D R A F T

PREVENTION OF SIGNIFICANT DETERIORATION
CONSTRUCTION PERMIT

PERMIT NUMBER: CP03-0042

PERMIT TO MODIFY AN
AIR CONTAMINANT SOURCE
IS HEREBY ISSUED TO:

Endicott Clay Products Company
PO Box 17
Fairbury, Nebraska 68352-0017

FOR THE SPECIFIC CONSTRUCTION OF:

Plant 2 Expansion in 1977 and Plant 3 Construction in 1985

LOCATED AT:

57120 707th Road
Endicott, Nebraska 68352

Pursuant to Chapter 14 of the Nebraska Air Quality Regulations, the public has been notified by prominent advertisement of this proposed modification of an air contaminant source and the thirty (30) day period allowed for comments has elapsed. This Construction Permit approves the proposed construction of the following existing emission units:

Unit ID	Unit Description	Construction Date
Unit #33	Plant 2 Dryer 2, with a maximum throughput rate of 9.0 tons/hr, using the waste heat from Kiln 2.	1977
Unit #11	Plant 2 Kiln 2, with a maximum throughput rate of 9.0 tons/hr, using natural gas as fuel.	1977
Unit #35	Plant 3 Dryer 1, with a maximum throughput rate of 8.84 tons/hr, using natural gas as fuel.	1985
Unit #12	Plant 3 Kiln 1, with a maximum throughput rate of 8.84 tons/hr, using natural gas as fuel.	1985

This permit may contain abbreviations and symbols of units of measure, which are defined in 40 CFR Part 60.3. Other abbreviations may include, but are not limited to, the following: Best Available Control Technology (BACT), National Emission Standards for Hazardous Air Pollutants (NESHAP), Particulate Matter (PM).

This permit is issued with the following conditions under the authority of Title 129 - Nebraska Air Quality Regulations as amended December 13, 2006:

General Conditions

I. This permit is not transferable to another source or location. {Title 129, Chapter 17}

II. Holding of this permit does not relieve the owner or operator of the source from the responsibility to comply with all applicable portions of the Nebraska Air Quality Regulations and any other requirements under local, State, or Federal law. Any permit noncompliance shall constitute a violation of the Nebraska Environmental Protection Act and the Federal Clean Air Act, and is grounds for enforcement action or permit revocation. {Title 129, Chapter 41 & Chapter 17, Section 011}

III. Application for review of plans or advice furnished by the Director will not relieve the owner or operator of legal compliance with any provision of these regulations, or prevent the Director from enforcing or implementing any provision of these regulations. {Title 129, Chapter 37}

IV. Any owner or operator who failed to submit any relevant facts or who submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. If the owner or operator wishes to make changes at the source that will result in change(s) to values, specifications, and/or locations of emission points that were indicated in the permit application (or other supplemental information provided by the owner or operator and reviewed by the Department in issuance of this permit), the owner or operator must receive approval from the Department before the change(s) can be made. In addition, any modification which may result in an adverse change to the air quality impacts predicted by atmospheric dispersion modeling (such as changes in stack parameters or increases in emission rates, potential emissions, or actual emissions) shall have prior approval from the Department. The owner or operator shall provide all necessary information to verify that there are no substantive changes affecting the basis upon which this permit was issued. Information may include, but not be limited to, additional engineering, modeling and ambient air quality studies. {Title 129, Chapter 17, Section 006, 007, & 008}

V. Approval to construct, reconstruct and/or modify the source will become invalid if a continuous program of construction is not commenced within 18 months after the date of issuance of the construction permit, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable period of time. {Title 129, Chapter 17, Section 012}

VI. The owner or operator of the source shall provide a notification to the Department of the date of construction, reconstruction or modification commenced, postmarked no later than 30 days after such date, and of the actual date of initial startup of operation, postmarked within 15 days after such date. {Title 129, Chapter 17, Section 012 }

VII. The owner or operator shall allow the Department, EPA or an authorized representative, upon presentation of credentials to: {Neb. Rev. Statute §81-1504}

(A) Enter upon the owner or operator's premises at reasonable times where a source subject to this permit is located, emissions-related activity is conducted or records are kept, for the purpose of ensuring compliance with the permit or applicable requirements;

(B) Have access to and copy, at reasonable times, any records, for the purpose of ensuring compliance with the permit or applicable requirements;

(C) Inspect at reasonable times any facilities, pollution control equipment, including monitoring and air pollution control equipment, practices, or operations, for the purpose of ensuring compliance with the permit or applicable requirements;

(D) Sample or monitor at reasonable times substances or parameters for the purpose of ensuring compliance with the permit or applicable requirements.

VIII. When requested by the Department, the owner or operator shall submit completed emission inventory forms for the preceding year to the Department by March 31 of each year. {Title 129, Chapter 6}

IX. Open fires are prohibited except as allowed by Title 129, Chapter 30.

X. Particulate Matter – General Requirements: {Title 129, Chapter 32}

(A) The owner or operator shall not cause or permit the handling, transporting or storage of any material in a manner, which allows particulate matter to become airborne in such quantities and concentrations that it remains visible in the ambient air beyond the property line.

(B) The owner or operator shall not cause or permit the construction, use, repair or demolition of a building, its appurtenances, a road, a driveway, or an open area without applying all reasonable measures to prevent particulate matter from becoming airborne and remaining visible beyond the property line. Such measures include, but not limited to, paving or frequent cleaning of roads, driveways and parking lots; application of dust-free surfaces; application of water; and planting and maintenance of vegetative ground cover.

XI. If and when the Director declares an air pollution episode as defined in Title 129, Chapter 38, Sections 003.01B, 003.01C, or 003.01D, the owner or operator shall immediately take all required actions listed in Title 129, Appendix I until the Director declares the air pollution episode terminated.

XII. This permit may be revised (reopened and reissued) or revoked for cause in accordance with Title 129 and Title 115, Rules of Practice and Procedure. Conditions under which this permit will be revised or revoked for cause, include but are not limited to: {Title 129, Chapter 15, Section 006}

(A) A determination by the Director, or the Administrator of EPA that:

(1) the permit must be revised to ensure compliance with the applicable requirements;

(2) the permit contains a material mistake or that inaccurate statements were made in the emissions standards or other terms or conditions of the permit.

(B) The existence at the source of unresolved noncompliance with applicable requirements or a term or condition of the permit, and refusal of the owner or operator to agree to an enforceable schedule of compliance to resolve the noncompliance;

(C) The submittal by the owner or operator of false, incomplete, or misleading information to the Department or EPA;

(D) A determination by the Director that the source or activity endangers human health or the environment and that the danger cannot be removed by a revision of the permit; or

(E) The failure of the owner or operator to pay a penalty owed pursuant to court order, stipulation and agreement, or order issued by the Administrator of the EPA.

Comment [std1]: Page: 1
Thought we should insert our new authority. If they happen to read this, it will make it clear what we can and cannot to. Also makes it consistent with the OP language.

Specific Conditions

XIII. Specific terms and conditions of this permit:

(A) The Permittee shall comply with the following BACT limitations for the modification project in 1985 {40 CFR 52.21 as of August 7, 1980 and Title 129, Chapter 19}:

(1) PM emissions from Plant 3 Kiln 1 (Unit #12) shall not exceed 8.49 pounds per hour (3-hour or test method average).

(2) PM emissions from Plant 3 Dryer 1 (Unit #35) shall not exceed 1.65 pounds per hour (3-hour or test method average).

(3) Total Fluoride emissions from Plant 3 Kiln 1 (Unit #12) shall not exceed 5.22 pounds per hour (3-hour or test method average).

The above limits apply at all times, including periods of start-up, shutdown, and malfunction.

(B) This brick and tile manufacturing plant is subject to the NESHAP for Brick and Structural Clay Products Manufacturing {40 CFR 63, Subpart JJJJJ and Title 129, Chapter 28, Section 001.70}. The applicable requirements in this subpart include, but are not limited to, the following:

(1) The maximum capacity for each of Plant 2 Kiln 2 (Unit #11) and Plant 3 Kiln 1 (Unit #12) shall be less than 10 tons of fired product per hour.

(2) Pursuant to 40 CFR 63.8505, the Permittee shall comply with the general provisions in 40 CFR 63.1 through 63.15 as applicable and specified in the Table 7 of this NESHAP.

(C) In order to demonstrate compliance with Conditions XIII.(A)(1) and (2), the source shall conduct PM performance tests on Unit #12 and Unit #35, while operating at full capacity within 180 days after the issuance of this permit. The performance test shall be conducted in accordance with Condition XIII.(E). {Title 129, Chapter 19}

(D) In order to demonstrate compliance with Condition XIII.(A)(3), the source shall comply with the following for Unit #12 {40 CFR 52.21 as of August 7, 1980 and Title 129, Chapter 19}:

(1) The source shall conduct a performance test for total fluoride emissions, while operating at full capacity within 180 days after issuance of this permit. This test

shall be repeated once per year. The performance test shall be conducted in accordance with Condition XIII.(E).

(2) The source shall test the fluoride content of the clay input to Unit #12 daily. The testing frequency may be reduced if the source can demonstrate the fluoride content of the raw clay materials do not vary significantly.

(3) The source shall develop a correlation relationship between the fluoride content of the clay input to Unit #12 and the total fluoride emissions from Unit #12, using the test data from Conditions XIII.(D)(1) and XIII.(D)(2).

(E) The performance tests required in the permit must be completed and submitted to the Department as follows: {Title 129, Chapter 34}

(1) Unless otherwise specified in this permit, the performance tests shall be conducted while operating at full capacity within 180 days after permit issuance.

(2) Testing methods shall be from 40 CFR 60 Appendix A, or other method approved by the NDEQ.

(3) An emission testing protocol shall be submitted to the Department at least 45 days prior to testing.

(4) The owner or operator of a source shall provide the Department 30 days notice prior to testing to afford the Department an opportunity to have an observer present.

(5) The permittee shall monitor the operating parameters for process and control equipment during the performance testing required in the permit (e.g., production rate, resin usage rate). The operating parameters shall be submitted with the test results.

(6) A certified written copy of the test results shall be provided to the Department within 45 days of completion of the test.

(F) Records shall be maintained on-site for a minimum period of five (5) years. These records shall be updated to be current through the end of the previous month no later than the 15^{th} day of each calendar month. These records shall be clear and readily accessible to Department representatives and shall include the following: {Title 129, Chapter 8, Section 012.01}

(1) Records of the maximum hourly capacity information for each of kilns Units #11 and 12 shall be kept on site to demonstrate compliance with Condition XIII.(B).

(2) Records of the daily fluoride content test results for the clay input to Unit #12 to demonstrate compliance with Condition XIII.(D)(2).

(3) Records of the correlation relationship between the total fluoride emissions and the fluoride content of the clay input for Unit #12 to demonstrate compliance with Condition XIII.(D)(3).

D R A F T

The undersigned issues this document on behalf of the Director in accordance with Title 129 – Nebraska Air Quality Regulations.

D R A F T

________________________________ Date	________________________________ Shelley Kaderly Air Quality Division Administrator

D R A F T

FACT SHEET

Endicott Clay Products Company
57120 707th Road
Endicott, Nebraska 68352

February 26, 2007

DESCRIPTION OF THE FACILITY OR ACTIVITY:

Endicott Clay Products, Co. (referred to as "ECP") currently operates a brick and tile manufacturing facility (Standard Industrial Code (SIC): 3251) at Endicott, Nebraska. The facility consists of Plants 1, 2, and 3 (constructed separately between 1920 and 1985), clay and brick handling operations, and a glaze line. Plant 1 was shut down in September 1989 and all equipment associated with Plant 1 (grinding/screening, dryer, and ten kilns) is currently inoperable. Plant 2 has a maximum capacity of 9 tons per hour of bricks and Plant 3 has a maximum capacity of 8.84 tons per hour of brick.

Two construction permits have been issued for Endicott Clay Products. On May 24, 1996, the first construction permit was issued for a brick and split tile glazing line. On January 11, 2001, a second construction permit was issued for a new enclosed grinding/screening system (Unit #6-A) and two storage bins. Their Class I operating permit was issued on April 30, 2004.

The construction permit issued on January 11, 2001 required ECP to conduct a facility-wide analysis of all historical construction projects/modifications to determine if all necessary Construction Permits were obtained. The results of this analysis indicated that two projects (1977 Plant 2 expansion and 1985 Plant 3 construction) may have triggered State and/or Federal construction permit requirements. Therefore, ECP submitted a construction permit application on July 2, 2003 to address the following two (2) historical construction projects:

Plant 2 Expansion, September 1977 – Plant 2 Dryer 2, Plant 2 Kiln 2
The Plant 2 expansion consisted of the installation of a natural gas-fired kiln (Unit #11) and a dryer (Unit #33). The waste heat from the kiln Unit #11 provides the heat for the dryer Unit #33. The potential to emit from these new units were greater than the construction thresholds in the State Rules (Title 129 as of the reversion dated June 19, 1976). Therefore, the Plant 2 expansion project in 1977 required a state construction permit. Since this modification occurred before March 1, 1978 and this source was not in one of 18 source categories regulated under Preventive Significant Deterioration (PSD) program at the time of the project, this expansion project was not subject to the federal PSD program.

Plant 3 Construction, Fall 1985 – Plant 3 Dryer 1, Plant 3 Kiln 1
The Plant 3 construction consisted of the installation of a natural gas-fired kiln (Unit #12) and a dryer (Unit #35). Waste heat from the kiln Unit #12 and a supplemental natural gas-fired burner provide the heat for the dryer Unit #35. The potential to emit of this source before the modification in 1985 was greater than 250 tons/yr, making it a major PSD source. The potential to emit of the modification in 1985 was greater than the PSD significant thresholds. Therefore, the modification in 1985 should have been permitted under the PSD program before this modification occurred. In addition, this construction project was also required to obtain a state construction permit pursuant to Title 129 as of the version dated May 21, 1983.

In preparation for the Plant 3 construction in 1985, ECP notified the Department of the proposed construction project. Although the details of this notification are limited, the Department issued a "No-

Permit-Required" (NPR) letter to ECP on September 3, 1985. The analysis provided above, however, indicates that the NPR determination in 1985 was in error.

TYPE AND QUANTITY OF AIR CONTAMINANT EMISSIONS ANTICIPATED:

Particulate Matter (PM) and Particulate Matter less than or equal to 10 micrometers (PM_{10}) are emitted from the previously constructed kilns and the dryers. Criteria pollutants and Hazardous Air Pollutants (HAPs) are emitted from the natural gas combustion process occurring in the dryer Unit #35 and the kilns (Units #11 and #12).

In addition, the modification in 1985 also increased utilization of the existing upstream and downstream units which include the mining activities, storage piles, grinding/screening system Unit #6-1B, grog crusher (Unit #23), and haul roads. Therefore, emissions for these upstream and downstream units are also considered here. Since this source is not in one of the 28 source categories listed in 40 CFR 52.21 and there are no applicable New Source Performance Standards (NSPS) that were in effect on August 7, 1980 and applicable to this source, the fugitive emissions are not counted toward determination of PSD applicability. Therefore, the calculations for fugitive emission sources, such as mining activities, storage piles, and haul roads, are not included in this fact sheet.

The Plant 2 expansion project in 1977 is not subject to the PSD review. For state rule review purposes, the potential to emit (PTE) of this modification only includes the emissions from the kiln Unit #11 and the dryer Unit #33.

The emission calculations for each unit are described below:

Natural Gas Fired Kilns

The potential to emit of natural gas fired kilns (Units #11 and #12) was calculated using the emission factors in AP-42, Chapter 11.3 for Brick and Structural Clay Product Manufacturing (SCC 3-05-003-11), except for the emission factor for total fluorides, which was obtained during the stack test at this source in 1993. See Appendix A for detailed calculations for the kilns.

Dryers

The dryer at Plant 2 (Unit #33) uses the waste heat from the kiln at Plant 2 (Unit #11). The potential to emit PM/PM_{10} of this dryer was calculated using the emissions factors in AP-42, Chapter 11.3 for Brick and Structural Clay Product Manufacturing (SCC 3-05-003-51). There are no combustion emissions from the dryer. See Appendix A for detailed potential to emit calculations for this unit.

The dryer at Plant 3 (Unit #35) uses mainly the waste heat from the kiln at Plant 3 (Unit #12), and also uses natural gas as a supplement fuel. The potential to emit of this dryer was calculated using the emissions factors in AP-42, Chapter 11.3. See Appendix A for detailed calculations for this unit.

Grinding/Screening System (Unit #6-B)

Since the modification project in 1985 is subject to PSD review and it increased utilization of the existing grinding/screening system (Unit #6-B), the PTE of the existing grinding/screening system is included here. This system is used to reduce clay to uniform size and PM and PM_{10} are the only pollutants emitted from this system. The potential to emit of this system was calculated using the emissions factors in AP-42, Chapter 11.3 for Brick and Structural Clay Product Manufacturing (SCC 3-05-003-02).

In addition, the existing grinding/screening system (Unit #6) was controlled by a building enclosure in 1985. The Permittee estimated the control efficiencies for this building enclosure to be 50% for PM and 25% for PM_{10}. The Permittee stated that the historical operating data in 1985 is not available, but they estimated an annual throughput rate of 130,000 tons/yr of clay for this unit based on the operating data they have currently. See Appendix A for detailed calculations for this unit.

Grog Crusher (Unit # 23)

The potential to emit PM/PM_{10} from the grog crusher (Unit #23) was calculated using the PM_{10} emission factor in EPA FIRE Software, Version 6.25 for primary crusher in Brick Manufacturing Plants (SCC 3-05-003-40). PM emissions are assumed to be equal to PM_{10} emissions. The Permittee stated that the historical operating data in 1985 is not available, but they estimated an annual throughput rate of 16,900 tons/yr for this unit in 1985. See Appendix A for detailed calculations for this unit.

A summary of the PTE for these modifications for State Rule applicability purposes is provided in the following table:

Regulated Pollutant	PTE of the Modification in 1977[a] (tons/year)	PTE of the Modification in 1985[a] (tons/year)
Particulate Matter (PM)	45.2	44.4
Particulate Matter smaller than or equal to 10 microns (PM_{10})	41.7	40.9
Sulfur Dioxide (SO_2)	26.4	30.2[b]
Oxides of Nitrogen (NO_x)	13.8	17.3
Carbon Monoxide (CO)	47.3	58.5
Volatile Organic Compounds (VOC)	2.13	2.09
Hazardous Air Pollutants (HAP)		
Fluorides	23.3	22.8
Hydrogen Chloride	6.70	6.58
Benzene	0.11	0.11
Bisphthalate	0.08	0.08
Chlorine	0.05	0.05
Total HAPs	30.2	29.7

[a] This only includes the PTE of the new units.
[b.] This includes both SO_2 and SO_3 emissions for state construction permit applicability purposes.

A summary of the PTE for the modification in 1985 for PSD review purposes is provided in the following table (emissions presented in tons/yr):

Process/Emission Unit	PM	PM_{10}	SO_2	VOC	CO	NO_x	Total Floride
PTE of Plant 3 Kiln 1 (Unit #12)	37.2	33.7	25.9	13.6	46.5	13.6	22.8
PTE of Plant 3 Dryer 1 (Unit #35)	7.24	7.24	-	1.16	12.0	3.79	-
PTE of Grinding/Screening System (Unit #6-1B)	745	69.9	-	-	-	-	-
PTE of Grog Crusher (Unit #23)	31.0	31.0	-	-	-	-	-
Actual Emissions from Grinding/Screening System (Unit #6-1B)	(276)	(25.8)	-	-	-	-	-
Actual Emissions from Grog Crusher (Unit #23)	(0.50)	(0.50)	-	-	-	-	-
Total PTE of the Modification in 1985*	543	115	25.9	2.09	58.5	17.3	22.8
PSD Significant Thresholds in 1985	25	NA	40	40	100	40	3.00

Note: "-" pollutant not emitted by the process/emission unit.
*PTE of the Modification = PTE of the New and Modified Units – Actual Emissions of the Modified Units.

APPLICABLE REQUIREMENTS AND VARIANCES OR ALTERNATIVES TO REQUIRED STANDARDS:

Title 129, Chapter 4 – Ambient Air Quality Standards: In 1977 and 1985, the state rules did not require air quality impact analysis for construction permits. However, an air quality impact analysis has been performed for PM emissions from the modification project in 1985 to fulfill the PSD requirements. See Section 2.0 of Title 129, Chapter 19 (PSD) discussion below for details.

Title 129, Chapter 17 – Construction Permit Requirements: A construction permit is required for the modifications in 1977 and 1985 because these construction projects have a net increase in emissions at the site greater than one or more of the threshold levels identified in Title 129, Chapter 17, Section 001.01 for PM_{10}, SO_x (SO_2 and/or SO_3), NO_x, CO, VOC and HAPs.

Title 129, Chapter 18 – New Source Performance Standards (NSPS): According to the definition in 40 CFR 60.671, clay (the raw material used at this brick and tile manufacturing plant) is considered a nonmetallic mineral. The affected facilities in this NSPS include each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station. Therefore, the clay handling and storage processes at this source may be subject to the requirements of NSPS, Subpart OOO (40 CFR 60.671- 676) for Nonmetallic Mineral Processing Plants.

However, all the existing material handling and storage processes at this source, including grog crusher (Unit #23), grinding/screening system (Unit #6-1B), belt conveyors, and clay storage bins, facilities, were constructed before August 31, 1983, the applicability date of this rule. In addition, no modifications, as defined in 40 CFR 60.2, for these units occurred after August 31, 1983. Therefore, none of the existing material handling and storage processes were subject to this Subpart in 1985 and the requirements of this NSPS are not applicable.

Title 129, Chapter 19 - Prevention of Significant Deterioration (PSD)

(a) The modification in 1977:

This existing source was not in one of 18 source categories listed in the PSD rule promulgated on December 5, 1974, and the modification in 1977 was commenced before March 1, 1978. The applicable date of the revised PSD rule is June 19, 1978. Therefore, the modification project in 1977 was not subject to the PSD program.

(b) The modification in 1985:

The PSD program was revised on June 19, 1978 to include all source categories and was further revised on August 7, 1980. In 1985, this source was not in 1 of 28 source categories listed in 40 CFR 52.21(b)(1)(i)(a), and had potential to emit PM greater 250 tons/yr (note that PM_{10} was not a regulated pollutant under the PSD program in 1985). Therefore, this source was an existing PSD major source in 1985. In addition, there are no applicable New Source Performance Standards (NSPS) that were in effect on August 7, 1980. Therefore, the fugitive emissions are not counted toward determination of PSD applicability.

The modification project in 1985 consisted of the construction of a new kiln and a new dryer at Plant 3 and increasing utilization of the existing material handling processes. The potential to emit of this modification is shown in Appendix A and the comparison between the PTE of this modification and the PSD significant thresholds is summarized in Table 1 below:

Table 1. PTE vs. PSD Significant Thresholds

Regulated Pollutant	PTE of the Modification in 1985 (tons/yr)	PSD Significance Threshold[a] (tons/yr)	PSD Applicability
NO_x	17.3	40	No
SO_2	25.9	40	No
CO	58.5	100	No
PM	543	25	Yes
VOC	2.09	40	No
Fluorides	22.8	3	Yes

[a] This is the thresholds listed in 40 CFR 52.21(b)(23)(i) as of date August 7, 1980.

The potential to emit PM and fluorides of this modification exceeded the PSD significant modification thresholds as defined in 40 CFR 52.21(b)(23)(i) as of August 7, 1980. Therefore, a PSD permit was required for the modification project in 1985. Pursuant to 40 CFR 52.21, the Permittee should have been required to control PM and fluoride emissions from this modification with Best Available Control Technology (BACT), and should have been required to conduct ambient air quality analysis for the PSD regulated pollutants emitted over the significant emission increase thresholds. Pursuant to 40 CFR 52.21(o), additional impact analysis must also be conducted.

1.0 <u>BACT</u>

Pursuant to 40 CFR 52.21(j)(3), a major modification shall apply BACT for each regulated NSR pollutant for which it would result in a significant net emissions increase at the source. This requirement applies to each proposed emission unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operation in the unit. Since there is no physical change or change in the method of operation of the existing grinding/screening system (Unit #6-1B), grog crusher (Unit #23), storage piles, mining activities, and haul roads, the BACT requirements only apply to the PM and fluoride emissions from the new construction kiln (Unit #12) and dryer (Unit #35). The PM and fluoride emissions from these units are listed in Table 2 below:

Table 2. PTE of Kiln Unit #12 and Dryer Unit #35

Pollutant	Kiln Unit #12 (tons/yr)	Dryer Unit #35 (tons/yr)
PM	37.2	7.24
Fluoride	22.8	0.00

BACT is defined as an emission limitation established based on the maximum degree of pollutant reduction, determined on a case-by-case basis, considering technical, economic, energy, and environmental factors. This Fact Sheet contains a summary of the BACT analysis performed for this modification. Refer to the permit application for complete details including the basis for the cost calculations provided in this permit document.

1.0-1 Top-Down BACT Analysis

The first step in a top-down BACT analysis is to determine, for the pollutant in question, the most stringent control technology and emission limit available for a similar source or source category. These technologies represent the top control alternative under the BACT analysis. If it can be shown that this level of control is infeasible on the basis of technical, economic, energy, and environmental impacts for the source in question, then the next most stringent level of control is identified and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any technical, economic, energy or environmental consideration.

A "Top-Down" BACT analysis basically consists of the following steps:

- Identify All Control Technologies. All control technologies for similar processes, as well as Lowest Achievable Emission Rate (LAER) technologies are included.

- Eliminate Technically Infeasible Options. Technologies demonstrated to be infeasible based on physical, chemical, and engineering principles are excluded from further consideration.

- Rank Technologies By Control Effectiveness. Technically feasible control technologies are ranked in the order of highest expected emission reduction to lowest expected emission reduction. The ranking also includes expected emission rate, control effectiveness, energy impacts, environmental impacts (including toxic and hazardous air emissions), and economic impacts.

- Control Technology Evaluation. The technology ranking is evaluated and case-by-case consideration is given to energy, environmental, and economic impacts. The most effective option not rejected is chosen as BACT and is used to express an enforceable emission limitation for the affected emission unit.

1.0-2 Applicable Pollutants

The BACT analysis has been divided into sections that address each of the applicable pollutants (PM and Fluoride) individually. The affected emissions units include kiln Unit #12 and dryer Unit #35 at Plant 3, which were installed in 1985.

1.1-0 PM BACT Analysis

The objective of this analysis is to determine the BACT for the PM emissions from kiln Unit #12 and dryer Unit #35 at Plant 3.

1.1-1 Identification of PM Control Technologies

Control of PM/PM_{10} emissions is achieved through the addition of equipment downstream of the emission units. The following four (4) control technologies have been identified for PM control:

(a) Wet Scrubbers

A wet scrubber is an absorption system in which the waste stream is dissolved in a solvent by passing it through a medium containing the solvent. The pollutants are removed primarily through the impaction, diffusion, interception and/or absorption of the pollutant onto droplets of liquid. Water is the most commonly solvent used. However, other solvents are used dependent upon the components of the waste stream.

(b) Electrostatic Precipitator (ESP) – Dry and Wet

ESPs remove PM from the flue gas stream using the principle of electrostatic attraction. PM in the exhaust stream is charged with a very high direct current (DC) voltage, and the charge particles are attracted to oppositely charged collection plates in the ESP. PM collected by the ESP continues to accumulate on the plates until removed by rapping the electrodes. The dust is then collected into a hopper for disposal. As opposed to baghouses, ESPs can handle large gas streams, high particulate loading and can operate at higher temperature and pressure conditions with wet or dry gas streams. However, the ESP is less effective at capturing fine particles than the baghouse. Very fine particles cannot carry a strong enough electrical charge to result in complete collection in an ESP.

(c) Cyclones

Cyclones are considered “pre-cleaners”, as they are typically used to reduce the particle concentration of an exhaust stream prior to further control. Although high efficiency cyclones are capable through engineering techniques of controlling particulates down to $PM_{2.5}$, generally cyclones are utilized to remove large particulates (>10 μm). Inlet dust loadings of a cyclone are normally in the range of 1-100 gr/scf.

(d) Baghouses

Fabric filtration in a baghouse consists of a number of filtering bags that are suspended in a housing. The particulate-laden gas passes through the housing and particulates collect on the fabric of the filter bag. Accumulated particulate matter on the bag surfaces enhance the bag's filtering efficiency. Periodically, the accumulated material or "cake" is removed from the bags through the use of a physical mechanism such as shaking or blasting the bags with compressed air. The dust is collected in a hopper and eventually removed.

In addition to the control technologies identified above, search for brick and tile manufacturing plants in EPA’s RACT/BACT/LAER Clearinghouse (RBLC) identified permits listed in Table 3 below which regulated PM emissions from kilns or dryers, and were issued in or before 1985.

Table 3. RBLC Search Results for PM Emissions from Dryers/Kilns

Plant	PBLD ID	Date Issued and State	Facility	Requirements
International American Ceramics, Inc.	OK-0019	04/06/81 (OK)	Bisque Dryer	Dry/Wet Collector (99%) 0.65 lbs/hr
			Kiln Tile	Dry/Wet Collector (99%) 0.65 lbs/hr
Kyanite Mining Corp.	VA-0040	07/10/85 (PA)	Kiln	Use coal with 10% ash by weight; 30.9 tons/yr

1.1-2 Eliminate Technically Infeasible Control Options

After reviewing the above technologies, NDEQ eliminated ESP and cyclone as not technically feasible for the dryers and kilns at brick manufacturing plants. The reasons for eliminating these control options are as follows:

Electrostatic Precipitator (ESP) – Dry and wet ESPs typically require flow rates of at least 100,000 cfm. Outlet flow rates of the dryers and kilns at Endicott range from 11,000 to 38,000 cfm. Wet ESPs are further limited to operating temperatures lower than 170 to 190 ºF. The outlet temperatures of Endicott's kilns are in the range of 325-400 ºF. Typical inlet concentrations to ESPs range from 1-50 gr/scf. The outlet concentrations from Endicott's dryers and kilns are only 0.006-0.073 gr/scf, lower than typical inlet concentrations to ESPs. Further, since both types of ESPs employ metal plates and wires to charge and collect particles, both are highly susceptible to corrosive environments such as exist in brick kiln exhaust gases. In addition, greater than 60% of particulates emitted from brick industry kilns and dryers are condensable, making them unavailable for control by ESP technology. For these reasons, ESPs are not technically feasible for the dryers and kilns at this source.

Cyclone - A cyclone is designed to remove particles by causing the entire gas stream to spin in a vortex at high velocity inside a cylindrical chamber. The centrifugal force acts more strongly on the larger, denser particles and flings them preferentially toward the inside wall of the cyclone where they impact and then fall to the bottom of the cyclone. Inlet dust loadings of a cyclone are normally in the range of 1-100 gr/scf and have a lower end of 0.44 gr/scf in specialized applications. Outlet concentrations from Endicott's dryers and kilns are much lower, ranging from 0.006-0.073 gr/scf. These particulate concentrations are too low to allow efficient operation of a cyclone. In addition, greater than 60% of particulates emitted from brick industry kilns and dryers are condensable, making them unavailable for control by cyclone technology. For these reasons, cyclones are not technically feasible for the dryers and kilns at this source.

1.1-3 Rank Remaining Control Technologies by Control Effectiveness

The PM control technologies that are considered technically feasible for implementation on a kiln or dryer have been ranked from most to least effective in terms of emission reduction potential. Table 4 summarizes the control technology and ranking.

Table 4. PM Control Technology Summary & Top-Down Ranking

Identified Control Technology	Potential to Control PM Emissions	Available and Demonstrated Effective	In service on Similar Systems	% PM Reduction
Baghouse	Yes	Yes	Yes	99%
Wet Scrubber	Yes	Yes	Yes	95%

1.1-4 Evaluate the Most Effective Controls and Document Results

The Permittee provided NDEQ with a thorough economic analysis of the technically feasible control options. The analysis estimated the cost of the PM control equipment, including the initial capital cost of the various components intrinsic to the complete system, and the estimated annual operating costs. The estimated total capital cost was calculated with the use of a factoring method of determining direct and indirect installation costs. The basic equipment costs were obtained from vendor's quoted prices. Annualized costs were developed based on information from the vendors and a literature review. The analysis assumed an interest rate of 7% and an equipment life of 20 years for baghouses and 15 years for wet scrubbers.

The basis of cost effectiveness, used to evaluate the control options, is the ratio of the annualized cost to the amount of PM (tons) removed per year. Note that the cost effectiveness of each option only accounts for the portion of PM removed by the add-on controls. Table 5 presents the control evaluations for feasible control technologies when controlling the Plant 3 Kiln 1 (Unit #12). Table 6 presents the cost effectiveness control evaluations for feasible control technologies when controlling the Plant 3 Dryer 1 (Unit #35).

Table 5. Control Technology Evaluation for Controlling PM Emissions from Kiln Unit #12

Control Option	Emissions from Kiln Unit #12	Economic Impacts		
	Emissions Reductions *(tpy)*	Installed Capital Cost *($)*	Total Annualized Cost *($/yr)*	Average Cost Effectiveness *($/ton)*
Baghouse (99%)	14.2[a]	152,264	333,332	23,545
Wet Scrubber (95%)	35.3	88,739	287,362	8,110

[a] According to the emission factors in AP-42, Table 11.3-1, the emission factor for NG fired kilns is 0.37 lbs/ton for filterable PM and 0.59 lbs/ton for condensible PM (which would not be collected by a baghouse). Therefore, the PM emission reduction by the use of baghouse = 37.2 tons/yr x 0.37 / (0.37+0.59) x 99% = 14.2 tons/yr.

Table 6. Control Technology Evaluation for Controlling PM Emissions from Dryer Unit #35

Control Option	Emissions from Kiln Unit #12	Economic Impacts		
	Emissions Reductions *(tpy)*	Installed Capital Cost *($)*	Total Annualized Cost *($/yr)*	Average Cost Effectiveness *($/ton)*
Baghouse (99%)	2.95[a]	152,264	333,332	112,993
Wet Scrubber (95%)	6.88	88,739	287,362	41,767

[a] According to the emission factors in AP-42, Table 11.3-1, the emission factor for a brick dryer is 0.077 lbs/ton for filterable PM and 0.11 lbs/ton for condensible PM (which would not be collected by a baghouse). Therefore, the PM emission reduction by the use of baghouse = 7.24 tons/yr x 0.077 / (0.077+0.11) x 99% = 2.95 tons/yr.

1.1-5 BACT Selection Review for PM

According to the analysis results in Section 1.1-4, the add-on control devices are not cost effective for Kiln Unit #12 and Dryer Unit #35 at Plant 3. In addition, Kiln Unit #12 is not required to put on an add-on control device pursuant to the current National Emission Standards for Hazardous Air Pollutants (NESHAP) for the Brick and Structural Clay Products Manufacturing (40 CFR 63, Subpart JJJJJ) due to the small capacity of this unit (less than 10 tons/hr). Therefore, NDEQ has determined the BACT for kiln Unit #12 and dryer Unit #35 at Plant 3 as follows:

(a) PM emissions from Plant 3 Kiln 1 (Unit #12) shall not exceed 8.49 pounds per hour. This is equivalent to 37.2 tons/yr of PM emissions.

(b) PM emissions from Plant 3 Dryer 1 (Unit #35) shall not exceed 1.65 pounds per hour. This is equivalent to 7.24 tons/yr of PM emissions.

1.2-0 Fluorides BACT Analysis

Fluoride emissions are emitted only from kiln Unit #12 and occur due to the present of fluoride compounds in the raw material. Fluoride emissions are primarily in the form of hydrogen fluoride (HF, or hydrofluoric acid). HF is water soluble.

1.2-1 Identification of Fluoride Control Technologies

NDEQ and the Permittee reviewed the following four (4) control technologies for fluoride emissions:

(a) Dry Lime Injection Fabric Filter

These systems inject hydrated lime (a dry lime powder) into the kiln exhaust. The lime and kiln exhaust mix in a reaction chamber or an exhaust duct and are ducted to a fabric filter. Acid gas removal takes place in the exhaust duct or reaction chamber and subsequent ductwork, and across the lime-caked fabric filter bags. The fabric filter then removes the lime and other PM from the exhaust stream prior to release to the atmosphere. The spent lime and PM collected by the fabric filter are then disposed of as solid waste.

(b) Dry Lime Scrubber/Fabric Filter
These systems mix fresh hydrated lime, recirculated hydrated lime, and a small amount of water in a conditioning drum. The lime/water mixture then is injected into a reaction chamber where it mixes with the kiln exhaust. Acid gas removal takes place in the reaction chamber, subsequent ductwork, and across the lime-cake fabric filter bags. Additionally, the hot exhaust gases from the kiln evaporate the water in the lime/water mixture, thereby cooling the exhaust gases before entering the fabric filter. From the reaction chamber, the exhaust stream is ducted to a fabric filter for PM removal, and a percentage of the fabric filter catch is reintroduced into conditioning drum along with fresh lime and water. The balance of the filter catch is disposed of as solid waste.

(c) Wet Scrubber (WS)

Two types of WS system can be used to control fluoride emissions. One is a vertical, packed – tower scrubber which quenches the exhaust gases with a soda ash and water solution. The exhaust gases then pass through 5 feet of random dump packing followed by a demister. The soda ash and water solution is also added to the top of the packing material, countercurrent to the gas flow. The other type of WS system is a fluidized bed scrubber that uses water and sodium hydroxide as the scrubbing solution. Test data documenting the performance of the fluidized bed scrubber are not yet available.

(d) Dry Limestone Adsorber

These system feeds limestone into the top of a reaction chamber countercurrent to the kiln exhaust gases. The limestone cascades through multiple baffles within the chamber and reacts with and removes HF, and to a lesser degree, HCl and SO_2 from the kiln exhaust. Depending on the system, the limestone is then pneumatically conveyed directly back to the top of the chamber or it mechanically processed (scraped) to remove reacted material from the surface and then pneumatically conveyed back to the top of the reaction chamber. New limestone is periodically added to the system as needed. The system does not provide a mechanism for controlling PM and may actually create PM emissions in some instances. This technology does not require a minimum air flow to operate properly and, once designed for maximum air flow, any fluctuations in air flow below the maximum actually increases contact time between the kiln exhaust gases and the limestone, likely increasing control effectiveness without affecting kiln operation.

The search for brick and tile manufacturing plants in EPA's RACT/BACT/LAER Clearinghouse (RBLC) identified the permit listed in Table 7 below. The permit listed in Table 7 was issued on or before 1985 and regulates the fluoride emissions from kilns.

Table 7. RBLC Search Results for Fluoride Emissions from Dryers/Kilns

Plant	PBLD ID	Date Issued and State	Facility	Requirements
Kyanite Mining Corp.	VA-0040	07/10/85 (PA)	Dryer, Kiln	Wet Collector (90%) 15.2 tons/yr

The Permittee also collected the following information for fluoride control options from the Brick Industry Association (BIA) for controlled tunnel kilns in brick industry. The results are listed in Table 8.

Table 8. Control Devices for Fluoride Emissions from Kilns

Kiln Size (tons/hr)	Control Technology	Year Installed
15.6	Wet Scrubber[a]	1982
22.83	Dry Limestone Scrubber	1991
11.3	Dry Limestone Scrubber	1993
11.3	Dry Limestone Scrubber	1993
11.35	Lime Baghouse	1993
11.35	Lime Baghouse	1993
11	Lime Baghouse w/ Reaction Chamber	1994
11	Lime Baghouse w/ Reaction Chamber	1994
10.8	Wet Scrubber	1995
13.7	Dry Injection Baghouse	1996
10.53	Dry Limestone Scrubber	1996
13.1	Dry Injection Baghouse	1996
11.8	Dry Limestone Scrubber	1998
11.8	Dry Limestone Scrubber	1998
12.6	Dry Injection Baghouse	1998
11.3	Dry Limestone Scrubber	1998
11.3	Dry Limestone Scrubber	1998
12.1	Dry Injection Baghouse	1999
7.45	Dry Limestone Scrubber	1999
8.84	Dry Injection Baghouse	2000
4.4	Dry Limestone Scrubber	2000
2.31	Dry Limestone Scrubber	2000

[a] This is the only unit installed before 1985.

1.2-2 Eliminate Technically Infeasible Control Options

All of the control options identified are considered technically feasible since they have been used at other brick and tile manufacturing plants.

1.2-3 Rank Remaining Control Technologies by Control Effectiveness

The fluoride control technologies that are considered technically feasible for implementation on kilns have been ranked from most to least effective in terms of emission reduction potential. Table 9 summarizes the control technology and ranking.

Table 9. Fluoride Control Technology Summary & Top-Down Ranking

Identified Control Technology	Potential to control PM emissions	Available and demonstrated effective	In service on similar systems	% PM Reduction
Wet Scrubber	Yes	Yes	Yes	95%
Dry Lime Scrubber /Fabric Filter	Yes	Yes	Yes	90% - 94.9%
Dry Lime Injection/Fabric Filter	Yes	Yes	Yes	90% - 94.8%
Dry Limestone Adsorber	Yes	Yes	Yes	90% - 91.4%

1.2-4 Evaluate the Most Effective Controls and Document Results

The basis of cost effectiveness, used to evaluate the control options, is the ratio of the annualized cost to the amount of Fluoride (tons) removed per year. Note that the cost effectiveness of each option only accounts for the portion of Fluoride removed by the add-on controls. Table 10 presents the cost effectiveness evaluations for feasible control technologies when controlling the Plant 3 Kiln 1.

Table 10. Top-Down BACT Analysis Results for Fluoride Emissions

Control Option	Emissions per Kiln	Economic Impacts		
	Emissions Reductions *(tpy)*	Installed Capital Cost *($)*	Total Annualized Cost *($/yr)*	Average Cost Effectiveness *($/ton)*
Wet Scrubber (95%)	21.7	88,739	287,362	13,242
Dry Lime Scrubber/FF* (94.9%)	21.6	1,210,000	450,000	20,833
Dry Lime Injection FF* (94.8%)	21.6	940,000	390,000	18,056
Dry Lime Adsorber* (91.4%)	20.8	635,000	220,000	10,577

* The cost information for these control options was taken from NESHAP background data (memo from Brian Shrager to Mary Johnson (EPA), Feb. 25, 2003) for a medium tunnel kiln (8-12.5 tph)

1.2-5 BACT Selection Review for Fluoride

According to the analysis results in Section 1.2-4, add-on control devices are not cost effective for Kiln Unit #12 at Plant 3. In addition, Kiln Unit #12 is not required to put on an add-on control device pursuant to the current NESHAP for the Brick and Structural Clay Products Manufacturing (40 CFR 63, Subpart JJJJJ) due to the small capacity of this unit (less than 10 tons/hr). Therefore, NDEQ has determined the BACT for kiln Unit #12 and dryer Unit #35 at Plant 3 as follows:

Total fluoride emissions from Plant 3 Kiln 1 (Unit #12) shall not exceed 5.22 pounds per hour. This is equivalent to 22.8 tons/yr of total fluoride emissions.

2.0 Air Quality Impact Analysis

This air quality impact analysis for the modification in 1985 consists of a significant impact area analysis and a preliminary modeling analysis of all emission sources at the facility to determine if the construction project in 1985 would have caused or contributed to any violations of applicable National Ambient Air Quality Standards (NAAQS) or PSD Increments for PM. Since there is no air quality standard for fluorides, the modeling results for the total fluoride emissions are discussed in Section 3.0 – Additional Impact Analysis.

Source Input Data

The stack parameters and emission rates for the emission points modeled can be found in the construction permit application received on July 2, 2003.

2.1 Significant Impact Area Analysis

Endicott's net emission increases for the modification project in 1985 were first modeled alone to determine the Significant Impact Area (SIA). The SIA is that area circumscribed by a circle, with Endicott as its center point, with a radius equal to the furthest distance to a receptor that had predicted concentrations (high, 1st high) exceeding the significance level. The significance levels are 5 $\mu g/m^3$ for the 24-hour average and 1 $\mu g/m^3$ for the annual average. The SIA defines the extent of the NAAQS and Increment receptor grids. The SIA for the modification in 1985 extended beyond Endicott's fence line. The extents of the SIAs are shown in Table 11.

Table 11. Extents of Significant Impact Areas (SIA)

Model Scenario	**Distance to SIA Boundary[a] (km)**	
	24-hr avg.	*annual avg.*
Plant 3 Construction	5.5	2.0

[a] As measured from the geographic center of Endicott's sources, not fence line; therefore, the radius of the final receptor grid was less than 6.2 km.

2.2 Modeling Analysis for NAAQS Compliance

The purpose of this analysis is to determine whether Endicott's modification in 1985 caused or significantly contributed to a predicted exceedance of NAAQS, and was conducted for two (2) scenarios. Scenario A assumed maximum hourly operations at the maximum hours per day the facility would operate at that hourly rate. Scenario B assumed the facility operated 24 hours per day, but at less than the maximum hourly rates. These emission rates were generally calculated by dividing the maximum daily throughput rates by 24 hours per day.

This ambient air quality impact analysis takes into account the combined impacts of emissions from the existing and proposed new units included in the modification project in 1985, and background concentrations due to distant major and minor sources and natural sources. The results are shown in Table 12 below. As shown in the table below, the modeling analysis shows no exceedances of either the 24-hour or annual PM NAAQS.

Table 12. Comparison of Modeled Results to NAAQS

Averaging Period	Modeled ($\mu g/m^3$)	Backgroun ($\mu g/m^3$)	Total ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
24-hour – Scenario	64.3[a]	60	124.3	150
24-hour – Scenario	66.1[a]	60	126.1	150
Annual[c]	14.0[b]	25	39.0	50

[a] High, 6th high value over 5 years.
[b] Highest average concentration over 5 years.
[c] Scenario A.

2.3 Modeling Analysis for PSD Increment Compliance

The purpose of this analysis is to determine whether Endicott's modification in 1985 caused or significantly contributed to a predicted exceedance of the allowable increment. The allowable increment is the degree to which an area's air quality is allowed to be degraded and is expressed in terms of an ambient concentration. These were established due to the goal of PSD of preventing "significant deterioration" of air quality.

The NDEQ identified two additional facilities whose emissions were to be included as surrounding increment consuming and expanding sources. Each facility had multiple sources and stacks; however, the NDEQ preferred they be merged into one stack per facility. In addition, due to Endicott's proximity to Kansas, several sources in Kansas were included in the increment modeling.

The Increment Analysis results are shown in Table 13 below. As shown, the modeling analysis shows no exceedances of either the 24-hour or annual PM_{10} allowable increment.

Table 13. Comparison of Modeled Results to Allowable Increment

Averaging Period	Modeled Impact ($\mu g/m^3$)	Allowable Increment ($\mu g/m^3$)
24-hour[a]	26.5	30
Annual[b]	5.6	17

[a] Highest, 2nd high value from each of 5 years.
[b] Highest of five annual average values.

2.4 Air Quality Impact Summary

The analyses described above demonstrate that the modification in 1985 at Endicott did not significantly contribute to any exceedence of NAAQS for any episode or the 24-hour allowable PM PSD increments.

3.0 Additional Impacts Analysis

An Additional Impacts Analysis, as required by 40 CFR 52.21(o), describes air quality and related impacts due to associated growth and construction, as well as potential impacts of atmospheric emissions on soils, vegetation, and visibility impairment. This analysis indicates no adverse impacts. This information is summarized as follows:

3.1-0 Economic Growth and Impact Analysis

Elements of the growth analysis include a projection of the associated industrial, commercial, and residential source growth that occur due to the construction projects and an estimate of the air emissions generated by any such associated growth. The construction project in 1985 created no permanent industrial, commercial, or residential growth. The few employees who were hired due to the projects came from the local area. Construction activities likely caused a small, temporary increase in fugitive dust emissions from plant roads. These emissions were mitigated through roadway watering, as are the routine plant roadway fugitive dust emissions. Therefore, no significant permanent emissions were generated as a result of the project.

3.2-0 Growth-Related Ambient Air Quality Impact Analysis

No significant associated growth occurred with the construction project in 1985. Therefore, no significant air emissions were generated. Any emissions that were generated were temporary in nature and not significant. As a result, there is no basis for projecting any growth-related ambient air quality impacts.

3.3-0 Soils and Vegetation Impact Analysis

The effects of air emissions from the two construction projects on the soils and vegetation surrounding the Endicott facility will be broken down by the pollutants subject to PSD review: PM, PM_{10}, and fluorides. Vegetation types commonly found in the vicinity of the Endicott facility are corn, soybeans, wheat, hay, and native grasses, as well as cottonwood, oak, and maple trees.

3.3-1 PM and PM_{10}

Particulate matter emissions from industrial sources often contain acid compounds (e.g. sulfates and nitrates), which can contribute to acid deposition on soils and vegetation, and/or heavy metals (e.g. lead, cadmium, arsenic), which can lead to soil deposition and eventual plant uptake. However, sulfate and nitrate emissions from Endicott's kilns and dryers should be quite low due to exclusive firing on natural gas and propane. Appreciable sulfur oxides are emitted from the kilns due to the presence of sulfur in the raw clay material; however, it is unknown as to the speciation of sulfates. Certainly the total SO_x emissions emitted from each kiln, approximately 25 tons per year, do not approach levels from the types of industrial facilities (e.g. coal-fired power plants) normally associated with acid rain emissions. Further, emissions of heavy metals should also be extremely low, with the only metals present are those minute amounts naturally occurring in the clay material and added to the bricks prior to firing to impart color and texture.

Deposition of generic particulates on plant leaves may reduce sunlight exposure and gas transfer to the leaf, which restricts energy intake and respiratory functions. However, the emission increases resulting from the 1985 construction project were relatively small in comparison to existing emissions and the rather high background concentration in the area. In addition, the results of the air quality modeling analysis in Section 2.2 indicate that both the primary and secondary NAAQS will not be exceeded.

In summary, given the information presented above, it is not expected that emissions of particulate matter from the modification project in 1985 will cause detrimental impacts on the soils and vegetation surrounding the Endicott facility.

3.3-2 Fluorides

Fluoride emissions from brick manufacturing facilities are predominantly HF. Therefore, particulate fluoride emissions are not expected to be significant. Results from a particulate matter source test study by EPA in the mid-1970's on four natural gas-fired brick tunnel kilns led the EPA to conclude "Particulate concentration was so low and fluoride content of particulate so small, that contribution of fluorides from this source was negligible" (*Characterization of Air Pollutants Emitted from Brick Plant Kilns*; Wilson, H.H. & Johnson, L.D.; Ceramic Bulletin; 1975; pgs. 990-991).

Little is known about the effects of particulate fluorides on soils and vegetation, as HF is believed to be the most important inorganic fluoride species affecting terrestrial plants (*Fluoride and Plant Life*; Weinstein, L.H.; Occupational Medicine; 1977; 19: 49-78). Gaseous fluorides constitute a greater threat to vegetation than do particulate fluorides, since particulates deposited on the leaf surface enter the leaf only after being dissolved (*Impacts of Coal-Fired Power Plants on Fish, Wildlife, and their Habitats*; Fish and Wildlife Service; March 1978). Generally speaking, for most types of soils and vegetation, ambient concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects (*New Source Review Workshop Manual*; EPA; 1990; pg. D.5). However, there is no primary or secondary ambient air quality standard for fluorides with which to compare.

Fluoride is a natural component of most types of soil, with concentrations ranging from 20 to 1,000 ppm in areas without natural phosphate or fluoride deposits, and up to several thousand ppm in mineral soils with deposits of fluoride (*Uptake, Transport, and Accumulation of Soil and Airborne Fluorides by Vegetation*; In: Fluorides – Effects on Vegetation, Animals, and Humans; Davison, A.W.; 1983; pp. 61-82). Much of the area surrounding the Endicott facility is underlain with clay deposits, thereby creating a source for naturally occurring fluorides in the soil. Soils and vegetation are exposed to fluorides in a variety of ways. The most prevalent are weathering of fluoride-containing minerals and volcanic eruptions. Anthropogenic sources can include brick manufacturing facilities. In this transport process, fluorides are emitted through the kiln exhaust stacks and reach the soil and vegetation through dry and wet deposition. The availability of inorganic fluorides to plants is affected by soil adsorption, which in turn is affected by the chemistry and proportion of clay, silt, and sand components in the soil, soil permeability, and pH (*Canadian Water Quality Guidelines for the Protection of Aquatic Life: Inorganic Fluorides*; August 2001; pg. 25).

Plant uptake of particulate fluorides from the soil is rather low. Fluoride is usually insoluble or tightly bound to soil particles, except in very acidic soils. Over 90% of soil fluoride may be unavailable for plant uptake (*Impacts of Coal-Fired Power Plants on Fish, Wildlife, and their Habitats*; Fish and Wildlife Service; March 1978; pg. 201).

Although ripening peach fruit tissues can be visibly injured by low fluoride concentrations, most plant species are considered resistant to fluoride and can tolerate concentrations of up to 30 $\mu g/m^3$ (*Pathways of Fluoride Transfer in Terrestrial Ecosystems,* In: Pollutant Transport and Fate in Ecosystems; Davison, A.W.; 1987; pp. 193-210).

The relative susceptibilities to airborne fluoride of the three primary cash crops grown in the vicinity of the Endicott facility are as follows (*Effects of Fluorides on Plants,* In: www.ncl.ac.uk/airweb/fluoride/fluoride.htm; Davison, A.W. and Weinstein, L.; 1998; Tables of Relative Sensitivity):

- Corn: Sensitive to Intermediate
- Soybean: Tolerant
- Wheat: Intermediate to Tolerant

Total Fluorides were modeled to compare predicted ambient concentrations with any known concentration known to be injurious to flora or fauna. Emission rates applied in the modeling analysis are shown in Table 14 and modeling results are shown in Table 15 below:

Table 14. Total Fluorides Emission Rates Modeled

EU No.	EU Description	Emission Rate *(lb/hr)*
010	Plant 2 Kiln 1	2.11
011	Plant 2 Kiln 2	2.11
012	Plant 3 Kiln 1	5.22*

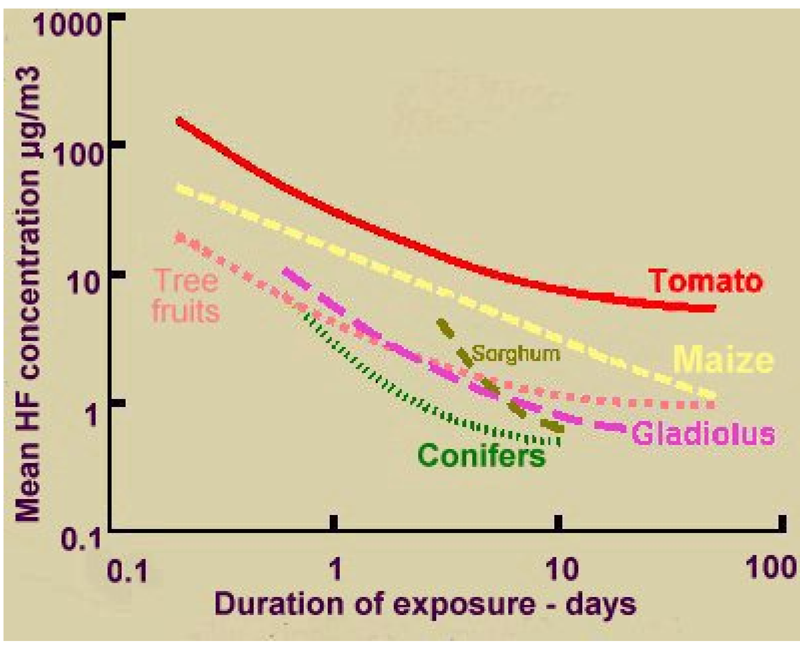
*Proposed PSD BACT limit.

Table 15. Maximum Total Fluorides Modeling Results

Met Data	1-hr Avg. *(μg/m³)*	12-hr Avg. *(μg/m³)*	24-hr Avg. *(μg/m³)*	Annual Avg. *(μg/m³)*
1987	43.2	20.0	13.6	1.2
1988	41.8	14.6	12.0	1.5
1989	41.8	14.5	13.1	1.4
1990	40.4	16.7	11.5	**1.7**
1991	**43.8**	**23.6**	**19.7**	1.5

Note: The numbers in bold represent the worse case results.

The following graph indicates a concentration as high as 25 $\mu g/m^3$ would be needed for a 24-hr. exposure to be injurious to maize (corn).



On the Establishment of Air Quality Criteria, with Reference to the Effects of Atmospheric Fluorine on Vegetation; Air Quality Monograph 69-3. American Petroleum Institute. 33 pp. McCune, D.C.; 1969

As shown in Table 15, the maximum modeled fluoride concentration for 24-hour average was 19.7 $\mu g/m^3$. Therefore, it is not expected that the fluoride emissions from the three kilns at Endicott Clay Products Co. will cause detrimental impacts on the soils and vegetation surrounding this facility.

3.4-0 <u>Visibility Impact Analysis</u>

A visibility analysis is required to determine if emissions from Endicott will likely cause a plume that could reduce the visual range, or impair visibility. Visibility is affected by pollutant concentrations, the viewing angle, relative humidity, cloud characteristics, and other physical factors such as color contrast between objects. Normally this analysis is conducted for federal Class I areas such as national parks, wildlife refuges, and monuments, or other visually-sensitive areas. Because there are no Class I areas within hundreds of miles, Rock Creek Station State Park was chosen for the analysis since it, at approximately 5.5 miles, is the closest public area to Endicott with any potential visual importance. However, it should be noted that Rock Creek Station SP does not have any identified visual impairment or scenic vistas associated with it. Southeast Nebraska has an estimated visual range of 22 miles.

The visibility analysis consisted of a two-phase approach. First, a Level-1 screening procedure was conducted using EPA's VISCREEN model, according to the methodology contained in the "Workbook for Plume Visual Impact Screening and Analysis (Revised), EPA-450/4-88-015, October 1992." Since a few of the screening criteria were exceeded, a Level-2 analysis was conducted to utilize certain facility-specific information. The results of the Level-2 analysis, shown below in Table 16, were numerically below the standardized screening criteria, indicating emissions from Endicott's construction project in 1985 would not result in a plume that significantly impaired visibility.

Table 16. Visibility Screening Results

Maximum Visual Impacts INSIDE Rock Creek Station State Park								
					Delta E		**Contrast**	
Background	**Theta**	**Azimuth**	**Distance**	**Alpha**	**Criteria**	**Plume**	**Criteria**	**Plume**
Sky	10	84	8.7	84	2.44	0.173	0.05	0.000
Sky	140	84	8.7	84	2.00	0.073	0.05	-0.003
Terrain	10	84	8.7	84	2.00	0.356	0.05	0.002
Terrain	140	84	8.7	84	2.00	0.036	0.05	0.001
Maximum Visual Impacts OUTSIDE Rock Creek Station State Park								
					Delta E		**Contrast**	
Background	**Theta**	**Azimuth**	**Distance**	**Alpha**	**Criteria**	**Plume**	**Criteria**	**Plume**
Sky	10	1	1.0	167	2.00	0.977	0.05	-0.001
Sky	140	1	1.0	167	2.00	0.410	0.05	-0.018
Terrain	10	1	1.0	167	2.00	1.926	0.05	0.021
Terrain	140	1	1.0	167	2.00	0.404	0.05	0.014

Title 129, Chapter 20, Section 001 - Process Weight Rate: This rule applies to Plant 2 Kiln 2 (Unit #11), Plant 2 Dryer 2 (Unit #33), Plant 3 Kiln 1 (Unit #12), and Plant 3 Dryer 1 (Unit #35) at this source. The following formulas were used to determine compliance:

for process weight rates up to 60,000 lbs/hr

$$E = 4.10\ p^{0.67}$$

These units are in compliance with the process weight rate limitations as shown on page 9 of Appendix A.

Title 129, Chapter 20, Section 004 – Opacity**:** This rule limits opacity from all equipment at the facility. It is very unlikely the fuel burning equipment would exceed this standard due to the use of only natural gas and propane.

Title 129, Chapter 24 - Sulfur Compounds Emissions: Plant 2 Kiln 2 (Unit #11), Plant 3 Kiln 1 (Unit #12), and Plant 3 Dryer 1 (Unit #35) are expected to be in compliance with this regulation because natural gas and propane are the only fuels combusted at these facilities. The regulation limits sulfur oxide emissions from fossil fuel burning to less than 2.5 lbs/MMBtu. The AP-42 sulfur oxide emission factor for natural gas combustion from Table 1.4-2 is 0.6 lb/MMscf or approximately 0.0006 lb/MMBtu, and the AP-42 emission factor for propane combustion from Table 1.5-1 is 0.0015 lb/kgal or approximately 0.00002 lb/MMBtu. Therefore, it is unlikely that the source would ever exceed the sulfur oxide limits

Title 129, Chapter 27 – Hazardous Air Pollutants: Each of the modifications in 1977 and 1985 has potential to emit a single HAP (fluoride) greater than 2.5 tons/yr and less than 10 tons/yr. However, these modifications were commenced before December 29, 1992. Therefore, the BACT requirements in Title 129, Chapter 27, Section 002 are not applicable.

Title 129, Chapter 28– Hazardous Air Pollutant Emission Standards (MACT): The potential to emit HAPs from this brick and tile manufacturing plant is greater than 10 tons/yr for a single HAP (fluoride). Therefore, this existing source is a major source for HAP and is subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Brick and Structural Clay Products Manufacturing (40 CFR 63.8380 – 63.8515, Subpart JJJJJ, and Title 129, Chapter 28, Section 001.70). Pursuant to 63.8395 (b), the compliance date for this existing source is May 16, 2003.

Plant 2 Kiln 2 (Unit #11) and Plant 3 Kiln 1 (Unit #12) have maximum capacities less than 10 tons/hr. Therefore, there are no specific emission limits or operating limits in 40 CFR 63.8405 applicable to these kilns. Pursuant to 40 CFR 63.8505, the Permittee shall comply with the general provisions in 40 CFR 63.1 through 63.15 as applicable and as specified in the Table 7 of this NESHAP.

Permit conditions specific to the proposed permit are discussed as follows:

XIII.(A) This condition outlines the PSD BACT requirement for the modification project in 1985, per Title 129, Chapter 19 and the 40 CFR 52.21 rules as of August 7, 1980.

XIII.(B) This condition outlines the requirements in NESHAP, Subpart JJJJJ. Since this NESHAP does not have specific emission limitations or operating limits for kilns with maximum capacities less than 10 ton/hr, Condition XIII.(B)(1) is in place to ensure that Plant 2 Kiln 2 (Unit #11) and Plant 3 Kiln 1 do not process more than 10 tons/hr.

XIII.(C) This condition requires PM stack testing to determine compliance with the emission rate limits in Conditions XIII.(A)(1) and (2) per Title 129, Chapter 19.

XIII.(D) This condition requires the following:

(1) Total fluoride stack testing for Unit #12;

(2) Analytical test for the fluoride content of the raw clay input to Unit #12; and

(3) Development of a correlation between the total fluoride emissions and the fluoride content of the raw clay.

Conditions XIII.(D)(2) and (3) are required because the total fluoride emissions are depended on the fluoride content of the raw clay. The testing results only show total fluoride emissions from the type of clay used at the time of the test. In order to ensure that the Permittee complies with the total fluoride emission limit in Condition XIII.(A)(3) continuously, the Permittee is required to perform analytical test for the fluoride content of the raw clay and develop a correlation between the total fluoride emissions and the fluoride content of the raw clay.

XIII.(E) This condition outlines the stack test procedures and requirements in Title 129, Chapter 34.

XIII.(F) Record keeping and reporting requirements are required to show compliance with Conditions XIII.(B) and XIII.(D).

STATUTORY OR REGULATORY PROVISIONS ON WHICH PERMIT REQUIREMENTS ARE BASED:

Applicable regulations: Title 129 - Nebraska Air Quality Regulations as amended December 13, 2006.

PROCEDURES FOR FINAL DETERMINATION WITH RESPECT TO THE PROPOSED CONSTRUCTION PERMIT:

The public notice, as required under NAQR Chapter 14, shall be published on March 6, 2007, in the Fairbury Journal-News newspaper. Persons or groups shall have 30 days from that issuance of public notice (April 4, 2007) to provide the NDEQ with any written comments concerning the proposed permit action and/or to request a public hearing, in accordance with NAQR Chapter 14. If a public hearing is granted by the Director, there will be a notice of that meeting published at least 30 days prior to the hearing. Persons having comments or requesting a public hearing may contact:

W. Clark Smith-Permitting Section Supervisor
Air Quality Division
Nebraska Department of Environmental Quality
PO Box 98922
Lincoln, Nebraska 68509-8922

If no public hearing is requested, the permit may be granted at the close of the 30-day comment period. If a public hearing is requested, the Director of the NDEQ may choose to extend the date on which the permit is to be granted until after that public hearing has been held. During the 30-day comment period, persons requiring further information should contact:

Brad Reid-Environmental Engineer
Air Quality Division
Nebraska Department of Environmental Quality
PO Box 98922
Lincoln, Nebraska 68509-8922

Telephone inquiries may be made at:

(402) 471-2189

TDD users please call 711 and ask the relay operator to call us at (402) 471-2186.

PUBLIC NOTICE

Nebraska Department of Environmental Quality

Air Quality Division

Notice is given to the public, according to Chapter 14 of Title 129 - Nebraska Air Quality Regulations, of the application of Endicott Clay Products Company for permission to construct two historical modification projects in 1977 and 1985 at a brick and tile manufacturing plant located at 57120 707th Road in Endicott, Nebraska.

The increase in emissions of air contaminants anticipated due to the proposed modifications in 1977 and 1985 are estimated in the following table:

Regulated Pollutant	PTE of the Modification in 1977[a] (tons/year)	PTE of the Modification in 1985[a] (tons/year)
Particulate Matter (PM)	45.2	44.4
Particulate Matter smaller than or equal to 10 microns (PM_{10})	41.7	40.9
Sulfur Dioxide (SO_2)	26.4	25.9
Oxides of Nitrogen (NO_x)	13.8	17.3
Carbon Monoxide (CO)	47.3	58.5
Volatile Organic Compounds (VOC)	2.13	2.09
Hazardous Air Pollutants (HAP)		
Fluorides	23.3	22.8
Hydrogen Chloride	6.70	6.58
Total HAPs	30.2	29.7

[a] This only includes the PTE of the new constructed units.

Jefferson County is in attainment with the National Ambient Air Quality Standards (NAAQS) for all regulated pollutants and is expected to continue to be in attainment. Predicted consumption of the Prevention of Significant Deterioration (PSD) Class II increment for PM_{10} was 26.5 micrograms per cubic meter (ug/m3) for the 24-hour averaging period and 5.6 ug/m3 for the annual averaging period. Jefferson County is in compliance with the state Total Reduced Sulfur (TRS) standards and no significant impact on these standards is expected from this project. No impact is anticipated on habitat for any rare or threatened species.

The Department proposes to issue a PSD construction permit with specific conditions, based on Title 129-Nebraska Air Quality Regulations, which:

- include the PSD BACT requirements for Plant 3 Kiln 1 (Unit #12) and Plant 3 Dryer 1 (Unit #35);
- include the requirements of NESHAP, Subpart JJJJJ for Plant 2 Kiln 2 (Unit #11) and Plant 3 Kiln 1 (Unit #12);
- require PM stack tests for Plant 3 Dryer 1 (Unit #35);
- require PM and fluoride stack tests for Plant 3 Kiln 1 (Unit #12); and
- require recordkeeping to demonstrate compliance with the permit conditions.

The proposed permit and supporting materials are available for inspection at the office of the Nebraska Department of Environmental Quality, Suite 400, 1200 "N" Street, Lincoln, Nebraska 68508. These materials were also forwarded to the Fairbury Public Library. Telephone inquiries may be made at (402) 471-2189. Please notify the Department of Environmental Quality if alternate formats of materials are needed. Contact phone number is (402) 471-2186. TDD users please call 711 and ask the relay operator to call us at (402) 471-2186. Persons requiring further information should contact:

Brad Reid, P.E.-Environmental Engineer
Air Quality Division
Nebraska Department of Environmental Quality
PO Box 98922
Lincoln, NE 68509-8922

Within 30 days after the initial publication of this notice, persons may request or petition the Director for public hearing, or submit comments relative to the issuance of the proposed permit. Comments received during the 30 day public notice period, ending April 4, 2007, will be considered prior to the final decision to issue or to deny the proposed permit. A request or petition for hearing must state the nature of the issues to be raised and all arguments and factual grounds supporting such position. If a public hearing is granted by the Director, the hearing will be advertised by public notice at least 30 days prior to its occurrence. Comments and requests should be mailed to:

W. Clark Smith-Permitting Section Supervisor
Air Quality Division
Nebraska Department of Environmental Quality
PO Box 98922
Lincoln, NE 68509-8922

Appendix A: Emission Calculations
Emissions
From Plant 2 Kiln 2 (Unit #11)

Max. Capacity
(tons/hr)

9.0

Pollutant

	PM*	PM_{10}*	NO_x	SO_2	CO	VOC
Emission Factor in lbs/ton	0.96	0.87	0.35	0.67	1.2	0.02
Potential to Emit in tons/yr	**37.8**	**34.3**	**13.8**	**26.4**	**47.3**	**0.95**

*PM and PM10 emission factors are condensable and filterable PM combined.
Emission factors are from AP-42, Table 11.3-2, 11.3-3, and 11.3-5 (AP-42, 08/97).

	Total Fluorides	HCl	Benzene	Bisphthalate	Chlorine	Total HAPs
Emission Factor in lbs/ton	0.59	0.17	0.0029	0.0020	0.0013	0.767
Potential to Emit in tons/yr	**23.3**	**6.70**	**0.11**	**0.08**	**0.05**	**30.2**

Emission factors are from AP-42, Tables 11.3-4 and 11.3-6 (AP-42, 08/97).

Methodology

PTE (tons/yr) = Max. Capacity (tons/hr) x Emission Factor (lbs/ton) x 8760 hr/yr x 1 ton/2000 lbs

Appendix A: Emission Calculations
Emissions
From Plant 2 Dryer 2 (Unit #33)

Max. Capacity (tons/hr)
9.0

Pollutant

	PM*	PM_{10}*	NOx**	SO_2**	CO**	VOC***
Emission Factor in lbs/ton	0.187	0.187	-	-	-	0.030
Potential to Emit in tons/yr	**7.37**	**7.37**	-	-	-	**1.18**

* PM emission factor is condensable and filterable PM combined. Assume PM10 emissions are equal to PM emissions.
** This dryer is heated with the waste heat from the kiln. Therefore, there are no combustion related emissions.
*** Emission factors are from AP-42, Tables 11.3-1 and 11.3-5 (AP-42, 08/97).

Methodology

PTE (tons/yr) = Max. Capacity (tons/hr) x Emission Factor (lbs/ton) x 8760 hr/yr x 1 ton/2000 lbs

Appendix A: Emission Calculations
Potential to Emit of the Modification in 1977
For Plant 2 Expansion Project

Pollutant

Unit Description	**PM**	**PM_{10}**	**NO_x**	**SO_2**	**CO**	**VOC**	**Total Fluorides****	**Total HAPs**
Plant 2 Kiln 2 (Unit 11)	37.8	34.3	13.8	26.4	47.3	0.95	23.3	30.2
Plant 2 Dryer 2 (Unit 33)	7.37	7.37	-	-	-	1.18	-	-
Total PTE of the Modification* (tons/yr)	**45.2**	**41.7**	**13.8**	**26.4**	**47.3**	**2.13**	**23.3**	**30.2**
Construction Permit Thresholds in the State Rules (06/19/1976 version)	**-**	**-**	**50 lbs/day (= 9.13 tons/yr)**	**2 lbs/hr (= 8.76 tons/yr)**	**-**	**-**	**-**	**-**

* Only the PTE of the new constructed units are included in the PTE of modification calculations for state rule applicability.
** Fluoride is the HAP with the greatest emissions.

Appendix A: Emission Calculations
Emissions
From Plant 3 Kiln 1 (Unit #12)

Max. Capacity (tons/hr)

8.84

Pollutant

	PM	PM_{10}	SO_2*	SO_2 and SO_3*	NO_x	CO	VOC
Emission Factor in lbs/ton	0.96	0.87	0.67	0.78	0.35	1.20	0.024
Potential to Emit in tons/yr	**37.2**	**33.7**	**25.9**	**30.2**	**13.6**	**46.5**	**0.93**

Emission factors are from AP-42, Table 11.3-2, 11.3-3, and 11.3-5 for natural gas fired kiln (SCC 3-05-003-11)(AP-42, 08/97).
* SO_2 is regulated under the PSD program. Nebraska State rules (Title 129 as of the version dated May 21, 1983) regulated both SO_2 and SO_3 emissions.

	Total Fluorides	HCl	Benzene	Bisphthalate	Chlorine	Total HAPs
Emission Factor in lbs/ton	0.59	0.17	0.0029	0.0020	0.0013	0.767
Potential to Emit in tons/yr	**22.8**	**6.58**	**0.11**	**0.08**	**0.05**	**29.7**

Emission factors are from AP-42, Tables 11.3-4 and 11.3-6 (AP-42, 08/97).

Methodology

PTE (tons/yr) = Max. Capacity (tons/hr) x Emission Factor (lbs/ton) x 8760 hr/yr x 1 ton/2000 lbs

Appendix A: Emission Calculations
PM and PM10 Emissions
From Grinding/Screening System (Unit #6-1B) - for the Modification in 1985

Max. Capacity (tons/hr)	Actual Throughput** (tons/yr)
40	130,000

	PM*	PM_{10}*
Emission Factor in lbs/ton	8.50	0.53
Control Efficiency* **	**50%**	**25%**
Potential to Emit (tons/yr)	**745**	**69.6**
Actual Emissions (tons/yr)	**276**	**25.8**
PTE of the Modification (tons/yr)	**468**	**43.8**

* Emission factors are from AP-42, Table 11.3-2 (AP-42, 08/97) for dry material.
** This is estimated by the source using recent operating data. The historical data in 1985 for the actual emissions from this unit is not available.
*** This unit was controlled by building enclosures in 1985 and the control efficiencies were estimated by the source.

Methodology

PTE (tons/yr) = Max. Capacity (tons/hr) x Emission Factor (lbs/ton) x 8760 hr/yr x 1 ton/2000 lbs x (1-Control Efficiency)
Actual Emissions (tons/yr) = Actual Throughput (tons/yr) x Emission Factor (lbs/ton) x 1 ton/2000 lbs x (1-Control Efficiency)
PTE of the Modification (tons/yr) = PTE(tons/yr) - Actual Emissions (tons/yr)

Appendix A: Emission Calculations
Emissions
From Plant 3 Dryer 1 (Unit #35)

Max. Capacity
(tons/hr)

8.84 (This unit is also heated by natural gas or propane)

Pollutant

	PM*	PM10*	SO_2	NOx	CO	VOC
Emission Factor in lbs/ton	0.187	0.187	-	0.098	0.31	0.030
Potential to Emit in tons/yr	**7.24**	**7.24**	**-**	**3.79**	**12.0**	**1.16**

* PM emission factor is condensable and filterable PM combined. Assume PM10 emissions are equal to PM emissions.
Emission factors are from AP-42, Tables 11.3-1, 11.3-3, and 11.3-5 for brick dryer with supplemental gas burner (SCC 3-05-003-51) (AP-42, 08/97).

Methodology

PTE (tons/yr) = Max. Capacity (tons/hr) x Emission Factor (lbs/ton) x 8760 hr/yr x 1 ton/2000 lbs

Appendix A: Emission Calculations
PM and PM10 Emissions
From Grog Crusher (Unit #23) - for the Modification in 1985

Max. Capacity (tons/hr)	Actual Throughput** (tons/yr)
120	16,900

Emission Factor in lbs/ton	PM* 5.90E-02	PM10* 5.90E-02
Potential to Emit (tons/yr)	**31.0**	**31.0**
Actual Emissions (tons/yr)	**0.50**	**0.50**
PTE of the Modification (tons/yr)	**30.5**	**30.5**

* PM10 emission factor is from EPA FIRE, Version 6.25 for the controlled crushers in brick manufacturing plant (SCC 3-05-003-40).
Assume (1) uncontrolled emission factor = controlled emission factor / (1-99%); (2) PM emissions are equal to PM10 emissions.
** This is estimated by the source using recent operating data. The historical data in 1985 for the actual emissions from this unit is not available.

Methodology

PTE (tons/yr) = Max. Capacity (tons/hr) x Emission Factor (lbs/ton) x 8760 hr/yr x 1 ton/2000 lbs
Actual Emissions (tons/yr) = Actual Throughput (tons/yr) x Emission Factor (lbs/ton) x 1 ton/2000 lbs
PTE of the Modification (tons/yr) = PTE (tons/yr) - Actual Emissions (tons/yr)

Appendix A: Emission Calculations
Potential to Emit of the Modification in 1985
For Plant 3 Expansion Project

Pollutant

Modification Project Description	PM	PM10**	SO_2	NO_x	CO	VOC	Total Fluoride	Total HAP
Installation of Plant 3 Kiln 1	37.2	33.7	25.9	13.6	46.5	0.93	22.8	29.7
Installation of Plant 3 Dryer 1	7.24	7.24	-	3.79	12.0	12.0	-	-
PTE change of the Grinding/Screening System	468	43.8	-	-	-	-	-	-
PTE change of the Grog Crusher	30.5	30.5						
Total PTE of the Modification* (tons/yr)	**543**	**115**	**25.9**	**17.3**	**58.5**	**12.9**	**22.8**	**29.7**
PSD Thresholds in 1985 (tons/yr)	**25.0**	**NA**	**40.0**	**40.0**	**100**	**40.0**	**3.00**	**NA**

* Note that this source is not in 1 of 28 source categories and the fugitive emissions from this project are not included in the total PTE for PSD review purposes.
** Before 1990, PM10 was not a regulated air pollutant and fluoride was one of the HAPs regulated under 40 CFR 52.21 (PSD as of 08/07/80).

Appendix A: Emission Calculations

Comparison Between PTE of PM and the Particulate Emission Limits

Unit ID	Number of Units	Max. Throughput Rate (tons/hr)	Particulate Emission Limit (lbs/hr)	PTE of PM (lbs/hr)
#11	Plant 2 Kiln 2	9.00	17.9	8.64
#33	Plant 2 Dryer 2	9.00	17.9	1.68
#12	Plant 3 Kiln 1	8.84	17.7	8.49
#35	Plant 3 Dryer 1	8.84	17.7	1.65

Methodology

Particulate Emission Limit (lbs/hr) = 4.1 x [Max. Throughput Rate (tons/hr)] $^{0.67}$

PTE of PM (lbs/hr) = PTE of PM for each unit after control (tons/yr) x 2000 lbs/hr / 8760 hr/yr