee shall monitor the following operating parameters for the SO₂ scrubber:
 - A. The pressure loss of the gas stream through the scrubber. The monitoring device must be accurate within ± 250 pascals.
 - B. The scrubbing liquid flow rate or supply pressure to the scrubbing chamber. The monitoring device must be accurate within ±5 percent of the design scrubbing liquid supply pressure.
 - C. The scrubbing liquid flow rate or supply pressure to the demister beds. The monitoring device must be accurate within ±5 percent of the design scrubbing liquid supply pressure.
 - ii. The Permittee shall measure exhaust concentration of SO₂ or the pH of the scrubbing liquid at least twice per shift during outage of the SO₂ continuous emission monitoring system required by Condition 11(a).
 - e. The Permittee shall install, maintain and operate devices to identify gas flow through bypass ductwork.
- 13a. The Permittee shall maintain operating log(s) for the kiln, baghouse, and scrubber, including the following information at a minimum:
- i. Each startup of the kiln, including the nature of the startup, sequence and timing of major steps in the startup, any unusual occurrences during the startup, and any deviations from the established startup procedures, with explanation;
 - ii. Each shutdown of the kiln including the nature and reason for the shutdown, sequence and timing of major steps in the shutdown, any unusual occurrences during the shutdown, and any deviations from the established shutdown procedures, with explanation; and
 - iii. Each malfunction or breakdown that significantly impairs emission performance, including the nature and duration of the event, type of malfunction, i.e., minor or major, sequence and timing of significant steps in the malfunction, corrective actions taken, any deviations from the established procedures for such a malfunction, estimated emissions, probable cause, and preventative actions taken to address similar events.
- b. The Permittee shall keep inspection, maintenance and repair log(s) that at a minimum shall identify such activities that are performed as related to components that may effect emissions; the reason for such activities, i.e., whether planned or initiated due to a specific event or condition, and any failure to carry out the established maintenance procedures, with explanation.

- 14a. The Permittee shall maintain the following operating records for the kiln:
 - i. Limestone feed rate, tons/day.
 - ii. Additive feed rates, if any, tons/day, by type.
 - iii. Coal/coke consumption, tons/day; and sulfur content of the coal/coke.
 - iv. Hours of operation per day.
 - v. Lime production, tons/day.
 - vi. Reagent consumption for the scrubber, tons/month, by type.
 - b. The Permittee shall maintain records of the following items related to the SO₂ and CO emissions monitoring systems:
 - i. The SO₂ and CO emission rates (expressed in pounds/hour);
 - ii. Identification of the times when the pollutant concentration exceeded full span of the continuous monitoring system;
 - iii. Description of any modifications to the continuous monitoring system that could affect the ability of the continuous monitoring system to comply with Performance Specification 3 or 4;
 - iv. Results of daily CEMS drift tests and quarterly accuracy assessments as required under Appendix F, Procedure 1 of 40 CFR 60.
 - c. The Permittee shall maintain the following records related to emissions:
 - i. Emissions of SO₂, CO, NO_x, PM, and VOM from the kiln (tons/month and tons/year); and
 - ii. Emissions of PM from material handling (tons/month and tons/year).
 - d. The Permittee shall maintain a log or other records that summarize public inquiries or complaints related to emissions, including nuisance dust or odors, and specific actions taken by the Permittee in response.
- 15a. i. The Permittee shall maintain a written fugitive dust control program describing the measures being implemented in accordance with Condition 6(b) to control fugitive dust at each area of the plant with the potential to generate significant quantities of fugitive dust. This program shall include estimated dust emissions control technique (e.g., water spray surfactant spray, water flushing, or sweeping); typical flow of water and additive

concentration; normal frequency with which measures would be implemented; circumstances, e.g., recent precipitation, in which the measure would not be implemented; triggers for additional control, e.g. observation of 10 percent opacity; and calculated control efficiency.

- ii. The program shall be accompanied by maps or diagrams indicating the location of areas at the plant with the potential to generate fugitive dust, with description (length, width, surface material, etc.) and volume and nature of expected traffic or other activity.
 - b. The Permittee shall maintain records documenting implementation of the fugitive dust control program, including:
 - i. Each application of water or other suppressant used by water trucks to plant roads to control dust.
 - ii. Periods of time when the wheel wash was not in operation.
 - c. The Permittee shall submit a copy of a revised fugitive dust control program to the Illinois EPA for review and approval within 90 days of a request from the Illinois EPA for a revision to the program to address observed deficiencies in the control program.
16. All records or logs required by this Permit shall be retained at a readily accessible location at the plant for at least three years from the date of an entry and shall be made available for inspection and copying by the Illinois EPA.
17. The Permittee shall report to the Illinois EPA as follows for the SO₂ scrubber. These reports should be submitted within 15 days after the end of the reporting period.
- a. Prior to commencing construction, project status reports shall be submitted every 2 months.
 - b. Notice of commencing construction shall be submitted within 15 days of the start of construction.
 - c. While the scrubber is under construction, progress reports shall be submitted monthly.
 - d. Notice of the actual date of initial startup.
 - e. During the shakedown period allowed by Condition 9, operating report summarizing operation of the kiln including availability of the scrubber and each period of time when it was not available.
- 18a. i. The Permittee shall notify the Illinois EPA Regional Office by telephone as soon as possible during normal office hours, of any

malfunction or breakdowns of the kiln and its control system as follows:

- A. Any malfunction or breakdown involving bypass of the scrubber for which the kiln is not being immediately shutdown;
 - B. Any malfunction or breakdown involving the scrubber that has resulted in excess emissions for more than 3 hours, and
 - C. Any malfunction or breakdown involving bypass of the baghouse for which the kiln is not being immediately shutdown.
- ii. The Permittee shall notify the Illinois EPA Regional Office as soon as possible during normal office hours after it has determined that the duration of exceedance may exceed 12 hours. This notification shall include the estimated amount of emissions during the continued malfunction or breakdown considering any reductions in the operating rate of the kiln.
- b. The Permittee shall submit a written follow-up report to the Illinois EPA within 7 working days following an occurrence for which notification is required pursuant to Condition 18(a)(i). This report shall:
- i. Identify the date, time and personnel involved in the notification;
 - ii. Provide summary of the records required by Condition 13(a)(iii).
- c. The Permittee shall submit quarterly reports to the Illinois EPA within 30 days following the end of each calendar quarter which shall include the following information for each month during the calendar quarter:
- i. The total quantity of each fuel burned expressed in tons.
 - ii. Weighted average percent of the sulfur content of the coal/coke burned.
 - iii. Total operating hours of the kiln and the number of such hours that the scrubber was not operating.
 - iv. Number of cold start-ups, hot start-ups and malfunctions that resulted in excess emissions, listed individually.
 - v. Emissions of PM, SO₂, NO_x, CO, and VOM with supporting data and calculation.
 - vi. A summary of incidents when the kiln had excess emissions. If there are no excess emissions during the calendar quarter, report shall state that no excess emissions occurred during the reporting period.

- vii. An availability and incident report for the continuous emissions monitoring systems required by Condition 21.
 - d. The Permittee shall report any exceedance of applicable requirements of this permit not addressed by the above quarterly report within 30 days of the occurrence, with date, duration, description, cause, if known, and remedial action, if any.
- 19a. Any reports and notifications required by this permit shall be sent to the Illinois EPA's Compliance Section at the following address unless otherwise indicated:
- Illinois Environmental Protection Agency
Division of Air Pollution Control
Compliance Section (#40)
P.O. Box 19276
Springfield, Illinois 62794-9276
- b. A copy of these reports and notifications, shall also be sent directly to the Illinois EPA's regional office at the following address:
- Illinois Environmental Protection Agency
Division of Air Pollution Control
9511 West Harrison
Des Plaines, Illinois 60016
- c. A copy of these reports and notifications concerning emission testing and initial installation and certification of continuous emission monitoring systems shall also be sent directly to the Illinois EPA's Source Monitoring Unit at the following address:
- Illinois Environmental Protection Agency
Division of Air Pollution Control
Source Monitoring Unit
9511 West Harrison
Des Plaines, Illinois 60016
- 20. The Illinois EPA may revise the requirements for recordkeeping and reporting established in this permit through action in a CAAPP permit for the source.
 - 21. The Permittee shall not alter any stack parameter operating or design characteristics identified in its application without prior written authorization from the Illinois EPA.
 - 22. This approval to construct does not relieve the Permittee of the responsibility to comply with all Local, State and Federal Regulations which are part of the applicable Illinois State Implementation Plan, as well as all other applicable Federal, State and Local requirements.

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It should be noted that this permit revises the requirements for control of SO₂, NO_x and CO emissions from the kiln, including adding requirements for use of a scrubber to control SO₂ emissions.

If you have any questions on this permit, please call Bob Smet at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

DES:RPS:jar

cc: Illinois EPA, FOS, Region 1
Illinois EPA, Compliance Section
USEPA

Table I

Applicable Limitations for the Kiln

<u>Pollutant</u>	<u>Emission Limits/ Control Measures</u>	<u>Basis</u>
Particulate Matter	0.134 lbs/ton of stone feed*	BACT
	0.02 gr/dscf**	Alt. BACT
	Baghouse, nominal 99.8% efficient	BACT
	6.70 lbs/hr* (Note 1)	NAAQS
Sulfur Dioxide	2.76 lbs/ton of stone feed	BACT
		NAAQ
	138.0 lbs/hr (Note 2)	
	2,825 lbs/day (Note 1)	NAAQS
Nitrogen Oxides	Baghouse and a scrubber (Note 3)	BACT
	4.5 lbs/ton of stone feed	BACT
	242.5 lbs/hr (Note 1)	NAAQS
Carbon Monoxide	Good Combustion Practice (Note 4)	BACT
	43.2 lb/ton of stone feed	BACT
	2,159 lb/hr (Note 1)	NAAQS
Volatile Organic Material	Good Combustion Practice (Note 5)	BACT
	0.146 lb/ton of stone feed	BACT
	7.9 lb/hr (average per day)	
	Good combustion practice (Note 5)	BACT

* Measured as PM₁₀

** Measured as total particulate matter

Note 1: The ambient air quality is based on this emission rate for the applicable averaging period (non-condensibles only). Note: Limits developed on a standard conversion factor.

Note 2: Maximum emission rate for the kiln, 3-hour average. The ambient air quality impact analysis for the 3-hour SO₂ standard is based on this emission rate. On a 24-hour average the maximum emission rate is 118 lb/hour).

Note 3: BACT for this process has been determined to be the use of a fuel with a sulfur content of less than or equal to four percent (by weight), the operation of the baghouse, and the use of a scrubber. The nominal overall control of these measures is 86 percent.

Note 4: BACT for this process has been determined to be good combustion practices and/or low excess air (less than 1.0 percent oxygen).

Note 5: BACT for this process has been determined to be proper design and operation of the kiln.

Table II

Emission Limits for the Lime Manufacturing Facility

	SO ₂		NO _x		CO		PM ¹		VOM	
	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)
Kiln ²	118.0 ³	515.0	242.5	1,062.0	2,159	9,456	6.7	29.4	7.9	34.6
Material Handling	-----	-----	---	-----	-----	-----	---	12.0		
Total		515.0		1,062.0		9,456		41.4		

Notes

1. Determined as PM₁₀. This limit does not address emissions of condensable particulate matter, which should not be significant during normal operation given control by the SO₂ scrubber.
2. The hourly limits for SO₂, CO and PM do not apply during startup, malfunction, breakdown or shutdown as addressed by Condition 7. The air quality impact analysis accompanying the application demonstrated compliance with the National Ambient Air Quality Standards during these periods based on the following "uncontrolled" emission rates during worst-case conditions for dispersion: 2,159 lb CO/hour, 170 lb SO₂/hour (3-hour average), 130 lb SO₂/hour (24-hour average) and 178 lb PM/hour (24-hour average).
3. Daily Average

DES:RPS:jar

PROJECT SUMMARY

I. INTRODUCTION

Vulcan Materials Company (Vulcan) has applied for a modified air pollution control permit for its lime manufacturing plant at the existing limestone quarry located south of Manteno. Vulcan proposes to operate its lime kiln with enhanced control via scrubber and mist eliminator for control of sulfur dioxide (SO₂), in addition to the existing baghouse, which controls particulate matter emissions. Vulcan has also requested an increase in the emissions limits for nitrogen oxides (NO_x) and carbon monoxide (CO).

II. BACKGROUND

The lime plant takes limestone from the existing quarry and processes it into fluxing lime, which is used during the manufacture of steel to remove impurities. The plant has a capacity to produce 650 tons per day of lime.

Lime is made by high-temperature roasting or "calcination" of limestone. There are two kinds of lime: high-calcium lime (CaO) and dolomitic lime (CaO-MgO), which is produced from limestone with a high magnesium content. The lime kiln at Vulcan produces dolomitic lime by the following general chemical reaction:



The basic steps in the production of lime are: (1) quarrying of the raw limestone, (2) preparing the limestone by crushing and sizing, (3) calcining the limestone to lime in a kiln, and (4) miscellaneous lime transfer, storage, and handling operations. Note that the quarrying of limestone at this site is an existing permitted process.

The heart of the lime plant is the kiln. The most prevalent type of kiln in the United States is the rotary kiln. This type of kiln is a long, cylindrical, slightly inclined, refractory-lined furnace, through which the limestone and hot combustion gases pass counter-currently. A coal or petroleum coke mix is used as the fuel for this kiln.

This kiln began operation in 1998. While Vulcan was permitted to build two kilns, it only built one kiln. If Vulcan decides to develop a second kiln at the site, it would have to obtain a new and separate construction permit for that kiln.

III. EMISSIONS

Particulate matter is emitted from the kiln itself and from the associated material handling operations at the plant. A baghouse is used to control the particulate matter emissions from the rotary kiln. Product conveying and lime storage bins are also enclosed controlled by filters. The storage piles are enclosed within the quarry pit on a shelf 50 feet below grade for wind blockage. Product loadout is

controlled by partial enclosure and loadout practices to minimize breakage. Vehicle traffic on roadways is controlled by truck wheel wash and water truck spraying.

Sulfur dioxide (SO₂), carbon monoxide (CO), and nitrogen oxides (NO_x) are also emitted from the kiln. Sulfur dioxide emissions are influenced by several factors, including the sulfur content of the fuel and the sulfur content and mineralogical form (pyrite or gypsum) of the stone feed. In a high-calcium lime kiln, the majority of the fuel sulfur is not emitted because it reacts with the lime dust in the kiln and baghouse. This is not the case with dolomitic limestone. For a dolomitic lime kiln, a scrubber followed by a mist eliminator will remove 90% of the sulfur dioxide from the kiln. Vulcan has proposed a two-stage double alkali scrubber, in which a sodium sulfite solution is used to capture sulfur dioxide, and the sodium sulfite solution is regenerated with lime in a separator reactor. Carbon monoxide is the product of incomplete combustion of carbon containing fuels and materials. It is also a byproduct of the calcination process. Nitrogen oxides is formed in a kiln when nitrogen and oxygen react in the flame.

IV. APPLICABLE EMISSION STANDARDS

All emission sources are subject to Illinois Pollution Control Board emission standards. Board emission standards represent the minimum requirement for sources in Illinois.

The Board has emission standards for particulate matter for new processes including lime kilns, 35 IAC 212.321. The above rules governing particulate matter emissions are less stringent than applicable federal standards.

Emission limits called New Source Performance Standards (NSPS) have been established by USEPA for various types of emission units. These emission limits specify the maximum allowable quantity or concentration of a pollutant that may be emitted to the atmosphere or certain design or operating standards that must be achieved. USEPA determines the degree of air pollution emission control which can be achieved by a particular unit and sets NSPS, that apply nationwide to new units. The Illinois EPA administers NSPS in Illinois for the USEPA under a delegation agreement.

The lime kiln is subject to the federal New Source Performance Standards (NSPS), 40 CFR 60 Subpart HH, for lime manufacturing plants. The NSPS sets emission limits for particulate matter, including opacity (40 CFR 60.342). Requirements for testing, recordkeeping, reporting, and continuous emissions monitoring are also set by the NSPS.

The limits set by the NSPS are 0.60 lb. of particulate/ton of limestone feed and 15% opacity (other than water vapor).

Testing of the kiln shows that the baghouse enables the kiln to meet these standards.

V. APPLICABILITY OF REQUIREMENTS FOR MAJOR SOURCES

Construction of a new major source or a modification that results in a significant increase in emissions at an existing major source is subject to new source review requirements. In an area which is attainment (i.e., meeting the air quality standards), the regulations for Prevention of Significant Deterioration (PSD) apply. This project is in an area classified as attainment for all regulated pollutants.

Emissions data for individual pollutants is provided in the chart below. This chart shows reductions in emissions for particulate matter due to the fact that only a single kiln was built. Even with one kiln, the chart shows increases in nitrogen oxides and carbon monoxide, as Vulcan's original application failed to adequately account for the emission characteristics of dolomitic lime, instead providing estimates for emissions that were reflective of production of high calcium lime. The chart also accounts for an increase in the rate of sulfur dioxide emissions from production of dolomitic lime, as compared to high-calcium limit. However, the addition of an SO₂ scrubbers would more than compensate for this increase. The revised permit would also address the permitted emissions of volatile organic material, which must be less than 40 tons per year.

Vulcan's failure to adequately account for emissions of the lime kiln, which led to violation of requirements for the kiln set in the original construction permit is the subject of enforcement action by the State of Illinois. While the requested permit would establish revised requirements for future operation of the kiln, it would not affect Vulcan's liability for past noncompliance. This must still be resolved in the context of the enforcement action.

Summary of Emissions Limits (Tons/Year)

<u>Pollutant</u>	<u>Significant Emissions Level</u>	<u>Current Permit</u>	<u>Proposed Permit</u>	<u>Net Change</u>
Particulate Matter/PM ₁₀	25/15	70.8	41.4	- 29.4
Sulfur Dioxide	40	2,046.4	515.0	-1,531.4
Nitrogen Oxide	40	613.2	1,062.0	+ 448.8
Carbon Monoxide	100	328.6	9,456.0	+9,127.4
Volatile Organic Material	40	34.6	34.6	-----

The lime plant was subject to PSD for sulfur dioxide, nitrogen oxides, and carbon monoxide because potential emissions are more than 100 tons/year. Emissions of particulate matter and PM₁₀ were also subject to PSD because they were significant.

VI. PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

Major construction in an attainment area is subject to the federal Prevention of Significant Deterioration (PSD) rules. The PSD rules were established to preserve clean air. PSD rules require: 1) an "emission limit" on new or modified equipment which represents Best Available Control Technology (BACT), 2) an air quality assessment of the impact of new emissions, and 3) an analysis of impacts on soils, vegetation, and visibility.

The Illinois EPA has been delegated authority by USEPA to administer the PSD program within Illinois. An assessment of particulate matter, PM₁₀, sulfur dioxide, nitrogen oxides, and carbon monoxide emissions on these issues follows.

A. Best Available Control Technology (BACT)

The Clean Air Act defines BACT as:

"... an emission limitation based on the maximum degree of reduction ... which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable"

The Illinois EPA determined that BACT for PM₁₀ emissions from the kiln still is a baghouse with an emission limit of 0.02 gr/dscf. An equivalent alternative emission standard is an emission rate of 0.134 lb/ton of stone feed to the kiln. Baghouses are generally considered the most effective particulate matter control.

The Illinois EPA determined that BACT for sulfur dioxide emissions from the kiln as it processes dolomitic limestone to be a scrubber. An equivalent alternative emission standard is an emission rate of 2.76 lb/ton of stone feed to the kiln.

The Illinois EPA determined that BACT for nitrogen oxide (NO_x) emissions from the kiln continues to be combustion controls with a conventional burner with an emission limit of 4.5 lb NO_x/ton of stone feed to the kiln. An equivalent alternative emission standard will be to control the level of excess air to minimize NO_x emissions such that the oxygen content in the kiln exhaust does not exceed 1 percent.

The Illinois EPA determined that BACT for carbon monoxide (CO) emissions from the kiln continues to be proper kiln design and combustion practices. For a dolomitic lime kiln, these should achieve an emission rate less than 43.2 lb CO/ton of stone feed to the kiln. While CO emissions could be reduced with introduction of additional excess air, this would be counter

productive, as it would act to increase NO_x emissions, reduce thermal efficiency of the kiln, and degrade product quality.

As part of BACT for the kiln, the Illinois EPA also had to address startup of the kiln and malfunction or breakdown of the control equipment.

The Illinois EPA previously determined that BACT for fugitive PM₁₀ emissions from the coal storage pile, petroleum coke storage pile, and dolomitic limestone storage pile to be enclosure within the pit on a shelf 50 feet below grade for wind blockage and use of dust suppressant spray if needed. BACT for PM₁₀ emissions from product conveying and lime storage bins is enclosure and filter. BACT for fugitive PM₁₀ emissions from product loadout is partial enclosure and loadout practices to minimize breakage. BACT for fugitive PM₁₀ emissions from vehicle traffic on roadways is truck wheel wash and water truck spraying.

B. Air Quality Analysis

A revised air quality analysis was conducted by a consulting firm, URS, on behalf of Vulcan to assess the effect of the requested permit revision on air quality. The analysis used reference dispersion models and other approved methodology. The results of this analysis follow.

The first step in this analysis was to review the impacts of the lime plant by itself using a simplified approach to model results that addressed maximum impacts (See Table 1).

Table 1 - Maximum Lime Plant Impacts (ug/m³)

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Maximum Predicted Impact</u>	<u>Significant Impact Level</u>
NO _x	Annual	16.22	1
PM ₁₀	24-hour	18.99	5
PM ₁₀	Annual	2.30	1
SO ₂	3-hour	374.29	25
SO ₂	24-hour	96.41	5
SO ₂	Annual	10.50	1
CO	1-hour	7,633.24	2,000
CO	8-hour	3,069.82	500

Because the impacts were significant, further modeling had to be performed using the regular version of the model. As part of that evaluation the impact of other new sources was also considered. This evaluation had to address both the National Ambient Air Quality Standards (NAAQS) and the PSD increments.

PSD areas have pre-established maximum allowable pollutant increase for particulate matter, sulfur dioxide, and nitrogen oxide which cannot be exceeded. These limits are called "allowable increments". This project is in an area for PSD which is Class II and has an allowable increment to accommodate moderate growth in emissions. Under no circumstances is air quality in a PSD area allowed to deteriorate beyond the National Ambient Air Quality Standard (NAAQS). The results of the PSD Increment Analysis are presented in Table 2. All of the results comply with the applicable PSD Increment levels.

Table 2 - Maximum Impact of New Sources (ug/m³)

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Modeled Impact Concentration¹</u>	<u>PSD Increment</u>	<u>Percent of Increment Consumed</u>
NO _x	Annual	16.41	25	65.6%
PM ₁₀	24-hour	7.97	30	26.6%
PM ₁₀	Annual	2.40	17	14.1%
SO ₂	3-hour	302.73	512	59.1%
SO ₂	24-hour	77.17	91	84.8%
SO ₂	Annual	10.51	20	52.6%

¹ For the purposes of this modeling, the "maximum" impacts are the relevant information based on the time frame for the applicable standard. For example, for the short-term SO₂ standard, the maximum impact is the highest second high result since the short-term standards set a concentration that shall not be exceeded more than once per year.

The modeling to evaluate impacts of the lime plant compared to the NAAQS also had to account for existing sources. Existing sources are included both by modeling of emission units at other sources and by use of a background concentration to account for sources that are not modeled. The maximum air quality impacts predicted by this analysis are in Table 3A.

Table 3A - Full Impact Analysis Results (ug/m³)

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Maximum Modeled Impacts</u>	<u>Background</u>	<u>Projected Concentration</u>	<u>NAAQS</u>
NO _x	Annual	80.97	17	97.97	100
PM ₁₀	24-hour	1,364.22	57	1,421.22	150
PM ₁₀	Annual	158.51	23	181.51	50
SO ₂	3-hour	2,188.36	150	2,338.36	1,300
SO ₂	24-hour	566.21	57	623.21	365
SO ₂	Annual	66.15	11	77.15	80

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Maximum Modeled Impacts</u>	<u>Background</u>	<u>Projected Concentration</u>	<u>NAAQS</u>
CO	1-hour	5,092.92	1,489	6,581.92	40,000
CO	8-hour	2,565.88	985	3,550.88	10,000

1. Maximum modeled impacts of all sources, at any point within a 60 mile radius of the Vulcan lime plant.
2. Data from Braidwood monitor (NO_x and CO) and Joliet monitor (PM₁₀ and SO₂).

The results in Table 3A modeled show exceedances for 3-hour SO₂, 24-hour SO₂, 24-hour PM₁₀, and Annual PM₁₀ NAAQS. However, URS demonstrated that Vulcan did not cause or significantly contribute to any of these exceedances. IEPA conducted a detailed review of URS' results and confirmed that the Vulcan-Manteno facility does not cause or contribute to any of the exceedances. These exceedances also appear to result from deficiencies in the emission inventories for existing sources, such as lack of site-specific stack parameters, that require assumptions that overstate impacts of existing sources. While the normal practice would be to attempt to correct these deficiencies, this was not appropriate for this analysis given the number and location of the existing sources. In particular, the modeling inventory used for modeling lime plant extended out for a 30 mile radius around the plant. These errors are more effectively corrected as part of routine processing of the affected sources or future air quality analysis focused on those sources.

A more realistic evaluation of the impact of the lime kiln on air quality in the vicinity of Manteno is shown in Table 3B. This alternative evaluation using the maximum modeled impacts of the lime kiln and other new sources in the area but assumes that other existing sources contribute to air quality in an amount equal to the monitored background concentration.

Table 3B - Further Evaluation - Alternative Analysis
(ug/m₃)

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Maximum Modeled Impacts</u>	<u>Background</u>	<u>Projected Concentration</u>	<u>NAAQS</u>
NO _x	Annual	16.4	34	50.4	100
PM ₁₀	24-hour	7.1	114	122.0	150
PM ₁₀	Annual	2.4	46	48.4	50
SO ₂	3-hour	302.7	300	602.7	1,300
SO ₂	24-hour	77.2	114	191.2	365
SO ₂	Annual	10.5	22	32.5	80

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Maximum Modeled Impacts</u>	<u>Background</u>	<u>Projected Concentration</u>	<u>NAAQS</u>
CO	1-hour	7,633.2	2,978	10,611.2	40,000
CO	8-hour	3,069.8	1,970	5,039.8	10,000

1. Maximum modeled impact of Vulcan and/or new sources from Table 1 or 2.
2. Double the monitored background concentration to account for other sources in the immediate vicinity of Vulcan.

At these levels, emissions of the lime plant will have no significant impact on soils, vegetation, and visibility in the area.

VI. REQUEST FOR COMMENT

It is the Illinois EPA's preliminary determination that the revised permit, as drafted, would meet all applicable state air pollution control regulations, and the federal regulations for Prevention of Significant Deterioration (PSD). The Illinois EPA is requesting public comments before taking action to issue a revised permit.

RPS:jar