

217/782-2113

CONSTRUCTION PERMIT -- REVISED

Draft

PERMITTEE

Exolon-ESK Company
Attn: Armand Ladage
R.R. #1, Box 200A
Hennepin, Illinois 61327

Application No.: 95060068 I.D. No.: 155801AAC
Applicant's Designation: SULFEROX Date Received: November 6, 2001
Subject: Silicon Carbide Furnaces With Sulfur Removal System
Date Issued: ---
Location: ESK Road (875E), Rural Hennepin

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of pre-quench mist eliminator and system for removal of sulfur containing compounds from four existing silicon carbide furnace groups, as described in the above referenced application. This Permit is granted based upon and subject to the findings and conditions which follow.

This permit also constitutes approval with respect to the federal rule for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21 to construct this sulfur removal system and to operate the above referenced furnaces with such system, in that the Illinois Environmental Protection Agency (Agency) finds that the application fulfills all applicable requirements for PSD. This approval is issued pursuant to the Clean Air Act, as amended, 42 U.S.C. 7401 et. seq., the Federal PSD regulations promulgated thereunder at 40 CFR 52.21, and a Delegation of Authority agreement between the United States Environmental Protection Agency and the Agency for the administration of the PSD regulations. 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

1. Exolon-ESK has requested a permit to construct a system for removing sulfur compounds from the off-gases from its existing silicon carbide furnaces. The proposed equipment to be constructed includes a mist eliminator and a Dow Sulferox⁷ system. The system is expected to provide at least 68 percent control of sulfur dioxide emissions from the furnaces on an annual basis.

This system will also remove particulate matter from the furnace off-gases.

2. Hennepin is located in Putnam County. The area is designated attainment for sulfur dioxide (SO₂).

3. Exolon-ESK became subject to PSD when a fourth furnace group was installed in 1990. Construction of a control system was begun at that time, but the system was never finished. The Sulferox⁷ control system now being planned is a replacement for that control system.
4. After reviewing all the materials submitted by Exolon-ESK, the Agency has determined that the project will (i) be in compliance with all applicable Board emission standards and (ii) utilize Best Available Control Technology (BACT) on emissions of sulfur dioxide.
5. The air quality analysis submitted by Exolon-ESK and reviewed by the Agency shows that the proposed project will not cause violations of the ambient air quality standard for sulfur dioxide. The air quality analysis also shows compliance with the allowable sulfur dioxide increment.
6. The Agency has determined that the construction of the proposed project complies with all 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 and the Agency's project summary and a draft of this permit were placed in a location in the vicinity of the Exolon-ESK, 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 Agency 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 IEPA.

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. The off-gas from the silicon carbide furnaces shall be collected and oxidized by a flare or other combustion device prior to discharge to the atmosphere to convert hydrogen sulfide and other sulfur compounds in the off-gas to sulfur dioxide, water and carbon dioxide and the carbon monoxide in the off-gas to carbon dioxide.
- b. The silicon carbide furnaces shall be equipped with a sulfur removal system to process the off-gas to remove hydrogen sulfide prior to oxidation.

- i. The hydrogen sulfide content of the off-gas prior to combustion shall not exceed 500 ppm, except as provided below.
- ii. Operation of the silicon carbide furnaces without the sulfur removal system is allowed during startup, shutdown, maintenance and malfunction for up to 21 days (504 hours) per year based on a running total of monthly data.
 - A. For the purpose of this provision, the definition of "malfunction" at 40 CFR 60.2 shall apply.
 - B. "Maintenance" means the carrying out of activities to keep equipment in proper operating condition, including inspection, adjustment, lubrication, cleaning, and repair and replacement of components. Maintenance may occur while equipment is operational or may require turndown or shutdown of equipment, which can be coordinated with equipment turndown or shutdown for other reasons.
- c. i. The sulfur removal system shall be installed and maintained with spares for critical pumps, air blowers, reliable operating instrumentation, and other features which might reasonably be used to minimize the frequency and duration of malfunctions.
- ii. At all times, including periods of startup, shutdown, maintenance and malfunction, the silicon carbide furnaces and associated control system shall be maintained and operated in a manner consistent with good air pollution control practice for minimizing emissions of sulfur dioxide, consistent with other provisions of this permit.
- iii. The operating level of the silicon carbide furnaces shall be reduced as soon as practicable to 3 furnaces during outage of the sulfur removal system related to malfunction. If a fourth furnace cannot be completely shutdown due to the potential loss of pressure from process generated gases and subsequent collapse of the plastic tarp enclosing the process, then the electricity to the fourth furnace shall be maintained at a level reasonably necessary to maintain tarp integrity.
- iv. A. Notice of routine major maintenance shall be submitted to the Agency 10 days before the start of such maintenance, or as soon as practicable if 10 days notice cannot be provided.

Such notice shall provide a description, explanation, and schedule for the intended maintenance activities.

- B. Notice of malfunctions which are longer than one hour in duration shall be submitted to the Agency as soon as practicable but not more than 10 days after the start of malfunction. Such notice shall provide the date, time, duration, description, and explanation of the malfunction.
- 3a. A mist eliminator or other pretreatment system shall be operated to remove particulate matter from the off gas-prior to entering the sulfur removal system.
- b. i. There shall be no visible emissions of particulate matter from any building or operation at the source.
 - ii. Emissions of particulate matter from all stacks on material handling and processing equipment shall not exceed 0.015 grains per dry standard cubic feet.
 - iii. Finished products of the silicon carbide operation shall only be moved in trucks or railroad cars that are covered or enclosed.
- Condition 2 and 3 represent the application of the Best Available Control Technology as required by Section 165 of the Clean Air Act.
- 4a. Open storage piles, roadways, parking facilities and other points of potential fugitive particulate matter emissions at the source shall be maintained and treated to significantly control such emissions.
- b. The Permittee shall follow the written operating program submitted with this application describing the points of potential fugitive particulate matter emissions and the practices used to reduce such emissions.
- 5a. Emissions of sulfur dioxide from the silicon carbide furnaces shall not exceed the following limits:
- i. Uncontrolled emissions shall not exceed 2400 lb/hr, based on 100 percent conversion of sulfur containing compounds in the off gas stream to sulfur dioxide.
 - ii. Controlled emissions shall not exceed 760 lb/hr when the sulfur removal system is operating.
 - iii. Annual emissions including outage of the control equipment, shall not exceed 2,150 ton/yr. Compliance with this limit shall be determined from a running total of 365 days of data.

Compliance with Conditions 5a(i) and (ii) shall be determined on a 3-

hour block average basis as measured by a continuous emission monitoring system installed on the afterburner discharge.

- b. Total emissions from the silicon carbide furnaces shall comply with the following limits.
 - i. Emissions of carbon monoxide shall be less than 75.0 pounds/hour or below detectible levels.
 - ii. Emissions of reduced sulfur compounds, including hydrogen sulfide shall be less than 11.0 pounds/hour or below detectible levels and 39.8 ton/yr.
 - iii. Emissions of nitrogen oxides shall be less than 36.0 pounds/hour.
 - iv. Emissions of particulate matter shall not exceed 22.5 pound/hour, and 23.3 ton/yr.
- c. Condition 4 and 5 are required to ensure that the project will be constructed and operated in accordance with the description presented in the application.
- 6. The silicon carbide furnaces and associated sulfur removal system may be operated under this construction permit until the CAAPP Permit is issued or revised if the emission rates in this permit are different than those in the CAAPP permit.
- 7a. Upon request by the Illinois EPA the, the Permittee shall perform emission stack testing of the sulfur removal system, the following tests shall be conducted by an approved testing service, during conditions which are representative of maximum emissions from the silicon carbide furnaces.
 - i. The hydrogen sulfide, carbonyl sulfide and carbon disulfide concentrations and mass flow rates in the off-gas before and after the sulfur removal system.
 - ii. The sulfur dioxide emissions following oxidation.
 - iii. The nitrogen oxides, carbon monoxide and particulate matter emissions following oxidation.
- b. The following methods and procedures shall be used to the extent practicable for testing of emissions: 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
Particulate Matter	USEPA Method 5
Sulfur Dioxide	USEPA Method 6
Nitrogen Oxides	USEPA Method 7
Carbon Monoxide	USEPA Method 10
Hydrogen Sulfide, Carbonyl Sulfide and Carbon Disulfide	USEPA Method 15

To the extent that a different method is deemed necessary, the Permittee shall submit a description of the test method to the Agency for approval prior to using such test method.

- c. At least 60 days prior to the actual date of testing a written test plan shall be submitted to the Agency for review and approval. This plan shall describe the specific procedures for testing, including as a minimum:
 - i. The person(s) who will be performing sampling and analysis and their experience with similar tests.
 - ii. The specific conditions under which testing will be performed, including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for the furnace and sulfur removal system will be determined.
 - iii. The specific determinations of emissions and operation which are intended to be made, including sampling and monitoring locations.
 - iv. The test method(s) which will be used, with the specific analysis method, if the method can be used with different analysis methods.
 - v. Any minor changes in standard methodology proposed to accommodate the specific circumstances of testing, with justification.
- d. Prior to carrying out these tests, the Agency's regional office and the Agency's Source Emission Test Specialist, and the Bureau of Air, Compliance Unit (see Condition 13) shall be notified a minimum of thirty (30) days prior to the expected date of these tests and further notified a minimum of five (5) working days prior to the test of the exact date, time and place of these tests, to enable the Agency to witness these tests.

Illinois Environmental Protection Agency
Division of Air Pollution Control - Regional Office
5415 North University
Peoria, Illinois 61614

Illinois Environmental Protection Agency
Attn: Source Emission Test Specialist
Division of Air Pollution Control
Eisenhower Tower
1701 First Avenue
Maywood, Illinois 60153

- e. Three copies of the Final Report(s) for these tests shall be submitted to the Agency within 30 days after test results are compiled and finalized. The Final Report shall include as a minimum:
 - i. A summary of results
 - ii. General information
 - iii. Description of test method(s), including description of sampling points, sampling train, analysis equipment, and test schedule
 - iv. Detailed description of test conditions, including
 - A. Process information, i.e., mode(s) of operation, process rate, e.g. number of furnace groups operating,
 - B. Control equipment information, i.e., equipment condition and operating parameters during testing, and
 - C. A discussion of any preparatory actions taken, i.e., inspections, maintenance and repair.
 - D. H₂S concentration measured by the monitoring system.
 - v. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration.
- f. Submittals of information shall be made as follows:
 - i. Submittal of Test Plan - one copy to Source Emission Test Specialist.
 - ii. Notices of Test - one copy to Source Emission Test Specialist, one copy to the Regional Office, and one copy to Compliance Unit.
 - iii. Final Report - one copy to Source Emission Test Specialist, one copy to the Regional Office, and one copy to Permit Section.
- 8. The Permittee shall maintain records of the following items to allow the Agency to review compliance with the requirements in Condition 2 through 5.
 - a. Records, on a hour-by-hour basis, of the number of furnaces operating (generating off-gas) and the status of the sulfur removal and oxidation systems.
 - b. The following records shall be kept on at least a monthly basis:

- i. Use of petroleum coke (ton), with sulfur content (average wt. %).
 - ii. Silicon carbide production (ton).
 - iii. Sulfur compounds generated in off gas based upon emission factors developed from emissions testing (ton sulfur).
 - iv. Sulfur recovered by sulfur removal system (ton).
 - v. Sulfur dioxide emissions (ton).
 - vi. Duration of furnace operation without the sulfur removal system (total hours and hours during startup, shutdown, maintenance or malfunction respectively) and without the oxidation system (total hours).
 - c. Logs of operating time for the capture system (i.e. bypass directly to flare), pretreatment and sulfur removal systems, and monitoring equipment.
 - d. Maintenance logs for the capture system, pretreatment and sulfur removal system, detailing all routine and non-routine maintenance performed, including dates and duration of any outages.
9. All records required by this permit shall be retained for at least three years at a readily accessible location at the source and shall be available for inspection by the Agency.
10. If there is an exceedance of the requirements of this permit as determined by the records required by this permit, the Permittee shall submit a report to the Agency within 30 days after the exceedance. The report shall include a copy of the relevant records, and a description of the exceedance or violation and efforts to reduce emissions and future occurrences.
11. With the annual report required by 35 Ill. Adm. Code 201.302, the Permittee shall report:
- a. The source's emissions of SO₂ and PM with supporting calculations.
 - b. The maximum sulfur content of the off-gas as determined by the CEM.
 - c. Any exceedance of applicable requirements, with date, duration, description of exceedance and explanation, not reported pursuant to Condition 10.

12. The Permittee shall continue to submit a report every three years with the annual report that summarizes the causes of outage of the sulfur removal system and the nature of the associated outages and evaluates operational or physical changes, such as installation of parallel equipment, that could be implemented to significantly reduce the duration and severity of outages.

13. All notifications and reports required by this permit should be sent to the Agency at the following address, unless otherwise specified:

Illinois Environmental Protection Agency
Bureau of Air
Compliance Unit (#39)
P.O. Box 19276
Springfield, Illinois 62794-9276

14. 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.

This permit has been revised to clarify the emission limits in Condition 5a, which reflect 68.3% of control efficiency of sulfur dioxide, as a result of July 17, 2001 emission test.

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

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

DES:RNG:jar

cc: Region 2
USEPA

