FLORIDA CRUSHED STONE COMPANY

PREVENTION
OF
SIGNIFICANT DETERIORATION (PSD)
PERMIT APPLICATION
FOR THE
UNIT II PROJECT

VOLUME I

DECEMBER 2004

RECEIVED
DEC 20 2004
BUREAU OF AIR REGULATION

Florida Crushed Stone Company

Prevention of
Significant Deterioration (PSD)
Permit Application
For the
Unit II Project

Volume I

Prepared By:
RTP Environmental Associates, Inc.
239 U.S. Highway 22 East
Green Brook, New Jersey 08812
(732) 968-9600

December 2004

VOLUME I

TABLE OF CONTENTS

SECTION			PAGE NO.
1.0	INTRODUCTION		1-1
1.1	SITE DESCRIPTION		1-1
2.0	AIR QUALITY REGULATIONS		2-1
2.1	APPLICABLE REGULATIONS		2-1
	2.1.1	Florida State Program Authority	2-1
	2.1.2	Prevention of Significant Deterioration (PSD)/ Nonattainment New Source Review (NSR) Applicability	2-2
	2.1.3	Ambient Air Quality Standards (AAQS)	2-4
	2.1.4	40 CFR 60 Subpart F, New Source Performance Standards (NSPS) for Cement Kilns	2-4
		• Compliance Testing	2-4
	2.1.5	40 CFR 60 Subpart OOO – New Source Performance Standards for Nonmetallic Mineral Processing Plants	2-5
	2.1.6	40 CFR 63 Subpart LLL – National Emission Standards For Hazardous Air Pollutants – Portland Cement Manufacturing Industry	2-5
	2.1.7	Enhanced Monitoring Rule	2-6
	2.1.8	Florida Air Regulations	2-6
2.2	EXISTING PERMITS		2-8
2.3	CONCLUSIONS		2-8
3.0	AIR POLLUTANT EMISSION ESTIMATES		3-1
3.1	EMISSION CONTROLS AND ASSOCIATED POTENTIAL EMISSION RATES		3-2
	3.1.1	Particulate Matter Emissions	3-2
		• Process Equipment	3-2
		• Fugitive PM/PM_{10} Emissions	3-6
	3.1.2	NO_x Emissions	3-6
		• Normal Operating Conditions	3-6
		• Start-up and Non-routine (Malfunction) Operating Conditions	3-6
	3.1.3	SO_2 Emissions	3-8
	3.1.4	CO Emissions	3-8
	3.1.5	VOC Emissions	3-9
	3.1.6	Lead, Mercury, Beryllium, and Sulfuric Acid Mist Emissions	3-9
3.2	INFORMATION SOURCES		3-9

VOLUME I

TABLE OF CONTENTS
(Continued)

SECTION PAGE NO.

4.0 CONTROL TECHNOLOGY REVIEW 4-1
4.1 PROCESS DESCRIPTION 4-1
4.2 RECENT BACT AND "NON-BACT" ESTABLISHED PERMIT LIMITS 4-2
4.3 BACT FOR PARTICULATE MATTER (PM ANF PM_{10}) EMISSIONS 4-8
4.4 BACT FOR SULFUR DIOXIDE EMISSIONS 4-10
4.5 BACT FOR NITROGEN OXIDES EMISSIONS 4-12
  4.5.1 Recent NO_x Control Information 4-12
    - Recent BACT Determinations 4-13
    - Other NO_x BACT Considerations – Experience in Europe 4-14
    - SNCR with MSC on European Facilities by Krupp-Polysius 4-15
  4.5.2 NO_x Control Technology Options 4-16
  4.5.3 Evaluating the NO_x Control Technology Options 4-18
    - European Commission Reference Document 4-20
    - Portland Cement Association (PCA) Report 4-21
    - NO_x Emissions Variability 4-25
  4.5.4 St. Lawrence Cement LAER Determination 4-26
  4.5.5 Rinker Unit II NO_x BACT Determination 4-27
4.6 BACT FOR CARBON MONOXIDE EMISSIONS 4-28
4.7 CONTROL TECHNOLOGY FOR VOC EMISSIONS 4-32
4.8 BIBLIOGRAPHY 4-34

5.0 EXISTING AIR QUALITY 5-1
5.1 AMBIENT AIR QUALITY STANDARDS 5-1
5.2 AMBIENT MONITORING SITES/MEASUREMENTS 5-1
5.3 ATTAINMENT STATUS 5-8
5.4 REFERENCES 5-9

6.0 AIR QUALITY MODELING ANSLYSES 6-1
  6.1.1 Pollutants 6-1
  6.1.2 Source Vicinity 6-1
  6.1.3 Source Characteristics 6-1
  6.1.4 Model Selection, Meteorological Data, and Receptor Grids 6-4
6.2 MODELING METHODOLOGY 6-6
  6.2.1 BPIP Analysis 6-6
  6.2.2 Load Screening Analysis 6-6

VOLUME I

TABLE OF CONTENTS
(Continued)

SECTION		PAGE NO.
	6.2.3 SIA Modeling Analysis	6-7
	6.2.4 Cumulative Modeling Analysis	6-7
6.3	MODELING ANALYSIS RESULTS	6-7
	6.3.1 Load Screening Modeling Results	6-7
	6.3.2 Significant Impact Analysis	6-9
	6.3.3 De Minimis Monitoring Levels	6-9
	6.3.4 Cumulative Modeling Emission Inventory	6-9
	6.3.5 Cumulative NAAQS Analysis	6-13
	6.3.6 Cumulative Class II PSD Increment Analysis	6-13
	6.3.7 Class I PSD Increment Analysis	6-18
6.4	REFERENCES	6-18
7.0	AIR QUALITY RELATED VALUES	7-1
7.1	VISIBILITY IMPACTS	7-1
	7.1.1 Visibility Impacts in Project Vicinity	7-1
	7.1.2 Class I Visibility Impacts	7-2
7.2	MINOR SOURCE GROWTH	7-10
7.3	SOILS AND VAGETATION	7-10
7.4	REFERENCES	7-11

LIST OF TABLES		PAGE NO.
Table 2-1	PSD Pollutant Applicability	2-3
Table 2-2	Existing Rinker FDEP Permits	2-9
Table 3-1	Summary of Criteria Pollutant Emissions	3-3
Table 3-2	Summary: Minor Sources and Associated Particulate Matter Emissions	3-4
Table 4-1	Summary of Recent Portland Cement Facility Air Permits Used in BACT Review	4-3
Table 4-2	Comparison of Range of Facility Permitted Emission Levels with Those for the Rinker Unit II Kiln	4-7
Table 4-3	Achievable NO_x Reductions with Various NO_x Control Technologies	4-24
Table 4-4	Rinker Unit II Cement Kiln Top-Down BACT Impact Analysis Summary	4-29
Table 5-1	National and Florida State Ambient Air Quality Standards	5-2
Table 5-2	Nearest Ambient Air Monitoring Sites	5-3
Table 5-3	Ambient Air Quality Monitoring Data	5-5

VOLUME I

TABLE OF CONTENTS
(Continued)

LIST OF TABLES (continued) **PAGE NO.**

Table 5-4 Comparison of Baseline Concentrations to Ambient Air Quality Standards 5-7
Table 6-1 Proposed Kiln Source Characteristics 6-2
Table 6-2 Source Characteristics for Material Handling Baghouse PM_{10} Sources 6-3
Table 6-3 Summary of Proposed Kiln Load Screening Results 6-8
Table 6-4 Summary of Significant Impact Modeling 6-10
Table 6-5 Cumulative PM_{10} Modeling Inventory – Sources that have emissions greater than 20D 6-14
Table 6-6 Summary of Cumulative NAAQS Modeling 6-15
Table 6-7 Summary of Cumulative PSD Increment Impacts – Class II 6-16
Table 6-8 Summary of Class I Significant Impact Modeling 6-19
Table 6-9 Summary of Cumulative PSD Increment Impacts – Class I 6-19
Table 7-1 Level-2 Meteorological Analysis for PLUVUE 7-6
Table 7-2 PLUVUE-II Input Data 7-8
Table 7-3 PLUVUE-II Modeling Results 7-9

LIST OF FIGURES **PAGE NO.**

Figure 6-1 Receptor Grid Plot 6-5
Figure 6-2 PM_{10} 24-hr Project Impacts Plot 6-11
Figure 6-3 PM_{10} Annual Project Impacts Plot 6-12
Figure 6-4 PM_{10} 24-hr PSD Increment Impacts Plot 6-17
Figure 7-1 PLUVUE Observer Locations for Wind Direction 110 degrees 7-3
Figure 7-2 PLUVUE Observer Locations for Wind Direction 127 degrees 7-4

1.0 INTRODUCTION

This document contains the supporting information for a Prevention of Significant Deterioration (PSD) Permit Application for a new cement manufacturing line (Cement Plant #2) at the existing Florida Crushed Stone/Rinker Materials facility located in Brooksville, Hernando County, Florida. The facility ID# is 0530021.

1.1 SITE DESCRIPTION

The 6400 contiguous acres owned by FCS is presently zoned for mining. Mining has been actively pursued on the property since 1938 to provide aggregate and road base material for the construction industry of Central Florida. Associated with the limestone mining operation is a lime production plant. Both the mining activities and the production of lime are expected to continue well into this century.

In addition to the active mine, lime plant, and power plant, the FCS property also includes approximately 1050 acres devoted to a closed water re-circulation system and settling ponds. The entire property is fenced and road access is restricted by gates. The site, except for the existing mining operation, lime plant, and power plant, is industrially undeveloped. Land use in the vicinity of the site consists generally of farming, mining, and light industry interspersed with undeveloped parcels. The area is rich in raw materials for lime and cement production.

The existing facility consists of one Portland cement plant (pre-heater design) and associated equipment (Cement Plant #1), a lime manufacturing plant, and a 150 MW power plant. The facility site is located on approximately 6400 acres, owned by Rinker Materials, doing business as Florida Crushed Stone Company (FCS), approximately 3 ½ miles northwest of Brooksville. This volume contains the required analyses in support of the application. Section 2.0 discusses the air quality regulations applicable to the construction of the new cement kiln. Section 3.0 presents the air pollution emission estimates, based on the control technologies discussed in Section 4.0, while Section 4.0 contains the Best Available Control Technology (BACT) review for the applicable pollutants. Section 5.0 provides a discussion of the existing meteorology and air quality in the vicinity of the proposed facility location. Section 6.0 provides the air quality impact analyses with additional impact analyses (air quality related values) included in Section 7.0.

2.0 AIR QUALITY REGULATIONS

This section will discuss the air quality regulations promulgated and proposed by the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) applicable to the proposed facility. Section 2.1 will discuss the pertinent air quality regulations. Section 2.2 will discuss the existing air permits for the facility.

2.1 APPLICABLE REGULATIONS

The proposed addition of a second production line (Unit II project) at the Rinker facility has been reviewed for compliance with the following:

40 CFR 50	National Primary and Secondary Ambient Air Quality Standards.
40 CFR 52	Subpart K - Approval and Promulgation of Implementation Plans, Florida.
40 CFR 60	Subpart F - New Source Performance Standards (NSPS) for Portland Cement Plants.
40 CFR 60	Subpart OOO – New Source Performance Standards for Nonmetallic Mineral Processing Plants
40 CFR 63	Subpart LLL - National Emission Standards for Hazardous Air Pollutants – Portland Cement Manufacturing Industry
40 CFR 64	Enhanced Monitoring Rule (Promulgated November 21, 1997).
62-210 FAC	Stationary Sources - General Requirements.
62-212FAC	Stationary Sources - Preconstruction Review.
62-272FAC	Ambient Air Quality Standards.
62-296FAC	Stationary Source - Emission Standards.
62-297FAC	Stationary Source - Emissions Monitoring.

NOTE: CFR is the Code of Federal Regulations. FAC is the Florida Administrative Code.

2.1.1 Florida State Program Authority

The state of Florida has been delegated full authority by the USEPA to administer the State Implementation Plan (SIP). Additionally, the FDEP has accepted delegation from the USEPA to issue permits for new and modified sources, and thereby satisfy the requirements of the Federal Prevention of Significant Deterioration (PSD) regulations (40 CFR Part 52.21). USEPA's role in permitting the proposed source includes a review of assessment protocols for compliance with the SIP and guidance for policy decisions on an as-needed basis.

2.1.2 Prevention of Significant Deterioration (PSD)/Nonattainment New Source Review (NSR) Applicability

The Clean Air Act (CAA) [42 USC §§ 7404-7671] was amended in 1977 by Congress to specifically include a PSD program. In order to carry out the policies of the 1977 amendments, the USEPA adopted revised PSD regulations on June 19, 1978 and August 7, 1980. These regulations contained the PSD increments mandated by Congress and identified the types of emission sources subject to PSD regulations, as directed by the amended CAA. PSD, as its name implies, restricts air quality deterioration in areas significantly better than the ambient air quality standards (AAQS), through the use of PSD increments. In areas, which do not meet the AAQS, non-attainment NSR regulations promulgated by the State under the SIP and approved by the USEPA, apply. The project site and vicinity are designated as attainment areas for all pollutants; hence PSD review is required for all pollutant emissions, which meet the applicability requirement.

A major stationary source is defined in two main ways and includes sources belonging to a list of 28 specified categories, which have the potential to emit at least 100 tons per year (tpy), or any source regardless of type with the potential to emit at least 250 tpy of any pollutants regulated under the CAA. Rinker is classified, for PSD purposes, as a Portland cement plant, which is one of the 28 source categories, as per Section 169 of the new CAA (1990). The existing facility has the potential to emit more than 100 tpy of at least one regulated pollutant. Therefore, the facility is an existing major stationary source.

A modification to an existing major source is subject to PSD regulations if it is located in a PSD attainment area and it is a major modification. As noted above, the project is located in Hernando County, which is designated as attainment for all criteria pollutants including total suspended particulate (TSP) matter and particulate matter (PM) with a mean aerodynamic diameter less than 10 μm (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_x), carbon monoxide (CO), lead (Pb), and ozone (O_3).

A major modification is generally a physical change or a change in method of operation of a major source, which would result in a contemporaneous, significant increase in emissions of any regulated pollutant. As noted in Table 2-1, the proposed addition of a second cement kiln will result in significant increases in actual emissions for all pollutants including PSD-listed pollutants. Therefore, the proposed project is subject to the PSD requirements (PSD review requirements are given in 62-212.400 FAC and are discussed in detail in Section 2.1.6 of this

TABLE 2-1

PSD POLLUTANT APPLICABILITY

POLLUTANT	POTENTIAL INCREASE IN FACILITY EMISSIONS (tons/year)	PSD SIGNIFICANT EMISSION RATES (tons)	SUBJECT TO PSD REVIEW
PM/PM10 (including minor and fugitive sources)	255.2	25/15	YES
SO_2	117.5	40	YES
NO_x	1124	40	YES
CO	2044	100	YES
VOC	97.1	40	YES
H2SO4	5.1	7	NO
Hg	0.0751	0.1	NO
Be	0.00034	0.0004	NO
Pb	0.038	0.6	NO

report.) As noted above, the area is classified as attainment for all pollutants, thus non-attainment NSR does not apply.

2.1.3 Ambient Air Quality Standards (AAQS)

Ambient Air Quality Standards (AAQS) are air quality concentrations, which are requisite to protecting the public health and welfare. The national and Florida Ambient Air Quality Standards are described in Section 5.0. Facility compliance with the AAQS is addressed in the air quality analyses contained in Section 6.0.

2.1.4 40 CFR 60 Subpart F, New Source Performance Standard (NSPS) for Cement Kilns

The USEPA has established the New Source Performance Standards (NSPS) for Portland cement plants that has undergone little change since being proposed on August 17, 1971. The NSPS contains standard requirements for emissions monitoring, test methods, and recordkeeping. These rules are applicable to all facilities that commenced construction or modification after August 17, 1971.

Emission standards established in the NSPS pertain only to particulate matter emissions and opacity. Rules are also established for monitoring, test methods and procedures, and recordkeeping/reporting.

The particulate matter (PM) emission standard specifies emission levels for two separate flue gas streams. Flue gases exiting the Portland cement kiln cannot contain PM in excess of 0.15 Kg per metric ton of raw material feed (dry basis) to the kiln (i.e., 0.30 lbs per ton [lbs/ton]) or exhibit greater than 20% opacity. Flue gas exiting the clinker cooler portion of the cement plant cannot contain particulate matter in excess of 0.05 Kg per metric ton of raw material feed (dry basis) to the kiln (i.e., 0.10 lbs ton) or exhibit an opacity level equal to or greater than 10%. As demonstrated in Section 4.3 the proposed kiln system (Kiln #2, Pre-heater, Pre-calciner, Clinker Cooler, Air Heater, Raw Mill; 2K-06), will consistently achieve these levels with a proposed potential particulate emission limit of 0.2 lbs PM/PM_{10} per ton of kiln feed.

Compliance and Testing

The NSPS includes the requirements for a continuous opacity monitor on the exit flue gases of any kiln and/or clinker cooler. For facilities implementing particulate control (fabric filters [FF] or electrostatic precipitators [ESP]), the rules allow the monitoring of visible emission once daily by a certified visible emissions observer in lieu of a continuous opacity monitor.

Required test methods include USEPA Method 5 for PM emissions and USEPA Method 9 for opacity. Required recordkeeping and reporting consist of semi-annual reports detailing emissions exceedances or malfunction conditions.

2.1.5 40 CFR 60 Subpart OOO – New Source Performance Standards for Nonmetallic Mineral Processing Plants

The provisions of Subpart OOO apply to fixed nonmetallic mineral processing plants with the following components; each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station. An affected facility that commences construction, reconstruction, or modification after August 31, 1983 is subject to the requirements of this part. These sources cannot emit particulate matter in excess of 0.022 gr/dscf and exhibit greater than 7 percent opacity. Subpart OOO contains standard requirements for emissions monitoring, test methods, and recordkeeping. The proposed facility units will maintain compliance with this New Source Performance Standard.

2.1.6 40 CFR 63 Subpart LLL - National Emission Standards for Hazardous Air Pollutants – Portland Cement Manufacturing Industry

Promulgated June 14, 1999; the provisions of this subpart apply to each new and existing Portland cement plant, which is a major source. The affected sources subject to this subpart are:

(1) Each kiln and each in-line kiln/raw mill at any major or area source, including alkali bypasses;

(2) Each clinker cooler;

(3) Each raw mill;

(4) Each finish mill;

(5) Each raw material dryer;

(6) Each raw material, clinker, or finished product storage bin;

(7) Each conveying system transfer point including those associated with coal preparation used to convey coal from the mill to the kiln; and

(8) Each bagging and bulk loading and unloading system.

Subpart LLL contains standard requirements for emissions of PM, Total Hydrocarbons and Dioxin/Furans as well as opacity limitations, emissions monitoring, test methods, and recordkeeping. The proposed facility units will maintain compliance with this Standard, as applicable.

2.1.7 Enhanced Monitoring Rule

USEPA proposed the enhanced monitoring rule on October 22, 1993 (40 CFR 64). The rule, also known as the Compliance Assurance Monitoring (CAM) rule, was promulgated on November 21, 1997. The rule requires major sources to install enhanced monitoring in order to prove compliance with the Clean Air Act (CAA) standards. The requirements of this rule apply to a pollutant-specific emissions unit at a major source that is required to obtain a 40 CFR Part 70 or 71 permit if the unit satisfies all of the following criteria:

(1) The unit is subject to an emissions limitation or standard for the applicable regulated air pollutant (or a surrogate thereof),

(2) The unit uses a control device to achieve compliance with any such emissions limitation or standard; and

(3) The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

Rinker will comply with all CAM requirements applicable to the proposed construction.

2.1.8 Florida Air Regulations

The Florida air regulations for permits and certificates are contained in 62-210; Florida Administrative Code (FAC). Specifically, 62-210.300 FAC requires appropriate permits prior to modification "to any source which emits or can reasonably be expected to emit any air pollutant...unless exempted pursuant to department rules or statutes." Air construction permits for source modifications subject to PSD review are required as per 62-212.400 FAC. PSD review requirements for modifications per 62-212.400(S) FAC are as follows:

1. Technology Review - The proposed modification shall comply with all applicable emission limits (see Sections 2.0, 3.0, and 4.0);

2. Best Available Control Technology (BACT) - The proposed modification shall apply BACT (see Section 4.0);

3. Ambient Impact Analysis - The applicant shall demonstrate that the facility and/or modification will comply with AAQS and PSD increments (see Section 6.0);

4. Additional Impact Analyses - The applicant shall provide analyses of the impairment to visibility (primarily in Class I areas), the impacts to local soils and vegetation with significant commercial or recreational value, and minor source growth associated with the proposed facility modification (see Section 7.0);

5. Ambient Air Quality - The applicant shall analyze ambient air quality for the area affected by the facility (see Section 5.0) and the FDEP may require pre- or post-construction monitoring (see Section 6.3.3).

6. Required Permit Application Information - The applicant shall provide this information to FDEP (see permit application and other permit application forms in Appendix A).

Florida Air Regulations (62-296 FAC) contain stationary source emission standards. Specific subsections concerning Portland cement plants and associated material processing equipment include:

62-296.320 FAC	General Pollutant Emissions Limiting Standards
62-296.407 FAC	Specific Emission Limiting and Performance Standards (Portland Cement Plants)

The "General Pollutant Emission Limiting Standards" provides numerical particulate emissions limits for material processing equipment based on the amount of material processed. These would apply to the material processing equipment necessary to support the Unit II cement plant. The "Specific Emission Limiting and Performance Standards" are identical to the Federal NSPS emission limitations previously discussed.

The Rinker facility, because it contains electric generating equipment, is subject to the Florida Power Plant Siting Act (PPSA). The addition of the Unit II kiln will require a modification to the current facility Site Certification.

2.2 EXISTING PERMITS

Rinker currently maintains FDEP air permits for numerous pieces of equipment at the facility. Unit I cement kiln has a separate air permit and emission limits when operating solely. However, when the cement kiln operates in conjunction with the power plant, emissions from the cement kiln are governed under the Power Plant Site Certification. In addition to the cement kiln and the power plant, Rinker maintains air permits for various materials crushers, grinders, transport equipment, etc. and their associated control devices. Table 2-2 provides a list of the equipment currently permitted under the Title V program.

2.3 CONCLUSIONS

The proposed Unit II Project facility will invoke a range of State and Federal regulations requiring review of estimated emissions and emission control devices. Analyses that were performed to address these regulations, as well as the results of those analyses, are detailed in this report.

The facility emissions will trigger review for the PSD significant pollutants (TSP, PM_{10}, SO_2, NO_x, CO and VOC) and will not trigger PSD review for Pb, Hg, Be, and H_2SO_4 mist. Estimated emission rates, after control, are in conformance with Federal NSPS and FDEP "Specific Emissions Limiting and Performance Standards". Finally, construction of the Unit II Project will require a review and modification to the facility Site Certification under the Florida PPSA.

TABLE 2-2

EXISTING RINKER FDEP PERMIT

Title V Air Operation Permit Number 0530021-007-AV	
Emission Unit ID No. And Facility ID No.	**Brief Description**
-001/D-75	Filter Dust Bin with Baghouse
-002/D-67	Fly Ash/Equilibrium Catalyst Bin with Baghouse
-004/F-14	Raw Meal Transfer with Baghouse
-006/G-12A & B	Two Blend Silos with Baghouse
-007/H-15	Kiln Feed Surge Bin with Baghouse
-xxx/L-03	Clinker Cooler Discharge with Baghouse
-010/L-06 & L-07	Clinker Storage Silo and Finish Mill Storage Silo with Baghouse
-011/L-08	Gypsum and Limestone Bins with Baghouse
-012/M-08	Silo Discharge with Baghouse
-013/N-13	Finish Mill with Baghouse
-014/Q-17	Cement Storage Silos #1 & #2 Discharge System with Baghouse
-015/Q-15	Cement Storage Silos #1 & #2 with Baghouse
-017/D-63	Iron Ore Bin with Baghouse
-019/M-05	Finish Mill Feed Belt with Baghouse
-021/Z-17	Cement Storage Silo #3 Discharge System with Baghouse
-022/Z-15	Cement Storage Silo #3 with Baghouse
-023/	Cement Storage Silo #4 and Truck Loadout System with Baghouse
-024/Z-18	Cement Storage Silo and Railcar Loadout System with Baghouses

3.0 AIR POLLUTANT EMISSION ESTIMATES

The high temperature combustion process used to produce cement in a kiln results in the emission of air pollutants. The air pollutants that will be emitted from the proposed Unit II kiln above Prevention of Significant Deterioration (PSD) significant levels are particulate matter (PM), particulate matter with a mean aerodynamic diameter less than ten microns (PM_{10}), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO) and volatile organic compounds (VOC). Other criteria pollutants resulting from the production of cement include mercury (Hg), Beryllium (Be), lead (Pb) and sulfuric acid mist (H_2SO_4 mist). The potential to emit for these constituents are less than the PSD significant levels. Other sources of air pollutants include auto and truck traffic, and baghouse PM control devices on various material handling systems. These other sources will result in additional emissions of PM/PM_{10}, and insignificant quantities of SO_2, NO_x, CO, and VOC.

The production capacity of the proposed Unit II cement kiln is based on 2800 tpd clinker production for the daily and annual rate (the annual capacity for 365 days of operation is 1,022,000 tons clinker), and the hourly maximum production rate is 3000 tpd clinker production. Emission rates from all sources associated with the proposed Unit II kiln have been reviewed relative to New Source Performance Standards, National Emission Standards for Hazardous Pollutants, and the proposed Best Available Control Technology (BACT) requirements and meet all applicable emission limitation. Based on the emission rate calculations presented in this section, the addition of the Unit II kiln will result in emission increases of the following criteria pollutants above the PSD significant emission rates: PM/PM_{10}, SO_2, NO_x, VOC, and CO.

Section 3.1 of the permit application describes the emission controls and associated potential emission rates proposed for the Rinker Unit II cement kiln and ancillary equipment. Section 3.2 describes the sources of information used to develop criteria pollutant emission estimates.

3.1 EMISSION CONTROLS AND ASSOCIATED POTENTIAL EMISSION RATES

Control of emissions from the proposed Unit II kiln is achieved by Multi-Stage Combustion (MSC) and Selective Non Catalytic Reduction (SCNR) equipment for NO_x control, the alkaline atmosphere of the flue gases for control of acid gases, and a fabric filter baghouse system for control of PM/PM_{10} (and additional control of acid gases from the un-reacted alkaline by-products in the dust cake which coats the bags of the fabric filter).

Table 3-1 summarizes the proposed emission limits and potential emissions for the proposed Unit II. Table 3-2 summarizes the emissions associated with the minor PM/PM_{10} sources (first baghouse dust control systems, and then the fugitive PM/PM_{10} emissions). Non-criteria pollutants and their potential estimated emission rates are listed in Appendix B. Further discussion of emission controls are presented in Section 4.0, the BACT analysis.

3.1.1 Particulate Matter Emissions

Process Equipment

Particulate matter emissions from the Unit II kiln consist of combustion reaction products, cement materials, and fly ash, and will be controlled by a fabric filter baghouse. The baghouse will be designed for the anticipated flows and temperatures of the new kiln, and will control kiln PM/PM_{10} emissions to 0.2 lbs/ton dry pre-heater feed (one-hour average).

The material handling dust collection systems will be controlled with fabric filter baghouses designed to meet an emission limit of 0.01 gr/dscf. The emissions from these sources were calculated by multiplying the controlled exit grain loading level by the flow rate through the baghouses (corrected to dry standard conditions).

TABLE 3-1

SUMMARY OF CRITERIA POLLUTANT EMISSIONS

Pollutant	Emission factor lb/ton [a]	Max Hourly Emissions (lb/hr) [b]	Normal Operation Daily Emissions (in lb/hr)	Annual Emissions (tons/yr)
PM/PM$_{10}$ (kiln)	0.2	41.3	38.5	168.6
PM/PM$_{10}$ (minor)	-	-	19.3	84.5
PM/PM$_{10}$ (fugitive) [c]	-	-	0.727	2.12
PM/PM$_{10}$ (total)	-	-	-	255.2
SO_2	0.23	57.5	57.5	117.5
NOx [d]	1.95	-	227.5	1124
CO	4	1000	467	2044
VOC	0.19	23.8	22.2	97.1
H_2SO_4	0.01	1.25	1.17	5.1
Hg	1.47E-04	0.018375	0.017	0.0751
Be	6.60E-07	0.00008	0.00008	0.00034
Pb	7.50E-05	0.009375	0.009	0.038
Maximum Hourly Clinker Production Rate (tons/hr)				**125.0**
Maximum Hourly Kiln Dry Feed Rate (tons/hr)				**206.3**
Daily and Annual Clinker Production Rate (tons/day)				**2800**
Daily and Annual Kiln Dry Feed Rate (tons/day)				**4620**

[a] Kiln lb/ton factors are based on dry kiln feed for PM/PM$_{10}$ and clinker production for other pollutants.

[b] Maximum 1-hr and 24-hr SO_2 emission rate is 57.5 lb/hr and maximum 1-hour CO emission rate is 1000 lb/hr.

[c] Fugitive PM/PM$_{10}$ hourly emission rate is based on typical 16 hrs/day of trucking operations.

[d] Start-up/Shut-down and non-routine NO_x emissions are based on estimate of 4 events/month, each lasting 7 hours for a total of 28 hours per month.

TABLE 3-2

SUMMARY: MINOR SOURCES AND ASSOCIATED PARTICULATE MATTER EMISSIONS

EMISSION UNIT LEGEND NUMBER	EMISSION UNIT DESCRIPTION	EMISSION UNIT EQUIPMENT NUMBER	DUST COLLECTOR EQUIPMENT NUMBER	PROCESS RATE	GRAIN LOADING	FLOWRATE	EMISSIONS	
				(tons/hr)	(grains/acf)	(ACFM)	lbs/hr	tons/yr
	Filter Dust A	2E-22 A	2G-08	30	0.01	4,000	0.27	1.18
	Filter Dust B	2E-22 B	2G-09	30	0.01	15,000	1.04	4.55
	Raw Meal Transport	2F-04	2F-09	200	0.01	3,000	0.21	0.91
	Kiln Feed Transport	2H-05	2H-08	170	0.01	3,000	0.21	0.91
	Clinker Transport	2L-01	2L-03	104	0.01	3,000	0.19	0.83
	Gypsum Bin	2L-14	2L-08	150	0.01	4,000	0.32	1.40
	Clinker Storage Silo	2L-05	2L-06	104	0.01	4,000	0.25	1.11
	Finish Mill Collecting Belt	2M-04	2M-09	276	0.01	12,000	0.83	3.64
	Finish Mill	2N-01	2N-12	411	0.01	35,000	2.31	10.12
	Air Slide	2N-03	2N-91	411	0.01	6,000	0.40	1.77
	Bucket Elevator	2N-04	2N-91	411	0.01	6,000	0.40	1.77
	High Efficiency Separator	2N-06	2N-09	411	0.01	128,600	9.20	40.29
	Cement Cooler	2N-26	2N-91	137	0.01	6,000	0.40	1.77
	Cement Transport A	2P-01	2Q-10	137	0.01	3,700	0.26	1.12
	Cement Transport B	2P-01	2Q-13	137	0.01	12,000	0.83	3.64
	Cement Loadout Bin	2Q-28	2Q-15	540	0.01	3,000	0.21	0.91
	Cement Loadout Bin	2Q-31	2Q-16	540	0.01	3,000	0.21	0.91
	Coal Mill	2S-15	2S-16	18	0.01	22,000	1.60	7.01
	Pulverized Fuel Bin	2S-20	2S-21	18	0.01	2,000	0.15	0.64
	Totals						**19.29**	**84.48**

TABLE 3-2 (continued)

Fugitive PM10 Emissions From Truck And Auto Traffic

Paved Roads emission factor from AP-42, Section 13.2.1: *Paved Roads* (12/03), Equation (1) - corrected to account for annual precipitation using Eq

E (emission lb /vehicle mile traveled) = [k(sL/2)^0.65 (W/3)^1.5 -C] (1-P/4N)

where:

k = 0.016 [particle size multiplier, Table 13.2.1-1, for PM_{10}]

sL = 0.4 [silt loading (g/m2) for low ADT street from AP42 table 13.2.1-2]

Mitigative Silt Control Effeciency = 79% Street Sweeping and water flushing based on Table 2-4 from EPA's Control of Open Fugitive

estimated Controlled sL = 0.086 controlled silt loading (g/m2)

W= 21.7 tons Average Weight of trucks - 26.75 tons @ 171 trips, car = 1.5 tons @ 91 trips

C = 0.00047 [factor exhaust, brake and tire wear, Table 13.2.1-2, for PM10 and PM]

P = 115 [number of days with >0.01 inches precip. per year, from AP-42 Figure 13.2.1-2]

N = 365 [number of days in averaging period]

Controlled Emission Factor (lb/VMT) E = 0.037 PM10

Vehicle Activity Levels:

Auto trips/day:	40	Truck trips/day:	159
Auto round trip (mi):	2	Truck round trip (mi):	2
Auto VMT/day:	80	Truck VMT/day:	239
Auto VMT/yr:	29200	Truck VMT/yr:	87053

Source Name	VMT/day	VMT/yr	Daily PM10 Emissions (lb PM10/day)	Annual PM10 Emissions (tpy)
Paved access road	319	116253	11.6	2.1

Based on typical 16 hours per day of trucking operations, the lb/ 0.73

Above based on 2800 tpd clinker production

Fugitive PM/PM10 Emissions

The proposed addition of the Unit II cement kiln will increase vehicular traffic, primarily cement haul trucks, and the associated fugitive PM/PM10 emissions from re-suspended road dust. The fugitive PM/PM10 emission calculations from are presented in Table 3-2.

3.1.2 NOx Emissions

Normal Operating Conditions

The Unit II kiln vendor has committed to attaining a controlled NOx emission of 1.95 lb/ton of clinker (30-day average) for normal operations following the completion of a site-specific performance optimization program of the MSC/SNCR equipment. The annual NOx emissions are based on this proposed BACT emission limit and the annual production capacity of 1,022,000 tons of clinker (NOx emissions from start-up and non-routine operations have also been calculated and added to these normal operation emissions, as described below).

Start-up and Non-routine (Malfunction) Operating Conditions

Start-up and non-routine (malfunction) conditions can be characterized as follows:

Kiln Start-up - Start-up conditions result in unstable and in-efficient operation, during which time the production is gradually increased to the nominal level. During a start-up, heat cannot be recovered by the Clinker Cooler as Secondary or Tertiary air. Therefore, the amount of fuel consumed is higher then during normal operations. The system flow rates do not exceed the normal flow rates under stable operation; however, the temperature at the exit of the pre-heater tower at this time is elevated and could reach 450 deg C. As a consequence, these conditions will increase the transient emission level of NOx to approximately 8 lb/ton.

6 per app NOx

Loss of Feed – During normal operating conditions, it is expected that an air flow rate of 1.6 Nm^3/kg clinker is being processed within the kiln and pre-heater tower. When the kiln is starved of feed, the production rate falls to zero and the corresponding specific airflow grows towards infinity. During this time, the actual airflow through the system does not change, but the temperature rises to 450° C and the NOx emission rates moves towards 8 lb/ton. This is partly

6 per app NOx

due to the lack of raw feed that "consumes" the heat energy and the fact that the operator will intentionally keep the kiln and pre-heater "hot" such that when feed is restored, the process will be ready to accept the feed again.

Kiln Inlet Buildup – This phenomenon occurs as a normal course of pre-heater tower operations and is particularly prevalent during start-up conditions. This is primarily due to the instability of the system during this period where a coating is formed at the base of the riser duct, in the area of the venturi. In general, the pressure drop in that area increases, due to the restriction, capacity of the system goes down, and hence, the specific volume of air through the system goes up from 1.6 Nm^3/kg to 2.0+Nm^3/kg. In addition, the oxygen content goes from 4% to 6-8%. Consequently, the NO_x emissions will increase to approximately 5 – 7 lb/ton.

Kiln Flush/Avalanche - These events are characterized by a large quantity of raw feed surging through the system so quickly and in such a large mass that the available system heat cannot process the meal, and as such, it flows unprocessed (unburned and with a high free CaO content) through the kiln to the cooler. This situation occurs either due to a feed system malfunction or because material that has settled onto the ledges of the system, breaks free and generally occurs gradually during prolonged operation at low pre-heater feed rates. A kiln flush is usually quick and dramatic and may extinguish the main burner flame. It can generate a tremendous pressure spike in the system and generally "cools" the entire pre-heater and kiln so that a system re-start/re-heat is required. NO_x emission rates may go as high as 8 lb/ton.

The additional NO_x emissions during start-up and non-routine operations were conservatively calculated and added to the PTE for normal operations. The additional emissions are based on 4 events/month, each lasting 7 hours for a total of 28 hours per month of start-up and/or non-routine operations. A conservative estimate of the maximum NO_x emissions during these transient events is 8 lbs/ton clinker. Given the proposed NO_x BACT emission limit of 1.95 lbs/ton clinker, the "delta" NO_x emission rate for start-up and non-routine operation above the normal BACT limit is approximately 6 lbs/ton clinker. Given a conservative kiln production rate of 125 tons per hour during start-up and non-routine events, the additional annual NO_x emissions from Unit II that are associated with start-up and non routine operations are calculated as:

6.05 lbs NO_x/ton clinker * 125 ton-clinker/hr * 28 hours/month * 12 months/year ÷ 2000lbs/ton = 127 tons NO_x per year.

3.1.3 SO_2 Emissions

The approximate composition of typical raw feed to Unit II will be 50% "high rock" (marly limestone), 39% waste fines (marlaceous lime with high silica content), 10% conditioned fly ash, and the remainder iron mill scale. The raw feed mill grinds moist feed to the desired particle size, and dries the ground feed via direct contact with flue gases. The mill is, therefore, an effective mass transfer device that promotes absorption of SO_2 by limestone in the feed. In addition, there is additional control of acid gases from the un-reacted alkaline by-products in the dust cake which coats the bags of the fabric filter. The Unit II SO_2 annual emissions are based on the proposed BACT SO_2 emission limit of 0.23 lbs SO_2/ton (30-day average) and unlimited operation.

During Unit II start-up and non-routine (malfunction) conditions, it is possible that short-term SO_2 emissions may increase due to process variabilities. Therefore, a maximum 1-hour SO_2 emission rate of 57.5 lb/hr (based on 0.46 lbs SO_2/ton clinker) is proposed.

3.1.4 CO Emissions

Good combustion practice is proposed as BACT for Unit II, with a CO emission limit of 4.0 lbs CO/ton of clinker produced (30-day average).

During Unit II start-up and non-routine (malfunction) conditions, it is possible that short-term CO emissions may increase due to process variabilities. Therefore, a maximum 1-hour CO emission rate of 1000 lb/hr (based on 8 lbs CO/ton of clinker) is proposed.

3.1.5 VOC Emissions

Good combustion practice is proposed as BACT for Unit II, with a VOC emission limit of 0.19 lbs VOC/ton of clinker produced (30-day average).

3.1.6 Lead, Mercury, Beryllium, and Sulfuric Acid Mist Emissions

Emissions of lead (Pb), mercury (Hg), beryllium (Be), and sulfuric acid mist (H_2SO_4) from cement plants result from the oxidation of these materials in the fuel and raw feed materials. EPA's AP-42 Section 11.6 provides emission factors for Pb and Be from cement production facilities utilizing similar technology and burning similar fuel. These values are 7.5E-5 pounds per ton clinker for Pb and 6.6E10-7 pounds per ton clinker for Be, and were used to calculate emissions of these pollutants.

The mercury and H_2SO_4 mist emission factors were based on current stack test data from similar kilns operating in Florida[1], with an added compliance margin. The emission factors are 1.47E-04 pounds per ton clinker for mercury and 0.01 pounds per ton clinker for H_2SO_4 mist.

The calculated Unit II emissions for these PSD pollutants are presented in Table 3-1. The emissions of these pollutants are less than the PSD significant emission increase, and are therefore not subject to PSD review.

3.2 INFORMATION SOURCES

Emissions and operational information reviewed during the emission factor development include:

1) The RACT/BACT/LAER Clearinghouse (RBLC);

2) EPA's AP-42 Emission factor Document;

3) Recent permit actions;

---

[1] Conversation between Mike Vardeman of Rinker and John Koogler of Koogler Assoc, 12/14/04, and email from John Koogler to Andrea Adams of RTP on 12/15/04.

4) Recent stack tests for similar cement kilns;

5) Correspondence with the Florida Department of Environmental Protection and other state agencies; and

6) Correspondence with other cement manufacturers.

4.0 CONTROL TECHNOLOGY REVIEW

Operation of the Unit II cement kiln will result in the emission of a number of pollutants. Pollutants emitted above Prevention of Significant Deterioration (PSD) threshold levels must be considered for BACT review. In the case of Unit II, six pollutants are projected to be emitted above threshold levels. These are sulfur dioxide (SO_2), particulate matter (PM), particulate matter smaller than ten microns (PM_{10}), carbon monoxide (CO), volatile organic compounds/ozone (VOC/O^3), and nitrogen oxides (NO_x). Thus, these must be addressed in the BACT review.

4.1 PROCESS DESCRIPTION

The Rinker Unit II kiln will incorporate a dry process pre-heater/pre-calciner system. Pre-heater/pre-calciner kiln designs have been shown to be the most fuel-efficient systems per unit of cement clinker produced, typically resulting in lower pollutant emissions per unit of production. The pre-heater/pre-calciner kiln system utilizes a second burner to carry out calcination in a separate vessel situated between the pre-heater sections and the kiln. The pre-calciner utilizes pre-heated combustion air drawn from the clinker cooler and kiln exit gases and burns up to 40 percent or more of the total kiln thermal energy requirement. Coal, petroleum coke and natural gas supplemented with tires and/or tire-derived fuel for normal operations and natural gas, fuel oil, and on-specification used oil for start-up operations will be used in the kiln and pre-calciner.

fuel seg

The raw material feed is calcined almost 95% in the calciner, and the gases continue their upward (countercurrent to the raw material flow) movement through successive cyclone pre-heater stages in the same manner as in an ordinary pre-heater system. The addition of the pre-calciner allows the use of a smaller kiln since the more efficient heat transfer reduces the time necessary to form clinker in the rotary kiln. Both the kiln and the pre-calciner will utilize indirect-fired burners, which will further improve thermal efficiency and reduce the amount of fuel combusted per ton of clinker produced. Design parameters to reduce fuel combusted per ton of clinker produced have the secondary benefit of reducing the amount of pollutants generated per ton of clinker produced. Combustion gases from the rotary kiln, pre-calciner, and pre-heaters will exhaust to a new baghouse prior to entering the main Unit II stack.

4.2 RECENT BACT AND "NON-BACT" ESTABLISHED PERMIT LIMITS

Table 4-1 presents a list of 48 cement production facilities identified as currently undergoing, or having recently undergone permitting changes to their operations. In most cases, older facilities are being decommissioned or updated by adding calciners, and creditable emissions from the old facilities in conjunction with lower emission rates are being used to "net-out" the new construction from New Source Review. Thus, many sources of information were consulted to compile this list, including:

1) The RACT/BACT/LAER Clearinghouse (RBLC);
2) Trade organizations and publications;
3) Recent permit actions;
4) Technical research papers and publications;
5) Correspondence with the Florida Department of Environmental Protection and other state agencies; and
6) Correspondence with cement manufacturers.

Where available, actual facility permits were obtained to verify permit emission limits. This BACT update incorporates information received to date in response to these requests.

Table 4-2 provides a comparison of the range of permitted emission limits for the facilities listed in Table 4-1 with those currently proposed for the Rinker Unit II kiln. The bulk of the facilities have emissions information given in lbs/ton Clinker (CL) or provide sufficient information to calculate emission estimates in these "normalized" units. However, PM/PM_{10} emission rates are typically given in pounds per ton dry kiln feed (lbs/ton KF). Thus, both are listed, but lb/ton KF are listed only for PM/PM_{10}. Upon review of the emission rates, Rinker's proposed values are at the low end of each range.

TA[illegible]E 4-1
SUMMARY OF RECENT PORTLAND CEMENT FACILITY AIR PERMITS USED IN BACT REVIEW

PM_{10}

Company Name & Location	Permit Date	Source Operation	PM Limit .2	NO_x Limit 1.95	SO_2 Limit .23	CO Limit 3.6	VOC Limit .12	Control Device	Comments
Rinker Unit II [Brooksville, FL]	Application: 12/2004	116.7 tph CL	0.2 lb/ton KF	1.95 lb/ ton CL	0.23 lb/ ton CL	4.00 lb/ ton CL	0.19 lb/ ton CL	SNCR, Bag, PC	
Blue Circle [Calera, AL]	10/25/2000	48 tph CL	0.30 lb/ ton CL	6.00 lb/ ton CL	10.00 lb/ ton CL	0.21 lb/ ton CL	0.027 lb/ ton CL	Bag	Title V Permit Rates for Kiln 3 and Kiln 4
CEMEX, Inc. [Demopolis, AL]	9/13/2002	230 tph	NLE	NLE	0.7 lb/ton CL	3.15 lb/ton CL	0.59 lb/ton CL		Permit #: 105-0002-Z004
Arizona Portland Cement [Rillito, AZ]	08/07/1998	2,300,000 tpy CL	0.30 lb/ ton KF [1]	4.473 lb/ ton CL	6.00 lb/ ton KF	4.408 lb/ ton CL	NLE	Bag	Significant Revision #: 1000547
Phoenix Cement Co. [Clarkdale, AZ]	08/28/2000	185,610 tpy KF First Year	0.30 lb/ ton KF	1.91 lb/ ton KF [2]	0.31 lb/ ton KF [2]	0.256 lb/ ton KF [2]	NLE	Bag	Significant Revision #: 1001001
California Portland Cement [Mojave, CA]	12/31/2000	106.3 tph KF [3]	0.30 lb/ ton KF	8.043 lb/ ton KF	5.795 lb/ ton KF	1.726 lb/ ton KF	0.173 lb/ ton KF	Bag	Permit to Operate #: 1003026M
Calavaras Cement Co. [Tehachapi, CA]	10/31/2000	59.67 tph KF [3]	0.30 lb/ ton KF	4.72 lb/ ton KF	4.95 lb/ ton KF	15.08 lb/ ton KF	0.76 lb/ ton KF	Bag	Permit to Operate #: 1147017D
National Cement Co. [Lebec, CA]	10/31/2000 *05/01/2001	3,400 tpd CL	0.30 lb/ton KF	3.4 lb/ton CL	0.380 lb/ton CL	8.47 lb/ton CL	0.071 lb/ton CL	Bag	Permit to Operate #: 1128004 Note: Max Emissions based on 30 day average
RMC Pacific-Davenport [Santa Cruz, CA]	07/06/2000 *10/11/2004	200 tph KF	0.30 lb/ ton KF	2.5 lb/ ton CL[4]	1.28 lb/ton KF	NLE	NLE		Permit to Operate #: 10171
Southdown (CEMEX) [Victorville, CA]	07/26/2000	208.3 tph CL	0.14 lb/ ton CL	2.80 lb/ ton CL	0.35 lb/ ton CL	NLE [5]	0.12 lb/ ton CL	Bag	Authority to Construct Construction Not Complete
TXI Riverside Cement [Oro Grande, CA]	08/05/1999 *06/03/2004	6,000 tpd CL	0.106 lb/ ton CL	2.45 lb/ ton CL	0.13 lb/ ton CL	1.5 lb/ ton CL	0.06 lb/ ton CL	Bag DS	ATC B007435 (Construction not Commenced)
Holnam Inc. [Florence, CO]	08/16/2000 *06/25/2001	1,873,898 tpy CL	0.30 lb/ ton KF	3.372 lb/ ton CL	1.13 lb/ ton CL	4.64 lb/ ton CL	0.21 lb/ ton CL	WS PC	Permit #: 98FR0895 Facility has SO_2 Scrubber
Rio Grande Cement [Pueblo, CO]	09/25/2000 *	2,890 tpd CL	0.105 lb/ ton CL	2.32 lb/ ton CL	1.99 lb/ ton CL	2.110 lb/ ton CL	NLE	Bag PC	Permit: 98PB0893 Startup/ Compliance in 2003 *Initial Approval of Mod. 3
CSR – Rinker [Miami, FL]	3/1/2002	137 tph CL	0.20 lb/ ton CL	4.9 lb/ ton CL	2.23 lb/ ton CL	3.01 lb/ ton CL	0.120 lb/ ton CL		Permit #: 0250014-008-AC
Florida Rock Ind. [Brooksville, FL]	06/12/2000	2,300 tpd CL	0.221 lb/ ton CL	2.799 lb/ ton CL	0.170 lb/ ton CL	3.600 lb/ ton CL	0.120 lb/ ton CL	ESP	Data from June 12, 2000 Application
Florida Rock Ind. [Newberry, FL]	01/26/2001 *12/2002	tph CL	0.23 lb/ ton CL	2.45 lb/ ton CL [7]	0.16 lb/ ton CL	2.45 lb/ ton CL	0.11 lb/ ton CL	ESP	Permit #: 0010087-009-AV * NO_x reduced at request of Florida Rock
Florida Rock Ind. [Newberry, FL]	*11/08/2004	125 tph CL	0.23 lb/ton KF	2.0 lb/ton CL (30 day avg)	0.28 lb/ton CL (30 day avg)	3.6 lb/ton CL (30 day avg)	0.12 lb/ ton CL (30 day avg)	SNCR, ESP, PC	Based on November 8, 2004 permit application
Southdown (CEMEX) [Brooksville, FL]	09/2000 Final Title V	90 tph CL	0.330 lb/ ton CL	3.344 lb/ ton CL	0.183 lb/ ton CL	2.200 lb/ ton CL	0.165 lb/ ton CL	Bag	Permit #: 0530010-002-AV

TA E 4-1
SUMMARY OF RECENT PORTLAND CEMENT FACILITY AIR PERMITS USED IN BACT REVIEW

Company Name & Location	Permit Date	Source Operation	PM Limit	NO_x Limit	SO_2 Limit	CO Limit	VOC Limit	Control Device	Comments
Suwannee American [Branford, FL]	06/01/2000	105 tph CL	0.220 lb/ ton CL	2.9 lb/ ton CL	0.27 lb/ ton CL	3.6 lb/ ton CL	0.12 lb/ ton CL	Bag	
Tarmac American Pennsuco [Medley, FL]	05/01/2001 *03/2004	208 tph CL	0.2404 lb/ ton CL	3.460 lb/ ton CL	1.540 lb/ ton CL	2.760 lb/ ton CL	0.190 lb/ ton CL	Bag	Permit #: 0250020-010-AC
Lafarge Corporation [Buffalo, IA]	07/01/2002	3488 tpd CL	0.516 lb/ton CL	4 lb/ton CL	7.6 lb/ton CL	4.5 lb/ton CL	NLE	Bag	Project #: 00-057
Lehigh Cement [Mason City, IA]	12/11/2003	150 tph CL	0.516 lb/ton CL	2.85 lb/ton CL	1.01 lb/ton CL	3.7 lb/ton CL	NLE	SNCR, ESP, WS	30-day averages for NO_x, SO_2; not including SSM
Illinois Cement Co. [LaSalle, IL]	10/07/1998	125 tph CL	0.208 lb/ ton CL	4.500 lb/ ton CL	0.800 lb/ ton CL	10.6 lb/ ton CL	0.32 lb/ ton CL	Bag	PSD Permit #: 97030016 No Limit on CO and VOC
Lone Star Industries, Inc. [Green Castle, IN]	04/16/1999 01/08/2001	183 tph CL	0.485 lb/ton CL	5.47 lb/ton CL	4.13 lb/ton CL	3.65 lb/ton CL	NLE		Modification from Wet Kiln to Semi-Dry Kiln
Ash Grove Cement [Chanute, KS]	08/26/1999	194 tph CL	0.693 lb/ ton CL	3.091 lb/ ton CL	1.222 lb/ ton CL	1.661 lb/ ton CL	NLE	Bag PC	Note: VOC not a permit limit.
Monarch Cement [Humboldt, KS]	01/27/2000	129 tph CL	0.707 lb/ ton CL	4.200 lb/ ton CL	1.099 lb/ ton CL	3.700 lb/ ton CL	0.12 lb/ ton CL	Bag PC	Note: VOC not a permit limit.
Kosmos Cement Co. [Louisville, KY]	04/18/2001	125 tph CL	0.298 lb/ ton CL	6.6 lb/ton CL	1.32 lb/ ton CL	3.6 lb/ ton CL	NLE	Bag	Title V Permit #: 156-97-TV
Lehigh Portland Cement [Union Bridge, MD]	06/08/2000	2,214,000 tpy CL	0.56 lb/ ton CL	4.4 lb/ ton CL	0.94 lb/ ton CL	3.0 lb/ton CL	NLE	Bag	Permit #: 06-6-0356R
Holcim (US), Inc. [Dundee Township, MI]	04/27/2004	2,237,596 tpy CL	0.3 lb/ton KF	3.02 lb/ton CL	10.7 lb/ton CL	3.15 lb/ton CL	6.46 lb/ton CL	Bag, DS	Permit #:MI-ROP-B1743-2004 (60-71O)
Continental Cement Co. [Ralls County, MO]	9/24/2002	183 tph	99% reduction	8.0 lb/ton CL (30-day avg)	10 lb/ton CL (24-hr avg)	10 lb/ton CL (8-hr avg)	NLE	SNCR, Bag, WS	Voluntary controls to avoid PSD.
Holcim (US), Inc. Lee Island Project [Ste. Genevieve, MO]	06/08/2004	4,828,074 tpy CL	0.28 lb/ ton CL	2.4 lb/ton CL after SNCR (12 mo avg)	1.26 lb/ ton CL (30 day avg)	6.0 lb/ton CL (30 day avg)	0.33 lb/ton CL (30 day avg)	SNCR, Bag DS/PC	Innovative Control Technology for SNCR, install no later than 2 years after kiln start-up; 3.0 lb/ton CL for 1st 2 years
LaFarge Corp. [8] [Sugar Creek, MO]	08/05/1997 *11/19/2001	2,818 tpd CL	0.164 lb/ ton CL	3.68 lb/ ton CL	4.066 lb/ ton CL	1.637 lb/ ton CL	NLE	Bag	Permit #: 0897-019
St. Lawrence Cement [Greenport, NY]	04/30/2001 Draft Permit	Nominal 2.6 million tpy CL	0.30 lb/ ton KF	3.6 lb/ ton CL [9]	0.743 lb/ ton CL	NLE	NLE	Bag	Permit ID: 4-1040-0001/00049
Ash Grove Cement [Durkee, OR]	02/26/2001	940,000 tpy CL	0.39 lb/ ton CL	3.709 lb/ ton CL	0.11 lb/ ton CL	2.675 lb/ ton CL	0.051 lb/ ton CL	Bag	Title V Permit #: 01-0029 8/18-20/1998 Test Showed VOC Exceedance

Company Name & Location	Permit Date	Source Operation	PM Limit	NO_x Limit	SO_2 Limit	CO Limit	VOC Limit	Control Device	Comments
Puerto Rican Cement Co. [Ponce. PR]	02/25/1997	4,100 tpd CL	NLE	NLE	NLE	1.74 lb/ ton CL	0.12 lb/ ton CL	PC	Wet to Dry Kiln Modification
Holnam Inc. [Holly Hill, SC]	10/13/2000	2,462,318 tpy CL	0.94 lb/ ton CL	4.48 lb/ ton CL	3.26 lb/ ton CL	8.00 lb/ ton CL	0.27 lb/ ton CL	Bag PC	Construction Permits: 1860-0005-CO through CU
GCC Dacotah [Rapid City, SD]	4/10/2003	2250 tpd CL	0.01 gr/dscf	5.5 lb/ton CL	6.7 lb/ton CL	3.45 lb/ton CL	NLE	Bag	Permit #: 28.1101-PSD
Signal Mountain Cement [Chattanooga, TN]	05/15/1999 *05/15/2004	89.5 tph CL	0.1542 lb/ ton CL	4.503 lb/ ton CL	1.00 lb/ ton CL	2.77 lb/ ton CL	0.120 lb/ ton CL	Bag PC	Part 70 Permit #: 47-065-3070
Alamo Cement [San Antonio, TX]	6/29/2001	124 tph CL	0.26 lb/ton CL	5.32 lb/ton CL	0.16 lb/ton CL	3.71 lb/ton CL	0.12 lb/ton CL	ESP	Permit #: PSD-TX-145 M1
Holnam, Inc. [Midlothian, TX]	06/2000	145.83 tph CL	0.21 lb/ ton CL	1.21 lb/ ton CL	2.77 lb/ ton CL	2.04 lb/ ton CL [10]	0.695 lb/ ton CL	SC	Facility Has SO_2 Scrubber Short-Term/Long-Term Limits Stack Test High on NO_x&THC
North Texas Cement [Whitewright, TX]	07/12/2000	129.17 tph CL	0.932 lb/ ton CL	2.802 lb/ ton CL	2.787 lb/ ton CL	5.700 lb/ ton CL	1.782 lb/ ton CL	SC	Permit #: 37177/PSD-TX-893 Hourly Value Significantly Higher
TXI Operations LP [Midlothian, TX]	Title V Not Final Yet [11]	2,200,000 tpy CL	0.262 lb/ ton CL	2.477 lb/ ton CL	1.208 lb/ ton CL	0.336 lb/ ton CL	0.023 lb/ ton CL	OX	Kiln 5
Ash Grove Cement Co. [Leamington, UT]	01/05/2000 Final Title V	170 tph KF	0.30 lb/ ton KF	2.353 lb/ ton KF	NLE	NLE	NLE	Bag	Title V Permit #: 2300015001
Holnam, Inc. [Morgan, UT]	05/02/2001 *11/12/2003	2,310 tpd CL	0.160 lb/ ton CL	5.369 lb/ ton CL	1.257 lb/ ton CL	5.006 lb/ ton CL	NLE	Bag	Approval Order Project Code #: N0007-005
Roanoke Cement [Cloverdale, VA]	01/23/2001	183 tph CL	0.458 lb/ ton CL	4.385 lb/ ton CL	4.776 lb/ ton CL	1.994 lb/ ton CL	0.758 lb/ ton CL	ESP	
Roanoke Cement [Troutville, VA]	12/01/2003	184 tph CL	0.4805 lb/ton CL	6.62 lb/ton CL	6.4 lb/ton CL	4.043 lb/ton CL	0.85 lb/ton CL	ESP, PC	Permit #: VA-20232
Ash Grove Cement Co. [Seattle, WA]	10/5/2001	92 tph CL	0.123 lb/ ton CL	4.923 lb/ ton CL	0.469 lb/ ton CL	6.275 lb/ ton CL	NLE	Bag DS	Permit #: PSD-90-03, Amendment 3
Mountain Cement [Laramie, WY]	06/02/1998 03/23/2000	Kiln 1 = 29 tph CL	0.469 lb/ ton CL	7.20 lb/ ton CL	3.448 lb/ ton CL	4.0 lb/ ton CL	0.252 lb/ ton CL	Bag	Title V Permit Amended 03/23/2000
Mountain Cement [Laramie, WY]	06/02/1998 03/23/2000	Kiln 2 = 62.5 tph CL	0.469 lb/ ton CL	7.20 lb/ ton CL	1.60 lb/ ton CL	4.0 lb/ ton CL	0.248 lb/ ton CL	Bag	Title V Permit Amended 03/23/2000

Legend:	
CL = Clinker	Bag = Baghouse
KF = Kiln Feed	SC = Scrubber
tpy = tons per year	WS = Wet Scrubber
tpd = tons per day	DS = Dry Scrubber
tph = tons per hour	PC = Emissions controlled by process controls such as good combustion practices
NLE = No Emission Limit Established in Permit	ESP = Electrostatic Precipitator
* Revised Permit date; placed below original permit date	OX = Combustion Controls (Thermal Oxidizer) to reduce emissions

Footnotes:

[1] Arizona Portland Cement particulate emissions are 0.3 lb/ton KF for Kiln 4 and 0.3 lb/ton KF for Kilns 1, 2, and 3.

[2] Phoenix Cement Company [Clarkdale, AZ] NO_x, SO_2, and CO values are calculated using a 30-day rolling average. Phoenix Cement recently submitted an application to increase CO emissions to 2.0 lbs/ton CL (8-hour average).

[3] Process Rate for California Portland Cement [Mojave, CA] and Calavaras Cement Co. [Tehachapi, CA] derived from NESHAP PM limit of 0.30 lb/ ton KF.

[4] RMC Pacific Materials (Santa Cruz) [Davenport, CA] facility permit to operate (10171) lists NO_x limits of 250 lb/24-hour avg. and 350 lb/2-hour avg. No permit limit on clinker production exists for this facility. These emission levels equate to 2.5 lb NO_x/ton CL (Contact Record Between Marc Lewis of RTP and Teresa Heron of Florida Department of Environmental Protection (October 10, 1995)).

[5] The Southdown (CEMEX) [Victorville, CA] facility 'netted-out' for Carbon Monoxide (CO). No permit limit has been established for CO on a lb/ton CL basis.

[6] Florida Rock Industries [Brooksville, FL] data is from the June 12, 2000 application. Application has been withdrawn from Florida DEP Review.

[7] Florida Rock Industries [Newberry, FL] has a NO_x limit is 3.8 lb/ton CL for first two years, then the NO_x limit is 2.8 lb/ton CL on a 30-day rolling average.

[8] LaFarge Corporation [Sugar Creek, MO] has a NO_x limit of 1,894.8 tons in any consecutive 12-month period and a CO limit of 742 tons in any consecutive 12-month period.

[9] The draft New York State Department of Environmental Conservation air permit for the St. Lawrence Cement [Greenport, NY] facility establishes a three-year time frame to allow the facility to achieve 2.8 lb NO_x /ton CL with an initial limit of 3.6 lb NO_x/ton CL. The emissions limits are averaged over a 12-month rolling average. This is a LAER determination and the facility will incorporate SNCR. Recent information indicates that the limits established in the draft permit are being contested.

[10] Holnam, Inc. [Midlothian, TX] has applied to increase the NO_x emission level to 2.8 lb NO_x/ton CL (annual average) and the CO emissions to 13.30 lb CO/ton CL (1-hour average) and 5.57 lb/ton CL (annual average).

[11] TXI Operations LP [Midlothian, TX] values from Special Conditions to Permit 1360A, dated January 11, 2001.

TABLE 4-2

COMPARISON OF RANGE OF FACILITY PERMITTED EMISSION LEVELS WITH THOSE FOR THE RINKER UNIT II KILN

(lb/ton CL or lb/ton KF)

POLLUTANT	RINKER EMISSION LEVELS		OTHER FACILITIES EMISSION LEVELS	
	lb/ton CL	**lb/ton KF**	**lb/ton CL**	**lb/ton KF**
PM	--	0.2	--	0.23 - 0.30(11)[1]
NO_x	1.95	--	1.21 - 7.20	--
SO_2	0.23	--	0.11 - 10.7	--
CO	4.0 3.6	--	0.21 - 10.6	--
VOC	0.19 .12	--	0.023 - 1.782	--

[1] The number in parentheses () indicates the number of facilities for which the range encompasses (i.e., number of facilities with emissions in a lbs/ton KF format).

lbs/ton CL = pounds per ton of clinker
lbs/ton KF = pounds per ton of dry kiln feed

NOTE: The averaging times for the above emissions ranges vary by specific facility.

The emission limits established for these facilities are reflective of the individuality of the specific projects. This individuality can be explained in part by some facilities having existing cement kilns to "net-out" of NSR and not being subject to BACT or Lowest Achievable Emission Rate (LAER) provisions for certain pollutants. To assist in "netting-out," some facilities have established emission levels below what was considered BACT at that time. This is the case with the Rinker Miami, Tarmac American Pennsuco, TXI Midlothian and Holnam Midlothian facilities. Also, variations in cement raw materials can have a significant impact on resultant emissions. Differences in available fuels and cement raw materials (including moisture and mineral content) must be considered in establishing realistic permit limits and compliance averaging times that provide allowance for the variability in cement kiln operation, which ultimately results in variability in emissions.

A number of recently permitted facilities have gone to great lengths to "net out" or avoid PSD review for facility upgrades, including installation of wet acid gas (SO_2) scrubbers and regenerative thermal oxidizers (RTOs) to reduce emissions of carbon monoxide (CO) and volatile organic compounds (VOCs). The cost implications for these tail gas controls are substantial. Also of consideration is that combustion conditions that reduce NO_x typically result in higher CO emissions. Modifying combustion in this fashion can negatively impact product (cement) quality, as well as increase combustion variability and frequency of system upset. In addition, these tail gas controls burn fossil fuels that result in additional emissions of pollutants. Given the individuality of the specific projects to date, it will be necessary, to the extent possible, to discuss facilities with lower rates to judge the merits of the proposed or current emissions limitations and pollutant controls employed in comparison to the currently permitted emission limits for the Rinker Unit II kiln.

4.3 BACT FOR PARTICULATE MATTER (PM AND PM_{10}) EMISSIONS

From a "top down" BACT perspective, particulate matter can be controlled in a number of ways. It is generally accepted that the "top" particulate control options (those with highest control efficiencies) are either electrostatic precipitators (ESPs) or fabric filter (FF) baghouses, both of which are considered to provide equivalent control. The issue of enhanced bag fabrics has been extensively evaluated by several industries. The municipal waste combustor industry has tried full scale tests with a variety of materials including Gortex, Teflon-coated fiberglass, and others. Although the different materials exhibit different operational characteristics (i.e., varying replacement schedules, pressure drops, etc.) testing has shown that there is not a significant difference in particulate removal efficiency.[1]

Rinker has chosen to install a FF on the Unit II stack, which is the "top" control option. The planned particulate control equipment will be designed, built, and operated to reduce facility particulate emissions to levels that are equivalent to 0.01 gr/dscf in order to maintain continuous (one-hour average) compliance with the proposed Rinker Unit II permitted limit. Also, other point sources of PM at the facility will be controlled with baghouses designed to meet 0.01 gr/dscf. Baghouse specifications (i.e., manufacturer, model numbers, and design specifications) can only be provided when design is completed.

PM → .01

PM_{10} → .007

Table 4-2 provides a summary of the range of permitted particulate emissions compared to those for the Rinker Unit II kiln. The range of PM emission rates is 0.23 lb/ton KF - 0.30 lb/ton KF. The proposed Rinker particulate emission rate (0.20 lb/ton KF) is lower than those listed. One facility, Ash Grove Cement in Leamington, UT, is listed in EPA's RBLC Clearinghouse with a permitted particulate emission rate of 0.138 lb/ton KF. This entry is outdated and a request to update it has been submitted by the Agency. Ash Grove increased the PM rate and the current rate permitted is 0.30 lb/ton KF.

Fugitive sources of PM at the plant associated with the Unit II project include material storage piles and increased road traffic. The material storage piles are under an enclosure to minimize emissions due to wind erosion. Also, the materials handled are high moisture content, which also reduces emissions. Roads will be paved, and street sweeping and water flushing will be employed to further minimize emissions. Therefore, the proposed particulate control technologies and emission limits are determined to be BACT.

---

[1] Telecon between D. Elias of RTP Environmental and Leon Brasowski of Covanta, 12/10/04.

4.4 BACT FOR SULFUR DIOXIDE EMISSIONS

Table 4-2 provides a summary of the range of permitted SO_2 emissions reviewed in comparison to those for the Rinker Unit II kiln. The range of emission rates is 0.11 to 10.7 lb/ton CL. Only six facilities listed a lower SO_2 permit limit than the proposed Rinker value (0.23 lb/ton CL). The TXI Riverside Cement facility proposes to incorporate an SO_2 scrubber system to achieve low SO_2 emissions. Also, the Florida Rock Newberry facility has a lower emission rate listed, however, this same facility just submitted a permit application in November with a proposed SO_2 rate of 0.28 lb/ton CL.

The lowest identified SO_2 permit limit is that for the Ash Grove facility in Durkee, OR. The limit (0.11 lbs SO_2/ton CL) is approximately 50% lower than the Rinker proposed limit. Based on the Title V permit reviewed for Ash Grove, no additional SO_2 controls are installed at the facility other than the inherent scrubbing of the kiln flue gases. We conclude that the Ash Grove raw materials are naturally very low in sulfur content, since the sulfur limitations on their permit-specified fuels - coal, oil and natural gas - have similar sulfur content as Rinker fuels. The Ash Grove permit specifies short-term SO_2 limits, but does not appear to require an SO_2 continuous emissions monitor. The April 12, 1999 compliance test report indicated that the test was conducted with natural gas firing, and as a result, the facility easily passed their compliance test for SO_2.

The approximate composition of typical raw feed to Unit II will be 50% "high rock" (marly limestone), 39% waste fines (marlaceous lime with high silica content), 10% conditioned fly ash, and the remainder iron mill scale. The raw feed mill grinds moist feed to the desired particle size, and dries the ground feed via direct contact with flue gases. The mill is, therefore, an effective mass transfer device that promotes absorption of SO_2 by limestone in the feed. Proposed BACT for the Rinker Unit II kiln is Unit II's inherent capacity to scrub the cement flue gases with this alkaline raw feed and control SO_2 to a limit of 0.23 lbs SO_2/ton CL (30-day average). While it is expected that the kiln may achieve lower SO_2 emissions, in order to maintain the permit emission limit on a 30-day basis, it is not possible at this time to surmise whether a lower emission limit is feasible, given the introduction of a new cement process at the facility (Unit I is a pre-heater kiln). Hence, additional control for SO_2 would have to be accomplished by addition of a control device, such as a semi-dry or wet limestone scrubber. Our recent conversations with state regulators indicate that construction has not commenced on the TXI Riverside cement facility.

The differential SO_2 reduction from the Rinker proposed level (0.23 lbs/ton CL) to the lowest listed level (0.11 lbs/ton CL) is approximately 61.3 tons of SO_2 per year (0.23 – 0.11 lb/ton * 2800 tons/day*365 day/year*ton/2000 lb), or an approximate 50% reduction. SO_2 control is typically achieved using flue gas scrubber systems. To achieve an approximate 50% reduction, the "top" control options would be either a wet limestone scrubber or semi-dry absorber ("dry scrubber"). Other SO_2 control options, such as dry sorbent injection, may not be capable of achieving a continuous 50% reduction at such a low inlet SO_2 concentration. Therefore, a wet limestone scrubber and semi-dry absorber will be analyzed for economic, energy, and environmental impacts relative to the base case of SO_2 absorption in the alkaline flue gases.

For purposes of the economic assessment, it is assumed that the semi-dry limestone absorber can be placed before the particulate control device (fabric filter baghouse). However, the wet limestone scrubber would have to be placed after the particulate control device to avoid potential damage to the fabric filter. It is also assumed that some flue gas reheat will be necessary after exiting the wet scrubber to improve exhaust gas dispersion and minimize impacts. To remove the differential amount of SO_2 emissions (61.3 tons annually), estimated costs for a dry limestone scrubber would exceed $10,000 per ton of SO_2 (ton/SO_2) removed and estimated costs for a wet limestone scrubber would exceed $30,000 per ton SO_2 removed (not including energy and environmental impacts). These values are substantially higher than those considered as economically feasible for implementation of BACT control. In addition, where actual SO_2 emissions from the proposed Unit II kiln are expected to be lower than the permitted value due to the low sulfur in the feed materials, those control costs would be even higher.

Both control options also would produce environmental and energy impacts that could have secondary impacts. Both would use water, a valuable commodity in Florida, in appreciable amounts. Solid waste from the collected sorbent would be generated and require disposal. Additional energy would be needed to operate the equipment and move the flue gas through the equipment. Finally, energy for the flue gas reheat would be needed in the wet scrubber case.

In the FDEP BACT Review for the Suwannee American Cement Company's facility in Branford, FL (which at 105 tons per hour CL is a similar sized facility with similar permit SO_2 emissions as the Rinker Unit II plant), it was determined that add-on SO_2 controls were not BACT due to the excessive cost. Estimated costs for wet scrubbing were $29,700 per ton of SO_2 removed. Estimated costs for a dry circulating scrubber were $7,400 per ton of SO_2 removed plus additional particulate control that, as stated, would result in "raising this cost substantially."[2]

Based on a review of the economic, energy, and environmental impacts, acid gas removal by installation of a wet or semi-dry limestone scrubber is rejected as BACT. SO_2 removal through the inherent scrubbing of the kiln flue gases in the raw mill and other portions of the process to a limit of 0.23 lbs SO_2/ton CL (30-day average) is determined to be BACT.

24 hr/avg

4.5 BACT FOR NITROGEN OXIDES EMISSIONS

4.5.1 Recent NO_x Control Information

There has been considerable debate recently regarding NO_x emissions from cement kilns and what should be considered BACT. Recent advancements in kiln designs that include pre-calciners and multi-stage combustion (MSC) are reducing NO_x emissions. Consistent low NO_x emissions require tight process optimization and raw materials quality control. There has also been discussion about the application of post-combustion controls (selective catalytic reduction [SCR] and selective non-catalytic reduction [SNCR]) to cement plants. A summary follows of recent developments, including recent NO_x BACT determinations for U.S. facilities, an update of NO_x abatement measures in Europe, and preliminary results from testing of SNCR with MSC on European facilities by Krupp-Polysius.

---

[2] Florida Department of Environmental Protection BACT Determination for the Suwannee American facility,

Recent BACT Determinations

Table 4-2 provides a summary of the range of permitted NO_x emissions reviewed in comparison to those for the Rinker Unit II kiln. No facilities were identified with permitted NO_x emissions lower than the proposed Rinker Unit II limit. The Holnam Midlothian facility was unable to comply with their emission level (1.21 lbs/ton CL) and recently submitted an application to increase the level to 2.8 lbs/ton CL averaged annually.[3] Holnam, Inc. informed the regulatory agencies that the initial permit value was a "calculation error."[4]

Several air permit applications with associated BACT determinations have recently been submitted to, or approved by, regulatory agencies. Three facilities have proposed MSC in conjunction with SNCR as BACT – Holcim Lee Island (Ste. Genevieve County, MO), Lehigh Cement (Mason City, IA), and Florida Rock (Alachua County). The Great Star facility in Clark County, NV proposed use of SNCR in an application submitted in the mid-1990s; however, this facility was never built and the application was withdrawn.[5] Three additional projects from 2000–2001 rejected SNCR, and kiln optimization and MSC were proposed and determined to be BACT - Continental Cement (Ste. Genevieve, MO), and Holnam, Inc. (Holly Hill, SC and Midlothian, TX).

St. Lawrence Cement in Greenport, NY proposed MSC with SNCR as lowest achievable emission rate (LAER). The New York State Department of Environmental Conservation (NYSDEC) issued a draft permit in May of 2001 that allowed St. Lawrence Cement three years to achieve a NO_x emission limit of 2.8 lb/ton CL (on an annual average) from an initial limit of 3.6 lb NO_x/ton CL. The NO_x permit limits included in the draft permit were contested. In July of 2003, NYSDEC requested that St. Lawrence submit an update to its NO_x LAER

Branford Plant, PSD-FL-259 and 1210465-001-AC.

[3] Excerpts from Environmental Quality Management, Inc.'s NO_x, CO and VOC BACT Review for the Holnam, Inc. Facility in Midlothian, Texas, September 2000.

[4] Letter from Mr. Glenn Raynor of Holnam, Inc., Holly Hill, South Carolina to Ms. Diana L. Zakrzwski in response to the South Carolina Department of Health and Environmental Control's conditions to the draft air permit, September 27, 2000.

[5] Personal Communication between Scott Heath or RTP Environmental Associates, Inc. and David Wignall of the Clark County Nevada Health District, May 2001.

determination, which was submitted in December 2003 (see more detailed discussion - Section 4.5.5)

Other NO_x BACT Considerations – Experience in Europe

To date, U.S. cement plants have not incorporated full-scale commercially demonstrated post-combustion NO_x controls, such as selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR). However, European facilities have installed post-combustion control for NO_x and other pollutants on cement kilns. We are aware of sixteen SNCR systems that have been installed and operated with varying degrees of success on cement plants in Europe, and one SCR system is installed at the Solnhofer Plant in Germany. Information from European facilities and from pilot tests in the U.S. show that post-combustion NO_x controls have the potential to reduce NO_x, but performance can vary significantly when compared to typical combustion sources, such as boilers or gas turbines.

The majority of the European cement plants with SNCR do not have precalciners, unlike the proposed Rinker project. It is our understanding that such designs do not incorporate MSC; therefore, the experience at these units cannot be directly compared to Rinker Unit II. But while the combination of MSC and SNCR is innovative, the MSC and SNCR have been demonstrated separately.

The Solnhofer cement plant in Germany is the only known, large-scale SCR installation on a cement plant. As compared to the Rinker Unit II Project, Solnhofer has an older, less efficient kiln design without a precalciner thus, MSC technology is not applicable at the facility. As a consequence, control efficiencies achieved at the Solnhofer plant are not directly applicable to the Rinker project. However, as part of its response to NYSDEC on its updated LAER determination, St. Lawrence Cement did obtain all publicly available data for the Solnhofer plant. They determined the estimated NO_x reduction efficiency from the SCR system in 2002 was about 40% (annual average basis).

SNCR with MSC on European facilities by Krupp-Polysius

Krupp-Polysius has conducted preliminary testing of SNCR in conjunction with MSC on three pre-heater/pre-calciner kilns in Europe.[6] Krupp-Polysius tested various reducing agents including urea, a 25 weight-percent aqueous ammonia solution, photo-chemicals, and others such as cyanuric acid. Based on their preliminary results, the aqueous ammonia solution provided the most cost-effective NO_x reduction with the lowest secondary impacts, such as CO emissions increase, energy consumption, etc. Furthermore, injection location of the NO_x reducing agent was determined to be critical to optimize system performance. NO_x reductions of up to 50% were achieved, even at low-NO_x baseline concentrations. This has yet to be verified during long-term operations.

The aqueous ammonia SNCR system is currently operating on one pre-heater/pre-calciner kiln in Europe. Krupp-Polysius is monitoring performance to resolve several issues presented in the preliminary testing, which were:

1) Increases of CO emissions varying from 15 - 27% were observed with corresponding NO_x reductions ranging from 20 - 50%. In addition, CO emissions tended to increase with increased NH_3 molar ratio;
2) Ammonia slip control continues to be problematic; and
3) It was inconclusive whether NO_x baseline concentration effects NO_x reduction.

The three European kilns where tests were conducted do not incorporate the latest generation of Low-NO_x calciner design. It is unknown what effect the low-NO_x (multi-stage burner) design parameters would have on the effectiveness of the SNCR system. Statistical review of the results has been far from rigorous. Substantial additional work is ahead to demonstrate that observed NO_x reductions are continuously achievable.

---

[6] Personal Communication Between Michael Hober of RTP Environmental Associates, Inc. and Mark Terry of Krupp-Polysius. October 2001.

4.5.2 NO_x Control Technology Options

The most fuel-efficient design for Portland cement production is a dry-process plant with a precalciner and a preheater. As this is the state-of-the-art for plant design, this is the only type of plant considered in this BACT analysis. And now the industry standard is to install MSC technology to reduce NO_x emissions at precalciner cement plants. MSC, also known as staged combustion or fuel re-burning, is a proven NO_x reduction technique for precalciner kiln systems. Low NO_x precalciner systems using staged combustion have been employed successfully in cement manufacturing for many years. The proposed vendor, Polysius, refers to this as the PREPOL®-MSC-CC calciner system. The first Polysius MSC systems were commissioned in 1992 and MSC is now the standard for new construction. This plant design is proposed for the Rinker Unit II project.

The MSC process controls emissions via staggered introduction of the fuel, tertiary air and raw meal, which allows the combustion to take place in several stages, and hence, controls the oxidizing and reducing conditions over the length of the calciner. Due to the requirements for using petroleum coke as a fuel and utilizing fly ash as a part of the raw material, the calciner will be designed with a the Combustion Chamber (CC). The separate CC, which connects to the calciner loop by an enlarged gas duct, is a special feature of the design. These CC features will enhance the MSC calciner with the ability to burn the hard burning fuel, coke, or secondary fuel with a low specific heat value. The fuel introduced to the CC chamber is burned under favorable conditions with high temperatures that are not influenced by the raw material. Fly ash will be introduced directly into the CC chamber.

Combustion starts in pure tertiary air (i.e., 21% O2) at the center of the combustion chamber, here there is a low concentration of raw meal. Unburned solid carbon then passes with the raw meal through a duct and enters the hot kiln exhaust gas, where it reacts with the residual oxygen. The combustion chamber has two tertiary air inlets, one arranged tangentially and the other entering the middle of the chamber. The calciner loop receives the exhaust gases from the kiln and from the combustion chamber. The raw meal from cyclone stage 2 of the preheater enters the CC at a point near the tangential air inlet and the fuel is injected into the center of the CC.

The conditions in the CC may be finely tuned to permit the initial stages of combustion to take place under either a reducing or oxidizing atmosphere independent from the remainder of the calcining reactor. Due to the ability to optimize the system and the fact that the proposed plant will be burning tires, a kiln inlet burner will not be required.

The main kiln burner will be a Low-NO_x design. The major designs for Low-NO_x burners include multiple paths for primary air. A fuel rich combustion zone for low NO_x formation is created by combination of primary air in relation to the fuel channel. The introduction of the primary air outside the fuel channel creates an oxygen deficient region (reducing conditions) and delayed combustion that leads to reduced formation of NO_x. The burner parameters that influence NO_x formation are primary air, configuration of the fuel channels, exit flow momentum, ignition distances, flow conditions, and oxygen content. Vendors have specific designs for each of these parameters.

In addition to minimizing the amount of NO_x generated during the combustion process, the quantity of NO_x emitted can be reduced by add-on post-combustion controls. Both SCR and SNCR are considered technically feasible for this BACT analysis. However, several factors influence the application of each of these control technologies to the proposed Rinker project.

Much of what is known about SCR and SNCR comes from application to other combustion processes, such as boilers or turbines. Relatively little information exists regarding SCR and SNCR application to direct-contact heating processes, including cement kilns. Such direct contact heating causes raw materials to undergo a series of complex chemical reactions to form cement clinker. The interaction of the SCR or SNCR reactants (i.e., ammonia) with the various chemical reactions occurring in the cement production process is not fully understood. Combustion sources such as boilers and turbines are capable of sustained steady-state operation with relatively little variation in emissions. By contrast, cement kilns have been shown to experience wide variations in NO_x emissions levels during day-to-day operations. For this reason, longer compliance averaging times are advisable for such processes.

While there is a considerable base of knowledge regarding SCR as applied to coal-fired boilers, there are significant and important differences between boilers and cement kilns. These differences include SO_2 and calcium loading; particulate loading and dust characteristics; and concentration and availability of alkali and metallic compounds. The performance of SCR units that operate in flue gases on the "dirty side" of the PM control device may be substantially affected by catalyst deactivation via plugging, fouling, masking or poisoning *(i.e.*, sticky deposits), undesirable byproduct formation and the impact on downstream equipment; startup, shutdown, and malfunction events; and gas flow distribution across the catalyst structure. Consequently, we evaluated a "clean side" SCR option (downstream of the fabric filter) in this BACT analysis.

Based on our observation that MSC technology is now incorporated into all new kiln designs in the U.S., we have selected MSC as the baseline for BACT analysis. The "top down" ranking of NO_x control technologies in order of effectiveness is as follows:

- SCR
- SNCR
- MSC alone (no add-on controls).

4.5.3 Evaluating the NO_x Control Technology Options

In order to evaluate the SCR and SNCR technologies for application to the Rinker Unit II kiln, we reviewed the limited operational data available from European and U.S. facilities.

Past data presented in regulatory and industry publications consisted of short-term (one-hour) compliance test results that typically showed substantial variation. Regulators have focused on the low numbers of the range and assumed that these can be achieved consistently and that higher emissions are the result of poor performance or combustion. Recent continuous emissions monitor (CEM) measurements have shown that hourly emissions typically exhibit substantial hourly and even daily variability, though cement production is relatively constant. This variability appears relatively uncontrollable by the equipment operators. Through design, NO_x emissions can be lowered when given a long enough averaging time.

Similarly, regulatory publications have assumed that SCR and SNCR can be applied to any combustion source, based on application to combustion turbines and boilers. For boilers and turbines, fuel specifications are relatively uniform, typically resulting in uniform source emissions and relatively predictable results from application of SCR or SNCR. However, direct contact of hot flue gases in cement kilns with raw materials creates locally heterogeneous mixing zones, and, therefore, significant time- and space- variability in kiln temperature profiles. Identical kilns with different raw material mixes can have substantially different NO_x emissions and show different variations in these emissions. This means that limitations exist on how much NO_x reduction can be achieved by design and on the effectiveness of post-combustion NO_x control (i.e., SCR or SNCR). Finally, this variability in NO_x formation also shows that stringent NO_x emission limits cannot be tied to short averaging times.[7]

Little documentation exists regarding innovative control technology tested or operating on cement kilns in the United States. The cement production process, by its nature, has provided significant obstacles to the application of pollution controls. High temperature oxidizing conditions in the rotating kiln limit the ability to apply innovative NO_x control techniques. The desire to maximize thermal efficiency of the pyro-processing equipment limits the ability to apply temperature controls on the exhaust gas stream. Kiln flue gases contain trace contaminants that would require removal prior to a catalytic system.

Nalco Fuel-Tech provided a technical paper on more recent SNCR pilot tests conducted on two pre-heater/pre-calciner kilns located in Taiwan.[8] Nalco[9] states that flue gas NO_x concentrations can vary significantly over short-term periods and strongly affect NO_xOUT® efficiency. In general, NO_xOUT® is effective at NO_x baseline concentrations in excess of 300 ppm, and percent removal increases with increasing concentration. NO_xOUT® removal efficiency is

---

[7] Young, Gerald L. and Michael von Seebach. "NOx Variability, Emissions & Control from Portland Cement Kilns" Penta Engineering. Presented at the 34th International Cement Seminar in Salt Lake City, UT, December 1998.

[8] *Cement Kiln NO_x Reduction Experience Using the NOxOut® Process*, M. Linda Lin and Michael J. Knenlein, FuelTech, Inc., from the Proceedings of 2000 International Joint Power Generation Conference, Miami Beach, FL, July 23-26, 2000.

[9] Personal Communication Between Michael J. Hober and Mr. Michael J. Knenlein of Nalco FuelTech, Telephone Conversation. August 2001.

marginal for NO_x baseline concentrations between 200 - 300 ppm and virtually non-existent at concentrations less than 200 ppm. In general, Nalco Fuel-Tech prefers NO_x baseline concentrations in excess of 500 ppm to get good NO_x conversion.

European Commission Reference Document

The European Integrated Pollution Prevention and Control Bureau (IPPCB) produced a *Reference Document on Best Available Technologies (BAT) in the Cement and Lime Manufacturing Industries* (March, 2000). This document presented the results of an exchange of information between European Union member states and industries regarding BAT for pollution control, associated monitoring, and current developments.

The IPPC recommended BAT for new and modified cement kilns in the European Union. The report presented three opposing views regarding NO_x emissions. The first view includes a recommended BAT level in the range of 0.8-2.0 lb/ton CL (approx. 200-500 mg/Nm^3). The second view proposed by the European cement industry recommended that the NO_x emissions be established higher, at a level of 500 - 800 mg NO_x/Nm^3 (approx. 2.0-3.2 lb/ton CL). This view was predicated on the fact that kilns were using some form of SNCR at that time, all were achieving low efficiencies (10 - 50%) to obtain emission levels below 800 mg NO_x/m^3. Limited experience with application of SNCR at higher reduction efficiencies and the subsequent uncertainty regarding additional ammonia emissions, detached plumes, pre-heater plugging, etc. did not justify a lower recommended BAT. Examples of kilns achieving substantially higher NO_x reduction efficiencies with SNCR presented in this document appear to be old facilities with very high NO_x emissions with the greatest potential for reduction. It is questionable if such high NO_x reduction efficiencies can be achieved with newer kilns that have substantially lower baseline NO_x emissions.

It appears that the conclusions drawn and recommendations made in the IPPCB document were derived from a limited data set. Furthermore, the European IPPCB recommendations establish no levels for CO and VOC, which play a role in efforts to control NO_x. The European IPPCB report does not appear to establish recommendations for monitoring, such as Continuous Emission Monitors (CEMs) for pollutants and opacity, nor does it discuss averaging times for the emission levels recommended. All play a role in a facility's ability to comply with emission requirements. Finally, problems have been encountered in the past when comparing European emissions data with U.S. emissions data due to differences in testing methodologies and techniques. This was highlighted during USEPA review of European emissions data while developing standards for Municipal Waste Combustors (MWC). As stated in the *Background Information Document for Promulgated Standards and Guidelines - Public Comments and Responses for Municipal Waste Combustors*:

> The EPA agrees that it is difficult to compare European performance data to U.S. performance data due to the difference in test methods, QA standards, and reporting methods. As noted in the proposal preamble and by the many commenters above, there are differences between the EPA and EU guidelines with respect to regulatory flexibility, compliance, and test methods used to measure emissions. These factors must be considered when comparing the respective emission requirements. Also, as some of the commenters noted, there are differences in national policy towards combustion of MSW and funding of projects.[10]

For this reason, USEPA refrained from using European data in developing the MWC standards.

Portland Cement Association (PCA) Report

Penta Engineering Corporation prepared a document entitled *NO_x Formation and Variability in Portland Cement Kiln Systems, Potential Control Techniques, and Their Feasibility and Cost-Effectiveness* for the Portland Cement Association, as well as the American Portland Cement Alliance and the Carolina Portland Cement Association. The purpose of this document was to conduct an independent technical, engineering, and cost review of various NO_x reduction techniques for the cement industry.

---

[10] *Municipal Waste Combustion: Background Information Document for Promulgated Standards and Guidelines – Public Comments and Responses*, Emission Standards Division, United States Environmental Protection Agency, Office of Air and Radiation, October, 1996 (EPA-453/R-95-0136).

The PCA report also presents the results of recent research into pre- and post-combustion control of NO_x in cement kilns. Of primary note is the continued variability of NO_x emissions data and NO_x reductions by control techniques for a given set of conditions. The information presented in the report does not refute that overall lower NO_x emissions can be achieved through application of pre- and post-combustion controls.

The report presents data from a research project conducted at the Riverside Cement Company, Crestmore plant located in Rubidoux, CA in the mid-1980's. Continuous Emissions Monitoring (CEM) data for NO_x, at six-minute averages, are shown to validate the high variability of NO_x emissions. A review of a short-term period of 240 consecutive data points (24-hour period) showed NO_x emissions vary from 2 to 14 lbs/ton CL. Similar variation is shown over a long-term period of 270 daily averages with NO_x emissions ranging from less than two to over 14 lbs/ton CL. The majority of the daily average data ranged from three to nine lbs/ton CL. However, a significant number of daily average values were outside that range.

This study shows that short-term stack tests for NO_x, as well as short-term tests of NO_x control efficiencies, do not provide meaningful estimates of expected average emissions and control efficiency. NO_x emissions limitations, as well as emissions control, must take into account this variability by establishing higher limits and/or extending compliance averaging times. Ideally, data should be collected continuously for a year or more to encompass variations in feed, operations, fuels, products, etc. Once the data are collected, statistical analyses are necessary to derive an accurate and achievable NO_x emission limit.

The above-mentioned study was conducted on a long, dry process kiln. This analysis was further validated in a 1999 Technical Study comparing the Crestmore Plant with a pre-heater kiln owned by Lone Star Industries, Inc., located in Maryneal, Texas, and a wet process kiln owned by the Dragon Products Company, located in Thomaston, Maine.[11] As in the earlier study, this review showed that measured NO_x emission values can not be averaged over a short period of time, such

---

[11] *Time Variability of NO_x Emissions from Portland Cement Kilns*, L. J. Walters, Jr. And M. S. May, III, PSM International; D. E. Johnson, Department of Statistics, Kansas State University; R. S. MacMann, Penta Engineering; and W. A. Woodward, Department of Statistics, Southern Methodist University. American Chemical Society, 1999.

as a stack test. Also stated in this report is that statistical parameter estimates are essential for the comparison of NO_x emissions before and after application of alternative control techniques to determine their effectiveness for NO_x reduction. Otherwise, it is questionable if NO_x emissions reductions by application of a control technique are real or simply within the statistical variation of the plant emissions. The need to perform these statistical analyses has also been realized by SNCR vendors, such as Nalco Fuel-Tech.[12]

For these reasons, the PCA report applied ranges to represent the potential variability without long-term test data. Table 4-3 presents these results.

The PCA report lists additional literature data of tests of SNCR on cement kilns in both Europe and the United States. These data, once again, show substantial variation in achieved results based on short-term limited testing. NO_x reductions varied with the type of kiln, SNCR reagent utilized (urea, ammonia water, or biosolids), process point of injection, molar ratio, baseline NO_x concentration, etc. Generally accepted results from the data were:

1) Baseline NO_x concentration can vary over an extremely wide range.
2) Ammonia slip can cause a detached plume, increase stack opacity, or exceed allowable emission limits for ammonia.
3) Ammonia utilization, and thus NO_x reduction, decreases significantly with decreasing NO_x concentration in exhaust gases (SNCR appears less promising at low baseline NO_x emissions rates).
4) Application of SNCR can increase emissions of carbon monoxide (CO), nitrous oxides (N2O), and ammonia compounds in aerosol form.
5) Several tests identified higher NO_x reductions with ammonia water injection than with urea injection.
6) One test showed increased SO_2 emissions over baseline emissions when urea was utilized as a reducing agent.

---

[12] IBID

TABLE 4-3
ACHIEVABLE NO_X REDUCTION WITH VARIOUS NO_X CONTROL TECHNOLOGIES

NO_x Control Technology	Available NO_x Emissions Reductions (%)
Process Modifications/Controls	0 - 30
Staged Combustion in Pre-Calciner	30 - 40
Conversion to Indirect Firing with a Low-NO_x Burner	0 - 20
Mid-Kiln Firing of Tires in Long Kilns	0 - 30
SNCR	15 - 65
SCR	N/A

Source: *Report on NO_x formation and Variability in Portland Cement Kiln Systems, Potential Control Techniques and Their Feasibility and Cost-Effectiveness*, Penta Engineering Corporation for the Portland Cement Association, 1999.

NOTES: NO_x = Nitrogen Oxides
SNCR = Selective Non-Catalytic Reduction
SCR = Selective Catalytic Reduction
N/A = Not addressed in report.

NO_x Emissions Variability

As previously presented in Section 4.5.3, recent studies have been performed in an attempt to quantify the variability of NO_x emissions from Portland cement kilns. Research conducted by L.J. Walters, Jr. and M.S. May, III, et al. and published in a technical article in 1999[13] presents data collected from five Portland Cement kilns - the Riverside Cement Company Crestmore Plant in Rubidoux, CA; the Lone Star Industries Maryneal Plant in Maryneal, TX; The Dragon Products Company plant in Thomaston, ME; the California Portland Cement Company located in Colton, CA; and the St. Lawrence Corporation plant in Hagerstown, MD. The studies presented the following recommendations and conclusions:

1) "The determination of the average emission rates and the uncertainty of the average has been improperly calculated by the cement industry and regulatory agencies"[14]
2) "The statistical analysis of NO_x emissions from cement kilns has not been rigorous. Correct calculation procedures for statistical parameter estimates, such as means and standard deviations, must be used. Such statistics are essential for the comparison of NO_x emissions before and after application of alternate control techniques to determine their effectiveness for NO_x reduction"
3) "Complexities inherent in the generation of NO_x from Portland cement kilns result in inappropriate analyses of CEM data."[15]
4) "Regulatory limits and evaluations may be misapplied because the assumption is made that NO_x measurements are independent and normally distributed. However, the degree of auto-correlation which is observed for NO_x measurements from Portland cement kilns requires an alternative method of interpretation."[16]
5) NO_x values cannot be averaged over a short period of time. This is especially true when a "few" grab samples are taken during "source tests."[17]

---

[13] IBID

[14] IBID

[15] IBID

[16] IBID

[17] IBID

4.5.4 St. Lawrence Cement LAER Determination

In December 2003, St. Lawrence Cement (SLC) prepared an updated LAER analysis for the proposed cement plant replacement project in Greenport, NY (the "Greenport Project"). MSC + SNCR were proposed as LAER at an initial controlled emission rate of 3.6 lb/ton CL, and a target controlled emission of 2.8 lb/ton CL following the conclusion of a site-specific performance optimization program. The combination of these two technologies was described as "innovative," since "no cement facility...has ever attempted to install and operate the combination of these...technologies while simultaneously complying with stringent opacity and CO limitations." The LAER analysis included extensive technical discussions with regard to the site-specific nature of NO_x control efficiency at modern cement plants with precalciners, and presented the concept of obtaining site-specific *in situ* experience with this technology prior to formalizing final emission limits. Among other factors, the discussion points out that MSC operates in a reducing atmosphere, while SNCR requires an oxidizing atmosphere. Combining the two, therefore, requires care in the design and operation of the cement plant in order to assure the proper hot gas conditions in both portions of the process. The SLC analysis points out that Polysius recently published results of engineering and performance tests demonstrating for the first time that, if properly operated, the combination of MSC and SNCR will produce lower NO_x emissions than either technology operating alone.

SLC report describes SCR operating experience at the Solnhofer (Germany) plant, where NO_x reduction efficiency of approximately 40% has been reported. SLC attempted to obtain SCR bids from four emission control technology vendors. Three of the four vendors declined to bid, and a fourth provided "preliminary technical data and indicative information," which was described as unresponsive to the request for proposal.

The SLC report states that "the level of emission reduction that can be achieved with SNCR applied to a MSC precalciner requires site-specific *in-situ* experience to balance these two systems to achieve optimum NO_x reductions."

4.5.5 Rinker Unit II NO_x BACT Determination

Based on performance commitments obtained from Polysius, Rinker considers MSC at 2.7 lb NO_x/ton (30-day average) to be the baseline achievable emission control level for modern cement kilns with high-thermal-efficiency precalciner systems.

With the combination of MSC and SNCR, Rinker proposes an initial controlled emission of 2.7 lb/ton NO_x. Polysius, however, has committed to attaining a controlled emission of 1.95 lb/ton CL with this combination following the completion of a site-specific performance optimization program.

The "top" level of performance for such kilns is considered to be MSC in combination with SCR on the "clean side" (downstream of the particulate control device). Neither Polysius nor any of the four emission control vendors approached by St. Lawrence Cement (above) appear prepared to offer performance warranties with respect to this technology. However, it is estimated that 1.7 lb/ton CL might be achieved with the combination of MSC and SCR following a site-specific performance optimization program (although this is likely to require several years to complete).

Using cost and performance estimates provided by Polysius and capital and operating cost estimating methods derived from the EPA Cost Manual, Rinker has developed cost-effectiveness projections for the various technologies representing baseline (MSC), intermediate (SNCR) and "top" (SCR) control technology options. The cost estimates and grade efficiency calculations are presented in Appendix C (C-1 and C-2)

At $16,712 per ton NO_x removed (average), the "top" performance alternative (SCR) is excessively expensive, and is therefore, rejected as BACT.

The average cost-effectiveness of the SNCR alternative is $2,477 per ton NO_x removed. This cost is considered to be in the range of prior accepted BACT determinations. Accordingly, Multi-Stage Combustion (MSC), in combination with Selective Noncatalytic Reduction (SNCR) is determined to be BACT for NO_x for the Rinker Unit II kiln. The associated 30-day average BACT performance levels are 2.7 lbs NO_x/ton CL (initial operation) and 1.95 lb NO_x/ton CL (following completion of a site-specific performance optimization program), not including periods of start-up, shutdown, and malfunction. Even though no performance warranties are provided for SCR, Polysius did provide cost-estimates for a SCR system.

Cost effectiveness calculations for NO_x and other criteria pollutants are presented in Table 4-4.

4.6 BACT FOR CARBON MONOXIDE (CO) EMISSIONS

The majority of the CO emission rates in Table 4-2 are not directly comparable to the proposed Rinker emission rate, because in the comparatives, SNCR was not proposed to control NO_x. In trials of SNCR and MSC conducted by the proposed vendor, Polysius, it was demonstrated that the molar ratio of NO_x control reagent (ammonia) to uncontrolled NO_x significantly impacted CO emissions. According to the trial results, CO emissions increase as this molar ratio increases. The most dramatic increase occurs when the molar ratio exceeds 1.0. According to Polysius, these results are not unexpected because CO, in the presence of NH_3 will have fewer OH radicals in which to react. The result is an expected slower CO oxidation and a resulting increase in CO emissions.

Efforts to reduce NO_x emissions through combustion controls such as multi-stage combustion typically result in higher CO emissions. Additionally, Rinker plans to use high loss on ignition (LOI) fly ash in the preheater which can increase CO and VOC emissions; however, this practice provides a beneficial re-use for this type fly ash as opposed to landfilling. Consequently, the extremely stringent short-term NO_x limitation established for the Rinker facility cannot be tied to a correspondingly stringent short-term CO limitation. Thus to provide an accurate comparison, the proposed Rinker CO emission rate is compared to the rates for other facilities proposing SNCR. The range for such facilities is 3.6 to 10 lb/ton CL. The proposed Rinker emission rate is at the low end of the range.

Table 4-4
Rinker Unit II Cement Kiln
Top-Down BACT Impact Analysis Summary

Pollutant	Control Alternative Added to Baseline	Emission Rates					Economic Impacts				Environmental Impacts		Energy Impact Increment Over Baseline (MMBtu/yr)	Selected as BACT?
		Uncontrolled		Controlled		Control Effic. %	Emission Reduction (ton/yr)	Annualized Cost ($/yr)	Cost Effectiveness		Toxics (Yes/No)	Adverse (Yes/No)		
		lb/ton CL	ton/yr*	lb/ton CL	ton/yr*				Average	Incremental				
PM/PM10	"Top" Control Alternative Selected for PM/PM10													
SO_2	Wet Scrubber	0.23	118	0.11	56.2	52%	61.3		$30,000	--	No	Yes***	Flue gas reheat (natural gas - not quantified)	No
	Semi-Dry Scrubber	0.23	118	0.11	56.2	52%	61.3		$10,000	--	No	Yes***	NA	No
NO_x	SCR**	2.7	1,380	1.70	869	37%	511	$8,540,027	$16,712	$59,417	No	No	102	No
	SNCR**	2.7	1,380	1.95	996	28%	383	$949,455	$2,477	--	No	No	NA	Yes
CO	RTO	4.0	2,044	0.20	102.2	95%	1,942	$14,921,000	$7,684	--	No	No	Flue gas reheat (natural gas - not quantified)	No
VOC	RTO	0.15	76.7	0.023	11.8	84.7%	64.9	$14,921,000	$229,918	--	No	No	Flue gas reheat (natural gas - not quantified)	No

*Basis: 2,800 ton CL/day
SCR = Selective Catalytic Reduction
SNCR = Selective Noncatalytic Reduction
RTO = Regenerative Thermal Oxidizer
CL = Clinker
NA = Not available or not calculated
**Refer to Appendix C for NOx cost effectiveness calculation spreadsheets:
Appendix C-1 SNCR Cost Estimates
Appendix C-2 SCR Cost Estimates
***Water consumption and solid waste disposal

Also, Polysius has incorporated in their design a u-shaped, goose neck section that has a self cleaning inner edge and promotes mixing/turbulence to minimize CO formation. The Polysius-designed calciner duct creates turbulence to destroy the laminar gas flow in the calciner by sharp turning (180 degrees) the direction of the flow and creating the vacuum zone in the gas stream. This is sufficient to have favorable conditions for CO combustion. The addition of PYROTOP or other turbulence enhancing technology is not believed to provide any additional reduction in CO or VOC emissions.

To reduce CO further, without the potential for an increase in NO_x emission, it is assumed that post-combustion control would be necessary. To date, post-combustion CO control has not been specified as BACT control on a cement kiln in the U.S. However, a regenerative thermal oxidizer (RTO) has been installed and is operating at the TXI Operations, LP facility in Midlothian, TX. This RTO was installed so the facility could "net-out" of PSD review during a recent upgrade project. Furthermore, the Midlothian facility is located very close to the Dallas-Fort Worth, Texas ozone non-attainment area, which could have triggered LAER review for VOC emissions. Holnam, Inc. incorporates RTOs on several wet process cement kilns in Dundee, MI to solve a visible emission problem determined to be a condensible hydrocarbon.

Based on information presented in the recent application to revise the Holnam Midlothian facility permit NO_x emission level, it was reported that TXI is experiencing significant performance problems with their RTO at their Midlothian, Texas facility, which include high static pressure losses caused by fouling of the heat exchanger surfaces.

The primary control mechanism for CO is oxidation and is typically achieved two ways: thermally or catalytically. Thus, the top control options to be considered are catalytic and thermal oxidation. Catalytic oxidation is accomplished by heating the flue gas stream containing CO and passing it through a catalyst bed to allow CO oxidation to occur at a lower temperature than thermal oxidation. Problems encountered with catalytic incinerators include catalyst plugging and fouling, catalyst deactivation, and there are limits to the amount of heat recovery that can be achieved. Thus, savings in fuel to heat the flue gas are offset by the lower heat efficiency than can be achieved. Catalytic oxidizers have been employed in numerous industrial applications, but not at a cement kiln.

Recuperative thermal oxidizers achieve CO oxidation through direct flame incineration. This requires substantially more fuel to heat incoming flue gas to CO oxidation temperatures. Recuperative thermal oxidizers are typically limited in the amount of heat recovery that can be achieved, and because of the large amounts of fuel combusted, typically results in significant additional pollutant generation. Regenerative thermal oxidizers (RTOs) also achieve CO control through heating the flue gas to the CO oxidation temperatures. However, in RTOs the heat is contained in a series of ceramic beds that are alternately heated and reheated to maximize heat efficiency. RTOs tend to have higher capital costs than recuperative thermal oxidizers. However, RTOs typically have significantly lower operating costs due to the greater heat efficiency of the ceramic bed design which result in substantially lower fuel usage than catalytic or recuperative thermal oxidizers.

Catalytic oxidizers have been employed in numerous industrial applications, but not on a cement kiln. Based on available data, catalytic oxidizers, recuperative thermal oxidizers, and RTOs have not been specified as BACT for cement kilns. However, an RTO has been installed on a pre-heater/pre-calciner kiln voluntarily. As this technology cannot be considered technically infeasible, and RTOs typically exhibit higher control efficiencies with higher heat efficiency and lower secondary pollutant generation than catalytic and recuperative thermal oxidizers, application of an RTO will be evaluated on an energy, environmental, and economic basis.

Utilizing information from a recent application to revise the permitted NO_x emissions from the Holnam Midlothian facility, the estimated total capital cost for installation of an RTO to achieve 95% reduction in CO emissions based on the costs incurred at the TXI Midlothian facility is $31,888,080. Because RTO capital costs vary almost linearly with flue gas flowrate, especially at higher flowrates, a scaling factor of 1.0 is used to scale this value to the size of the Rinker Unit II kiln.. Total annual costs excluding capital recovery were estimated to be $11,209,800 for the Holnam Midlothian facility. Scaling the total annual costs and including capital recovery (ten years at 7%) yields an approximate annual cost of $15,750,663. Estimated annual CO emissions from the facility are approximately 2,044 tons. Assuming the RTO achieves 95% efficiency in reducing CO emissions, the cost per ton of CO removed with the application of a RTO is approximately $8,111 per ton CO removed. This cost is significantly higher than that considered as a BACT technology.

Application of a RTO would also have additional energy and environmental impacts in that fossil fuel would be burned to heat the flue gas, which would increase emissions of NO_x and CO as well as other pollutants. Electrical energy would be necessary to drive the system, which would have secondary environmental impacts, including increases in CO emissions. The environmental and energy impacts of the RTO and their potential secondary impacts were not quantified for this review.

Based on the above analysis, application of a RTO to control CO is rejected as BACT due to the energy, environmental, and economic impacts. Good combustion practice to limit CO emissions to 4.0 lbs CO/ton CL (30-day average) is determined to be BACT for the Rinker Unit II kiln.

4.7 CONTROL TECHNOLOGY FOR VOC EMISSIONS

Add-on controls have not been specified as VOC BACT for cement kilns. BACT has been determined to be combustion controls, which limit the products of incomplete combustion. As discussed previously, combustion conditions to reduce NO_x typically result in increased emissions of CO and VOC. Rinker believes that with a restrictive NO_x permit limit (1.95 lbs NO_x/ton CL) and similarly restrictive CO emission limit (4.0 lbs CO/ton CL), achieving a lower VOC emission limit would require post-combustion control of VOC.

Control techniques for VOC are similar in nature to control techniques for CO because typically thermal oxidation is employed. VOC can also be removed by condensation and filtration, but these are generally used for low exhaust flow rate sources, as they are costly in nature. The exception to this is the POLVITEC® filter utilized at the cement facility in Siggenthal, Switzerland. The Siggenthal plant is permitted to combust hazardous waste and sewage sludge and the POLVITEC® filter was financed by the City of Zurich. The Rinker Unit II kiln is not permitted to combust hazardous waste or municipal sewage sludge, and unfortunately, no government agency will be financing the installation of pollution control equipment. Although no accurate cost data or VOC control efficiency data is available regarding the POLVITEC® filter, it is assumed that these would be similar or higher than thermal oxidation for equivalent control. Therefore, VOC control utilizing a RTO is considered a potential control option and will be reviewed for energy, economic and environmental impacts.

The discussion of thermal oxidation provided in Section 4.6 for CO emissions also applies to VOC emissions. However, for purposes of the economic assessment, it is assumed that the RTO will control to the lowest VOC emissions limit identified (0.023 lb VOC/ton CL), which would be an approximate 85% reduction. It is questionable that at such low inlet VOC emission values, the RTO could even achieve a high efficiency. Utilizing scaled capital and operating cost data for a RTO previously presented in Section 4.6 (total capital costs of $31,888,080 and total operating costs including capital recovery of $15,750,663), the estimated cost-effectiveness of application of a RTO is $190,917 ton/VOC removed. The total VOC removed in this calculation is 85% of current estimated VOC emissions or approximately 82.5 tons. This cost per ton of VOC removed far exceeds what is considered as acceptable for application of BACT. In addition, operation of a RTO requires energy (fossil fuel combustion and electricity) consumption that results in secondary environmental impacts, including increased VOC emissions from generation of additional pollutants. Good combustion practice limiting VOC emissions to 0.19 lbs VOC/ton CL (30-day average) is selected for the Rinker Unit II kiln.

.12 lb/ton CL 24 hr avg

4.8 BIBLIOGRAPHY

Permits and Related Documents

Arizona Portland Cement Company, Rillito, AZ. Arizona Department of Environmental Quality - Significant Revision No. 1000547 to Air Quality Control Permit No. M191365P1-99. August 7, 1998.

Ash Grove Cement Company, Chanute, KS. Kansas Department of Health and Environment - Air Emission Source Construction Permit. Source ID Number 1330001. September 1999.

Ash Grove Cement Company, Durkee, OR. Oregon Department of Environmental Quality - Oregon Title V Operating Permit. Permit No. 01-0029. February 26, 2001.

Ash Grove Cement Company, Durkee, OR. Oregon Department of Environmental Quality - Oregon Title V Operating Permit Review Report. Review Report/Permit No. 01-0029.

Ash Grove Cement Company, Nephi, UT. (Permitted Location: Leamington Cement Plant, Leamington, UT.) Utah Department of Environmental Quality, Division of Air Quality - Title V Operating Permit. Permit No. 2300015001. January 5, 2000.

Ash Grove Cement Company, Seattle, WA. Letter to Mr. Fred Austin of Puget Sound Clean Air Agency from Henrik Voldbaek, Plant Manager of Ash Grove Cement Company regarding Ash Grove Cement Company NO_x Limits (to support request to increase NO_x limits in Approval Order 7381). September 12, 2000.

Ash Grove Cement Company, Seattle, WA. Letter to Mr. Fred Austin and Mr. Jay Willenberg of Puget Sound Clean Air Agency from Matthew Cohen of Heller Ehrman Attorneys regarding Ash Grove Cement Application to Revise NO_x Limits. November 29, 2000.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 7381. Reg. No. 11339. January 8, 2001.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 7722 (Canceled). Reg. No. 11339. February 24, 1999.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 7242. Reg. No. 11339. Received October 29, 1997.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 6644. Reg. No. 11339. October 15, 1996.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 8318. Reg. No. 11339. November 27, 2000.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 8415. Reg. No. 11339. March 14, 2001.

Ash Grove Cement Company, Seattle, WA. Puget Sound Clean Air Agency Notice of Construction Worksheet. NOC No. 6708. Reg. No. 11339. January 12, 1998.

Blue Circle Cement, Calera, AL. Alabama Department of Environmental Management - Major Source Operating Permit. Facility No. 411-0004. October 25, 2000.

Calaveras Cement Company, Tehachapi, CA. Kern County Air Pollution Control District - Permit to Operate. Permit No. 1147017D. October 31, 2000.

California Portland Cement Company, Mojave, CA. Kern County Air Pollution Control District - Permit to Operate. Permit No. 1003026M. December 31, 2000.

California Portland Cement Company, Mojave, CA. South Coast Air Quality Management District (CA) - Facility Equipment List Report for Facility Nos. 1623, 2692, 9899, 18653, 39495, 53381, 800181. Run date June 15, 2001.

California Portland Cement Company, Mojave, CA. South Coast Air Quality Management District (CA) - Annual Emissions Reports 1994 through 2000 for Facility No. 800181. Dates documents were prepared: August 25, 1994; August 28, 1995; October 2, 1996; August 25, 1997; August 26, 1998; August 25, 1999; August 25, 2000.

Carolina Cement Company, Castle Hayne, NC. North Carolina Department of Environment and Natural Resources Division of Air Quality Air Permit No. 07300R04. January 26, 2001.

Carolina Cement Company, Castle Hayne, NC. North Carolina Division of Air Quality - Air Quality Action Request (Renewal of Air Permit No. 7300R2). Issue Air Permit 7300R3. Received February 3, 1997.

Carolina Cement Company, Castle Hayne, NC. North Carolina Department of Environment, Health, and Natural Resources, Division of Air Quality - Air Permit No. 7300R3. May 9, 1997.

CEMEX California Cement LLC, Victorville, CA. Mojave Desert Air Quality Management District - Authority to Construct. No. B005362. July 26, 2000.

Continental Cement Company, Ste. Genevieve, MO.. Prepared by Barr Engineering Company. Air Emission Permit Application - Prevention of Significant Deterioration and National Emission Standards for Hazardous Air Pollutants. March 31, 2001.

Florida Crushed Stone Company - Brooksville Cement, Lime and Power Plants, Brooksville, FL. Florida Department of Environmental Protection - P.E. Certification Statements. DRAFT Permit No. 0530021-002-AV. October 21, 1999.

Florida Crushed Stone Company - Portland Cement Facility No. 2, Brooksville, FL. Florida Department of Environmental Protection - Final Determination. Permit No. AC 27-274892(A), PSD-FL-227(A). February 6, 1997.

Florida Crushed Stone Company - Brooksville Cement, Lime and Power Plants, Brooksville, FL. Florida Department of Environmental Protection - Initial Title V Air Operation Permit. Final Permit No. 0530021-002-AV. October 18, 2001.

Florida Crushed Stone Company, Brooksville, FL. Florida Department of Environmental Protection - Permit for Construction of No. 2 Cement Kiln and Associated Equipment. Permit No. AC 27-274892, PSD-FL-227. Expiration Date: November 30, 1998.

Florida Crushed Stone Company, Brooksville, FL. Final Determination for Permit PSD-FL-227/AC 27-274892.

Florida Crushed Stone Company, Brooksville, FL. Florida Department of Environmental Protection - Permit for Construction (Portland Cement Manufacturing Plant No. 2 and Associated Equipment). PSD No. PSD-FL-227(A), Permit No. AC 27-274892. Expiration Date: January 30, 2002.

Florida Crushed Stone Company. United States Environmental Protection Agency Region IV - Permit to Construct Under the Rules for the Prevention of Significant Deterioration of Air Quality. March 27, 1984.

Florida Crushed Stone Company. Florida Department of Environmental Regulation - Conditions of Certification. Case No. PA 82-17. Revised February 20, 1985.

Florida Crushed Stone Company, Brooksville, FL. Florida Department of Environmental Protection - Amended Permit. Permit No. AO27-231888A. August 30, 1994.

Florida Crushed Stone Company, Brooksville, FL. Florida Department of Environmental Protection - Notice of Permit and Final Determination. File No. AC 27-274892/PSD-FL-227. November 17, 1995.

Florida Crushed Stone Company, Brooksville, FL. Before the Florida Department of Environmental Protection - Final Order Modifying Conditions of Certification. No. PA 82-17F. April 15, 1997. (Faxed by Lawrence Curtin of Holland & Knight Law Offices on April 21, 1997.)

Florida Rock Industries, Newberry, FL. Staff Report of the Local Planning Agency regarding Comprehensive Plan Amendment from Mining to Industrial on the Future Land Use Map Series of the Comprehensive Plan. File Number CPAM-99-1. June 14, 1999.

Florida Rock Industries, Newberry, FL. Memo from Lawrence Jennings, Assistant County Administrator, Growth & Development Services, to The Honorable Chairman and Members of the Board of County Commissioners regarding Packet for Hernando County Comprehensive Plan Amendments CPAM-99-1 and CPAM-99-6(DCA#00-1). May 31, 2000.

Florida Rock Industries, Newberry, FL. "Objections, Recommendations, and Comments for Hernando County Amendment 00-1."

Florida Rock Industries, Newberry, FL. "Ordinance #2000-11." An ordinance amending the Hernando County Code of Ordinances, Chapter 23 - Planning. . . .

Florida Rock Industries, Newberry, FL. Letter from Howard Rhodes, Director, Florida Department of Environmental Protection, Division of Air Resources Management, to John Baker, President of Florida Rock Industries, Inc. regarding DEP File No. 0010087-003-AC (PSD-FL-228A) Newberry Cement Plant Permit Modification.

Florida Rock Industries, Newberry, FL. Florida DEP Public Notice of Intent to Issue Title V Air Operation Permit and Public Notice of Intent to Issue Air Construction Permit Modification. Draft Title V Air Operation Permit No. 0010087-002-AV. Draft Air Construction Permit No. 0010087-003-AC.

Florida Rock Industries, Brooksville, FL. Report in Support of an Application for a PSD Construction Permit Review. June 20, 2000.

Florida Rock Industries, Brooksville, FL. Florida Department of Environmental Protection, Division of Air Resources Management - Application for Air Permit-Title V Source. Effective February 11, 1999.

Florida Rock Industries, Newberry, FL. Technical Evaluation and Preliminary Determination. DEP File No. 0010087-003-AC/PSD-FL-228A.

Florida Rock Industries, Newberry, FL. Florida Department of Environmental Protection - Initial Title V Air Operation Permit. Draft Permit No. 0010087-002-AV.

Florida Rock Industries, Newberry, FL. Response to Request for Additional Information. Permit Nos. AC01-267311 and PSD-FL-228. Cover letter dated May 16, 1995.

Florida Rock Industries, Newberry, FL. Florida Department of Environmental Protection, Division of Air Resources Management - Application for Air Permit - Long Form. Effective November 23, 1994.

Holnam, Inc. - Portland Plant, Florence, CO. Colorado Department of Public Health and Environment - Initial Approval - Modification-1 (Draft Permit). Permit No. 98FR0895. August 16, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control Engineering Calculation Sheet, BAQ Engineering Services Division. July 17, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control Memo from Donna Moye of the Bureau of Air Quality to Pat Walker et al. regarding Public Notice #00-112-PS-N. August 15, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control Public Notice of Proposed Permit Decisions and Public Hearing. Public Notice #00-112-PS-N. August 14, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Donna Moye of the Bureau of Air Quality to Greg Worley of US EPA Region IV regarding PSD Preliminary Determination (Draft Permit Nos. 1860-0005-CO through 1860-0005-CU) for Holnam, Inc. August 14, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Donna Moye of the Bureau of Air Quality to Glenn Raynor of Holnam, Inc. Regarding PSD Preliminary Determination (Draft Permit Nos. 1860-0005-CO through 1860-0005-CU) for Holnam, Inc. August 14, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Donna Moye of the Bureau of Air Quality to Hazel Miller of Times and Democrat regarding Public Notice #00-112-PS-N for Holnam, Inc. August 10, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Donna Moye of the Bureau of Air Quality to William Jackson of the USDA Forest Service regarding PSD Preliminary Determination (Draft Permit Nos. 1860-0005-CO through 1860-0005-CU) for Holnam, Inc. August 28, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control memo from Donna Moye of the Bureau of Air Quality to Lower Savanna Council of Governments et al. regarding Public Notice #00-112-PS-N for Holnam Inc. August 24, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control - Preliminary Determination for Holnam - Holly Hill Plant, Orangeburg County, South Carolina. August 14, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control NESHAP (40 CFR 63) Construction Permit. Permit Nos. 1860-0005-CO through CU. October 13, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control Memo from Donna Moye of the Bureau of Air Quality to Pat Walker et al. regarding PSD Final Determination and Response to Comments for Public Notice #00-112-PS-D for Holnam Inc. October 11, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control - Public Notice of Final Permit Decision. Public Notice #00-112-PS-D for Permit Nos. 1860-0005-CO through 1860-0005-CU. October 13, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Carl W. Richardson of the Bureau of Air Quality to Gregg Worley of the US EPA Region IV regarding PSD Final Determination and Response to Comments (Permit Nos. 1860-0005-CO through 1860-0005-CU) for Holnam, Inc. October 11, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Carl W. Richardson of the Bureau of Air Quality to Glenn Raynor of Holnam, Inc. regarding PSD Final Determination and Response to Comments (Permit Nos. 1860-0005-CO through 1860-0005-CU) for Holnam, Inc. October 11, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Donna Moye of the Bureau of Air Quality to Hazel Miller of the Times and Democrat regarding Public Notice #00-112-PS-D for Holnam, Inc. October 10, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Carl W. Richardson of the Bureau of Air Quality to William Jackson of USDA Forest Service regarding PSD Final Determination and Response to Comments (Permit Nos. 1860-0005-CO through 1860-0005-CU) for Holnam, Inc. October 11, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control memo from Carl Richardson of the Bureau of Air Quality to Lower Savannah Council of Governments et al. regarding Final Permit Decision and Response to Comments for Holnam, Inc. October 13, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control Bureau of Air Quality - Response to Issues Raised and Comments Made during the Formal Comment Period for Public Notice #00-112-PS-N.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Patrick Walker of the Bureau of Air Quality to Ms. Virginia Townsend of the Boyer Community regarding Holnam - Holly Hill Facility Air Quality Construction Permit Nos. 1860-0005-CO through 1860-0005-CU. October 13, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control letter from Patrick Walker of the Bureau of Air Quality to Ms. Helena Miles of the Boyer Community regarding Holnam - Holly Hill Facility Air Quality Construction Permit Nos. 1860-0005-CO through 1860-0005-CU. October 13, 2000.

Holnam, Inc., Holly Hill, SC. South Carolina Department of Health and Environmental Control Bureau of Air Quality - Final Determination for Holnam - Holly Hill Plant, Orangeburg County, South Carolina. October 13, 2000.

Holnam, Inc., Holly Hill, SC. Letter from Glenn Raynor, Environmental Manager at Holnam Holly Hill Plant, to Diana L. Zakrzwski of the Bureau of Air Quality (SC DHEC) regarding Holnam responses to EPA Comments on Holly Hill PSD Permit.
September 27, 2000.

Holnam Texas Portland Cement Plant, Midlothian, TX. Texas Natural Resource Conservation Commission - Special Conditions and Amendment Technical Review for Permit No. 8996/PSD-TX-454M2. (Faxed by Earl Jones of the TNRCC Office of Permitting/NSRP Division on March 29, 2001.)

Holnam Inc., Morgan, UT. Utah Department of Environmental Quality, Division of Air Quality - Approval Order for PSD Major Modification to Increase NO_x Emissions from the Main Kiln. Approval No. DAQE-303-01. May 2, 2001.

Holnam, Inc., Morgan, UT. Utah Division of Air Quality - Modified Source Plan Review. March 27, 2001.

Holnam, Inc., Morgan, UT. Utah Department of Environmental Quality, Division of Air Quality - Intent to Approve PSD Major Modification to Increase NO_x Emissions from the Main Kiln. Intent to Approve No. DAQE-225-01. March 28, 2001.

Illinois Cement Company, LaSalle, IL. Illinois Environmental Protection Agency - Revised Construction Permit - PSD Approval - NSPS Source. Application Number 97030016. October 7, 1998.

Illinois Cement Company, LaSalle, IL. Illinois Environmental Protection Agency - Project Summary for Proposed Issuance of an Air Pollution Control Construction Permit for Illinois Cement Company. Application Number 97030016. August 1997.

Kosmos Cement Company - Louisville Plant, Louisville, KY. Air Pollution Control District of Jefferson County, Kentucky - Title V Operating Permit (DRAFT). Permit No. 156-97-TV. October 22, 2000.

Kosmos Cement Company - Louisville Plant, Louisville, KY. Air Pollution Control District of Jefferson County, Kentucky - Title V Operating Permit. Permit No. 156-97-TV. April 18, 2001.

La Farge Corporation, Sugar Creek, MO. Missouri Department of Natural Resources, Division of Environmental Quality - Permit to Operate. Operating Permit Number OP2000099. September 11, 2000.

La Farge Corporation, Sugar Creek, MO. Missouri Department of Natural Resources - Permit to Construct. Permit No. 0897-019. August 5, 1997.

La Farge Corporation, Sugar Creek, MO. Missouri Department of Natural Resources Division of Environmental Quality - Permits Action Management System (Permit to Construct Amendment). Permit Review No. EX200011022. Date received November 8, 2000.

La Farge Corporation, Sugar Creek, MO. Missouri Department of Natural Resources Division of Environmental Quality letter from Randy Raymond, Permit Section Chief, to Steven Kidwell, Environmental Manager of La Farge Corporation - Sugar Creek Plant, regarding Permit Amendment - Project No. 2000-11-022. April 10, 2001.

La Farge Corporation, Sugar Creek, MO. Missouri Department of Natural Resources Division of Environmental Quality. Memo from Dawn Froning, Environmental Specialist III, Modeling Unit, to Kyra Moore, Environmental Engineer, Permit Section regarding Revised Ambient Air Quality Impact Analysis (AAQIA) for La Farge Corp., Sugar Creek, MO. January 24, 2001.

Lehigh Portland Cement Company, Union Bridge, MD. Maryland Department of the Environment, Air and Radiation Management Administration - Construction Permit. Permit No. 06-6-0256 N. April 8, 1999.

Lone Star Industries, Inc., Pleasanton, CA. Letter to Ralph F. Mitchell, Regional Environmental and Resource Manager for Lone Star Industries, Inc., from David P. Howekamp, Director of the Air Toxics Division of United States Environmental Protection Agency Region IX regarding Modification of PSD Permit for Davenport Facility (RMC-Pacific Santa Cruz Facility). July 31, 1991.

Lone Star Industries, Inc., Green Castle, IN. Letter to Mr. Craig Chrispell of Lone Star Industries from Paul Dubenetzky of the Indiana Department of Environmental Management's Office of Air Management regarding 133-12826 Amendment to CP-133-10159-00002.

Miami Cement Plant, Rinker, Miami, FL. Miami-Dade County Department of Environmental Resources Management - Notice of Final Permit. Permit No. 0250014-003-AV. October 31, 2000.

Mitsubishi Cement Corporation, Lucerne Valley, CA. Mojave Desert Air Quality Management District - Permit to Operate. Permit No. B001025. April 19, 2000.

Monarch Cement Company, Humboldt, KS. Kansas Department of Health and Environment - Air Emission Source Construction Permit. Source ID Number 0010009. January 2000.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Letter to Mr. Richard Long, Air Branch Chief of US EPA Region VIII, from Dan Olson, Administrator in Air Quality Division regarding Administrative Amendment to Operating Permit 30-098. March 22, 2000.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Letter to Mr. Richard Long, Air Branch Chief of US EPA Region VIII, from Dan Olson, Administrator in Air Quality Division, regarding Administrative Amendment to Operating Permit 30-098. February 2, 2000.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Letter to Mr. Scott Nielson, Environmental Manager for Mountain Cement Company, from Dan Olson, Administrator in Air Quality Division, regarding Operating Permit 30-098 Change Notification. October 20, 1999.

Mountain Cement Company, Laramie, WY. Letter from Scott Nielson, Environmental Manager for Mountain Cement Company, to Diana Hulme, WDEQ Air Quality Division, regarding Burning additional used oil solids. October 7, 1999.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Letter to Mr. Steve Goodrich, Environmental and Safety Manager for Mountain Cement Company, from Dan Olson, Administrator in Air Quality Division, regarding Operating Permit 30-098, Notification of change for which no permit revision is required. November 18, 1998.

Mountain Cement Company, Laramie, WY. Letter from Steve Goodrich, Environmental and Safety Manager for Mountain Cement Company, to Dan Olsen, Department of Environmental Quality, Air Quality Division, regarding 14-Day Notification of Modification Schedule for Rail Car Unloading System. November 12, 1998.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Letter to Mr. Steve Goodrich, Environmental and Safety Manager for Mountain Cement Company, from Dan Olson, Administrator in Air Quality Division, regarding Mill Scale Increase and Rail Car Unloading, AP-B99. October 23, 1998.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality Air Quality Division - Air Quality Section 30 Operating Permit. Permit No 30-098. June 2, 1998.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Testing Requirements from March 23, 2000 Permit Amendment. pp. 2 and 3.

National Cement Company of California, Inc., Lebec, CA. Kern County Air Pollution Control District - Permit to Operate. Permit No. 1128004R. October 31, 2000.

North Texas Cement Company, Whitewright, TX. Texas Natural Resource Conservation Commission - Combined Permit. Permit No. 37177/PSD-TX-893. July 12, 2000.

Phoenix Cement Company, Clarkdale, AZ. Arizona Department of Environmental Quality - Significant Revision No. 1001001 to Air Quality Control Permit No. 0381-95. August 28, 2000.

Puerto Rican Cement Company, Ponce, PR. United States Environmental Protection Agency Region 2 - Final Prevention of Significant Deterioration of Air Quality (PSD) Permit. February 25, 1997.

Rio Grande Portland Cement Corporation, Pueblo, CO. Colorado Department of Public Health and Environment, Air Pollution Control Division - Construction Permit Initial Approval. Permit No. 98PB0893. September 25, 2000.

Riverside Cement Company, Oro Grande, CA. Mojave Desert Air Quality Management District - Authority to Construct. No. B007435. August 5, 1999.

RMC Pacific-Davenport, Santa Cruz, CA. Monterey Bay Unified Air Pollution Control District - Permit to Operate. Permit No. 10171. July 6, 2000.

Roanoke Cement Company, Cloverdale, VA. Commonwealth of Virginia Department of Environmental Quality - Permit to Modify and Operate. Registration No. 20232. January 24, 2001.

St. Lawrence Cement Company, Greenport, NY. New York State Department of Environmental Conservation Permit. Permit ID No. 4-1040-00011/00049. Draft permit April 30, 2001.

Signal Mountain Cement Company, L.P., Chattanooga, TN. Chattanooga-Hamilton County Air Pollution Control Bureau - Part 70 Permit Number 47-065-3070. May 15, 1999.

Southdown California Cement LLC, Victorville, CA. Mojave Desert Air Quality Management District - Engineering Evaluation for Modification of a Major Facility. June 10, 1999.

Southdown, Inc., Brooksville, FL. Florida Department of Environmental Protection, Southwest District - Final Title V Air Operation Permit. Final Permit No. 0530010-002-AV. September 14, 2000.

Southdown, Inc., Brooksville, FL. Florida Department of Environmental Protection, Southwest District - Notice of Administratively Corrected Title V Operation Permit. Final Permit No. 0530010-002-AV, Administrative Correction Project No. 007.

Tarmac America, Inc., Medley, FL. Miami-Dade Department of Environmental Resources Management - Initial Title V Air Operating Permit (Final). Permit No. 0250020-002-AV. October 26, 2000.

Tarmac-Pennsuco Cement, Medley, FL. Miami-Dade County Department of Environmental Resources Management Permit to Construct. Permit No. 0250020-010-AC. May 1, 2001.

TXI Riverside Cement, Oro Grande, CA. Mojave Desert Air Quality Management District - Engineering Evaluation for Modification of a Major Facility. August 5, 1999.

TXI Operations, L.P., Midlothian, TX. Texas Natural Resource Conservation Commission letter from Jeffrey A. Saitas to Mr. Eric Tiemeyer regarding Permit Amendment - Permit No. 1360A. October 12, 1999.

TXI Operations, L.P., Midlothian, TX. Texas Natural Resources Conservation Commission - Permit Amendment and Consolidation. Permit No. 1360A. (Cover letter from Jeffrey Saitas of TNRCC to Rex Coffman of TXI Operations dated January 11, 2001.)

TXI Operations, L.P., Midlothian, TX. Texas Natural Resource Conservation Commission - Permit Amendment and Consolidation. Permit No. 1360A. January 11, 2001.

Emissions Data

Ash Grove Cement Company, Durkee, OR. Oregon Department of Environmental Quality - Memo from Jeff Ross to Peter Brewer regarding Source Test Review Report. Permit Number 01-0029. April 12, 1999.

Holnam Cement, L.P., Midlothian, TX. METCO Environmental - Source Emissions Survey for Holnam Cement, L.P., Line Number 1 Stack (EPN 07), TNRCC Permit 8996/PSD-TX-PR454M2. Supplied by Earl Jones of the Texas Natural Resource Conservation Commission on April 16, 2001.

Illinois Cement Company, LaSalle, IL. Applied Environmental Services - Final Report on Carbon Monoxide Emissions Testing. April 5, 1993.

Illinois Cement Company, LaSalle, IL. Halm Engineering - Final Report on Air Emissions Testing Prepared for Illinois Cement Company. April 13, 1998.

Lone Star Industries, Inc., Green Castle, IN. Stack Test Results provided by Karen Nowak of Indiana Department of Environmental Management's Office of Air Quality. (Sent via e-mail on April 27, 2001.)

Mitsubishi Cement Corporation, Lucerne Valley, CA. Parsons Engineering Science, Inc. - Report of Air Pollution Source Testing of a Cement Plant Rotary Kiln Operated by Mitsubishi Cement Corporation, Lucerne Valley, CA. May 30, 1997.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Continuous Emissions Monitoring System RATA Review for Kiln #1. April 5, 2000.

Mountain Cement Company, Laramie, WY. Wyoming Department of Environmental Quality - Continuous Emissions Monitoring System RATA Review for Kiln #2. April 7, 2000.

Mountain Cement Company, Laramie, WY. Memo from Brian Bowman, Air Quality Engineer, to Mountain Cement Company (Stack Test File) regarding Evaluation of Particulate Stack Tests on the Clinker Cooler Transfer Tower by Western Environmental Services and Testing, Inc. on July 6, 2000. October 19, 2000.

Mountain Cement Company, Laramie, WY. Memo from Brian Bowman, Air Quality Engineer, to Mountain Cement Company (Stack Test File) regarding Evaluation of Particulate Stack Test for Kiln #2 by Western Environmental Services and Testing, Inc. on September 13, 2000. November 8, 2000.

RMC Pacific Materials (Santa Cruz), Davenport, CA. Source Test Report (prepared by L.J. Borrelli). August 2, 2000 (Test date).

Roanoke Cement Inc., Cloverdale, VA. Letter from Timothy L. Overstreet of the Commonwealth of Virginia Department of Environmental Quality to Robert M. Omer of Roanoke Cement Inc. regarding receipt and review of Excess Emission Report for period of April 1, 2000 through June 30, 2000. August 16, 2000.

Roanoke Cement, Inc., Cloverdale, VA. Letter from Timothy L. Overstreet of the Commonwealth of Virginia Department of Environmental Quality to Robert M. Omer of Roanoke Cement Inc. regarding receipt and review of Excess Emission Report for period of July 1, 2000 through September 30, 2000. November 14, 2000.

Roanoke Cement, Inc., Cloverdale, VA. Letter from Timothy L. Overstreet of the Commonwealth of Virginia Department of Environmental Quality to Robert M. Omer of Roanoke Cement Inc. regarding receipt and review of Excess Emission Report for period of October 1, 2000 through December 31, 2000. February 14, 2001.

Roanoke Cement, Inc., Cloverdale, VA. Letter from Timothy L. Overstreet of the Commonwealth of Virginia Department of Environmental Quality to Robert M. Omer of Roanoke Cement Inc. regarding receipt and review of Excess Emission Report for period of January 1, 2000 through March 31, 2000. May 24, 2000.

Contact Records

Austin, Fred of Puget Sound Clean Air Agency. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding Cement Facilities in Seattle, WA from USEPA RBLC Clearinghouse (La Farge Corp. in Seattle, WA and Ash Grove Cement in Seattle, WA). June 13, 2001.

Beerli, George of Maryland Department of the Environment. Phone call to Michael Hober of RTP Environmental Associates, Inc. regarding Lehigh Portland Cement (Union Bridge, MD). June 25, 2001.

Bennett, John, Vice President for Regulatory Affairs for California Cement Company. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding information on California Cement Company. July 11, 2001.

Coffman, Rex, Environmental Manager for TXI Operations, Ltd. in Midlothian, TX. Phone call to Michael Hober of RTP Environmental Associates, Inc. regarding information for TXI Operations, Ltd. in Midlothian, TX. March 30, 2001.

Damo, Julie, Air Quality Engineer for Kern County Air Pollution Control District. E-mail to Scott Heath of RTP Environmental Associates, Inc. regarding Cement Kiln Information Request. June 6, 2001.

DeSalvio, Alan of Mojave Desert Air Quality Management District. E-mail to Scott Heath of RTP Environmental Associates, Inc. regarding California Portland Cement in Mojave, CA. May 29, 2001.

Elias, Donald of RTP Environmental Associates, Inc. Memo to Al Linero of Florida Department of Environmental Protection regarding BACT for Florida Crushed Stone Kiln No. 2. January 29, 2001.

Freedom of Information Officer 2CD of United States Environmental Protection Agency Region II. Letter, to Scott Heath of RTP Environmental Associates, Inc. regarding acknowledgment of information request. May 29, 2001.

Geier, James of Colorado Department of Public Health and Environment. E-mail to Scott Heath of RTP Environmental Associates, Inc. regarding information on Holnam, Inc. facility in Florence, CO. May 31, 2001.

Geier, James of Colorado Department of Public Health and Environment. E-mail to Scott Heath of RTP Environmental Associates, Inc. regarding information on Holnam, Inc. facility in Florence, CO. June 1, 2001.

Hamm, Jody, Coordinator of Freedom of Information Center, South Carolina DHEC. Letter to Scott Heath of RTP Environmental Associates, Inc. regarding information request for Holman, Inc. June 1, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Al Linero of Florida Department of Environmental Protection, Division of Air Quality regarding locating the Swiss Plant in the July 2000 Letter from FDEP to Florida Rock Industries. May 8, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Doug Welch of Oregon Department of Environmental Quality Air Quality Program regarding Ash Grove Cement Company in Durkee, Oregon. May 7, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to John Jenks of Utah Department of Environmental Quality Division of Air Quality regarding New Source Review Permit for Holnam, Inc. (Morgan, UT). April 19, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to John Jenks of Utah Department of Environmental Quality, Division of Air Quality regarding update to Holnam Facility in Morgan, UT. May 7, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to David Beatty of Utah Department of Environmental Quality Division of Air Quality regarding BACT Review - Ash Grove Cement (Nephi, UT). April 19, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Nisha Sizemore of Indiana Department of Environmental Management, Bureau of Air Quality regarding Lone Star Industries (Green Castle, IN). April 26, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Illinois Environmental Protection Agency FOIA Officer - Air Permits requesting information on Illinois Cement Company. May 9, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Missouri Department of Natural Resources, Division of Environmental Quality requesting information on La Farge Corporation, Sugar Creek, MO. May 9, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Monterey Bay Unified Air Pollution Control District requesting information on RMC Pacific Materials, Inc. Santa Cruz Cement Plant, Davenport, CA. May 18, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Steven Dietrich of Commonwealth of Virginia Department of Environmental Quality, West Central Regional Office regarding information on Roanoke Cement Company in Cloverdale, VA. May 24, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Commonwealth of Virginia Department of Environmental Quality, West Central Regional Office requesting information on Roanoke Cement Company, Cloverdale, VA. May 24, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to United States Environmental Protection Agency Region II Freedom of Information Act Officer requesting information on Puerto Rico Cement Company, San Juan, PR. May 24, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Dean Carol of NC DENR, Wilmington Regional Office regarding information on Carolina Cement Company of Castle Hayne, NC. May 24, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Alan DeSalvio of Mojave Desert Air Quality Management District regarding information on Southdown (now CEMEX) facility in Victorville, CA. May 24, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call with Brian Bowman of Wyoming Department of Environmental Quality, Air Quality Division regarding information on Mountain Cement Company of Laramie, WY. May 29, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Wyoming Department of Environmental Quality, Air Quality Division requesting information on Mountain Cement Company, Laramie, WY. May 29, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Kern County Air Pollution Control District requesting information on National Cement Company, Lebec, CA. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Mallika Muthiah of Miami-Dade County Department of Environmental Resources Management, Air Quality Management Division regarding information on Tarmac American Pennsuco (Medley, FL). May 29, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Clark County Health District, Air Quality Division requesting information on Great Star Cement Corp./United Rock Products Corp., Las Vegas, NV. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Kern County Air Pollution Control District requesting information on California Portland Cement Company, Mojave, CA. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Public Records Request Form for information on California Cement Company, Colton, CA. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Missouri Department of Natural Resources, Division of Environmental Quality requesting information on Continental Cement Company, Saint Genevieve County, MO. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Kern County Air Pollution Control District requesting information on Calaveras Cement Company, Tehachapi, CA. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to Kansas Department of Health and Environment, Bureau of Air and Radiation requesting information on Ash Grove Cement, Chanute, KS and Monarch Cement Company, Humboldt, KS. May 31, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Letter to South Carolina Department of Health and Environmental Conservation, Freedom of Information Office requesting information on Holman, Inc., Holly Hill, SC. May 31, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to David Gilmore of Missouri Department of Natural Resources, Air Pollution Control Program regarding Cement Facilities in Missouri. May 30, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call with Brian Bowman of Wyoming Department of Environmental Quality, Air Quality Division regarding follow-up on Mountain Cement Company of Laramie, WY. July 12, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Doug Welch of Oregon Department of Environmental Quality, Air Quality Program regarding information on Ash Grove Cement Company, Durkee, OR. July 5, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Mallika Muthiah of Miami-Dade County Department of Environmental Resources Management, Air Quality Management Division regarding follow-up on Tarmac American Pennsuco (Medley, FL). June 13, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Jim Lehmann of Mojave Desert Air Quality Management District regarding follow-up on PM Limit in TXI Riverside Cement (Oro Grande, CA) Permit. June 14, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to George Beerli of Maryland Department of the Environment, Bureau of Air and Radiation regarding information on Lehigh Portland Cement of Union Bridge, MD (Carroll County). June 4, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Errol Reksten of Chattanooga-Hamilton County Air Pollution Control Bureau regarding information on RC Cement (Signal Mountain Cement Company). May 31, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Doug Shumway of Mitsubishi Cement Corp. regarding NO_x Control at Mitsubishi Cement Corp. in Lucerne Valley, CA. July 16, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Dave Long of California Cement Industry as follow-up on Sewage Sludge Injection Used at Mitsubishi Cement. July 19, 2001.

Heath, Scott of RTP Environmental Associates, Inc. E-mail to James Geier of Colorado Department of Public Health and Environment requesting information on the Holnam, Inc. facility in Florence, CO. May 31, 2001.

Heath, Scott of RTP Environmental Associates, Inc. E-mail to Alan DeSalvio of Mojave Desert Air Quality Management District regarding Information Request for Texas Industries Inc. at Oro Grande, CA. June 1, 2001.

Heath, Scott of RTP Environmental Associates, Inc. E-mail to Prabhat Bhargava of Arizona Department of Environmental Quality regarding Information Request on Portland Cement Facilities in Arizona (California (Arizona) Portland Cement Company, Rillito, AZ and Phoenix Cement, Clarkdale, AZ). June 1, 2001.

Heath, Scott of RTP Environmental Associates, Inc. E-mail to James Lehmann of Mojave Desert Air Quality Management District requesting information on Mitsubishi Cement Corporation.

Heath, Scott of RTP Environmental Associates, Inc. Phone call to Mike Sewell of Monterey Bay Unified Air Pollution Control District regarding RMC Pacific Materials (former Lone Star) Santa Cruz facility in Davenport, CA. November 13, 2001.

Heath, Scott of RTP Environmental Associates, Inc. Telephone call to Michael T. Higgins of the New York State Department of Environmental Conservation regarding St. Lawrence Cement Company's proposed facility in Greenport, NY, January 22, 2002.

Hober, Michael of RTP Environmental Associates, Inc. Phone call to Barbra Sprungl of Arizona Department of Environmental Quality regarding construction of Kiln #4 at the Phoenix Cement Company, Clarkdale, AZ. November 27, 2001.

Hober, Michael of RTP Environmental Associates, Inc. Memo to Scott Demick requesting Title V Permit for Blue Circle Cement Company in Calera, AL. April 18, 2001.

Hober, Michael of RTP Environmental Associates, Inc. Phone call to Berhann Getahuu of Missouri Department of Natural Resources regarding La Farge Corp., Sugar Creek, MO. June 28, 2001.

Hober, Michael of RTP Environmental Associates, Inc. Phone call to Earl Jones of Texas Natural Resources Conservation Commission regarding Holnam Texas Limited Partnership, Midlothian, Texas Facility. March 30, 2001.

Hober, Michael of RTP Environmental Associates, Inc. Phone call with Pradeep Raval of Koogler & Associates regarding status of Florida Rock Industries response to request for additional information. March 26, 2001.

Hober, Michael of RTP Environmental Associates, Inc. Phone call to John Reynolds of Florida DEP regarding status of Florida Rock Industries' Brooksville, FL plant air permit. March 26, 2001.

Hober, Michael of RTP Environmental Associates, Inc. Letter to Missouri Department of Natural Resources, Division of Environmental Quality requesting information on La Farge Corporation, Sugar Creek, MO. June 28, 2001.

Hober, Michael of RTP Environmental Associates, Inc. with Mark Terry of Krupp-Polysius, Personal Communication, October 2001.

Hober, Michael of RTP Environmental Associates, Inc. and Mary Terry of Krupp-Polysius. Personal Communication, Telephone conversation regarding St. Lawrence Cement Company's proposed facility in Greenport, NY, January 2002.

Hober, Michael of RTP Environmental Associates, Inc. and Michael J. Knenlein of Nalco FuelTech. Personal Communication, Telephone Conversation. August 2001.

Jenks, John of Utah Department of Environmental Quality, Division of Air Quality. E-mail to Scott Heath of RTP Environmental Associates, Inc. regarding Engineering Review for Holnam, Inc. April 19, 2001.

Lehmann, James of Mojave Desert Air Quality Management District. E-mail to Scott Heath of RTP Environmental regarding final NSR for Southdown Cement (CEMEX, Victorville, CA). May 24, 2001.

Lehmann, James of Mojave Desert Air Quality Management District. E-mail to Scott Heath of RTP Environmental Associates, Inc. regarding Request for information on Mitsubishi Cement Corporation. July 11, 2001.

Lewis, Marc of RTP Environmental Associates, Inc. Phone call to Teresa Heron of Florida Department of Environmental Protection regarding cement plant names and details for BACT analysis. October 10, 1995.

Linero, A.A. c/o John Reynolds, Florida Department of Environmental Protection Division of Air Resources Management. Fax to Don Elias regarding review by Mr. Linero. May 9, 2001.

Linero, A.A. of Florida Department of Environmental Protection. Letter to Don Elias of RTP Environmental Associates, Inc. replying to memoranda dated January 29 and May 8, 2001 regarding approach to re-determination of BACT applicable to planned facility. May 17, 2001.

Long, David M., Executive Director of Cement Industry Environmental Consortium. Memo to Scott Heath of RTP Environmental regarding Requested Information. July 19, 2001.

Ondrusek, Bob of Indiana Department of Environmental Management, Office of Air Quality. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding Cement Plants in Indiana from Portland Cement Association Document. May 31, 2001.

Piece, Tracy of Alabama Department of Environmental Management. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding National Cement of Alabama (Ragland, AL). June 12, 2001.

Ramsay, John of Kansas Department of Health and Environment's Bureau of Air & Radiation. Phone call to Scott Heath of RTP Environmental regarding Kansas Portland Cement Sites in Portland Cement Assoc. Document (Ash Grove Cement and Monarch Cement Company). May 31, 2001.

Reyes, Virginia for Linda Mills, Public Records Coordinator for South Coast Air Quality Management District (CA). Letter to Scott Heath of RTP Environmental Associates, Inc. acknowledging request for information on California Portland Cement Company, Colton, CA. May 31, 2001.

Rojas, Jorge. Phone call to Michael Hober of RTP Environmental Associates, Inc. regarding Holnam, Inc. Midlothian, TX facility. April 5, 2001.

Seetharama, Ram of Colorado Department of Public Health and Environment, Air Pollution Control Division. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding information on Rio Grande Portland Cement of Pueblo, CO. May 21, 2001.

Steele, Jerry of Monterey Bay Unified Air Pollution Control District. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding Lonestar Davenport Cement of Santa Cruz, CA. May 18, 2001.

Tiethoff, Tanya, Records Manager for Missouri Department of Natural Resources Air Pollution Control Program. Letter to Scott Heath of RTP Environmental Associates, Inc. regarding request for information concerning La Farge Corporation. May 16, 2001.

Tiethoff, Tanya, Records Manager for Missouri Department of Natural Resources Air Pollution Control Program. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding status of request for information on La Farge Corporation. June 1, 2001.

Terry, Mark of Polysius. E-mail to Michael Hober of RTP Environmental Associates, Inc. regarding NO_x Emissions from Cement Kilns. October 5, 2001.

Terry, Mark of Krupp-Polysius Corp. Faxed document to Michael Hober of RTP Environmental Associates, Inc. regarding cost analysis for Suwanee American. October 16, 2001.

Vardeman, Michael of Rinker Cement Mill Administration Office. Fax to Don Elias of RTP Environmental Associates, Inc. regarding Application Requirements to Extend Rinker Kiln 2 Permit to 2005. December 4, 2000.

Welch, Laura, File Room of Missouri Department of Natural Resources, Air Pollution Control Program. Faxed letter to Scott Heath of RTP Environmental Associates, Inc. regarding Records Request. June 1, 2001.

Wignall, David of Clark County Health District. Phone call to Scott Heath of RTP Environmental Associates, Inc. regarding information on Great Star Cement of Las Vegas, NV. May 30, 2001.

Other Correspondence

Boyer Community. Letter to Thomas N. Thornton, Plant Manager of the Holnam - Holly Hill Plant regarding Health and Environmental Concerns of the Boyer Community with the Proposed Holnam Holly Hill, SC Plant Expansion. Received by Bureau of Air Quality October 16, 2000.

Boyer Community. Letter to Patrick T. Walker, Assistant Bureau Chief of the Bureau of Air Quality as follow up to conversations between Mr. Walker and Boyer Community resident Mrs. Helena Miles. October 9, 2000.

Cullen, Steven of Koogler & Associates. Letter and Attachments ("Protocol for the Use of the Plume Visibility Model Pluvue II for Coherent Plume Analyses at Chassahowitzka Class I Area" and "Evaluation of Nitrogen Deposition at Chassahowitzka Class I Area") to Al Linero of Florida DEP, Division of Air Resources regarding Florida Rock Industries, Inc. Proposed Brooksville Cement Plant. June 2, 2000.

Durham, Dawn M., Environmental Planner for Board of County Commissioners - Hernando County. Letter and Attachments to Al Linero of Florida DEP, Division of Air Resource Management regarding Comments Relating to the Proposed FRI Portland Cement Plant in Hernando County, FL (BCC Minutes Excerpt - Florida Rock Comprehensive Plan Amendment). August 10, 2000.

Linero, A.A, Administrator, New Source Review Section, Florida DEP. Letter to John Bunyak, Chief of Policy, Planning & Permit Review Branch, NPS-Air Quality Division regarding PSD Permit Application for Florida Rock Industries, Inc., Brooksville, FL. PSD-FL-293. June 14, 2000.

Linero, A.A, Administrator, New Source Review Section, Florida DEP. Letter to Gregg Worley, Section Chief of Air, Radiation Technology Branch, Preconstruction/HAP Section, US EPA Region IV regarding PSD Permit Application for Florida Rock Industries, Inc., Brooksville, FL. PSD-FL-293. June 14, 2000.

Linero, A. A. Letter to Mr. John D. Baker, President of Florida Rock Industries Inc. regarding Request for Additional Information regarding DEP File No. 0530050-005-AC (PSD-FL-293). July 11, 2000.

Thornton, Thomas N. Letter to the Residents of the Boyer Community (South Carolina) c/o Ms. Virginia Townsend regarding Holnam's offer to contribute funds toward a public health study. October 17, 2000.

Guidance Documents

Battye, Rebecca, and Stephanie Walsh and Judy Lee-Greco of EC/R Incorporated. NO$_x$ Control Technologies for the Cement Industry - Final Report. EPA Contract No. 68-D98-026. September 19, 2000.

"Best Available Control Technology (BACT) Determination" for Florida Crushed Stone Company, Hernando County, FL. Amended 6 April 1982. Approved November 10, 1983.

"Best Available Control Technology (BACT) Determination" for Florida Crushed Stone, Hernando County, FL. PSD-FL-227/AC 27-274892. Revised November 9, 1995.

Biggs, H.O. "Biosolids Injection Technology: An Innovation in Cement Kiln NO$_x$ Control."

BRG Environmental. "NO$_x$ Control Technology Review Summary Table for Portland Cement Kilns." Draft June 13, 2000.

"DEP Steps Up Monitoring of Newberry Plant." Florida Department of Environmental Protection Web Site - External Affairs Communications: http://www.dep.state.fl.us/comm/releases/2001/00-061.htm. For immediate release February 13, 2001.

"The Facts on the DEP permit to Suwannee American Cement." Florida Department of Environmental Protection Web Site: http://www.dep.state.fl.us/officsec/news/cement.htm. Last updated June 16, 2000.

Golder Associates. "Best Available Control Technology." Document sent to Don Elias by Patty Adams of Florida DEP on October 16, 2001. 4-2 to 4-15.

HCB "Holderbank" Cement and Concrete. Environmental protection in construction materials production: objectives, measures, achievements. April 2000 (2nd ed.).

European Integrated Pollution Prevention and Control Bureau. "Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries." European Commission. Seville, Spain: March 2000.

Lin, M. Linda. and Michael J. Knenlein. "Cement Kiln NO_x Reduction Experience Using the NO_xOUT Process." Proceedings of 2000 International Joint Power Generation Conference. ASME, 2000.

Linero, A. A. "What's Up With Cement Plant Permitting? - What's BACT?" Presented at Air and Waste Management Association's 94th Annual Conference and Exhibition, Orlando, FL. June 24-28, 2001.

Linero, A. A. "What's Up With Cement Plant Permitting?" Abstract No. 884, Session No. EI-5a. Proceedings of the Air & Waste Management Association 94th Annual Conference and Exhibition, Orlando, FL. June 24-28, 2001. "NO_x Generation" Excerpt from Air Permit Application to Revise NO_x Emission limits for the

Holnam, Inc. Facility in Midlothian, TX. Document faxed by Ron Hawks of Environmental Quality Management, Inc. to Michael Hober of RTP Environmental Associates, Inc. Fax date September 17, 2001.

United States Environmental Protection Agency (USEPA) New Source Review (NSR)/RACT, BACT, LAER Clearinghouse (RBLC) Query Results (Matching Records for Process Code 90.006). Search conducted on March 27, 2001. http://209.42.208.109/rblc/cfm/result01.cfm.

USEPA NSR/RBLC Query Results (Matching Records for Process Code 90.028). Search conducted on March 27, 2001. http://209.42.208.109/rblc/cfm/result01.cfm.

USEPA NSR/RBLC Query Results (Matching Records for Process Code 90.028). Search conducted on March 19, 2001. http://209.42.208.109/rblc/cfm/result01.cfm.

Penta Engineering Company, St. Louis, MO, for Portland Cement Association. Report on NO_x Formation and Variability in Portland Cement Kiln Systems Potential Control Techniques and Their Feasibility and Cost Effectiveness. December 1998. (Copyright 1999 by Portland Cement Association.)

Portland Cement Association (Economic Research Department). "U.S. & Canadian New Cement Plants and Plant Modernizations." November 29, 2000.

Portland Cement Association (Economic Research Department). "U.S. & Canadian New Cement Plants and Plant Modernizations." September 1, 2000.

Portland Cement Association (Economic Research Department). Executive Summary. Skokie, Illinois: 2000.

Schreiber, Robert J., Jr. et al. "Selective Non-Catalytic Reduction and the Low NO_x Precalciner Kiln: Limitations on NO_x Control."

"Technical Consideration in Formation of CO and VOC from Cement Kilns." Excerpt from Air Permit Application to Revise NO_x Emission limits for the Holnam, Inc. Facility in Midlothian, TX. Document faxed by Ron Hawks of Environmental Quality Management, Inc. to Michael Hober of RTP Environmental Associates, Inc. Fax Date September 17, 2001.

"Technical Consideration in Formation of NO_x From Precalciner Cement Kilns." Excerpt from Air Permit Application to Revise NO_x Emission limits for the Holnam, Inc. Facility in Midlothian, TX. Document faxed by Ron Hawks of Environmental Quality Management, Inc. To Michael Hober of RTP Environmental Associates, Inc. Fax date September 17, 2001.

Sun, W.H., et al. "Reduction of NO_x Emissions from Cement Kiln/Calciner through the Use of the NO_xOUT Process." (Nalco Fuel Tech) Presented at the International Specialty Conference on Waste Combustion in Boilers and Industrial Furnaces, sponsored by Air & Waste Management Association, Kansas City, MO, April 21, 1994.

Terry, Mark S. "BACT: What is Achievable with Today's Technologies." Proceedings of the 36th International Cement Seminar December 3 - December 6, 2000. Greenwood Village, CO: Intertec Exhibitions. 131-157.

Texas Natural Resource Conservation Commission. "Subchapter B: Combustion at Existing Major Sources - Division 4: Cement Kilns." Chapter 117 - Control of Air Pollution from Nitrogen Compounds. Effective May 11, 2000. 98 - 103.

United States Environmental Protection Agency. Municipal Waste Combustion: Background Information for Promulgated Standards and Guidelines - Summary of Public Comments and Responses Appendices A to C. Office of Air Quality Planning and Standards. Research Triangle Park, NC: December 1990.

Utah Department of Environmental Quality - Division of Air Quality. "Title V Operating Permits Issued." March 30, 2001. http://www.deq.state.ut.us/equair/permits/pi_opp.htm. (Accessed on April 19, 2001.)

Walters, L. J., Jr. et al. "Time-Variability of NO_x Emissions from Portland Cement Kilns." Environmental Science & Technology 33 (1999): 700-704.

Young, Gerald L., and Michael von Seebach. "NO_x Variability Emission and Control from Portland Cement Kilns." Penta Engineering. Presented at the 34th International Cement Seminar in Salt Lake City, UT, December 1998.

Xeller, H. "Neue Entwicklungen bei der NO_x - Minderung in der Zementindustrie, Teil 2." ZKG International: April 1998. 208-218.

5.0 EXISTING AIR QUALITY

5.1 AMBIENT AIR QUALITY STANDARDS

Existing air quality can be evaluated by comparison of ambient pollutant measurements to ambient air quality standards (AAQS). National AAQS have been established by the USEPA. Primary AAQS are designed to protect public health with an adequate margin of safety. Secondary AAQS are designed to protect public welfare-related values, including property, materials, and plant and animal life. The State of Florida has adopted State AAQS that are at least as stringent as the National AAQS. These National and Florida AAQS are shown on Table 5-1. AAQS have been promulgated by USEPA and Florida for seven "criteria" pollutants: sulfur dioxide (SO_2); nitrogen dioxide (NO_2); carbon monoxide (CO); particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}); fine particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$); lead (Pb); and ozone (O_3). The 8-hour O_3 AAQS will eventually replace the 1-hour O_3 AAQS. Existing air quality for both 1-hour and 8-hour O_3 AAQS is assessed for completeness.

5.2 AMBIENT MONITORING SITES/MEASUREMENTS

Air quality in Florida is measured by a network of monitoring sites operated by the Florida Department of Environmental Protection (FDEP), by local air pollution control agencies, or by private companies. Table 5-2 shows the three monitoring sites nearest the Rinker Material Brooksville facility for each pollutant. A monitoring program consisting of three PM_{10} monitoring sites is operated in Hernando County for Rinker Materials in the area surrounding the facility. Other monitoring sites within 55 kilometers (km) of the facility measure SO_2 at

TABLE 5-1
NATIONAL AND FLORIDA STATE AMBIENT AIR QUALITY STANDARDS[a]

Pollutant/Averaging Time		Florida AAQS	National AAQS	
SO$_2$	3-hour average	1300 ug/m^3 (0.5 ppm)	0.5 ppm (1300 ug/m^3)	Secondary
	24-hour average	260 ug/m^3 (0.1 ppm)	0.14 ppm (365 ug/m^3)	Primary
	Annual arith. mean	60 ug/m^3 (0.02 ppm)	0.03 ppm (80 ug/m^3)	Primary
NO$_2$	Annual arith. mean	100 ug/m^3 (0.05 ppm)	0.053 ppm (100 ug/m^3)	Primary & Secondary
CO	1-hour average	35 ppm (40,000 ug/m^3)	35 ppm (40,000 ug/m^3)	Primary[b]
	8-hour average	9 ppm (10,000 ug/m^3)	9 ppm (10,000 ug/m^3)	Primary[b]
PM$_{10}$	24-hour average[c]	150 ug/m^3	150 ug/m^3	Primary & Secondary
	Annual arithmetic mean[d]	50 ug/m^3	50 ug/m^3	Primary & Secondary
PM$_{2.5}$	24-hour average[d]	-----	65 ug/m^3	Primary & Secondary
	Annual arithmetic mean[d]	-----	15 ug/m^3	Primary & Secondary
Lead	Quarter arithmetic mean	1.5 ug/m^3	1.5 ug/m^3	Primary & Secondary
O$_3$	Max.daily 1-hr avg[c]	0.12 ppm (235 ug/m^3)	0.12 ppm (235 ug/m^3)	Primary & Secondary
	Max.daily 8-hr avg[e]	-----	0.08 ppm (~ 157 ug/m^3)	Primary & Secondary

---

[a] Except where noted, short-term standards are not to be exceeded more than once in a calendar year and long-term standards are never to be exceeded.

[b] National secondary standards for carbon monoxide have been dropped.

[c] Compliance with short-term PM$_{10}$ and 1-hour O$_3$ standards is achieved, in simplest terms, when the expected number of days exceeding the standard is less than or equal to 1.0 per calendar year when averaged over a consecutive three year period. Or, if data completeness criteria are met, when the fourth-highest daily maximum concentration in three consecutive years is less than or equal to the AAQS.

[d] Compliance with the 24-hour PM$_{2.5}$ AAQS is achieved when the 3-year average of the annual 98th percentile concentrations is less than or equal to the AAQS. Compliance with the annual PM$_{10}$ and PM$_{2.5}$ AAQS is achieved when the 3-year average of the annual mean concentrations is less than or equal to the AAQS (essentially a 3-year average). The annual PM$_{2.5}$ AAQS also allows for spatially averaging concentrations over multiple monitoring sites.

[e] Compliance with the 8-hour O$_3$ AAQS is achieved when the 3-year average of the annual fourth-highest daily maximum 8-hour concentrations is less than or equal to the AAQS. The Federal regulations do not give a ug/m^3 concentration equivalent to the ppm AAQS, hence the approximation.

SOURCE: FAC 62-204.240 (Eff.7-1-2004) for Florida AAQS and 40 CFR 50 for National AAQS.

TABLE 5-2
NEAREST AMBIENT AIR MONITORING SITES

Site ID	City,County	UTM Coors (km)[a] East, North	Dist(km) Dir(deg)[b] from Facility
PM_{10} Monitors			
053-0005	Site Vicinity, Hernando	361.731 3161.711	1.9 ESE
053-0009	Site Vicinity, Hernando	361.684 3163.242	1.9 ENE
053-0004	Site Vicinity, Hernando	356.788 3161.835	3.3 W
O_3 Monitors			
101-0005	Dade City, Pasco	372.000 3134.500	30.4 SSE
101-2001	Holiday, Pasco	327.447 3119.882	53.6 SW
103-5002	Tarpon Springs, Pinellas	332.880 3108.174	60.6 SSW
SO_2 Monitors			
017-0003	Crystal River, Citrus	340.3 3198.4	41.0 NNW
017-0005	Crystal River, Citrus	334.370 3206.850	51.3 NNW
103-5003	Tarpon Springs, Pinellas	329.140 3113.970	57.4 SSW
$PM_{2.5}$ Monitors			
017-0005	Crystal River, Citrus	334.370 3206.850	51.3 NNW
057-1075	Tampa, Hillsborough	364.560 3103.340	59.2 S
057-0030	Tampa, Hillsborough	351.467 3090.422	72.5 S
NO_2 Monitors			
057-1065	Tampa, Hillsborough	348.560 3086.060	77.2 S
103-0018	St. Petersburg, Pinellas	328.560 3074.500	93.4 SSW
057-0081	Hills. Bay, Hillsborough	355.544 3069.100	93.4 S
CO Monitors			
103-2006	Clearwater, Pinellas	331.920 3103.450	65.3 SSW
057-1070	Tampa, Hillsborough	357.000 3096.500	66.0 S
103-2008	Clearwater, Pinellas	334.583 3086.245	80.3 SSW
Pb Monitors			
057-1073	Patent Scaffold, Hillsboro	364.310 3093.990	68.5 S
057-1066	Gulf Coast Lead, Hillsboro	364.000 3093.400	69.1 S
103-3005	Pinellas Park, Pinellas	333.000 3084.420	82.5 SSW

[a] Sites operated from 2001-2003 are shown. UTM coordinates are taken from the FDEP Air Monitoring Report 2002 or provided by Brian Kerckoff, FDEP, for industry monitors by telephone conversation and e-mail in September 2004 (with raw data).

[b] Distances and directions from the facility are based on facility UTM Coordinates (Zone 17) of 360.008 km East and 3162.398 km North.

two locations in Citrus County; $PM_{2.5}$ at one location in Citrus County; and O_3 at two locations in Pasco County.

The nearest monitoring sites for the remaining criteria pollutants (PM_{10}, NO_2, CO, and Pb) are located in the nearest major metropolitan area -- Tampa-St.Petersburg in Hillsborough and Pinellas Counties. The locales for most of these monitoring sites are more urban in nature than the facility location and would be expected to record higher concentrations than experienced at the facility site. However, the four nearest monitoring sites in Tarpon Springs and Clearwater in Pinellas County (103-5002 for O_3, 103-5003 for SO_2, 103-2006 and 103-2008 for CO) are located in an area that is less developed than the city centers. SO_2 monitors in Citrus County are located near the Crystal River fossil-fueled power plant and would also be expected to record higher concentrations than experienced at the project site. Since the two Hillsborough County lead monitoring sites are special purpose monitors for a localized source of lead emissions, the Pinellas County lead monitor will be used to estimate existing air quality for lead.

Table 5-3 shows the second-highest short-term and maximum long-term concentrations measured at each of these monitoring sites during each of the years during the most recent three year period for which data are available (2001-2003). The most recent three-year period was selected since attainment designations are typically based on a consecutive two-year or three-year period. Except for lead as discussed above, the maximum second-highest short-term (or other short-term concentrations as appropriate for the AAQS) and maximum long-term concentrations from any of the three nearest monitoring sites will be used for estimating baseline concentrations. Table 5-4 compares these baseline concentrations to the appropriate AAQS. Maximum SO_2 baseline concentrations are about 35% and 12% of the most restrictive National or Florida AAQS for short-term (i.e., 3-hours and 24-hours) and annual averaging times, respectively. The maximum annual NO_2 baseline concentration is 22% of the National and Florida AAQS. Maximum CO baseline concentrations are 16% and 44% of the National

TABLE 5-3
AMBIENT AIR QUALITY MONITORING DATA

Pollutant/	-------Hernando County-------			------Pasco Co-------		---Citrus County[a]---		--Pinellas County--	
Avg.Time/Year	053-0005	053-0009	053-0004	101-0005	101-2001	017-0003	017-0005	103-5003	103-5002
PM_{10}/24-hour Second-Highest Concentration (ug/m^3)									
2003	34	26	33	---	---	---	---	---	---
2002	29	38	25	---	---	---	---	---	---
2001	57	**58**	46	---	---	---	---	---	---
PM_{10}/Annual Arithmetic Mean Concentration (ug/m^3)									
2003	16.3	15.5	15.8	---	---	---	---	---	---
2002	16.6	17.0	14.3	---	---	---	---	---	---
2001	19.4	18.9	18.8	---	---	---	---	---	---
3-year Arith. Average	**17.4**	17.1	16.3	---	---	---	---	---	---
O_3/1-hour Maximum Concentration, Second-Highest Day (ppb)									
2003	---	---	---	91	99	---	---	---	97
2002	---	---	---	86	87	---	---	---	78
2001	---	---	---	83	91	---	---	---	95
3-year Fourth-highest	---	---	---	90	92	---	---	---	**95**
O_3/8-hour Maximum Concentration, Fourth-Highest Day (ppb)									
2003	---	---	---	77	80	---	---	---	77
2002	---	---	---	69	74	---	---	---	67
2001	---	---	---	74	78	---	---	---	80
3-year Arith. Average	---	---	---	73	**77**	---	---	---	74
SO_2/3-hour Second-Highest Concentration (ppb)									
2003	---	---	---	---	---	42	74	55	---
2002	---	---	---	---	---	34	80	72	---
2001	---	---	---	---	---	36	**167**	75	---
SO_2/24-hour Second-Highest Concentration (ppb)									
2003	---	---	---	---	---	8	17	10	---
2002	---	---	---	---	---	7	16	15	---
2001	---	---	---	---	---	6	**35**	18	---
SO_2/ Annual Arithmetic Mean Concentration (ppb)									
2003	---	---	---	---	---	0.8	2.0	1.9	---
2002	---	---	---	---	---	0.8	1.8	2.3	---
2001	---	---	---	---	---	0.8	**2.7**	2.5	---

[a] Data missing for 1/1/01-3/31/01 for both Citrus County sites as well as 7/1/02-12/31/02 and 4/1/03-6/30/03 for 017-0003 so annual averages for 2001 (both sites) and 2002-2003 (017-0003) not representative.

TABLE 5-3 (Concluded)
AMBIENT AIR QUALITY MONITORING DATA

Pollutant/	--Citrus--	Hillsborough County							Pinellas County			
Avg./Yr	017-0005	057-1075	057-1070	057-1073	057-1066	057-0030	057-1065	057-0081	103-2006	103-2008	103-3005	103-0018
PM$_{2.5}$/24-hour Concentration – 98th Percentile(ug/m^3)												
2003	19.0	21.5	---	---	---	21.4	---	---	---	---	---	---
2002	19.4	24.0	---	---	---	20.6	---	---	---	---	---	---
2001	23.8	29.9	---	---	---	27.0	---	---	---	---	---	---
3-year Avg.	20.7	**25.1**	---	---	---	23.0	---	---	---	---	---	---
PM$_{2.5}$/Annual Arithmetic Mean Concentration (ug/m^3)												
2003	8.7	11.2	---	---	---	11.6	---	---	---	---	---	---
2002	8.6	11.4	---	---	---	10.7	---	---	---	---	---	---
2001	9.8	15.1	---	---	---	11.8	---	---	---	---	---	---
3-year Avg.	9.0	**12.6**	---	---	---	11.4	---	---	---	---	---	---
NO$_2$/Annual Arithmetic Mean Concentration (ppb)												
2003	---	---	---	---	---	---	9.7	6.9	---	---	---	9.8
2002	---	---	---	---	---	---	10.6	7.0	---	---	---	11.2
2001	---	---	---	---	---	---	11.1	7.4	---	---	---	**11.5**
CO/1-hour Second-Highest Concentration (ppm)												
2003	---	---	**5.7**	---	---	---	---	---	3.2	3.1	---	---
2002	---	---	5.3	---	---	---	---	---	2.7	3.7	---	---
2001	---	---	5.1	---	---	---	---	---	2.5	4.0	---	---
CO/8-hour Second-Highest Concentration (ppm)												
2003	---	---	3.3	---	---	---	---	---	1.1	1.8	---	---
2002	---	---	**3.8**	---	---	---	---	---	1.7	2.3	---	---
2001	---	---	3.0	---	---	---	---	---	1.5	2.1	---	---
Pb/Maximum Quarterly Arithmetic Mean Concentration (ug/m^3)												
2003	---	---	---	0.25	0.74	---	---	---	---	---	**0.01**	---
2002	---	---	---	0.41	1.27	---	---	---	---	---	0.01	---
2001	---	---	---	0.47	1.29	---	---	---	---	---	0.01	---

Note: The selected baseline concentrations summarized on Table 5-4 are **bolded**.

TABLE 5-4
COMPARISON OF BASELINE CONCENTRATIONS TO AMBIENT AIR QUALITY STANDARDS

Pollutant/Avg.Time		Baseline Conc (ug/m^3)[a] and Year/Location	AAQS[b] (ug/m^3)	Baseline % of AAQS
PM_{10}	24-hour	58 (01/053-0009)	150	39%
	Annual	17.4 (--/053-0005)	50	35%
O_3	1-hour	186 (--/103-5002)	235	79%
	8-hour	151 (--/101-2001)	~157	96%
SO_2	3-hour	438 (01/017-0005)	1300	34%
	24-hour	92 (01/017-0005)	260	35%
	Annual	7.1 (01/017-0005)	60	12%
$PM_{2.5}$	24-hour	25.1 (--/057-1075)	65	39%
	Annual	12.6 (--/057-1075)	15	84%
NO_2	Annual	22 (01/103-0018)	100	22%
CO	1-hour	6,555 (03/057-1070)	40,000	16%
	8-hour	4,370 (02/057-1070)	10,000	44%
Lead	Quarter	0.01 (03/103-3005)	1.5	0%

---

[a] Baseline concentrations are the appropriate concentrations for the form of the AAQS for the most recent three year period (2001-2003). SO_2, NO_2, CO, and O_3 converted from ppb or ppm using 2620, 1881, 1150, and 1963 ug/m^3 per ppm, respectively.

[b] Some AAQS shown are the Florida AAQS, which are more restrictive than the National AAQS.

and Florida AAQS for averaging times of 1-hour and 8-hours, respectively. Maximum PM_{10} baseline concentrations measured in Hernando County are 39% and 35% of the PM_{10} National and Florida AAQS for averaging times of 24-hours and annual periods, respectively. Maximum $PM_{2.5}$ baseline concentrations are 39% and 84% of the $PM_{2.5}$ National AAQS for averaging times of 24-hours and annual periods, respectively. Lead levels measured at the selected representative site in Pinellas County were below the detection limits of the monitoring methods. The maximum 1-hour O_3 baseline concentration is 79% of the National and Florida AAQS while the 8-hour O_3 baseline concentration is slightly less than the newer O_3 National AAQS. Therefore, the baseline air quality estimated for the project site is in compliance with all National and Florida AAQS.

5.3 ATTAINMENT STATUS

Under Section 107 of the Clean Air Act (CAA), each state is required to develop a State Implementation Plan (SIP) that specifies the manner by which all areas within the state will achieve and maintain compliance with the National AAQS. For regulatory purposes under the SIP, all areas in the United States are designated as either attainment, nonattainment, or unclassifiable with the National AAQS for each criteria pollutant. Attainment areas are areas that are currently in compliance with the National AAQS and continued compliance is expected under the current SIP requirements. Nonattainment areas are areas which either currently do not comply with the National AAQS or which significantly contribute to nearby areas that do not comply with the National AAQS. Nonattainment areas can also be areas which previously did not comply with the National AAQS and SIP requirements to ensure future compliance (i.e., maintenance) with the National AAQS are deemed inadequate or have not yet been approved by USEPA. Unclassifiable areas are areas where insufficient data exists to classify the area as either attainment or nonattainment and are generally presumed to be in attainment with the National AAQS.

The facility is located in Hernando County, which is part of the West Central Florida Intrastate Air Quality Control Region (AQCR). This AQCR also includes Levy, Citrus, and Sumter

Counties to the north and Pasco, Pinellas, Hillsborough, Polk, Manatee, and Hardee Counties to the south (40 CFR 81.96). The project site and Hernando County are designated as attainment or unclassifiable (presumed to be in attainment) areas for all criteria pollutants. The entire state of Florida is considered to be in attainment with the National AAQS for PM_{10}, O_3 (both 1-hour and 8-hour standards), SO_2, CO, NO_2, and lead (40 CFR 81 and 69 FR 23893). Florida is expected to be considered to be in attainment with the $PM_{2.5}$ AAQS when the official attainment designations are promulgated.

USEPA considers the entire state of Florida to be attainment for lead and the 1-hour O_3 AAQS. However, maintenance areas south of the facility in the Tampa-St.Petersburg area exist for these two AAQS. These areas exceeded the AAQS in the past and additional control requirements were added to the Florida regulations and SIP for these areas in order to maintain AAQS compliance. These maintenance areas include:

- A lead maintenance area 5 km in radius in Hillsborough County associated with the Gulf Coast Recycling (a battery recycling facility), centered at UTM Zone 17 coordinates 364.0 km east and 3093.5 km north, which is 64 km south of the facility
- A 1-hour O_3 maintenance area consisting of Pinellas and Hillsborough Counties, which is located 45 km south of the facility at its closest boundary.

Other 1-hour O_3 maintenance areas in Florida consist of Orange County; Duval County; and Broward, Dade, and Palm Beach Counties.

5.4 REFERENCES

Code of Federal Regulations, Title 40, Parts 50 and 81.

Florida Administrative Code, Chapter 62-204 (Effective 7-1-2004)

Florida Department of Environmental Protection (FDEP). Air Monitoring Report 2002.

FDEP. QUICK LOOK Computer Reports for 2003, 2002, and 2001.

6.0 AIR QUALITY MODELING ANALYSES

6.1 MODEL SELECTION

An air quality modeling analysis was performed for the proposed Unit II addition to the Rinker Brooksville facility in order to compare project impacts to the significant impact levels (SILs), and if necessary to perform cumulative analyses to determine compliance with the State and National Ambient Air Quality Standards (NAAQS) and the PSD increments.

6.1.1 Pollutants

For the modeling analyses, all pollutants will be considered to be inert pollutants. The Ambient Ratio Method (ARM) will be used to determine the portion of the nitrogen oxides (NO_x) emissions that are converted into nitrogen dioxide (NO_2) for purposes of estimating ambient NO_2 impacts. Since ozone (O_3) is not emitted directly from any source but results from regional photochemical interactions of volatile organic compounds (VOC) and NO_x emissions of many sources, the impact of facility emissions on O_3 concentrations will not be estimated. As discussed in Section 5.0, the project site and vicinity are designated as attainment for all criteria pollutants, including O_3. Modeling will be performed for all pollutants subject to PSD review (i.e., SO_2, NO_x, CO, and PM_{10}) as shown on Table 2-1.

6.1.2 Source Vicinity

The terrain and land uses of the project vicinity must be considered in the modeling analyses. The terrain around the project site is flat to gently rolling. No terrain above the stack release height (termed "complex terrain") occurs in the project area. Therefore, simple terrain models are required for the modeling analyses and no complex terrain modeling is required.

The facility is located in an overwhelmingly rural area based on the Auer land use methodology. Therefore, rural dispersion curves are required in all models used for the modeling analyses.

6.1.3 Source Characteristics

The existing Brooksville facility includes a cement kiln and power plant boiler (exhausted through a common 320 foot high GEP stack), along with existing material handling equipment controlled with baghouse dust collectors. This permit application is being submitted to add a second cement kiln (Unit II, exhausted through a separate stack) and associated material handling equipment to the facility. Tables 6-1 and 6-2 present the UTM coordinates, source characteristics, and emission rates used in the modeling analysis for the Unit II kiln and material handling equipment, respectively.

TABLE 6-1
PROPOSED KILN SOURCE CHARACTERISTICS

Parameter/Operating scenario	Kiln 2 @ 100%	Kiln 2 @ 75%	Kiln 2 @ 50%
Stack Height (ft agl)	350	350	350
Stack Height (m agl)	106.7	106.7	106.7
Stack Diameter (ft)	13.6	13.6	13.6
Stack Diameter (m)	4.15	4.15	4.15
Stack Flow (ACFM)	370,000	277,500	185,000
Stack Exit Velocity (m/sec)	12.94	9.70	6.47
Stack Temperature (F)	550	550	550
Stack Temperature (K)	560.9	560.9	560.9
SO2 3-hr and 24-hr Emission rate (lb/hr)	57.5	43.13	28.75
SO2 Annual Emission rate (lb/hr)	26.83	20.12	13.42
NOx Annual Emission rate (lb/hr)	256.5	192.4	128.2
PM 24-hr and Annual Emission rate (lb/hr)	38.50	28.88	19.25
CO Short Term Emission rate (lb/hr)	1000.0	750.0	500.0

TABLE 6-2
SOURCE CHARACTERISTICS FOR MATERIAL HANDLING BAGHOUSE PM_{10} SOURCES

Name	ISC ID #	Vent #	UTM East m	UTM North m	Flow Rate (ACFM)	Temp (F)	PM_{10} Emissions (lbs/hr)	PM_{10} Emissions (tons/yr)	Stack Ht m	Stack Dia m	Temp K	Velocity m/sec
Filter Dust; 2E-22	N2G08	2G-08	360090	3162615	4,000	200	0.269	1.18	59.1	0.52	366.5	8.95
Filter Dust; 2E-22	N2G09	2G-09	360100	3162594	15,000	180	1.040	4.56	59.1	1.01	355.4	8.91
Raw Meal Transport; 2F-04	N2F09	2F-09	360091	3162596	3,000	180	0.208	0.91	9.1	0.43	355.4	9.90
Kiln Feed Transport; 2H-05	N2H08	2H-08	360104	3162588	3,000	180	0.208	0.91	9.1	0.43	355.4	9.90
Clinker Transport; 2L-01	N2L03	2L-03	360128	3162540	3,000	240	0.190	0.83	9.8	0.49	388.7	7.58
Gypsum Bin; 2L-14	N2L08	2L-08	360157	3162425	4,000	95	0.320	1.40	36.6	0.49	308.2	10.11
Clinker Storage; Silo 2L-05	N2L06	2L-06	360170	3162438	4,000	240	0.253	1.11	61.9	0.49	388.7	10.11
Finish Mill Collecting Belt; 2M-04	N2M09	2M-09	360176	3162462	12,000	180	0.832	3.64	4.6	0.70	355.4	14.67
Finish Mill; 2N-01	N2N12	2N-12	360169	3162485	35,000	212	2.310	10.12	39.6	1.22	373.2	14.15
Air Slide 2N-03 & Bucket 2N-04	N2N91	2N-91	360179	3162476	6,000	200	0.403	1.77	14.0	0.55	366.5	11.98
High Efficiency Separator; 2N-06	N2N09	2N-09	360182	3162485	128,600	160	9.199	40.29	39.6	2.29	344.3	14.79
Cement Cooler; 2N-26	N2N91	2N-91	360177	3162500	6,000	200	0.403	1.77	14.0	0.55	366.5	11.98
Cement Transport; 2P-01	N2Q10	2Q-10	360165	3162440	3,700	180	0.256	1.12	61.9	0.49	355.4	9.35
Cement Transport; 2P-01	N2Q13	2Q-13	360150	3162397	12,000	180	0.832	3.64	61.9	0.64	355.4	17.60
Cement Loadout Bin; 2Q-28	N2Q15	2Q-15	360140	3162362	3,000	180	0.208	0.91	9.1	0.43	355.4	9.90
Cement Loadout Bin; 2Q-31	N2Q16	2Q-16	360144	3162354	3,000	180	0.208	0.91	9.1	0.43	355.4	9.90
Coal Mill; 2S-15	N2S16	2S-16	360138	3162585	22,000	150	1.600	7.01	12.2	1.19	338.7	9.35
Pulverized Fuel Bin; 2S-20	N2S21	2S-21	360136	3162572	2,000	150	0.145	0.64	12.2	0.34	338.7	10.69

6.1.4 Model Selection, Meteorological Data, and Receptor Grids

Based on the characteristics of the source and source vicinity, ISCST3 was used. This model is a "preferred" air quality model recommended for regulatory use by the Guideline on Air Quality Models (GAQM). The latest regulatory-approved version of this model was obtained from the USEPA SCRAM Bulletin Board System for use in this analysis. Model options selected are concentration impacts and the regulatory default option switch.

Five years of National Weather Service (NWS) meteorological data, 1991 through 1995, from Tampa International Airport were utilized. Since five years of NWS data were used, the design concentrations for short-term averages will be the highest-second-high (H2H) concentration.

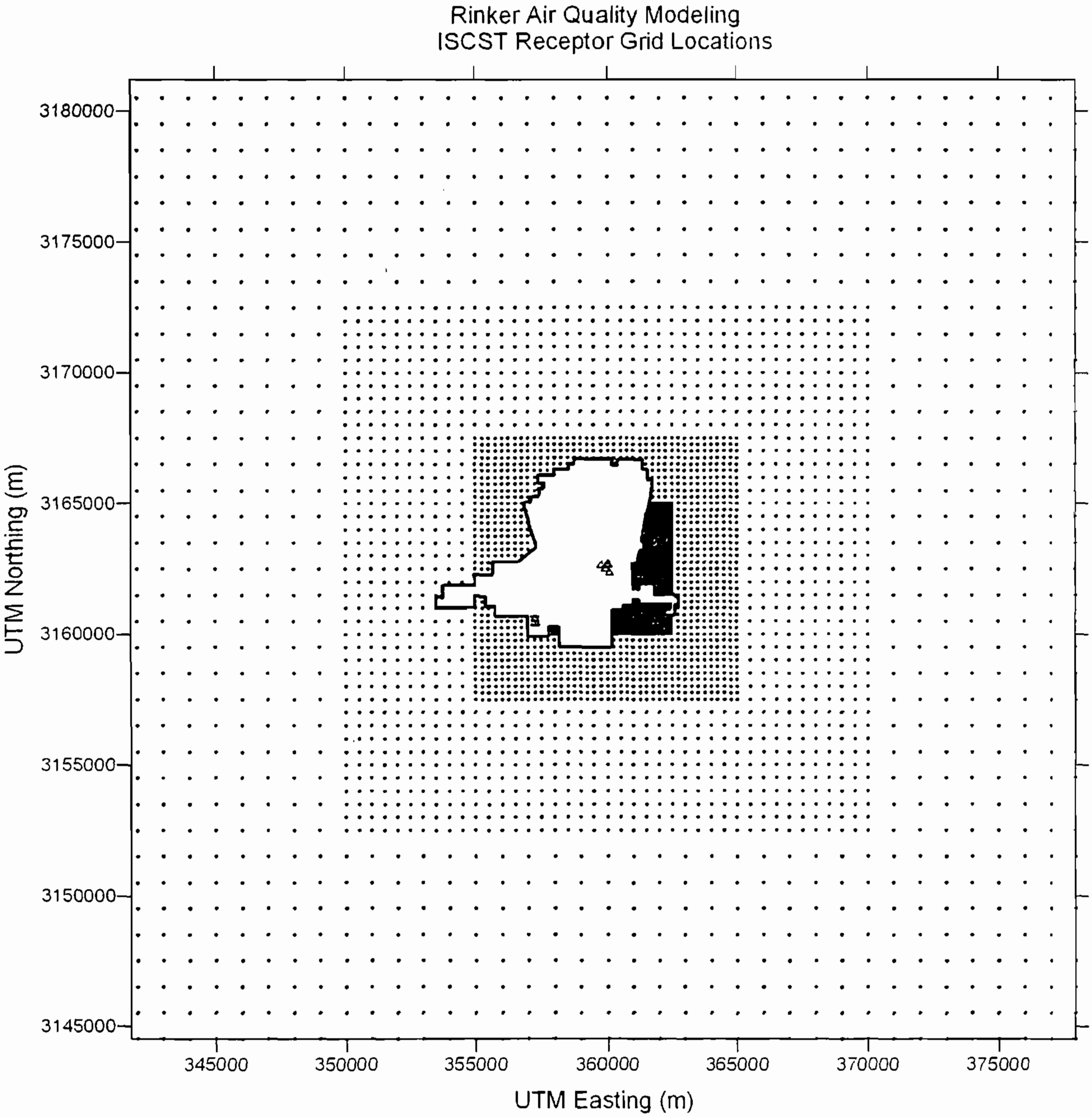
The selection of appropriate receptor locations is an important aspect of the air quality analysis. The receptors developed for the Brooksville analysis are based on multiple rectangular receptor arrays, which decrease in density as the distance from the source increases. In addition, "fine" receptors were used to cover areas of maximum impacts. The purpose of these different networks is to ensure that the maximum concentrations are accurately estimated. Actual receptor elevations were used in the analysis because there were some terrain differences on the order of 200 feet within a few kilometers of the kiln stack. The main receptor grid includes the following:

- a fence line grid at 50 meter spacing,
- a 100 meter spaced rectangular grid extending out 2.5 km in all directions,
- a 250 meter spaced rectangular grid extending out 5 km,
- a 500 meter spaced rectangular grid extending out 10 km, and
- a 1 km spaced rectangular grid extending out 18 km

See Figure 6-1 for a plot of the receptor grid. These receptor grids and receptor elevation data were developed using AERMAP, the terrain preprocessor for AERMOD, and USGS Digital Elevation Model (DEM) 7.5 minute data files.

Additionally, a separate receptor grid was created to assess impacts at the nearest PSD Class I area, the Chassahowitzka NWR, located approximately 20 kilometers to the northwest of the facility.

Figure 6-1 Receptor Grid Plot



The receptor grid for the Class I area includes boundary receptors at 200 meter spacing, and a 500 meter spaced rectangular grid extending throughout the entire NWR .

6.2 MODELING METHODOLOGY

EPA guidance for performing PSD air quality analyses is set forth in Chapter C of EPA's New Source Review Workshop Manual, Draft - October 1990, and in EPA's "Guideline on Air Quality Models", 40 CFR Part 51 Appendix W (herein referred to as the GAQM). All modeling procedures used for the Brooksville analysis are consistent with EPA guidance. The analysis is conducted in two steps. The first step is a "project-only" or "significant impact analysis" (which includes a load screening analysis for the proposed kiln to determine worst case source configurations). If the ambient impacts of the proposed project are greater than the significant impact levels (SIL) for a particular pollutant and averaging interval, then the geographical extent of the project's Significant Impact Area (SIA) is determined and a "multi-source" or "cumulative impact" analysis is performed within the SIA.

6.2.1 BPIP Analysis

A Good Engineering Practice (GEP) stack height analysis for the proposed second kiln stack and material handling baghouse stacks was conducted as part of the modeling analysis. The latest version of EPA's BPIP program was used to calculate GEP stack heights that were compared to actual stack heights to demonstrate compliance with the stack height regulations codified at 40 CFR Part 51. The facility layout was digitized and geo-referenced, and 36 stacks and 34 structures (including existing stacks and structures) were input to the BPIP data files. BPIP was then run, and results were tabulated.

The GEP analysis indicates that the proposed kiln stack height of 350 feet is less than the GEP height of 510 feet (the nearby pre-calciner tower is 264 feet high, and is the controlling structure in the BPIP analysis for the proposed kiln stack). In addition, since the material handling baghouse systems are typically located adjacent to a structure, all the stack heights from these point sources were less than GEP. Therefore, for all point sources for the proposed project, the building downwash parameters calculated by BPIP were used in the modeling analysis.

6.2.2 Load Screening Analysis

In order to determine worst-case source configurations for the proposed kiln, a load screening analysis was performed. The stack volumetric flow rates and emissions were linearly varied for operating configurations of 100%, 75%, and 50% load to determine if the lower plume rise associated with low load operations could result in higher ambient impacts, even though the emission rates are lower.

6.2.3 SIA Modeling Analysis

Once the worst-case configuration for the proposed kiln was determined, the ambient impacts from the proposed kiln, all associated material handling baghouse PM_{10} emissions, and all project related cement truck haul road fugitive PM_{10} emissions were determined. The roadway emissions were modeled as 70 small volume sources, and the source parameters (based on guidance in Table 3-1 of the ISCST3 Users Guide for a line source represented by separated volume sources) included a release height of 1 meter, an initial lateral dimension of 9.3 meters, and an initial vertical dimension of 3 meters.

6.2.4 Cumulative Modeling Analysis

If the ambient impacts of the proposed project alone are greater than the significant impact levels (SIL) for a particular pollutant and averaging interval, then a "multi-source" or cumulative impact analysis must be performed for that particular pollutant and averaging interval. The cumulative analysis considers emissions from existing facility emission units as well as other nearby sources, and consists of separate NAAQS and PSD increment cumulative analyses. For the NAAQS analyses, the modeled impacts from the proposed, existing, and other nearby sources (using maximum allowable emission rates) are added to ambient background concentrations (tabulated in Section 5) and the total concentrations are compared to the NAAQS. For the PSD increment analysis, the appropriate sources and emissions that are modeled are those source changes that have occurred since the applicable baseline date.

6.3 MODELING ANALYSIS RESULTS

6.3.1 Load Screening Modeling Results

Table 6-3 presents the results of the proposed kiln load screening analysis. The analysis was performed with ISCST3 for both the Class II and Class I receptor grids. For all pollutants and averaging intervals, the 100% load scenario was either the worst-case scenario or equal to any other scenario. Therefore, all subsequent modeling was based on the 100% load scenario for the proposed kiln.

Table 6-3
Summary of Proposed Kiln Load Screening Results

CLASS II RESULTS - 100% Load

	Emission rate (lb/hr)	X/q ug/m3	Impact (ug/m3)	Class II SIL
SO2 3hr	57.5	0.139	**7.99**	25
SO2 24hr	57.5	0.028	**1.63**	5
SO2 ann	26.8	0.0018	**0.05**	1
NOx	256.5	0.0018	**0.46**	1
PM 24hr	38.5	0.028	**1.09**	5
PM ann	38.5	0.0018	**0.07**	1
CO 8hr	1000.0	0.070	**70**	500
CO 1hr	*1000.0*	*0.157*	**157**	*2000*

CLASS I RESULTS - 100% Load

	Emission rate (lb/hr)	X/q ug/m3	Impact (ug/m3)	Class I SIL
SO2 3hr	57.5	0.0150	**0.86**	1
SO2 24hr	57.5	0.0032	**0.18**	0.2
SO2 ann	26.8	0.0003	**0.007**	0.08
NOx	256.5	0.0003	**0.07**	0.1
PM 24hr	38.5	0.0032	**0.12**	0.32
PM ann	38.5	0.0003	**0.010**	0.16

CLASS II RESULTS - 75% Load

	Emission rate (lb/hr)	X/q ug/m3	Impact (ug/m3)	Class II SIL
SO2 3hr	43.1	0.176	7.59	25
SO2 24hr	43.1	0.037	1.61	5
SO2 ann	20.1	0.0024	0.05	1
NOx	192.4	0.0024	0.46	1
PM 24hr	28.9	0.037	1.08	5
PM ann	28.9	0.0024	0.07	1
CO 8hr	750.0	0.088	66	500
CO 1hr	750.0	0.198	149	2000

CLASS I RESULTS - 75% Load

	Emission rate (lb/hr)	X/q ug/m3	Impact (ug/m3)	Class I SIL
SO2 3hr	43.1	0.0160	0.69	1
SO2 24hr	43.1	0.0039	0.17	0.2
SO2 ann	20.1	0.0003	0.006	0.08
NOx	192.4	0.0003	0.06	0.1
PM 24hr	28.9	0.0039	0.11	0.32
PM ann	28.9	0.0003	0.008	0.16

CLASS II RESULTS - 50% Load

	Emission rate (lb/hr)	X/q ug/m3	Impact (ug/m3)	Class II SIL
SO2 3hr	28.8	0.236	6.79	25
SO2 24hr	28.8	0.052	1.50	5
SO2 ann	13.4	0.0034	0.046	1
NOx	128.2	0.0034	0.44	1
PM 24hr	19.3	0.052	1.00	5
PM ann	19.3	0.0034	0.07	1
CO 8hr	500.0	0.118	59	500
CO 1hr	500.0	0.272	136	2000

CLASS I RESULTS - 50% Load

	Emission rate (lb/hr)	X/q ug/m3	Impact (ug/m3)	Class I SIL
SO2 3hr	28.8	0.0230	0.66	1
SO2 24hr	28.8	0.0050	0.14	0.2
SO2 ann	13.4	0.0003	0.004	0.08
NOx	128.2	0.0003	0.04	0.1
PM 24hr	19.3	0.0050	0.10	0.32
PM ann	19.3	0.0003	0.006	0.16

6.3.2 Significant Impact Analysis

Table 6-4 presents the results of the project significant impact analysis. This modeling run considered the project emissions from the proposed kiln, material handling baghouse PM_{10} emissions, and all project related cement truck haul road fugitive PM_{10} emissions.

The only pollutants and averaging intervals that have significant impacts were PM_{10} annual and PM_{10} 24-hour averages, therefore cumulative NAAQ and PSD increment analyses were performed for this pollutant. The PM_{10} significant impact area was determined to be 5.2 km. Figures 6-2 and 6-3 present isopleth plots for the 24-hr and annual project PM_{10} impacts. The maximum impact locations occur near the eastern facility boundary.

6.3.3 De Minimis Monitoring Levels

The project significant impact results presented in Table 6-4 also compare project ambient impacts to the de minimis monitoring thresholds. The maximum impacts from the proposed project are less than the de minimis monitoring levels for all pollutants except PM_{10}.

Ambient air quality background data were reviewed and summarized in Section 5.0 for use in the NAAQS analyses. The PM_{10} background concentrations were compiled from three PM_{10} monitoring sites currently being operated in Hernando County for Rinker Materials. Therefore, the applicant has collected PM_{10} data that meets the de minimis monitoring requirements. For all other pollutants, the applicant is requesting an exemption from pre- or post-construction PSD monitoring requirements for this modification as allowed for under 62-212.400(2)(f) FAC on the basis the project modeled impacts are below the thresholds.

6.3.4 Cumulative Modeling Emission Inventory

Cumulative NAAQ and PSD increment analyses were required for PM_{10}. A PM_{10} emission inventory was obtained from the Department's Bureau of Information Systems of all permitted air emission sources within 55 km of the proposed project (this represents the 5.2 km PM_{10} SIA plus an additional 50 km distance). The modeling inventory for PSD increments and NAAQS analyses were developed from the master inventory. Small, insignificant sources were removed from the master inventory on the basis of the 20-D methodology. The 20-D methodology multiplies the distance between the facility and the proposed project in kilometers (D) by 20, and compares this value to the facility's emissions in tons per year. Any facility where the 20-D value was greater than the emission value is assumed to have a negligible effect on the ambient air concentrations,

Table 6-4
Summary of Significant Impact Modeling

Pollutant	Avg. Period	Maximum Project Impact (μg/m3)	Class II SIL (μg/m3)	Class II Cumulative Analysis (Yes/No)	SIA Extent (km)	De Minimis Monitoring Level (μg/m3)	Triggers Monitoring Data Requirement (Yes/No)
NO_2	Annual	0.46	1	NO	--	14	No
SO_2	3-Hr	8.0	25	NO	--	NA	NA
	24-Hr	1.6	5	NO	--	13	No
	Annual	0.05	1	NO	--	NA	NA
CO	1-Hr	157	2000	NO	--	NA	NA
	8-Hr	70	500	NO	--	575	No
PM_{10}	24-Hr	12.8	5	YES	4.2	10	Yes
	Annual	1.7	1	YES	1.3	NA	NA

The extent of the SIA is measured from the location of the proposed kiln stack.

Figure 6-2 PM$_{10}$ 24-hr Project Impacts Plot

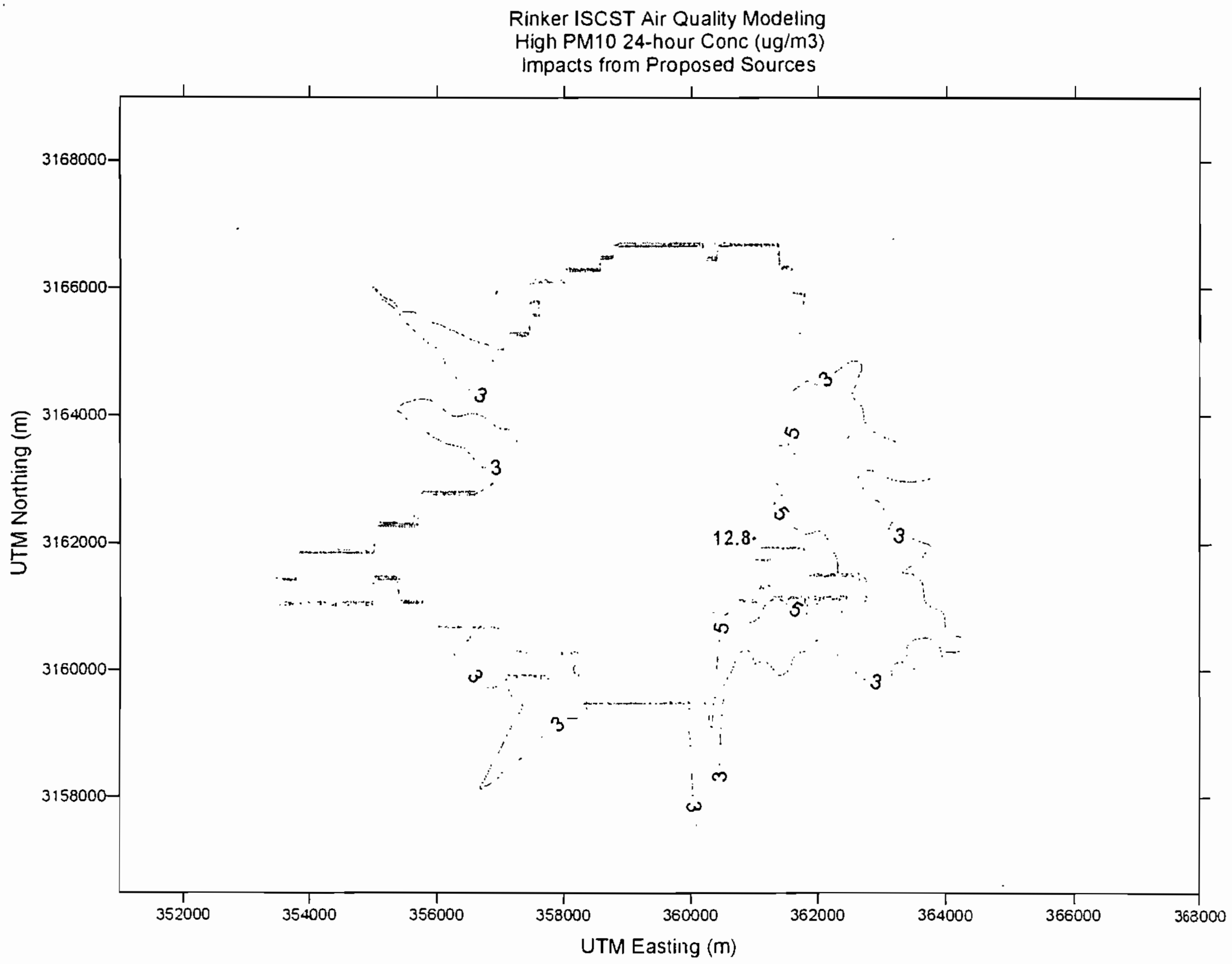
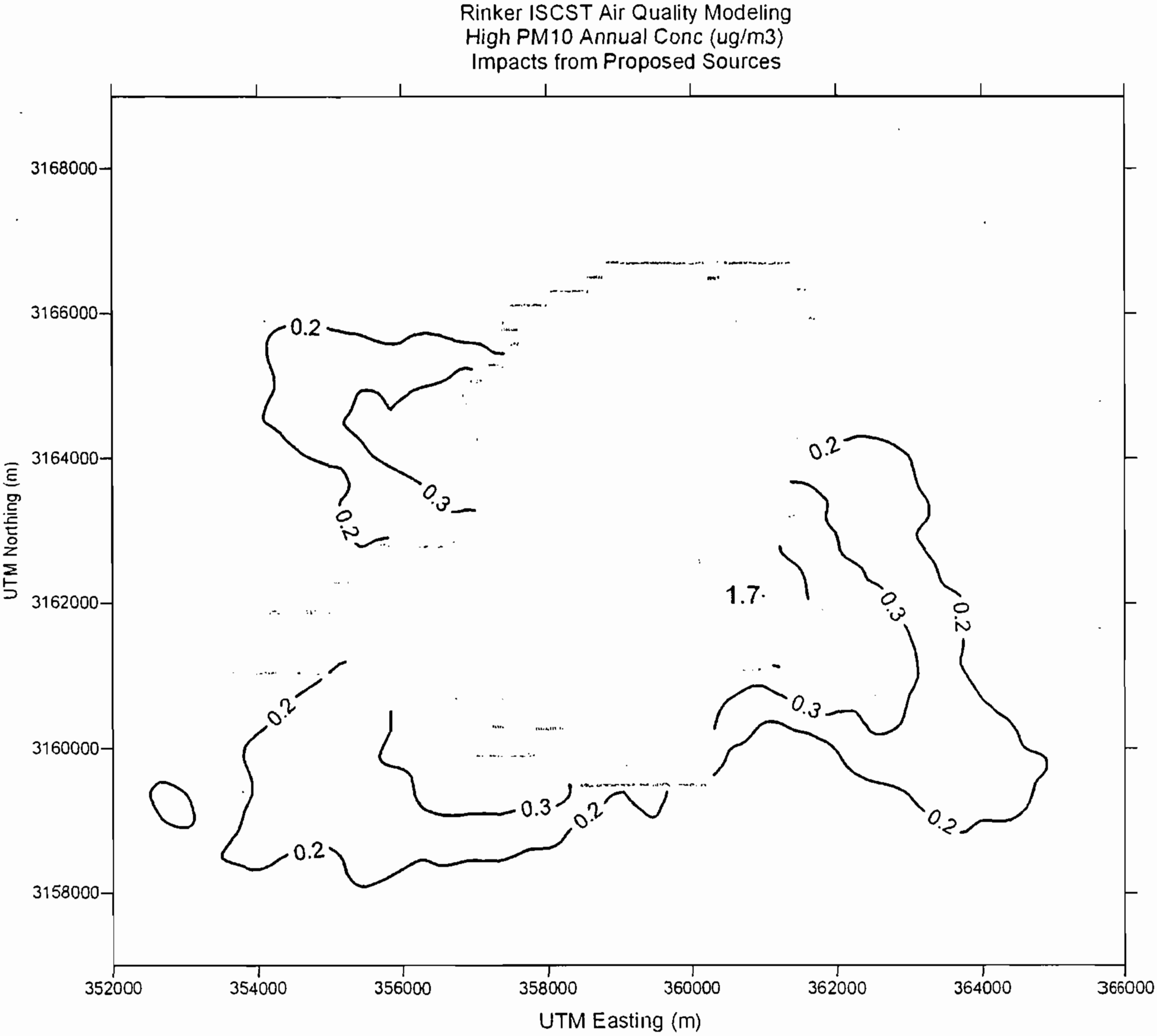


Figure 6-3 PM$_{10}$ Annual Project Impacts Plot



and was removed from the cumulative inventory. One inventory was developed for use in the Class II area based on the distance to the proposed project, and another inventory was developed for use in the Class I area based on the distance to the Class I area.

Table 6-5 presents the sources that remain after 20-D editing of the inventory, along with the modeling parameters (the complete inventory is submitted in Excel format on the modeling CD-ROM). The sources used in the cumulative analysis include the Crystal River and Anclote power plants, and the Cemex and Gregg Mine sources. Out of these sources included in the cumulative modeling, only the Crystal River 3 and 4 boilers are PSD increment affecting sources (these units were built in the 1980s).

In addition to these other sources, the existing Brooksville cement kiln Unit I, the power plant, the material handling baghouse point sources, and the existing cement haul truck traffic emission sources were also included in the modeling analysis. The maximum permitted emission rates for the existing sources were used. The existing truck traffic PM_{10} emissions were assumed to be equal to the proposed Unit 2 project truck traffic emissions (this is conservative, as the capacity of the existing kiln is lower than the proposed Unit II kiln), effectively doubling the rate for the cumulative analyses. The same 70 volume sources were used to model the existing road emissions. Based on previous modeling of the existing kiln and power plant stack, the worst-case stack temperature and flow conditions were used for the existing stack in the modeling analysis.

6.3.5 Cumulative NAAQS Analysis

Table 6-6 presents the results of the cumulative NAAQS PM_{10} analysis. The maximum 24-hr impact, including background concentrations, is 70% of the 24-hr NAAQS, and the annual impact is 49% of the annual NAAQS. Therefore, compliance with the NAAQS is demonstrated.

6.3.6 Cumulative Class II PSD Increment Analysis

Table 6-7 presents the results of the cumulative Class II PM_{10} increment analysis. The maximum 24-hr impact is 93% of the 24-hr PSD increment, and the annual impact is 22% of the annual PSD increment. Therefore, compliance with the Class II increments is demonstrated. Figure 6-4 presents the isopleth plot for the 24-hr PSD increment impacts. The maximum impact locations occur near the eastern facility boundary.

Table 6-5

Cumulative PM_{10} Modeling Inventory – Sources that have emissions greater than 20D

SITE NAME	NORTH (km)	EAST (km)	EU ID	STACK HT (ft)	DIAM (ft)	EXIT TEMP (F)	ACFM	VEL (ft/s)	PM_{10}(lb/hr)
CRYSTAL RIVER Boiler 1	3204.5	334.3	CRPP1	499	15	291	1407923	132.8	468.7
CRYSTAL RIVER Boiler 2	3204.5	334.3	CRPP2	502	16	300	1931324	160.1	599.3
CRYSTAL RIVER Boiler 3 - PSD	3204.5	334.3	CRPP3	600	25.5	253	2111300	68.9	667.0
CRYSTAL RIVER Boiler 4 - PSD	3204.5	334.3	CRPP4	600	25.5	253	2111300	68.9	667.0
CRYSTAL RIVER Cooling Tower	3204.5	334.3	CRPP15	443	214	100	NA	33	350.0
CEMEX	3169.19	357.47	CEMEX5	70	2.6	200	15000	47.1	36.0
CEMEX	3169.19	357.47	CEMEX8	216	2	85	15000	79	37.2
GREGG MINE	3163.4	359.8	GREGG1	Volume Source - Rel Ht, SyInit, SzInit = 1, 46.51, and 2.33					6.9
ANCLOTE POWER PLANT	3120.68	327.41	APP1	499	24	320	1699026	62	634.0
ANCLOTE POWER PLANT	3120.68	327.41	APP2	499	24	320	1692307	62	619.4

Note that only the Crystal River Power Plant boilers 3 and 4 were considered as increment consuming sources. When PM_{10} emission rates were not reported, PM emissions were used. The emission rates were the highest of any reported hourly or annual emission rates.

Table 6-6

Summary of Cumulative NAAQS Modeling

Pollutant/Avg.Period	PM_{10} 24-Hr	PM_{10} Annual
Max. Modeled Impact (mg/m3)	46.8	7.1
DateTime	1/6/1991	1991
X Coord.(UTM E km)	356.5	356
Y Coord.(UTM N km)	3169	3168.5
Background Conc. (mg/m3)	58	17.4
Total Conc. (mg/m3)	104.8	24.5
NAAQS (mg/m3)	150	50
Percent of NAAQS (%)	70%	49%

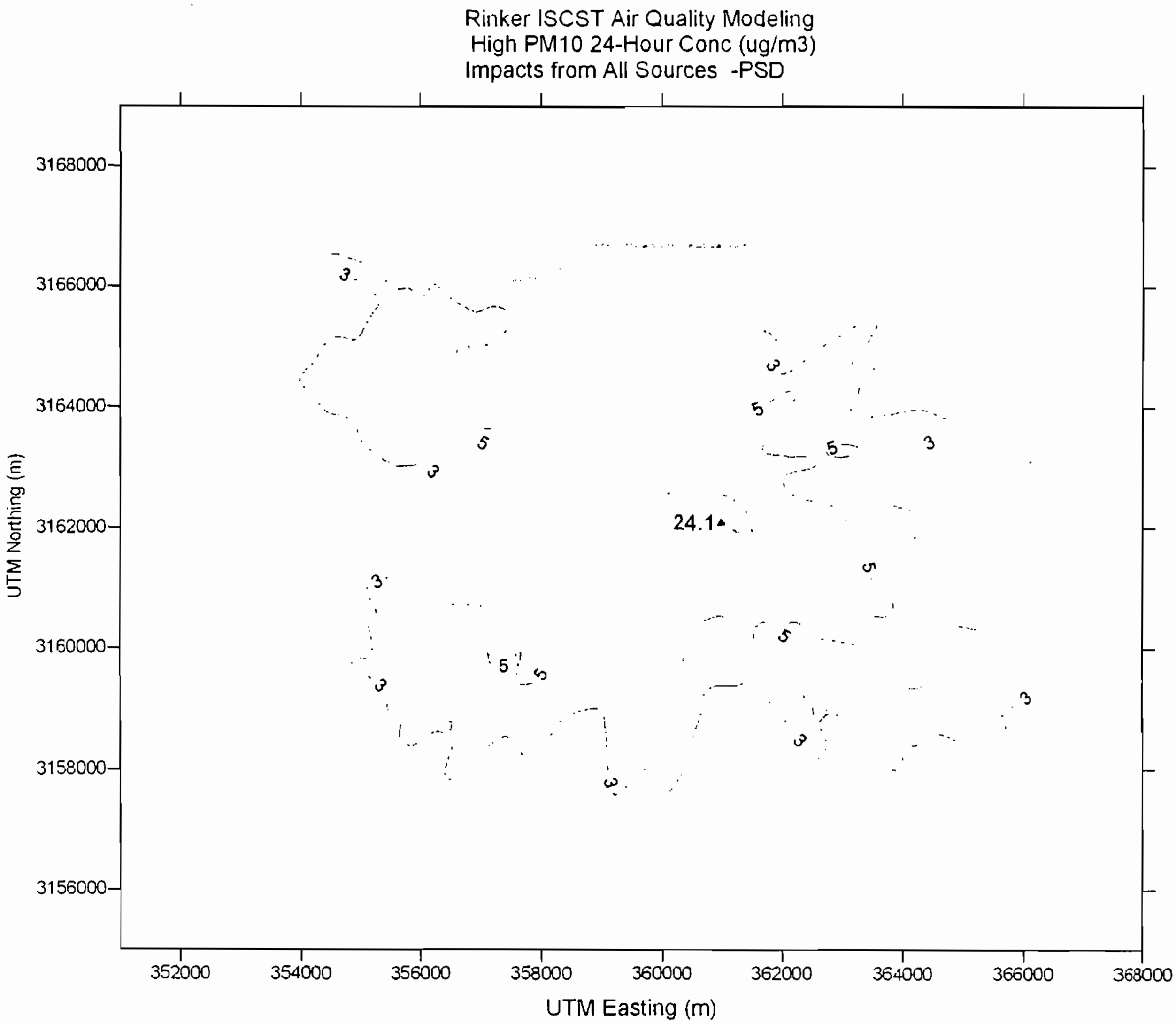
Table 6-7

Summary of Cumulative PSD Increment Impacts – Class II

Pollutant	Avg. Period	Maximum Modeled Impact (μg/m3)	Date Time	X Coord. (UTM E km)	Y Coord. (UTM N km)	Class II PSD Increment (μg/m3)	Percent of Increment (%)
PM_{10}	24-Hr	24.1	09/17/95	360.987	3162.087	30	80.3%
	Annual	3.3	1992	361.000	3162.100	17	19.4%

NOTE – All short-term concentrations are highest-second-high.

Figure 6-4 PM$_{10}$ 24-hr PSD Increment Impacts Plot



6.3.7 Class I PSD Increment Analysis

This section presents the Class I PSD increment analysis (Section 7 presents the Class I visibility analysis). The first step in the Class I PSD increment analysis is to determine if project impacts are greater than the EPA Class I SILs. If the project impacts are greater than the SILs for a particular pollutant and averaging interval, then a "multi-source" or cumulative impact analysis must be performed for that particular pollutant and averaging interval.

Table 6-8 presents the Class I area significant impact analysis results. All project impacts are below the Class I SILs with the exception of the 24-hr PM_{10} impact. Therefore, a cumulative class I PSD increment analysis was performed for this pollutant and averaging interval. Section 6.3.4 describes the cumulative inventory developed for this project. The only sources determined to be increment consuming were the proposed Brooksville kiln 2 project, the existing Brooksville facility, and the Crystal River power plant number 3 and 4 boilers.

Table 6-9 presents the results of the cumulative Class I PM_{10} increment analysis. The maximum 24-hr impact is 13% of the Class I 24-hr PSD increment. Therefore, compliance with the Class I increments is demonstrated.

6.4 REFERENCES

Auer, A.H., 1978. "Correlation of Land Use and Cover with Meteorological Anomalies," Journal of Applied Meteorology. Vol. 17, pp. 636-643.

Code of Federal Regulations (CFR), Title 40, Protection of the Environment.

Florida Administrative Code (FAC), Title 62, Rules of the Dept. of Environmental Protection.

USEPA, 1995. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models. EPA-454/B-95-003, September 1995.

USEPA, 1990. New Source Review Workshop Manual (Draft). October 1990.

Table 6-8

Summary of Class I Significant Impact Modeling

Pollutant	Avg. Period	Maximum Project Impact (μg/m3)	Class I SIL (μg/m3)	Class II Cumulative Analysis (Yes/No)
NO_2	Annual	0.07	0.1	NO
SO_2	3-Hr	0.86	1.0	NO
	24-Hr	0.18	0.2	NO
	Annual	0.007	0.1	NO
PM_{10}	24-Hr	0.73	0.3	YES
	Annual	0.04	0.2	NO

Table 6-9

Summary of Cumulative PSD Increment Impacts – Class I

Pollutant	Avg. Period	Maximum Modeled Impact (μg/m3)	Date Time	X Coord. (UTM E km)	Y Coord. (UTM N km)	Class I PSD Increment (μg/m3)	Percent of Increment (%)
PM_{10}	24-Hr	1.31	12/10/1995	331.350	3175.000	10	13.1%

NOTE – All short-term concentrations are highest-second-high.

7.0 AIR QUALITY RELATED VALUES

In Section 6.0, air quality modeling analyses are described which demonstrate compliance with the NAAQS and the Class I and Class II PSD increments. PSD regulations require the following additional impact analyses for PSD major sources or major modifications:

- Impairment to visibility and any other Air Quality Related Values (AQRVs) which would occur, primarily in Class I areas within 100 kilometers (km) of the source;
- Air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the facility or modification; and
- Impacts to soil and vegetation (having significant commercial or recreational value) that would occur due to emission from the source or modification and associated commercial, residential, industrial, and other growth.

7.1 VISIBILITY IMPACTS

Pollutants have specific effects upon visibility within the atmosphere. Particulate matter (PM) can both scatter and absorb light. Under certain viewing conditions, PM can result in a plume brighter or darker than the viewing background. Emissions of nitric oxide (NO) react with various atmospheric constituents, primarily ozone (O_3), to form nitrogen dioxide (NO_2), a secondary pollutant. While NO does not affect visibility, NO_2 preferentially absorbs the blue portion of the light spectrum, which can cause a plume to be perceived as brown under certain viewing conditions.

The visibility analyses below focus on emissions from the proposed main kiln stack and material handling baghouses (since the visibility model used can only simulate one stack, the stack parameters for the main kiln stack were used with the total emissions from the main stack and all baghouses). While PM is also emitted from fugitive sources, these sources are relatively small and are scattered throughout the facility property and would not form coherent plumes,which could be visible.

7.1.1 Visibility Impacts in Project Vicinity

Only about 10% or less of nitrogen oxides (NO_x) emissions are in the form of NO_2 (the remainder being mostly NO). Since NO_2 is formed in the plume at distances downwind from the source, visibility impacts in the project vicinity are not typically caused by NO_x stack emissions. Instead, stack PM emissions are more likely to have the potential to result in visibility impacts in the project vicinity. Potential visibility impacts in the project vicinity will be minimized by permit limits for opacity. The permit opacity limits for the new kiln will likely be 10% for six-minute averages, and given the dilution of the plume that occurs as it is transported offsite it is unlikely that visible plumes will occur in the project vicinity.

7.1.2 Class I Visibility Impacts

The nearest Class I area to the Brooksville facility is the Chassahowitzka National Wildlife Refuge (CNWR), located in Hernando and Citrus Counties along the Florida Gulf of Mexico coast approximately 20 km from the facility. Guidance from the Federal Land Managers (FLMs) on conducting Class I visibility analyses is found in the "Federal Land Managers Air Quality Related Values Workgroup (FLAG) Phase I Report" (December 2000). .

Because the CNWR is located within 50 km of the Brooksville facility, the visibility analyses were performed using the "Near Field Analysis Technique for Analyzing Plumes or Layers Viewed Against a Background", as described on page 30 of the FLAG document. Based on previous level-1 and level-2 visibility analyses for a second kiln at Brooksville proposed in 1996, it is known that a level-3 visibility analysis using the PLUVUE-II model will be necessary. FLAG recommends that the visual range corresponding to natural conditions be used to generate the hourly estimates of delta E and plume contrast (the two visibility parameters used to quantify visual impacts). FLAG recommends this in order for the analysis technique to be consistent with the national visibility goal. For the refined level-3 analysis, the natural condition is derived from the relative humidity used in the modeling, the corresponding relative humidity adjustment factor (Table 2.A-1 in FLAG), and estimated natural aerosol concentrations (Table 2.B-1 in FLAG). If a refined level-3 analysis of a new or modified source demonstrates that its emissions will not cause a plume with any hourly estimates of delta E greater than or equal to 1.0, or the absolute value of the plume contrast values greater than or equal to 0.02, the FLM is not likely to object to the issuance of the PSD permit based on near field visibility impacts.

Two wind directions and multiple viewer geometries were used for the PLUVUE analysis, as illustrated in Figures 7-1 and 7-2. The first direction of 110.5 degrees (direction the wind blows

Figure 7-1 PLUVUE Observer Locations for Wind Direction 110 degrees

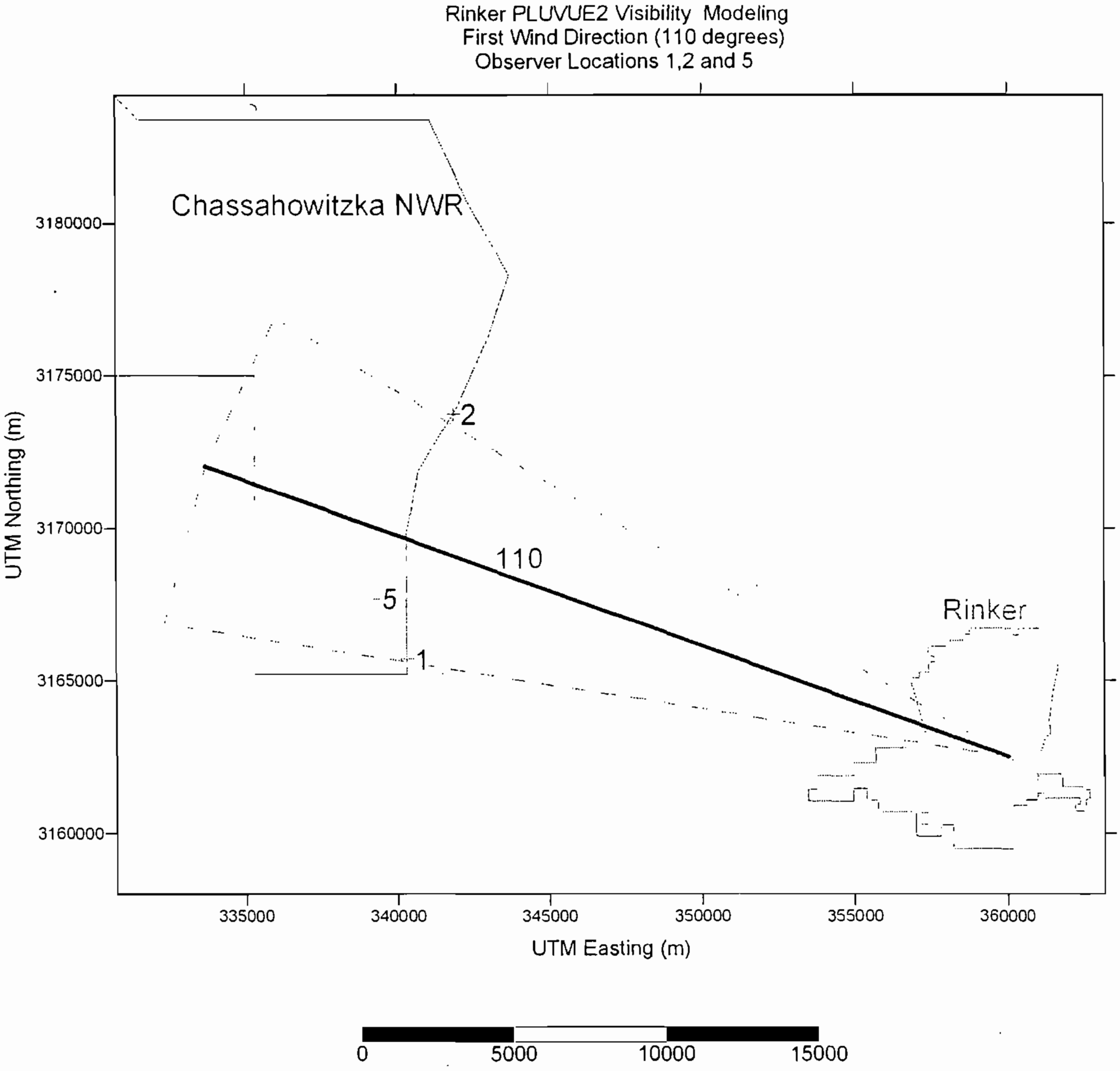
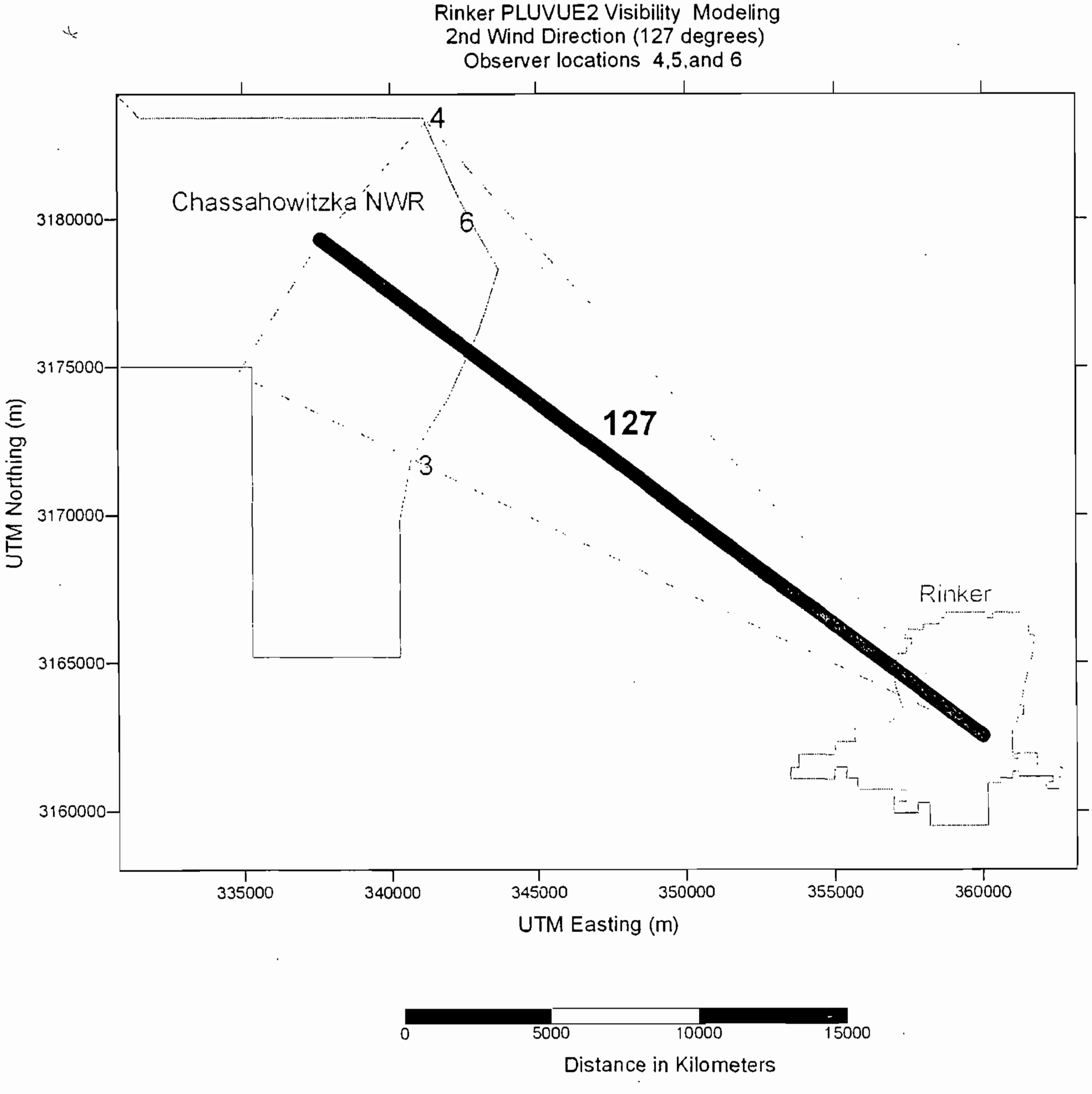


Figure 7-2 PLUVUE Observer Locations for Wind Direction 127 degrees



from) places the southeastern-most Class I receptor (and the shortest distance to the Class I area) on the south edge of a 22 ½ degree sector centered on the plume. Views perpendicular through the plume centerline for observer locations 1 and 2 were analyzed, as well as for observer location 5 which is located below/within the plume itself. A second wind direction of 127 degrees places the northeastern-most Class I receptor (and farthest distance to the Class I area) on the north edge of a 22 ½ degree sector centered on the plume. Views were analyzed for observer locations 3, 4, and 6 for this wind direction. These wind directions and viewer locations bracket the range of possible values.

A level-3 analysis requires the determination of the "worst-case" meteorological condition, defined as the dispersion condition (a given wind speed and stability class associated with the wind direction that would transport emissions toward the Class I area) that has a cumulative probability of 1 percent. The range of transport wind directions used was 90 to 140 degrees (which encompasses the wind directions and sector widths described above). The 1-percentile meteorology is assumed to be indicative of worst-day plume visual impacts when the probability of worst-case meteorological conditions is coupled with the probability of other factors being ideal for maximizing plume visual impacts. Dispersion conditions associated with transport times of more than 12 hours are not considered in this cumulative frequency. The meteorological data are typically stratified into four time-of-day categories, and the distributions of wind direction, wind speed and stability are determined separately for each of the four time periods. Each time period's frequency distribution is calculated such that the sum of the frequencies for all dispersion conditions adds up to 100 percent. For each time period, the one percentile meteorology is then be determined, solely on the cumulative frequencies for that time period. Then, the most restrictive of the one-percentile dispersion conditions determined for the 4 time periods would be used as a basis for the Level-3 analysis. The rationale for stratifying the joint frequencies in this way is to provide conservatism in the calculation and also to provide information on the time of day that worst-case plume visual impacts are likely to occur. By determining worst-case dispersion in this way, one knows the dispersion conditions for each time period that would be expected to be worse one percent of the hours during that time-of-day period. Table 7-1 presents the analysis of the worst-case condition for these four time periods, based on 5 years of Tampa meteorological data. The

TABLE 7-1
Level-2 Meteorological Analysis for PLUVUE
Distance to Class I Area is 20 km
Wind Direction range is 90 to 140 degrees

Hours of the day =				00-06		07-12		13-18		19-24	
Stability Class	Wind Speed	y-z-u	Transport Time hrs	Freq.	Cumulative Freq.	Freq.	Cumulative Freq.	Freq.	Cumulative Freq.	Freq.	Cumulative Freq.
F	1	3.02E+04	5.56	0.0E+00	0.000	0.0E+00	0.000	0.0E+00	0.000	0.0E+00	0.000
F	2	6.04E+04	2.78	3.3E-02	**0.033**	2.3E-03	0.002	0.0E+00	0.000	1.1E-02	**0.011**
E	1	8.22E+04	5.56	0.0E+00	0.033	0.0E+00	0.002	0.0E+00	0.000	0.0E+00	0.011
F	3	9.06E+04	1.85	6.4E-02	0.097	3.8E-03	0.006	0.0E+00	0.000	1.7E-02	0.028
E	2	1.64E+05	2.78	1.2E-03	0.098	5.0E-03	**0.011**	1.9E-04	0.000	1.9E-03	0.030
D	1	2.01E+05	5.56	0.0E+00	0.098	0.0E+00	0.011	0.0E+00	0.000	0.0E+00	0.030
E	3	2.47E+05	1.85	2.6E-02	0.124	1.0E-02	0.021	1.1E-03	0.001	2.1E-02	0.051
E	4	3.29E+05	1.39	2.0E-02	0.144	3.8E-03	0.025	4.6E-04	0.002	1.6E-02	0.067
D	2	4.01E+05	2.78	7.9E-04	0.145	6.7E-03	0.032	5.6E-04	0.002	2.0E-03	0.069
E	5	4.11E+05	1.11	8.6E-03	0.153	9.6E-04	0.033	1.9E-04	0.003	8.5E-03	0.078
D	3	6.02E+05	1.85	5.3E-03	0.159	2.3E-02	0.056	6.8E-03	0.009	4.5E-03	0.082
D	4	8.02E+05	1.39	1.0E-02	0.169	2.1E-02	0.077	1.1E-02	**0.020**	1.2E-02	0.095
D	5	1.00E+06	1.11	9.2E-03	0.178	1.4E-02	0.091	8.2E-03	0.028	8.8E-03	0.103

worst-case meteorological data occurs for the period 00:00 to 06:00, and consists of a wind speed of 2 m/sec and F stability (note that the period 19:00 to 24:00 also has a worst-case condition of 2 m/sec and F stability, but this period occurs after sunset and is of less concern).

The visibility analyses for the project was performed using the latest version of PLUVUE-II (version 96170). Only sky backgrounds were considered since there is no significant terrain in the study area (i.e., views of the plume with terrain in the background would not occur; so white, gray, or black backgrounds were not considered). PLUVUE-II input parameters were generally set equal to the model defaults or recommended values and are shown on Table 7-2. Analyses were performed for spring, summer, and winter seasons (these dates are included on Table 7-2). Appropriate temperatures and relative humidities were selected based on Tampa International Airport data as shown on Table 7-2. Based on the fact that the worst-case meteorology occurs for the period 00:00 to 06:00, and that previous PLUVUE modeling conducted for the proposed second kiln in 1996 demonstrated that the maximum visibility impacts occurred during the hours around sunrise, the PLUVUE simulations were performed for sunrise (or as soon after sunrise as PLUVUE would perform a valid calculation), and for two additional hours after sunrise (using 30 minute increments), for a total of 5 simulations for each season. The time of sunrise was determined using NOAA's Sunrise/Sunset calculation program, and were calculated as 06:30, 05:30, and 07:17 for the spring equinox, summer solstice, and winter solstice, respectively.

Results of the PLUVUE-II analysis are presented in Table 7-3, and are summarized below. Maximum impacts occurred during the summer just after sunrise for an observer within the plume with 110 degrees wind direction. Since the maximum impacts are less than the critical values, it can be concluded that there is little potential for a visible plume as viewed from the CNWR due to the proposed project.

Visibility Impact	Critical Values	Maximum Impact
Delta-E	1.0	0.94
Plume Contrast	$> \pm 0.02$	0.008

TABLE 7-2 PLUVUE-II INPUT DATA

Chapter 1 Emissions/Miscellaneous Data	**Chapter 2 Meteorological/Air Quality Data**
Site elevation (feet msl) 0	Worst case Wind speed (mps) 2.0
Number of units 1	Wind meas.ht index for 10 m 1
Stack height (feet) 350	Pasquill-Gifford stability F
Flue gas flowrate (ACFM) 369,932	Lapse rate (F/1000 ft) 13.83
Flue gas exit velocity (m/s) 12.94	Mixing depth (m) 10,000
Flue gas temperature (F) 550	Ambient pressure (atm) 1.0
Flue gas oxygen (mole %) 3	Background NO_x conc (ppm) 0.000
SO2 emission rate (tons/day) 0.2875	Background NO_2 conc (ppm) 0.000
NO_x emission rate (tons/day) 2.8100	Background O_3 conc (ppm) 0.040
PM emission rate (tons/day) 0.7880	Background SO2 conc (ppm) 0.000
Source UTM Coor (km) 360.0,3162.5	Background coarse conc (ug/m3) 35.0
UTM Zone 17	Background visual range (km) 177.0
Time Zone (relative to GMT) 5	SO2 deposition velocity (cm/s) 1.0
Model Options based on PLUVUE Defaults	NO_x deposition velocity (cm/s) 1.0
Aerosol Inputs based on PLUVUE Defaults	Coarse PM dep. velocity (cm/s) 0.10
	Fine PM dep. velocity (cm/s) 0.10

Observer Data	**Direction of 110.5**	**Direction of 127**
South Observer E/N UTM (km)	340.3, 3165.7	
South Observer elevation (ft-msl)	0	
South Critical Plume Distance (km)	19.6	
North Observer E/N UTM (km)	341.84, 3173.74	
North Observer elevation (ft-msl)	0	
North Critical Plume Distance (km)	21.0	
Plume Observer E/N UTM (km)	339.25, 3167.67	
Plume Observer elevation (ft-msl)	0	
Plume Critical Plume Distance (km)	21.0	

TABLE 7-3 PLUVUE-II MODELING RESULTS

Case	Spring			Summer			Winter		
	Time	Delta E	Contrast	Time	Delta E	Contrast	Time	Delta E	Contrast
WD = 110.5 & Observer (1) South of Plume	700	0.77	-0.005	600	0.88	-0.004	745	0.79	-0.006
	730	0.71	-0.005	630	0.78	-0.003	815	0.71	-0.007
	800	0.67	-0.005	700	0.73	-0.004	845	0.68	-0.007
	830	0.66	-0.005	730	0.70	-0.004	915	0.67	-0.007
	900	0.65	-0.005	800	0.68	-0.004	945	0.68	-0.007
WD = 110.5 & Observer (2) North of Plume	700	0.78	-0.006	600	0.78	-0.008	745	0.78	-0.006
	730	0.72	-0.006	630	0.72	-0.008	815	0.70	-0.005
	800	0.69	-0.006	700	0.69	-0.007	845	0.67	-0.005
	830	0.68	-0.005	730	0.67	-0.007	915	0.66	-0.005
	900	0.67	-0.005	800	0.65	-0.006	945	0.67	-0.004
WD = 110.5 & Observer (5) Below/Inside Plume	700	0.82	-0.005	600	0.94	-0.003	745	0.82	-0.006
	730	0.74	-0.005	630	0.84	-0.003	815	0.74	-0.006
	800	0.71	-0.005	700	0.77	-0.003	845	0.71	-0.006
	830	0.69	-0.005	730	0.75	-0.003	915	0.70	-0.006
	900	0.68	-0.005	800	0.72	-0.003	945	0.70	-0.007
WD = 127 & Observer (3) South of Plume	700	0.79	-0.004	600	0.94	-0.001	745	0.78	-0.006
	730	0.70	-0.004	630	0.81	-0.001	815	0.69	-0.006
	800	0.68	-0.004	700	0.76	-0.002	845	0.66	-0.006
	830	0.65	-0.005	730	0.72	-0.002	915	0.64	-0.006
	900	0.64	-0.004	800	0.69	-0.003	945	0.64	-0.006
WD = 127 & Observer (4) North of Plume	700	0.72	-0.006	600	0.75	-0.008	745	0.78	-0.006
	730	0.65	-0.006	630	0.69	-0.007	815	0.70	-0.005
	800	0.64	-0.006	700	0.66	-0.007	845	0.68	-0.005
	830	0.62	-0.006	730	0.64	-0.007	915	0.67	-0.005
	900	0.62	-0.005	800	0.63	-0.006	945	0.67	-0.004
WD = 127 & Observer (6) Below/Inside Plume	700	0.73	-0.007	600	0.78	-0.007	745	0.76	-0.006
	730	0.68	-0.007	630	0.74	-0.007	815	0.68	-0.006
	800	0.66	-0.007	700	0.70	-0.007	845	0.65	-0.006
	830	0.64	-0.006	730	0.69	-0.007	915	0.64	-0.005
	900	0.63	-0.006	800	0.67	-0.007	945	0.64	-0.005

7.2 MINOR SOURCE GROWTH

Approximately 15 to 20 new jobs are expected to be created as a result of the Brooksville expansion project. According to the 1990 census, the population of Hernando County was 101,115. Assuming all of the new hires relocate to Hernando County from outside the region, this represents a population increase of only 0.02%. In reality, most of the new workers will likely be hired from the surrounding community, reducing the number of new residents moving into the area from outside.

Therefore, there is expected to be little significant impact on general commerce, transportation or public services (police, fire, medical, sewage, education and utility services) from the addition of new Rinker employees to this region. In addition, the proposd project will not require a significant expansion of industry in surrounding areas for support services.

With no significant increases in residential, commercial, public service or industrial growth, no significant increase in atmospheric emissions would be expected to occur. The capacity expansion is expected to increase truck traffic by 159 additional trips per weekday. Given the existing level of trucking in the area, the projected increases are not expected to be significant.

7.3 SOILS AND VEGETATION

Atmospheric pollutants emitted in significant quantity from the proposed facility modification include NO_x, sulfur dioxide (SO_2), PM, and carbon monoxide (CO). At extreme levels, these contaminants may cause direct damage to plant tissue and may result in deposition of chemicals into surrounding soil. The significance of the impacts depends primarily on the atmospheric concentration levels of these pollutants as well as on the types of plants grown and the land use patterns in the surrounding area. Compliance of air quality impacts due to facility emissions with NAAQS is described in Section 6.0.

Approximately 20% of the land in Hernando County is devoted to agricultural production. Major crops grown in the county include hay, horticultural specialties, fruits, and nuts. Other uses of the land which could potentially experience impacts include the growth or ornamental and turf grass within the surrounding area. Parkland and other open areas within the County contain significant amounts of open vegetation and exposed soil.

Potential impacts on soils and vegetation have been evaluated due to facility emissions of both criteria and noncriteria (trace element) pollutants. The emissions in this permit have been shown not to interfere with the maintenance of NAAQS. Since one of the factors used in developing the NAAQS was the prevention of adverse impacts on soils and vegetation, facility compliance with the NAAQS also indicates that no significant adverse impact on soils and vegetation will occur.

7.4 REFERENCES

Code of Federal Regulations, Title 40, Part 52.

Florida Administrative Code, Chapter 62-212.

United States Environmental Protection Agency (USEPA), 1988. Workbook for Plume Visual Impact Screening and Analysis. EPA-450/4-88-015, September 1988 with October 1992 revisions from USEPA OAQPS/SCRAM Bulletin Board System.