RTP ENVIRONMENTAL ASSOCIATES INC.
AIR • WATER • SOLID WASTE CONSULTANTS
239 U.S. Highway 22 East • Green Brook, New Jersey 08812
(908) 968-9600

LETTER OF TRANSMITTAL

TO Mr. Clair Fancy
Florida Department of Environmental Protection
111 S. Magnolia, Suite #4
Tallahassee, FL 32301

Date: 07-11-95 Proj. ID: FCS-100

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			Application

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July 11, 1995

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JUL 13 1995
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Mr. Clair H. Fancy, P.E.
Florida Department of Environmental Protection
111 S. Magnolia, Suite #4
Tallahassee, FL 32301

RE: Florida Crushed Stone Incompleteness/Insufficiency Review
File Nos. PSD-FL-227 and PA 82-17

Dear Mr. Fancy:

RTP Environmental Associates, Inc. (RTP) and the applicant have prepared the following responses to the comments of FDEP's June 16, 1995 memorandum (Attachment 1) regarding the Florida Crushed Stone (FCS) air permit application for the additional cement kiln. These responses are given below in the numbered order in the FDEP memorandum. Responses to the National Park Service letter of June 16, 1995 are given as FDEP response Number 7.

1) Appendix A contains information on the basis for the emission calculations for each pollutant, along with associated reference material.

2) As discussed during our meeting on June 26, 1995 at your offices and in Response #1 of our May 10, 1995 letter, the comparison of existing actual emissions to future potentials is not required for this project. We have provided Attachment 2, which summarizes results of the stack emission tests performed on the Unit I kiln alone for the previous five years of operation, for your use.

3) Appendix B contains process flow diagrams for the cement plant and the power plant, along with a narrative describing how the feed material is processed in the kiln. In response to the specific question posed in the June 16, 1995 memorandum on combustion in the raw mill and dryer, there is no independent combustion source for the raw mill. The raw mill will utilize the hot gases from the preheater during material processing. In addition, there will be no dryer associated with the new kiln. Tire derived fuel is fed to the kiln at the base of the preheater (kiln inlet).

4) The FCS operation of the kiln and the Central Power and Lime operation of the power plant referred to in this question are unrelated and independent projects.

5) As requested, we have expanded the BACT analysis to include the issues raised by the Department. The following NO_x control alternative were considered and dismissed as not being applicable to FCS's operation for the reasons discussed below:

Cement kilns are unusual combustion systems in that simultaneous heat exchange and chemical transformations are required. Combustion gases interact directly with feed materials. Solid components of the fuels (nominally "ash") are incorporated into the product. The temperature required to form tricalcium silicate, the final reaction product, is about 2700°F. These very high material temperatures require that combustion gas temperature exceed 3000-3500°F to provide efficient heat transfer. In addition, product quality requires that tricalcium silicate be formed in an oxidizing atmosphere. It is the very high temperatures and oxidizing conditions which account for the preponderance of NO_x generated in cement kilns.

Fuel nitrogen can be converted to NO_x during combustion and this NO_x is commonly called fuel NO_x. In cement kilns, thermal NO_x produced in the Zeldovich reactions from free radicals, accounts for most of the NO_x formed. Thermal NO_x increases exponentially with temperature above approximately 2500°F. Fuel NO_x will participate in further reactions to achieve equilibrium with thermal NO_x. Where thermal NO_x is high due to high combustion temperatures, there is very little contribution to the total NO_x from the nitrogen in fuels. For electric utility and industrial boilers which operate at far lower temperatures, fuel nitrogen is a primary concern. For cement kilns, thermal NO_x dominates. This explains why cement kilns generate less NO_x with nitrogen containing coal than with natural gas. Thermal NO_x in cement kilns is lower with coal because coal produces a lower temperature flame. This is the opposite of what occurs in boilers. For the kiln design proposed by FCS, the use of lower nitrogen fuels is expected to have little or no effect on overall NO_x emissions.

For cement kilns, uniform operation with relatively small changes in operating conditions is very important in controlling NO_x. Transient conditions in feed or fuel preparation or burning can significantly affect the maximum combustion temperature. Small changes in temperature at the high temperatures required in cement kilns create much larger changes in NO_x emissions. The Polysius GEPOL design proposed for FCS Brooksville is expected to provide the most consistent operation possible for the raw materials and fuels available at this site.

<u>Flue Gas Recirculation (FGR)</u> - According to Energy and Environmental Research Corporation (EER), a combustion process design engineering firm with expertise in the field, FGR is a technologically infeasible control technology as applied to a cement kiln. It is contrary to the process of cement manufacturing. Cement manufacturing requires very high temperature reactions and

FGR results in a lowering of the peak flame temperatures, very likely below that required for cement production. EER is unaware of any cement kiln utilizing this technology (conversation with Mike Booth and Steve Lanier of EER - Attachment 3).

Fuel Reburning - The technology of fuel reburning, also known as stage combustion, as a NO_x control measure in a cement kiln involves the injection of fuel downstream from the primary combustion zone to serve as a NO_x reducing agent. While fuel reburning is conceptually a viable NO_x control measure, there is no evidence that is has been demonstrated as an effective control measure in any cement kiln in the United States or Europe.

A number of USEPA sources were reviewed for information on fuel reburning in cement kilns. A search of the USEPA BACT/LAER Information System failed to list fuel reburning as a control option for any cement kiln in the database (RTP's USEPA BACT/LAER database search). The USEPA ACT document on NO_x emission from cement manufacturing discusses secondary combustion of fuel as a control option for cement kilns. While the document indicates fuel reburning is a theoretically viable option for reducing NO_x levels, it fails to indicate that the technology has actually been demonstrated in an operating kiln with a preheater design (USEPA Alternative Control Techniques Document - "NO_x Emissions from Cement Manufacturing," March, 1994, pp. 5-8 and 5-13).

In addition, recognized experts in the field were queried. EER is unaware of any cement kiln utilizing fuel reburning technology in the United States or Europe. According to EER, it is possible that demonstration projects using this technology will occur in California within the next six to nine months (conversation with Mike Booth and Steve Lanier of EER - Attachment 3). Also, according to Construction Technologies Laboratory (CTL), an engineering consulting firm with expertise in the cement manufacturing industry, while there has been research and lab scale testing of fuel reburning, to their knowledge there is no kiln in operation which has successfully implemented the technology (conversation with Wally Klemm of CTL - Attachment 4).

RTP contacted the Kern County, California Air Pollution Control District for information on the Calaveras Cement Company's kiln in Tehachapi, California. This plant had been suggested as possibly employing fuel reburning technology for NO_x control. Mary Flynn provided information on the kiln at this facility (Attachment 5). This facility utilizes a NO_x control measure involving injection of excess air to a precalciner. This process is different from the FCS process utilizing a preheater and very limited information was available concerning the control system design.

Low Nitrogen Fuels - Although in general reducing fuel nitrogen content should result in lower NO_x emissions, this does not prove to be true when substituting natural gas for coal in cement kilns.

Although natural gas has a lower fuel nitrogen content than coal, it has been shown that natural gas combustion in kilns results in substantially increased NO_x emissions over coal combustion (USEPA Alternative Control Techniques Document - "NO_x Emissions from Cement Manufacturing," March, 1994, p. 5-4). Changing the primary kiln fuel from natural gas to coal reduces the flame temperatures resulting in lower thermal NO_x emissions. No data was found on the effect on NO_x emissions of using other fuels with reduced nitrogen content. It is believed that no effect on annual NO_x emissions would occur as thermal NO_x dominates NO_x emissions for cement kilns.

Contemporaneous Reductions - Contemporaneous reductions in NO_x emissions from the power plant is not possible. The power plant and the cement kiln are two separate, unrelated, and independent projects.

The proposed second kiln at FCS in Brooksville is a four stage preheater design which is very similar to the existing kiln system. This design has been selected from many other possible designs to accommodate the unique raw materials, fuels, and operating experience developed at the plant over the past ten years. Representative at Polysius have expressed concern that combustion of more than scrap tire fuel in the preheater tower may increase plugging with material build-up and induce kiln instabilities. At Brooksville, the Polysius GEPOL design does not currently require a bypass system to eliminate alkali chlorides or sulfates. Staged combustion of additional fuel in the preheater may be possible if a dust bypass system were installed, but there would be a significant energy penalty, generation of cement kiln dust (CKD) waste, and possibly increased overall NO_x generation due to reduced energy efficiency.

The use of lower nitrogen fuels and limitations on the application of staged combustion (gas reburning) and FGR do not appear to provide viable alternatives to NO_x reduction at the FCS Brooksville plant. Consequently, it is not possible to develop cost, energy, and environmental comparisons for these alternatives. Increased use of fuel in the preheater may actually increase NO_x emissions, if such a change requires installation of a bypass system with associated energy and environmental penalties.

The FCS Brooksville design is expected to produce approximately 4.5 pounds of NO_x per ton of clinker. Emissions of NO_x from preheater kilns described in AP-42 are about 4.8 pounds of NO_x per ton of clinker, based on a production rate of 100 tons of clinker per hour. Recent BACT determinations for cement kilns include facilities expected to emit over 4.5 pounds of NO_x per ton of clinker. Given the unique raw material, fuel and operating constraints at FCS Brooksville, it appears the proposed design is the best available technology for this facility.

6) Attachment 6 is a summary of permitting activity that has occurred at the facility since the beginning of its operation.

7) Responses to June 16, 1995 Fish and Wildlife Service (FWS) Comments - The FWS comments were discussed in a July 5, 1995 conference telephone call between representatives of RTP, FDEP, FWS, and the National Park Service (NPS). The following responses provide the information and materials agreed upon during the conference.

<u>Air Quality Modeling Analyses</u> - The FWS modeling analysis discussed in the comment considers only the emissions and stack characteristics of the proposed kiln flue. Since the flue for the proposed kiln emissions will be attached to the existing main facility stack similar to a multiflued arrangement, the air permit application modeling analyses consider the change in facility impacts due to the proposed kiln. The two facility scenarios that need to be considered in the permitting are two kilns operating together and two kilns operating simultaneously with the power plant. These impacts are calculated by modeling these scenarios minus existing conditions. In the permit application, it was shown that the increase in facility impacts due to the proposed kiln was less than the Class I USEPA proposed draft significant impact levels (SILs) for all pollutants. The increase in facility impacts for two operating kilns was greater than the NPS SILs for SO_2 and NO_2. However, in the March 21, 1995 comment responses, it was noted that the operating scenario of two operating kilns alone was unlikely to occur for any appreciable amount of time. The most likely operating scenario, two kilns operating simultaneously with the power plant, evinced no increases in facility impacts in the Class I area greater than the NPS SILs.

As discussed in the telephone conference, the applicant is waiting for the USEPA to formally propose Class I SILs this summer in the Federal Register. At that time, the applicant would likely reduce the proposed SO_2 emission rate in order to show increases in facility impacts less than the proposed Class I SILs. Based on existing test data, the applicant cannot significantly reduce the proposed NO_x emission rate for the proposed cement kiln. Therefore, a NO_x multisource modeling analysis was performed for the Class I area. The NO_x multisource inventory facsimilied to us by Mr. Cleve Holladay of FDEP on May 12, 1995, as shown on Attachment 7, was modeled. The Florida Rock Industries, Inc. Newberry Cement Plant was added to the list based on the Air Permit Forms recently submitted to the Department. The Florida Crushed Stone facility was modeled separately for both Case 1 - two operating cement kilns and Case 2 - two operating cement kilns and the power plant. The modeling was performed identical to the ISCST2 refined Class I analysis as described in the air permit application. Maximum annual NO_2 Class I increment consumption based on the multisource modeling results are:

	NO_x INVENTORY + CASE 1		NO_x INVENTORY + CASE 2	
Year Modeled	Max Annual NO_2 Impact (ug/m^3)	Location UTM Coors (km) East, North	Max Annual NO_2 Impact (ug/m^3)	Location UTM Coors (km) East, North
1984	0.84343	340.3, 3165.7	0.79055	340.3, 3165.7
1985	0.95121	340.3, 3165.7	0.91449	340.3, 3165.7
1986	0.95400	340.3, 3165.7	0.91921	340.3, 3165.7
1987	0.95121	340.3, 3165.7	0.89265	340.3, 3165.7
1988	0.81748	340.3, 3165.7	0.79712	340.3, 3165.7

As can be seen, the maximum annual NO_2 impact in Chassahowitzka NWR is 0.954 ug/m^3, which is 38% of the Class I increment of 2.5 ug/m^3. Therefore, compliance with the NO_2 Class I increment in Chassahowitzka NWR is predicted. Diskettes of the modeling input and output files are being provided to Mr. Cleve Holladay of FDEP and Mr. John Notar of NPS.

Class I Visibility - With the May 10, 1995 responses, a revised Table 7-2 was submitted which addressed earlier comments by NPS/FWS. Namely, changes in the VISCREEN analyses based on NPS/FWS comments were as follows: the winds as measured at Tampa International Airport at a sensor height of 22 feet were assumed to be representative of winds measured at the stack top height of 320 feet (wind speeds in Table 7-2 of the original air permit application were adjusted by the standard rural USEPA wind profile factors); a background visual range of 65 km was used representing the 90th percentile visual range (rather than the average visual range of 25 km in the visibility workbook); and H_2SO_4 emissions were modeled as sulfate emissions.

In the revised Table 7-2, visible plumes were identified by the VISCREEN model output (rather than using default values such as 2.0 for ΔE). The VISCREEN model therefore determines a predicted frequency of 5.9% rather than 6.3% according to the comment. As noted during the telephone conference, the predicted frequency of 5.9% for a visible plume is due to both existing and proposed emissions from the main facility stack. Since the predicted frequency for a visible plume due to existing emissions is 5.5%, the proposed cement kiln would only increase the predicted frequency of a visible plume by 0.4%. It is our belief, as well as the applicant's, that the VISCREEN model is grossly overpredicting the current potential for a visible, coherent plume in the Class I area. This belief is bolstered by the fact that there are no recorded complaints that either we or FDEP are aware of, of any coherent plume from the facility ever observed at Chassahowitzka.

Similar to the last response and as discussed during the telephone conference, modeling the proposed kiln by itself for visibility is not indicative of proposed impacts by the proposed kiln since a single kiln operating alone is already permitted. However, as requested by Mr. John Notar, a single kiln was modeled with VISCREEN and the results are shown in Attachment 8. There are no predicted occurrences of a visible plume based on single kiln emissions due to contrast values. Based on VISCREEN ΔE values, the predicted frequency for a visible plume in Chassahowitzka due to emissions from a single kiln is 3.2% of the time. This value is less than the predicted frequency for a visible plume in Chassahowitzka due to existing facility emissions. Therefore, we believe that no significant adverse impact due to visibility will occur.

PSD Applicability/Source Definition - FDEP has confirmed that the two projects are independent. The proposed megawatt increase for the power plant would only be for periods when the cement kilns are not operating. When the proposed kiln is operating, existing permit conditions for the power plant would apply as considered in the air permit application.

Air Quality Related Values (AQRV) Analysis - As agreed to in the telephone conference, total SO_2 loadings at Chassahowitzka were addressed by adding the increase in SO_2 impacts due to the proposed kiln to SO_2 background concentrations measured at a representative monitoring site. The SO_2 monitoring site closest to Chassahowitzka is the monitoring site maintained by the applicant in Hernando County. The maximum SO_2 background values measured at this monitoring site, the maximum increases in facility SO_2 impacts in the Class I area, and the total of these two values are as follows:

Avg. Time	Background (ug/m³)	Maximum Impacts (ug/m³)	Total Concentration (ug/m³)	Ambient Standard (ug/m³)	% of Standard
3-hour	77	0.50	77.50	1300	6.0%
24-hour	21	0.12	21.12	260	8.1%
Annual	3	0.01	3.01	60	5.0%

The increases in Class I concentrations due to the proposed kiln are less than 0.65% of existing representative background concentrations. These increases are based on the currently proposed emission limit of 45 lbs/hour, which may change as described above. Also, it would be expected that SO_2 concentrations in Chassahowitzka would be even less than the background concentrations measured in Hernando County as the monitoring site is designed to detect emissions from Florida Crushed Stone.

Should you have any questions or need any additional information, please feel free to contact me at (908) 968-9600.

Sincerely,

RTP ENVIRONMENTAL ASSOCIATES, INC.®

Donald F. Elias

Donald F. Elias
Principal

DFE/trp

Enclosures

cc: T. Mountain - FCS
L. Curtin - Holland & Knight
H. Oven/T. Heron/C. Holladay - FDEP
S. Kukier - USEPA Region IV
J. Bunyak - NPS
M. Hober/W. Corbin/M. Lewis - RTP
Proj. File - FCS
SW District
Hernando County

ATTACHMENT 1

MEMO FROM BUCK OVEN WITH ATTACHMENTS
JUNE 16, 1995

Memorandum

Florida Department of Environmental Protection

RECEIVED
JUN 26 1995

TO: Buck Oven

THROUGH: Al Linero
Clair Fancy

FROM: Teresa Heron

DATE: June 16, 1995

SUBJECT: Florida Crushed Stone
Incompleteness/Insufficiency Review
File No. PSD-FL-227 and PA 82-17

Following are additional requests pursuant to the May 10, 1995, Florida Crushed Stone response to the Department's letter of April 21, 1995.

1. Please supply the basis for the calculations of emissions (lb/hr, ton/yr and/or lb/MMBTU, lb/ton, if applicable) for each pollutant emitted (criteria and non-criteria) as a result of this project. Include all assumptions, reference materials, and engineering calculations.

2. Pursuant to Rule 62-212.200(2) and Rule 62-212.400(2)(e), F.A.C., please supply calculations for the last two (2) years of operation. Compare past actual emissions with the future potential emissions for each criteria and non-criteria pollutants emitted as a result of this project.

3. Please provide a process diagram of the new kiln which shows all input feeds of gases and materials along with the sources of these feeds. Provide a process diagram of the entire facility including the two kilns and power plant. Indicate whether the raw mill or the dryer for the new kiln will be fired by a combustion source. Provide a description of how the feed material is processed in the existing kiln and state whether any of this processed (heated or dried) material will be utilized in the new kiln.

4. Both Central Power and Lime (CPL) and Florida Crushed Stone (FCS) were authorized under the same Certification (PA 82-17). The recent modification of CPL's operation and the one proposed for FCS relate to the same Certification. Also, they are under common ownership, control, and contiguous (in fact integrated). In accordance with the attached August 1983 letter from EPA, please assure the Department that these two projects are unrelated and independent.

5. The April 21, 1995 letter from the Department asked the applicant to investigate any emerging technology for the control of NOx (Question 17). Question 18 asked the applicant to provide a BACT analysis for each PSD pollutant. The applicant's response stated that the most stringent available control technologies have been selected for all pollutants and that no technical, economic, or environmental analysis are required. A top-down approach or a review of alternatives would have revealed that gas reburning is an available technology which is more stringent (gives a lower emission rate) than the one chosen. Please compare costs, energy and environmental effects of reaching a lower emission rate using alternatives including gas reburning, flue gas recirculation, low nitrogen fuels and possibly contemporaneous reductions from the power plant.

6. Please provide in a chronological order the different permitting activities that have occurred at this facility since the beginning of its operation.

7. Please address the comments in the attached National Park Service correspondence.

If you have any questions on this matter, please write to A. A. Linero, P.E. Supervisor or call Marty Costello, P.E. (BACT Engineer), Cleve Holladay (Meteorologist), John Glunn (Air Toxic Specialist) or Teresa Heron (Review Engineer) at (904)488-1344.

AL/th/t

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4AW-AM

AUG 15 1983

Mr. Harold E. Hodges, P.E., Director
Division of Air Pollution Control
Tennessee Department of Public Health
150 Nineth Avenue North
Nashville, Tennessee 37203

Dear Mr. Hodges:

This is in answer to a request made by Angie Pitcock to Roger Pfaff by telephone on July 21, regarding EPA's policy on accumulation of de minimis increases in emissions at major stationary sources.

As you know, EPA interprets the PSD and nonattainment new source review rules (40CFR 51.24, 40CFR 52.21, 40CFR 51 Appendix S, 40 CFR 51.18 (j), 40CFR 52.24) as allowing an unlimited number of de minimis increases at major stationary sources without subjecting the source to review. This policy is stated in a memorandum from Edward E. Reich to Charles Whitmore, January 22, 1981, and is further confirmed in EPA's June 2, 1983 summary of applicability determinations (PSD-138).

Although the policy outlined in these documents allows a series of de minimis modifications to escape review, it is important that the reviewing agency not allow a source owner to circumvent the regulations by splitting up what would normally be considered a single major modification into two or more de minimis increases. Two or more increases should be considered by the reviewing agency to be part of the same project if they are considered part of the same project in the corporate planning of the source owner or if the emission units being constructed or modified are interdependent. For example, if the company institutes a "debottlenecking" project or a plant-wide energy conservation project involving several independent facilities, the project should be considered to be a single modification. If a company constructs a new boiler to generate steam and also adds new steam-using equipment, such as an evaporator, these units should also be considered part of the same project.

In order to facilitate agency decisions regarding whether two or more increases constitute a single project, EPA Region IV is adopting a policy which allows an initial presumption based upon easily distinguishable criteria, with allowance for rebuttal of the presumption by the applicant. Region IV policy is to consider two or more increases as a single project if the permit application for the last increase is submitted before the first increase is operational. This is a reasonable dividing line because it is easily discernible and because it would prohibit two facilities from being considered separate projects if one could not operate without the other.

For example, suppose a company obtains a permit for a new boiler at a major source in an attainment area on June 1, 1983. The new boiler emits 30 tons per year of SO_2 and escapes PSD review as a de minimis increase. On October 1, 1983, while the first boiler is under construction, the company submits an application for a second, identical, boiler. The agency would initially presume that these two boilers were part of a single project causing a significant increase in SO_2. Both boilers would be subject to PSD, including retroactive BACT for the first boiler. However, if the company could show, through engineering analysis and internal documents, that the two boilers were planned during separate time frames and involve separate, independent facilities (such as separate product lines at a large chemical plant), the agency could allow the boilers to be treated as separate projects. Conversely, if you know that two actions are actually one project, but the source owner is able to build and operate the first one before applying for the second, solely to avoid review, you should use that knowledge to subject the project to review.

The initial presumption criteria are used for the purpose of simplifying your decision process for the more obvious cases. The final criteria should always be whether or not the source owner is circumventing the new source review rules by separating what would normally be considered one project into two or more projects.

Sincerely yours,

James T. Wilburn, Chief
Air Management Branch
Air and Waste Management Division

cc: Ed Reich
Mike Trutna
All state agencies

Don

Post-it® Fax Note 7671	Date	# of pages ▶
To Don Elias	From Steve Holladay	
Co./Dept. RTP	Co.	
Phone # 908-968-9600	Phone # 904-488-1344	
Fax # 908-968-9603	Fax #	

Mr. C. H. Fancy
Chief, Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

In our April 19, 1995, letter to you we commented on the Prevention of Significant Deterioration permit application for the new cement kiln (kiln #2) proposed by Florida Crushed Stone (FCS). The kiln would be located 20 km southeast of Chassahowitzka Wilderness Area, a Class I air quality area administered by the U.S. Fish and Wildlife Service. The new kiln would emit significant amounts of PM-10, sulfur dioxide, nitrogen oxides, and carbon monoxide. Our initial review determined that the application was incomplete for reasons stated in our April 19 letter. We have received additional information from FCS, but still find the application incomplete for the reasons given in the enclosed technical review document.

We would like to consult with your office on this project. Please contact Ellen Porter of our Air Quality Branch in Denver at (303) 969-2617.

Sincerely,

Noreen K. Clough
Regional Director

Enclosure

cc: Jewell Harper, Chief
Air Enforcement Branch
Air, Pesticides and Toxic Management Division
U.S. EPA, Region 4
345 Courtland Street, NE
Atlanta, Georgia 30365

bcc: FWS-REG. 4: AQC
CHAS: Refuge Manager
AQD-DEN: Ellen Porter
National Park Service - AIR
P.O. Box 25287
Denver, CO 80225

Technical Review of Additional Information Regarding the Prevention of Significant Deterioration Permit Application for Florida Crushed Stone's Proposed New Cement Kiln, Hernando County, Florida

by

Air Quality Branch, Fish and Wildlife Service - Denver

We received additional information regarding the Prevention of Significant Deterioration (PSD) permit application for Florida Crushed Stone's (FCS) proposed new cement kiln on March 21 (from Florida Department of Environmental Protection - FDEP) and May 10 (from FCS). Our comments on this additional information are given below.

Air Quality Modeling Analysis

The additional information did not clarify whether the proposed new kiln's sulfur dioxide (SO_2) emissions would significantly impact Chassahowitzka Wilderness Area (WA). Upon consultation with FDEP, we performed additional modeling analyses to determine the Class I SO_2 impact of the proposed kiln's emissions. The modeling was performed with the Environmental Protection Agency's (EPA) ISCST2 model, using the stack parameters for the proposed kiln found in Table 6-1 of the original permit application. Emissions from the proposed kiln were modeled, using an emission rate of 5.67 grams per second (Table 6-1). All three load scenarios (nominal, maximum, and minimum) described in table 6-1 were modeled. We used the standard 1982-1986 Tampa meteorological data obtained from FDEP. The thirteen receptors used were the standard set agreed to by FDEP and our office.

The modeling results (see attachments) predict that the proposed kiln's impacts at Chassahowitzka WA exceed the Fish and Wildlife Service (FWS) Class I 24-hr SO_2 significant impact level of 0.07 micrograms per cubic meter (ug/m³) for all five years (all load scenarios); the proposed kiln's impacts exceed the proposed EPA Class I 24-hr SO_2 significant impact level of 0.20 ug/m³ for several years (e.g., four out of five years for the nominal load). In addition, the proposed kiln exceeds the FWS Class I 3-hr SO_2 significant impact level for all five years (all load scenarios). Please note that FDEP has recognized the FWS significant impact levels since these levels were proposed four years ago and has required all PSD applicants to apply them.

Because emissions impacts from the FCS project exceed the Class I short-term SO_2 significant impact levels, we request that FCS perform a cumulative Class I SO_2 increment analysis. We ask that FCS use the source inventory used by recent Florida PSD applicants, including sources beyond 100 kilometers.

Visibility

The revised visibility analysis, submitted May 10, predicts numerous occurrences of a visible coherent plume at Chassahowitzka WA due to emissions from the proposed kiln. The VISCREEN model predicts a visible plume occurring 6.28 percent of the time within the Class I area (Table 7-2, May 10), with "delta E" values greater than 2.0 (the EPA- and FWS-accepted threshold value of a colored plume). This would correspond to approximately 275 hours of a visible coherent plume within the Class I area. This would constitute an adverse impact to visibility and would be unacceptable to us. We request that additional emissions controls for nitrogen oxides and PM-10 be required to alleviate the plume impacts. If the applicant wishes to perform a more refined analysis, they may use the EPA PLUVUE 2 model. However, due to the known limitations of the PLUVUE 2 model, and the difficulty in its application, we request that a written modeling protocol be developed and agreed to by our office, FDEP, EPA Region IV, and the applicant.

PSD Applicability/Source Definition

In our April 19 letter to FDEP, we requested clarification regarding the relationship between the Central Power & Lime PSD application and the FCS PSD application, since the two projects are at the same facility. FCS responded (May 10, Item 25) that the two projects are independent; the proposed megawatt increase for the power plant would only be for periods when the cement kilns are not operating. However, in their March 21 submittal to FDEP, FCS states that "...two cement kilns operating with the power plant, is the facility configuration most likely to occur the majority of the time." (p.1, par.2) We again ask FDEP to clarify this.

Air Quality Related Values (AQRV) Analysis

We noted in our April 19 letter that the application lacked a Class I AQRV analysis (other than for visibility). FCS's May 10 response stated that they had addressed impacts to soils and vegetation in the vicinity of the proposed project in the "Additional Impacts" section of the original application. Please note that FCS considered only impacts from the proposed project's emissions. A Class I AQRV analysis should consider the total pollutant concentrations and loadings that resources at the Class I area will experience. It should consider emissions from all sources with the potential to affect these resources.

We recently established a list of lichen species found at Chassahowitzka WA. The lichen Ramalina americana, identified by Wetmore (1983) as SO_2-sensitive, occurs at the wilderness area. We are currently attempting to verify the presence of several other SO_2-sensitive lichen species at the wilderness area. We request that FCS perform a cumulative analysis so that we may adequately assess potential impacts of total pollutant concentrations and loadings to sensitive AQRVs at the Class I area.

REFERENCES:

1983. Wetmore, C.M. Lichens of the Air Quality Class 1 National Parks. (Final Report, National Park Service).

ATTACHMENT 2

STACK TEST RESULTS - UNIT I KILN

STACK TEST RESULTS SUMMARY - UNIT I KILN
FLORIDA CRUSHED STONE

TEST DATE		Part lbs/hr	SO2 lbs/hr	NOx lbs/hr	CO lbs/hr	THC lbs/hr	NOTES
	permit allowable	**49.5**	**50.0**	**359.0**	**127.0**	**6.35**	
08/20/90	test 1	23.03	7.16	378.1			coal only
	test 2	23.12	1.74	560.8			NOx failed stack test
	test 3	16.03	1.78	447.5			
	avg.	**20.73**	**3.56**	**462.1**			
03/02/91	test 1	18.69	7.81	66.9			coal only
	test 2	22.44	3.51	59.4			NOx measured on CEM
	test 3	31.47	4.37	152.6			Method 7E
	avg.	**24.2**	**5.23**	**92.9**			
11/13/91	test 1	25.14		434	63.5	3.5	coal only
	test 2	10.75		240	55	3.4	
	test 3	11.96		384	56.9	3.9	
	avg.	**11.36**		**353**	**58.6**	**3.6**	
	test 1	10		210.6	74.2	1.15	coal & TDF
	test 2	9.07		174.6	90.4	1.31	
	test 3	0.76		212.3	75.2	1.2	
	avg.	**9.61**		**199.1**	**79.9**	**1.22**	
02/11/92	test 1		2.26				coal only
	test 2		3.8				
	test 3		3.61				
	avg.		**3.22**				
03/16/93	test 1	1.36	4.6	222.9			coal & TDF burned
	test 2	2.51	3.3	212.3			NOx measured on CEM
	test 3	1.49	3.4	207.8			Method 7E
	avg.	**1.79**	**3.8**	**214.3**			
06/01/94	test 1	10.31	4.39	200.1			coal & TDF burned
	test 2	11.36	3.5	170.2			NOx measured on CEM
	test 3	8.76	3.47	306.7			Method 7E
	avg.	**10.14**	**3.79**	**225.7**			

ATTACHMENT 3

TELEPHONE CALL REPORT - EER

TELEPHONE CALL REPORT

Firm/Office: RTP-NJ

Date: 6/30/95

Proj. ID: FCS

Description: CALL TO INQUIRE ON NOx TECHNOLOGY APPLICABLE TO FCS

Distribution:

Made By/Received By: MIKE HOBER/MARC LEWIS

Talked With: MIKE BOOTH, DIRECTOR OF BUSINESS DEVELOPMENT AND STEVE LANIER, VICE PRESIDENT OF EER, DURHAM, NC

Phone #: 919-489-1726

Marty Costello, BACT engineer on the FCS project referred us to Mike Booth of Energy and Environmental Research Corporation (EER) in Durham, North Carolina, as a contact with information on applicability of fuel reburning and flue gas recirculation as NOx control measures to the FCS Cement Kiln installation. We spoke with Mike Booth and Steve Lanier of EER.

EER is an engineering design firm with expertise in the design of emission control systems and process modifications to combustion processes. This includes boilers and kilns.

Mr. Booth and Mr. Lanier are very familiar with cement kiln combustion technology and NOx control measures on cement kilns. Concerning the applicability of Flue Gas Recirculation as a possible NOx control measure, Mr. Lanier indicated that it would be absurd to consider flue gas recirculation as a potential control technique. He indicated that it absolutely would not work as a control technique because it is contrary to the process required to make cement. Cement manufacturing requires temperatures in the 3500 deg. F range, and flue gas recirculation would likely result in a lowering of the peak flame temperature below this level. He is unaware of any cement kiln utilizing this technology.

Regarding the technique of fuel reburning as a possible NOx control measure, again Mr. Lanier is unaware of any cement kiln that has demonstrated the use of this technology in the U.S or Europe. However he indicated that conceptually, fuel reburning, or the injection of additional fuel downstream of the primary zone as a NOx reducing agent, is a viable control option. He indicated that there may be some demonstration projects using the technology approved in California within the next six to nine months.

ATTACHMENT 4

TELEPHONE CALL REPORT - CTL

TELEPHONE CALL REPORT

Firm/Office: RTP-NJ

Date: 7/6/95

Proj. ID: FCS

Description: CALL TO CONSTRUCTION TECHNOLOGIES LABORATORY TO OBTAIN INFORMATION ON FUEL REBURNING IN CEMENT KILNS

Distribution:

Made By/Received By: MARC LEWIS

Talked With: WALLY KLEMM, SENIOR PRINCIPAL SCIENTIST, CTL, SKOKIE, IL.

Phone #: 708-965-7500

Tony Fiorado of the Portland Cement Association referred me to Wally Klemm for information on fuel reburning technology applicable to cement kilns. Wally is a senior principal scientist with Construction Technology Laboratories, Inc., in Skokie, IL. CTL is an engineering consulting firm providing process consulting and testing services to the cement manufacturing industry. Wally has over 30 years of experience in the U.S. cement industry.

To the best of Wally's knowledge, while there has been research and testing done on fuel reburning (i.e. injecting fuel downstream as a reducing agent) as a form of NOx control in kilns, there is no kiln in operation which has implemented the technology.

ATTACHMENT 5

TELEPHONE CALL REPORT - KERN COUNTY APCD

TELEPHONE CALL REPORT

Firm/Office: RTP-NJ

Date: 7/5/95

Proj. ID: FCS

Description: CALL TO INQUIRE ON NOx CONTROL MEASURES FOR CALAVERAS CEMENT CO. CEMENT KILN IN KERN COUNTY, CA.

Distribution:

Made By/Received By: MARC LEWIS

Talked With: MARY FLYNN, KERN CTY., CA., AIR POLLUT. CONTROL DIST.,

Phone #: 805-861-2593

Mary Flynn works with the Kern County, CA air pollution control district. She was asked about the implementation of fuel reburning at the Tehachapi Cement plant in Kern County. The indicated that the correct name of the plant is the Calaveras Cement Company, located in Tehachapi, CA. The plant operates a kiln with permit allowable clinker production rate of 2300 tons/day. The kiln is a dry kiln design with a preheater and a precalciner. Kiln length is approximately 200 to 300 feet. According to Mary, Calaveras received an air permit for a cement kiln approximately 3 years ago. Emission limits in the permit are the following:

Part:	16 lbs/hr	387 lbs/day
SO2:	295 lbs/hr	7086 lbs/day
NOx:	281 lbs/hr (2.9lbs/ton clinker)	6752 lbs/day
VOC:	45 lbs/hr	1082 lbs/day
CO:	1282 lbs/hr	30768 lbs/day

Maximum raw material feed rate for the kiln is 3600 tons/day. Maximum clinker production rate is 2300 tons/day. Mary indicated that the kiln runs 24 hours per day, thus the hourly rates would be 150 tons/hr feed rate and 95.8 tons/hr clinker production.

When originally installed, the kiln was unable to meet permitted NOx emission limits. About 1.5 years ago, they modified the process and installed staged combustion in the preheater. The staged combustion involved the introduction of excess air through various ducts in the preheater. Mary didn't know much more about the modification. She indicated it was proprietary, the company was reluctant to share information about it, and her agency was primarily concerned with the results of the stack tests anyhow.

The kiln was stack tested in 1994, after the installation of the staged combustion. The results were as follows at maximum production rates:

Telephone Call Report
Mary Flynn
7/5/95

Part:	0.00034 grains/dscf
SO2:	1.2 ppm, 1.54 lbs/hr
NOx:	251 ppm, 241 lbs/hr
VOC:	7 ppm, 2.27 lbs/hr
CO:	153 ppm, 89 lbs/hr

Mary indicated the stack test resulted in the facility meeting its permitted emission limits.

Additional information about the process include:

average gas flow: 131,000 DSCFM
kiln utilizes coal exclusively as fuel. Coal feed rate is 14 tons/hour.

It is apparent that this control technology, while applicable to the Calaveras precalciner kiln design, is not applicable to Florida Crushed Stone's preheater design.

ATTACHMENT 6

PERMITTING ACTIVITY SUMMARY

CPL PLANT MAIN STACK PERMITTING SUMMARY
(6-26-95)

Cement Plant

06-13-83	PA 82-17	Original PPS Certification
07-25-83	PA 82-17	Modification, limestone injection
11-10-83	AC27-61016	Original air construction permit
03-27-84	PSD-FL-091	EPA PSD permit
06-29-86	PA 82-17	Modification , limestone calciner
08-26-86	AC27-118674 PSD-FL-091	Modification, reduced emission limits
04-30-90	AC27-118674 PSD-FL-091A	Intent to Issue, testing shredded tires
06-06-90	AC27-118674 PSD-FL-091A	Amendment, testing shredded tires
09-24-90	AC27-118674 PSD-FL-091	Amendment, testing JEA sediment
05-24-91	A027-183508	Original air operation permit
08-30-91	AC27-118674 PSD-FL-091A	Intent to Issue, use of shredded tires
08-30-91	AC27-118674 PSD-FL-091B	Intent to Issue, testing whole tires
10-09-91	AC27-118674 PSD-FL-091	Amendment, testing shredded tires for NOx measurements
10-25-91	AC27-118674 PSD-FL-091	Amendment, testing whole tires
07-20-92	AC27-118674 PSD-FL-091C	Amendment, additional testing with whole tires
11-18-92	AC27-118674 PSD-FL-091A	Modification, use of shredded tires
11-24-92	AC27-118674 PSD-FL-091C	Intent to Issue, use of whole tires

12-21-92	AC27-118674 PSD-FL-091C	Modification, use of whole tires
12-17-93	AC27-222095 PSD-FL-091D	Modification, use of used oil
03-11-94	A027-231888	Modification, use of used oil, and tires (whole and shredded)
08-10-94	AC27-222095 PSD-FL-091E	Modification, use of used oil w/PCB limit condition
08-30-94	A027-231888A	Modification, used oil test method

Power Plant

06-13-83	PA 82-17	Original PPS Certification
07-25-83	PA 82-17	Modification, limestone injection
08-03-83	PA 82-17	Modification
03-27-84	PSD-FL-090	EPA PSD permit
02-20-85	PA 82-17	Modification
06-29-86	PA 82-17	Modification, limestone calciner
06-02-94	PA 82-17	Revision to transfer authorization from SWFWMD to DEP for dike construction
10-06-94	PSD-FL-090A	Amendment, testing at 133 MW
05-23-95	PSD-FL-090D	Intent to Issue, for operation of power plant at 1850 MMBtu/hr input

ATTACHMENT 7

CHASSAHOWITZKA NWR NO_x PSD INVENTORY

CHASSAHOWITZKA NWR NOx PSD INVENTORY

ISCST2 ID.NO	FACILITY/SOURCE	UTM COOR (km) EAST	UTM COOR (km) NORTH	MAX.NOx EMISSIONS (g/s)	STACK HEIGHT (m)	STACK DIAMETER (m)	EXIT TEMP (K)	EXIT VELOCITY (m/s)	CLASS I MINIMUM DISTANCE (km)
101	Auburndale	420.8	3103.3	21.17	48.80	5.50	411.0	14.30	101.9
102	Enron Silver Springs	418.8	3240.9	1.33	13.72	0.49	641.0	36.51	96.7
103	Farmland Green Bay	409.5	3080.1	1.25	45.72	2.44	355.4	11.58	110.1
104	FL Mining & Mtls	355.9	3169.9	11.56	32.00	4.27	394.3	9.90	14.4
105	FPC Debary	467.5	3197.2	137.60	15.24	4.21	819.8	56.21	125.2
106	FPC Int City 7EA	446.3	3126.0	84.20	15.24	4.21	819.8	56.21	113.2
107	FPC Int City 7FA	446.3	3126.0	91.80	15.24	7.04	880.8	32.07	113.2
108	FPC Polk	414.4	3073.9	160.40	34.40	4.10	400.0	40.50	118.0
109	IMC Agrico New Wales	396.7	3079.4	5.49	61.00	2.59	350.0	15.33	103.1
110	IMC Agrico S Pierce	407.9	3071.9	-2.93	45.73	1.60	350.0	26.40	115.6
111	IMC Agrico S Pierce	407.9	3071.9	3.98	45.73	1.55	349.8	39.05	115.6
112	Kissimmee Utilities	447.7	3127.9	27.72	12.20	3.00	654.0	29.10	113.9
113	Lakeland Utilities	409.2	3102.8	21.04	30.48	5.79	783.2	28.22	93.3
114	OMS Lake Co RRF	413.1	3179.3	20.79	38.10	1.83	422.0	23.36	69.4
115	OUC Stanton 2	483.5	3150.6	91.80	167.60	5.80	324.2	23.50	142.5
116	Pasco Co RRF	347.0	3139.0	40.57	83.82	3.05	394.3	15.70	27.5
117	Lake Cogen	434.0	3198.8	11.64	30.48	3.35	384.3	17.13	92.6
118	Pasco Cogen	385.6	3139.0	11.64	30.48	3.35	384.3	17.13	52.6
119	Ridge Cogen	416.7	3100.4	8.73	99.10	3.00	350.0	14.50	100.5
120	Stauffer Shutdown	325.6	3116.7	0.80	49.00	1.20	293.0	3.60	51.2
121	Seminole Hardee 3	405.0	3057.7	32.78	22.90	7.01	851.5	32.67	125.9
122	TPS Hardee	404.8	3057.4	241.83	22.90	4.88	389.0	23.90	126.1
123	TECO Polk Aux.Blr	402.5	3067.4	1.00	6.10	0.90	533.0	13.10	116.3
124	TECO Polk IGCC	402.5	3067.4	23.69	45.70	5.80	400.0	16.80	116.3
125	Tropicana	346.8	3040.9	3.96	24.40	2.13	555.4	7.55	125.0
126	Tropicana Turbine	346.8	3040.9	9.20	24.40	3.66	404.3	16.55	125.0
127	Pend Kathleen	398.7	3105.5	5.42	45.73	5.34	416.0	13.86	83.9
128	FPL Manatee	367.3	3054.1	612.40	144.80	7.99	339.8	23.70	114.8
129	FL Rock Newberry	346.8	3287.0	56.25	76.20	2.87	369.3	14.15	103.8
	CASE 1 - TWO OPERATING KILNS								
1	FCS Baseline	360.0	3162.5	-45.23	97.54	4.88	385.4	6.67	20.0
2	FCS Baseline+Proposed	360.0	3162.5	90.47	97.54	5.75	385.4	9.59	20.0
	CASE 2 - TWO OPERATING KILNS AND POWER PLANT								
11	FCS Baseline	360.0	3162.5	-151.83	97.54	4.88	450.9	21.48	20.0
12	FCS Baseline+Proposed	360.0	3162.5	197.06	97.54	5.75	433.7	20.25	20.0

ATTACHMENT 8

LEVEL 2 VISIBILITY SCREENING ANALYSES
FOR SINGLE KILN EMISSIONS

LEVEL-2 VISIBILITY SCREENING ANALYSES FOR SINGLE CEMENT KILN EMISSIONS

Stab Class	WS Class (m/s)	Avg. WS (m/s)	$u\sigma_y\sigma_z$ (m^3/s)	Transport Time (hrs)	Freq.	Cumul Freq.	VISCREEN RESULTS for Single Cement Kiln ΔE	Contrast
F	1-2	1.5	4.51E+04	3.7	0.50%	0.50%	7.565*	-.049
F	2-3	2.5	7.52E+04	2.2	1.51%	2.01%	4.748*	-.030
F	3-4	3.5	1.05E+05	1.6	0.44%	2.45%	3.458*	-.022
E	1-2	1.5	1.23E+05	3.7	0.09%	2.54%	4.356*	-.028
F	4-5	4.5	1.35E+05	1.2	0.00%	2.54%	2.718*	-.017
E	2-3	2.5	2.05E+05	2.2	0.69%	3.23%	2.679*	-.017
E	3-4	3.5	2.87E+05	1.6	0.63%	3.86%	1.934	-.012
D	1-2	1.5	3.02E+05	3.7	0.05%	3.91%	2.355	-.015
E	4-5	4.5	3.69E+05	1.2	0.41%	4.32%	1.513	-.009
E	5-6	5.5	4.51E+05	1.0	0.13%	4.45%	1.242	-.008
D	2-3	2.5	5.03E+05	2.2	0.43%	4.88%	1.432	-.009
E	7-8	7.5	6.15E+05	0.7	0.00%	4.88%	N/C	N/C
D	3-4	3.5	7.04E+05	1.6	0.59%	5.47%	N/C	N/C
D	4-5	4.5	9.05E+05	1.2	0.46%	5.93%	N/C	N/C
D	5-6	5.5	1.11E+06	1.0	0.35%	6.28%	N/C	N/C
D	6-7	6.5	1.31E+06	0.9	0.26%	6.54%	N/C	N/C
D	7-8	7.5	1.51E+06	0.7	0.07%	6.61%	N/C	N/C
D	8-9	8.5	1.71E+06	0.7	0.01%	6.62%	N/C	N/C
D	9-10	9.5	1.91E+06	0.6	0.00%	6.62%	N/C	N/C
D	>10	10.5	2.11E+06	0.5	0.01%	6.63%	N/C	N/C
C	1-2	1.5	2.15E+06	3.7	0.03%	6.66%	N/C	N/C
C	2-3	2.5	3.59E+06	2.2	0.14%	6.80%	N/C	N/C
C	3-4	3.5	5.02E+06	1.6	0.28%	7.08%	N/C	N/C
C	4-5	4.5	6.46E+06	1.2	0.41%	7.49%	N/C	N/C
C	5-6	5.5	7.89E+06	1.0	0.20%	7.69%	N/C	N/C
C	6-7	6.5	9.33E+06	0.9	0.02%	7.71%	N/C	N/C
B	1-2	1.5	9.36E+06	3.7	0.02%	7.73%	N/C	N/C
C	7-8	7.5	1.08E+07	0.7	0.01%	7.74%	N/C	N/C
B	2-3	2.5	1.56E+07	2.2	0.13%	7.87%	N/C	N/C
A	1-2	1.5	2.08E+07	3.7	0.01%	7.88%	N/C	N/C
B	3-4	3.5	2.18E+07	1.6	0.38%	8.26%	N/C	N/C
B	4-5	4.5	2.81E+07	1.2	0.08%	8.34%	N/C	N/C
A	2-3	2.5	3.46E+07	2.2	0.06%	8.40%	N/C	N/C

σ_y and σ_z dispersion coefficients at 20.0 km based on Tables 1-1 and 1-2 of ISCST2 User's Manual Vol.II and are (A through F stabilities): σ_y = 2769, 2133, 1515, 1005, 752, and 501 meters and σ_z = 5000, 2924, 947, 200, 109, and 60 meters. Values identified by VISCREEN as exceeding the visibility screening criteria are starred "*". Due to limited probability for significant results, VISCREEN runs were not performed for those cases noted as "N/C".

APPENDIX A

EMISSION CALCULATIONS

EMISSION CALCULATIONS
FLORIDA CRUSHED STONE

I. UNIT II KILN

Table 3-4 in the document entitled "Application To Construct a Second 600,000 Ton Per Year Cement Kiln At The Florida Crushed Stone Company Facility In Brooksville, Florida" (Application) summarizes pollutant emissions from the cement kiln in pounds per hour (lb/hr) and tons per year (tpy) and is included as Attachment A1. The data provided below supplement the information provided in Chapter 3 of the initial application which contains data from the BLIS database and other sources. It should also be noted that the permit limits represent deterministic standards that must be continuously achieved for the entire life of the facility. As such, they represent the maximum, worst case level. Normal operations typically evince lower actual emissions. Emission calculations for these values are as follows:

Particulates - Subpart F - New Source Performance Standards (NSPS) for Portland Cement Plants (Attachment A2) limits particulate matter emissions from a cement kiln to 0.3 lb/ton of dry kiln feed. Clinker cooler emissions are limited to 0.1 lb/ton of dry kiln feed. The kiln feed rate of Unit II kiln in the Application is 127 tons per hour (tph)(page 3-6). Based on this feed rate, allowable particulate matter (TSP) emissions are:

Kiln:
0.3 lb/ton dry kiln feed x 127 tph dry kiln feed = 38.1 lb/hr

Clinker Cooler:
0.1 lb/ton dry kiln feed x 127 tph dry kiln feed = 12.7 lb/hr

Based on NSPS requirements, total allowable TSP emissions from the cement plant are 38.1 + 12.7, or 50.8 lb/hr. The current permit for Unit I kiln imposes a maximum particulate limit of 49.5 lb/hr for the kiln and clinker cooler. Florida Crushed Stone (FCS) requests this limit for TSP emissions for Unit II kiln as well.

Annual emissions calculations for the Unit II kiln are derived based on the operation of the kiln 24 hours per day (hrs/day) and seven days per week (days/wk).

(49.5 lb/hr x 365 days/yr x 24 hrs/day)/(2000 lb/ton) = 216 tpy

In order to calculate a PM_{10} emission level, it was conservatively assumed that all TSP emissions are PM_{10} and the PM_{10} emission level was assumed to be the same as the TSP emission level.

Based on available stack test data, as provided with this response, this limit provides a demonstrated BACT level for a kiln with a baghouse. The emissions have been set at the lowest level that can be consistently maintained under all operating conditions.

<u>Sulfur Dioxide</u> - The current permit allowable SO_2 emission rate for the Unit I cement kiln is 0.6 lb/ton of dry kiln feed with a not to exceed maximum hourly emission rate of 50 lb/hr. FCS is requesting that the Unit II kiln be given emission limits of 0.6 lb/ton of dry kiln feed, with a not-to-exceed limit of 45 lb/hr. The not-to-exceed limit on emissions from the Unit II kiln is calculated based on emission factors in AP-42 (Emission Factor Documentation for AP-42 Section 11.6, Portland Cement Manufacturing, May 18, 1994). Table 11.6-8 from this document is provided in Attachment A3.

The maximum sulfur dioxide hourly emission level is based on the maximum production of clinker in the preheater process kiln as follows:

0.55 lb SO_2/ton clinker x 83 tons clinker/hr = 45 lb SO_2/hr
(.27) = 22.41

FCS is requesting an emission level lower than the current emission level of 50 lb/hr primarily due to the efficiency of a newer design.

Annual emission calculations for the Unit II kiln are derived based on operation of the kiln 24 hrs/day and seven days/wk.

(45 lb/hr x 365 days/yr x 24 hrs/day)/(2000 lb/ton) = 197.1 tpy

It is normal to increase AP-42 calculated emissions with a "safety factor" for setting permit levels. However, based on test data provided with this response and in an attempt to be responsive to agency concerns, we have proposed an emission level equal to the AP-42 factor.

<u>Nitrogen Oxides</u> - An emission test performed on Unit I kiln dated November 13-21, 1991, (Attachment A4) determined an average NO_x emission value for three tests of the kiln alone while firing coal of 353 lb/hr. The existing conditions for Unit I kiln limit NO_x emissions to 359 lb/hr. As Unit II kiln is identical to Unit I kiln, the requested NO_x emission value for Unit II kiln is 359 lb/hr. This emission level is consistent with the results from the November 13-21, 1991 emission test. This corresponds to an emission rate of approximately 2.9 lb/ton of dry kiln feed, at a kiln feed rate of 127 tph.

Annual emissions calculations for the Unit II kiln are derived based on the operation of the kiln 24 hrs/day and seven days/wk.

(359.0 lb/hr x 365 days/yr x 24 hrs/day)/(2000 lb/ton) = 1572 tpy

Based on the stack test data, it is not possible to consistently achieve a lower NO_x level for this kiln.

Carbon Monoxide - An emission test performed on Unit I kiln dated November 13-21, 1991 (Attachment A4) indicated the maximum value for CO emissions was 90.4 lb/hr while firing a mixture of coal and tire derived fuel. An emission rate of 1.0 lb CO per ton of dry kiln feed is requested for the Unit II kiln based on the results from the November 13-21, 1991 emission test and engineering judgement to provide for a margin of safety over measured stack test results. This value equates to an hourly emission rate of 127.0 lb/hr.

1.0 lb CO/ton dry kiln feed x 127 tons dry kiln feed = 127 lb CO/hr

Annual emissions calculations for the Unit II kiln are derived based on the operation of the kiln 24 hrs/day and seven days/wk.

(127.0 lb/hr x 365 days/yr x 24 hrs/day)/(2000 lb/ton) = 556.3 tpy

Volatile Organic Compounds - An emission test performed on Unit I kiln dated November 13-21, 1991 (Attachment A4) indicated the maximum value for VOC emissions was 3.9 lb/hr while firing coal. An emission rate of 0.05 lb VOC per ton of dry kiln feed is requested for the Unit II kiln based on the results from the November 13-21, 1991 emission test and engineering judgement to provide for a margin of safety over measured stack test results. This value equates to an hourly emission rate of 6.35. lb/hr.

0.05 lb VOC/ton dry kiln feed x 127 tons dry kiln feed = 6.35 lb VOC/hr

Annual emissions calculations for the Unit II kiln are derived based on the operation of the kiln 24 hrs/day and seven days/wk.

(6.35 lb/hr x 365 days/yr x 24 hrs/day)/(2000 lb/ton) = 27.8 tpy

Lead, Mercury, Beryllium, and H_2SO_4 - Emissions of Pb, Hg, Be, and H_2SO_4 (as SO_3) are based on emission factors found in the USEPA publication "Emission Factor Documentation for AP-42 Section 11.6, Portland Cement Manufacturing," May 18, 1994. Table 4-15 in this publication (Attachment A5) summarizes noncriteria pollutant emission factors for portland cement plants. The following emission factors were provided in this table for cement plants utilizing a fabric filter for control:

Pb	- 7.5 x 10E-5 pounds Pb per ton clinker
Hg	- 2.4 x 10E-5 pounds Hg per ton clinker
Be	- 6.6 x 10E-7 pounds Be per ton clinker
SO_3	- 0.014 pounds SO_3 per ton clinker

These emission factors were utilized to calculate emission rates for contaminants from Unit II kiln. A clinker production rate of 83 tons clinker per hour, as indicated on page 19 of the Division of Air Resource Management Application for Air Permit for Florida Crushed Stone was used in the calculations. The calculations are as follows:

Pb: 7.5 x 10E-5 lb/ton clinker x 83 tons clinker/hr x 8760 hrs/hr x 1 ton/2000 lb = 0.027 tpy Pb

NOTE: FCS requests an emission rate for Pb of 0.043 lb/hr to provide for a factor of safety above AP-42 averages due to potential variability in emissions.

Hg: 2.4 x 10E-5 lb/ton clinker x 83 tons clinker/hr x 8760 hrs/hr x 1 ton/2000 lb = 0.009 tpy 0.10

Be: 6.6 x 10E-7 lb/ton clinker x 83 tons clinker/hr x 8760 hrs/hr x 1 ton/2000 lb = 0.00024 tpy 0.0004

NOTE: FCS requests an emission rate of 0.0003 lb/hr to provide for a factor of safety above AP-42 averages) = .00131

SO_3: 0.014 lb/ton clinker x 83 tons clinker/hr x 8760 hrs/hr x 1 ton/2000 lb = 5.1 tpy SO_3

II. MINOR PARTICULATE SOURCES

Table 3-2 in the Application (Attachment A6) shows emissions from minor particulate sources necessary to support the operations of the cement kiln. All sources listed in the table are controlled by dust collectors. Particulate emissions from these sources are calculated based on a maximum emission rate of 0.01 grains/acf from the dust collectors. A sample calculation for emissions from Source No. 1 in the table, the Iron Ore Bin, is shown below. Emission calculations for the other sources in the table are derived in the same way, based on the exhaust gas flow rate in the table.

Iron Ore Bin - 3000 ACFM Exhaust Flow x 0.01 grains/acf x 60 min/hr x 1 lb/7000 gr = 0.257 lb/hr particulate emissions

0.257 lb/hr x 8760 hrs/yr x 1 ton/2000 lb = 1.125 tpy particulates

III. SITE TRAFFIC

The proposed addition of the Unit II cement kiln will increase vehicular traffic to and from the FCS facility. Attachment A7 shows emission estimates for emissions from auto, truck and rail traffic at the site prior to the addition of the Unit II Kiln. Table 3-3 in the Application presents current estimated annual truck and rail shipments of materials from the operation of the cement plant (Attachment A8). The addition of the Unit II kiln will approximately double traffic, resulting in the following annual emissions:

Contaminant	tpy
Particulate Matter	2.4
Carbon Monoxide	13.4
Volatile Organic Compounds	3.4
Nitrogen Oxides	9.2
Sulfur Dioxide	1.4

ATTACHMENT A1

SUMMARY OF POLLUTANT EMISSIONS

TABLE 3-4
SUMMARY OF POLLUTANT EMISSIONS

POLLUTANT	EMISSIONS											
	UNIT I KILN SEPARATELY		UNIT II KILN SEPARATELY		BOTH UNIT I AND UNIT II KILNS		POWER PLANT SEPARATELY		EITHER UNIT I OR UNIT II KILN & POWER PLANT		2 KILNS & POWER PLANT	
	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)
TSP	49.5	216.0	49.5	216.0	99.0	434.0	37.02	162.0	86.52	379.0	136.02	596.0
PM_{10}	49.5	216.0	49.5	216.0	99.0	434.0	37.02	162.0	86.52	379.0	136.02	596.0
SO_2	50.0	219.0	45.0	197.1	95.0	416.1	770.0	3372.6	781.0	3420.8	826.0	3617.9
NO_x	359.0	1572.0	359.0	1572.0	718.0	3144.8	846.0	3705.5	1205.0	5277.9	1564.0	6850.32
CO	127.0	556.3	127.0	556.3	254.0	1112.5	1125.0	4927.5	1252.0	5483.8	1379.0	6040.0
VOC	6.35	27.8	6.35	27.8	12.7	55.63	3.5	15.33	9.9	43.36	16.2	70.96
Pb	N/A	0.04	N/A	0.04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg	N/A	0.009	N/A	0.009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Be	N/A	0.0003	N/A	0.0003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SO_3	N/A	5.1	N/A	5.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A = Not PSD Applicable
lbs/hr = pounds per hour
tpy = tons per year

ATTACHMENT A2

NSPS SUBPART F

unless it is assumed that the total heat input to the combustor is from MSW with a design heating value of 10,500 kilojoules per kilogram (4,500 British thermal units per pound).

(c) Following the initial compliance test as required under §§60.8 and 60.58a, the owner or operator of an affected facility located within a large MWC plant shall submit the initial compliance test data, the performance evaluation of the CEMS using the applicable performance specifications in appendix B, and the maximum demonstrated MWC unit load and maximum demonstrated particulate matter control device temperature established during the dioxin/furan compliance test.

(d) [Reserved]

(e) The owner or operator of an affected facility located within a large MWC plant shall submit quarterly compliance reports for sulfur dioxide, nitrogen oxide (if applicable), carbon monoxide, load level, and particulate matter control device temperature to the Administrator containing the information recorded under paragraphs (b)(1), (2)(ii), (3), (4), (5), and (6) of this section for each pollutant or parameter. The hourly average values recorded under paragraph (b)(2)(i) of this section are not required to be included in the quarterly reports. Combustors firing a mixture of medical waste and other MSW shall also provide the information under paragraph (b)(15) of this section, as applicable, in each quarterly report. Such reports shall be postmarked no later than the 30th day following the end of each calendar quarter.

(f) The owner or operator of an affected facility located within a large MWC plant shall submit quarterly excess emission reports, as applicable, for opacity. The quarterly excess emission reports shall include all information recorded under paragraph (b)(3) of this section which pertains to opacity and a listing of the 6-minute average opacity levels recorded under paragraph (b)(2)(i)(A) of this section for all periods when such 6-minute average levels exceeded the opacity limit under §60.52a. The quarterly report shall also list the percent of the affected facility operating time for the calendar quarter that the opacity CEMS was operating and collecting valid data. Such excess emission reports shall be postmarked no later than the 30th day following the end of each calendar quarter.

(g) The owner or operator of an affected facility located within a large MWC plant shall submit reports to the Administrator of all annual performance tests for particulate matter, dioxin/furan, and hydrogen chloride as recorded under paragraph (b)(7) of this section, as applicable, from the affected facility. For each annual dioxin/furan compliance test, the maximum demonstrated MWC unit load and maximum demonstrated particulate matter control device temperature shall be reported. Such reports shall be submitted when available and in no case later than the date of required submittal of the quarterly report specified under paragraph (e) of this section covering the calendar quarter following the quarter during which the test was conducted.

(h) [Reserved]

(i) Records of CEMS data for opacity, sulfur dioxide, nitrogen oxides, and carbon monoxide, load level data, and particulate matter control device temperature data shall be maintained for at least 2 years after date of recordation and be made available for inspection upon request.

(j) Records showing the names of persons who have completed review of the operating manual, including the date of the initial review and all subsequent annual reviews, shall be maintained for at least 2 years after date of review and be made available for inspection upon request.

(k)-(l) [Reserved]

(m) The owner or operator of a cofired combustor located within a plant having an MWC plant capacity, as determined under §§60.51a and 60.58a(j)(3), greater than 225 megagrams per day (250 tons per day) shall submit quarterly reports of the daily weights of MSW and each other fuel fired as recorded under paragraph (b)(14) of this section. Such reports shall be postmarked no later than the 30th day following the end of each calendar quarter.

Subpart F—Standards of Performance for Portland Cement Plants

§60.60 Applicability and designation of affected facility.

(a) The provisions of this subpart are applicable to the following affected facilities in portland cement plants: Kiln, clinker cooler, raw mill system, finish mill system, raw mill dryer, raw material storage, clinker storage, finished product storage, conveyor transfer points, bagging and bulk loading and unloading systems.

(b) Any facility under paragraph (a) of this section that commences construction or modification after August 17, 1971, is subject to the requirements of this subpart.

§60.61 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in Subpart A of this part.

(a) *Portland cement plant* means any facility manufacturing portland cement by either the wet or dry process.

(b) *Bypass* means any system that prevents all or a portion of the kiln or clinker cooler exhaust gases from entering the main control device and ducts the gases through a separate control device. This does not include emergency systems designed to duct exhaust gases directly to the atmosphere in the event of a malfunction of any control device controlling kiln or clinker cooler emissions.

(c) *Bypass stack* means the stack that vents exhaust gases to the atmosphere from the bypass control device.

(d) *Monovent* means an exhaust configuration of a building or emission control device (e.g., positive-pressure fabric filter) that extends the length of the structure and has a width very small in relation to its length (i.e., length to width ratio is typically greater than 5:1). The exhaust may be an open vent with or without a roof, louvered vents, or a combination of such features.

§60.62 Standard for particulate matter.

(a) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any kiln any gases which:

(1) Contain particulate matter in excess of 0.15 kg per metric ton of feed (dry basis) to the kiln (0.30 lb per ton).

(2) Exhibit greater than 20 percent opacity.

(b) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into

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the atmosphere from any clinker cooler any gases which:

(1) Contain particulate matter in excess of 0.050 kg per metric ton of feed (dry basis) to the kiln (0.10 lb per ton).

(2) Exhibit 10 percent opacity, or greater.

(c) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any affected facility other than the kiln and clinker cooler any gases which exhibit 10 percent opacity, or greater.

§60.63 Monitoring of operations.

(a) The owner or operator of any portland cement plant subject to the provisions of this part shall record the daily production rates and kiln feed rates.

(b) Except as provided in paragraph (c) of this section, each owner or operator of a kiln or clinker cooler that is subject to the provisions of this subpart shall install, calibrate, maintain, and operate in accordance with §60.13 a continuous opacity monitoring system to measure the opacity of emissions discharged into the atmosphere from any kiln or clinker cooler. Except as provided in paragraph (c) of this section, a continuous opacity monitoring system shall be installed on each stack of any multiple stack device controlling emissions from any kiln or clinker cooler. If there is a separate bypass installed, each owner or operator of a kiln or clinker cooler shall also install, calibrate, maintain, and operate a continuous opacity monitoring system on each bypass stack in addition to the main control device stack. Each owner or operator of an affected kiln or clinker cooler for which the performance test required under §60.8 has been completed on or prior to December 14, 1988, shall install the continuous opacity monitoring system within 180 days after December 14, 1988.

(c) Each owner or operator of a kiln or clinker cooler subject to the provisions of this subpart using a positive-pressure fabric filter with multiple stacks, or a negative-pressure fabric filter with multiple stacks, or an electrostatic precipitator with multiple stacks may, in lieu of installing the continuous opacity monitoring system required by §60.63(b), monitor visible emissions at least once per day by using a certified visible emissions observer. If the control device exhausts gases through a monovent, visible emission observations in lieu of a continuous opacity monitoring system are required. These observations shall be taken in accordance with EPA Method 9. Visible emissions shall be observed during conditions representative of normal operation. Observations shall be recorded for at least three 6-minute periods each day. In the event that visible emissions are observed for a number of emission sites from the control device with multiple stacks, Method 9 observations shall be recorded for the emission site with the highest opacity. All records of visible emissions shall be maintained for a period of 2 years.

(d) For the purpose of reports under §60.65, periods of excess emissions that shall be reported are defined as all 6-minute periods during which the average opacity exceeds that allowed by §60.62(a)(2) or §60.62(b)(2).

(e) The provisions of paragraphs (a), (b), and (c) of this section apply to kilns and clinker coolers for which construction, modification, or reconstruction commenced after August 17, 1971.

§60.64 Test methods and procedures.

(a) In conducting the performance tests required in §60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in §60.8(b).

(b) The owner or operator shall determine compliance with the particulate matter standard in §60.62 as follows:

(1) The emission rate (E) of particulate matter shall be computed for each run using the following equation:

$$E=(c_s Q_{sd})/(P K)$$

where:

E=emission rate of particulate matter, kg/metric ton (lb/ton) of kiln feed.

c_s=concentration of particulate matter, g/dscm (g/dscf).

Q_{sd}=volumetric flow rate of effluent gas, dscm/hr (dscf/hr).

P=total kiln feed (dry basis) rate, metric ton/hr (ton/hr).

K=conversion factor, 1000 g/kg (453.6 g/lb).

(2) Method 5 shall be used to determine the particulate matter concentration (c_s) and the volumetric flow rate (Q_{sd}) of the effluent gas. The sampling time and sample volume for each run shall be at least 60 minutes and 0.85 dscm (30.0 dscf) for the kiln and at least 60 minutes and 1.15 dscm (40.6 dscf) for the clinker cooler.

(3) Suitable methods shall be used to determine the kiln feed rate (P), except fuels, for each run. Material balance over the production system shall be used to confirm the feed rate.

(4) Method 9 and the procedures in §60.11 shall be used to determine opacity.

§60.65 Recordkeeping and reporting requirements.

(a) Each owner or operator required to install a continuous opacity monitoring system under §60.63(b) shall submit reports of excess emissions as defined in §60.63(d). The content of these reports must comply with the requirements in §60.7(c). Notwithstanding the provisions of §60.7(c), such reports shall be submitted semiannually.

(b) Each owner or operator monitoring visible emissions under §60.63(c) shall submit semiannual reports of observed excess emissions as defined in §60.63(d).

(c) Each owner or operator of facilities subject to the provisions of §60.63(c) shall submit semiannual reports of the malfunction information required to be recorded by §60.7(b). These reports shall include the frequency, duration, and cause of any incident resulting in deenergization of any device controlling kiln emissions or in the venting of emissions directly to the atmosphere.

(d) The requirements of this section remain in force until and unless the Agency, in delegating enforcement authority to a State under section 111(c) of the Clean Air Act, 42 U.S.C. 7411, approves reporting requirements or an alternative means of compliance surveillance adopted by such States. In that event, affected sources within the State will be relieved of the obligation to comply with this section, provided that they comply with the requirements established by the State.

§60.66 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 111(c) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authorities which will not be delegated to States: No restrictions.

[Sec. 60.66(b)]

ATTACHMENT A3

AP-42 EMISSION FACTORS FOR
PORTLAND CEMENT MANUFACTURING

Table 11.6-8 (English Units).
EMISSION FACTORS FOR PORTLAND CEMENT MANUFACTURING[a]

Process	SO_2[b]	EMISSION FACTOR RATING	NO_x	EMISSION FACTOR RATING	CO	EMISSION FACTOR RATING	CO_2[c]	EMISSION FACTOR RATING	TOC	EMISSION FACTOR RATING
Wet process kiln (SCC 3-05-007-06)	8.2[d]	C	7.4[e]	D	0.12[f]	D	2,100[g]	D	0.028[f]	D
Long dry process kiln (SCC 3-05-006-06)	10[h]	D	6.0[j]	D	0.21[k]	E	1,800[m]	D	0.028[n]	E
Preheater process kiln (SCC 3-05-006-22)	0.55[p]	D	4.8[q]	D	0.98[r]	D	1,800[s]	C	0.18[t]	D
Preheater/precalciner kiln (SCC 3-05-006-23)	1.1[u]	D	4.2[v]	D	3.7[w]	D	1,800[x]	E	0.12[y]	
Preheater/precalciner kiln with spray tower (SCC 3-05-006-23)	1.0[z]	E	ND		ND		ND		ND	D

[a] Factors represent uncontrolled emissions unless otherwise noted. All emission factors in lb/ton of clinker produced unless noted. SCC = Source Classification Code. ND = no data available.
[b] Mass balance on sulfur may yield a more representative emission factor for a specific facility than the SO_2 emission factors presented in this table.
[c] Mass balance on carbon may yield a more representative emission factor for a specific facility than the CO_2 emission factors presented in this table.
[d] References 20, 25-26, 32, 34-36, 41-44, 60, 64.
[e] References 26, 34-36, 43, 64.
[f] Reference 64.
[g] References 25-26, 32, 34-36, 44, 60, 64.
[h] References 11, 19, 39-40.
[j] References 11, 38-40, 65.
[k] References 39, 65.
[m] References 11, 21, 23, 65.
[n] References 40, 65; total organic compounds as measured by Method 25A or equivalent.
[p] References 47-50.
[q] References 48-50.
[r] Reference 49.
[s] References 24, 31, 47-50, 61.
[t] Reference 49; total organic compounds as measured by Method 25A or equivalent.
[u] References 28, 30, 33, 37, 53, 56-59.
[v] References 28, 30, 33, 37, 45, and 56 to 59.
[w] References 28, 30, 37, 56-58, 63.
[x] References 24, 31, 47-50, 61. Based on test data for preheater kilns; should be considered an upper limit.
[y] References 30, 33, 56, 63; total organic compounds as measured using Method 25A or equivalent.
[z] Reference 54.

ATTACHMENT A4

NOVEMBER 13-21, 1991 EMISSION
TEST REPORT SUMMARY

SUMMARY OF PARTICULATE MATTER, BENZENE, TOTAL HYDROCARBONS, CARBON MONOXIDE AND NITROGEN OXIDES EMISSION RATES UNDER BASELINE AND WHOLE-TIRE TDF FIRING CONDITIONS

FLORIDA CRUSHED STONE COMPANY
CEMENT/LIME PLANT

BROOKSVILLE, FLORIDA

NOVEMBER 13 - 21, 1991

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 N.W. 13TH STREET
GAINESVILLE, FL 32609
(904) 377-5822

1.0 INTRODUCTION

The Florida Crushed Stone Company (FCS) operates a cement/power/lime (CPL) plant in Hernando County, northwest of Brooksville. The cement plant was permitted under Florida Department of Environmental Regulation (FDER) Air Construction Permit AC27-118674 and the facility was permitted under Permit PSD-FL-091. The CPL plant includes a Portland cement plant having a kiln feed rate of 123.5 tons per hour and a clinker production rate of 75 tons per hour. The plant is normally fired with low-sulfur coal.

In March 1990, FCS applied to FDER requesting approval to burn tire derived fuel (TDF) as a supplemental heat source in the cement kiln of the CPL plant. On June 6, 1990, FDER issued an amendment to the referenced permits authorizing performance tests on the cement plant while using TDF to supply up to 15 percent of the heat input to the kiln. In September 1990, the tests were conducted to measure air pollutant emissions from the CPL plant while the plant was operating under baseline conditions and with shredded TDF supplying up to 15 percent of the heat input to the plant. In September 1991, FCS requested approval from FDER to conduct additional tests with TDF. On October 9, 1991, FDER authorized FCS to conduct tests under baseline conditions and while using whole-tire TDF to provide up to 15 percent of the heat input to the plant. These tests were conducted during the period November 13 - 21, 1991, and the results are reported herein.

The approval granted by FDER on October 9, 1991, authorized two test periods; one representing baseline or normal plant operating conditions and the second representing whole-tire TDF firing conditions. The baseline test was conducted during the period 0942-1412 on November 13, 1991. The whole-tire TDF firing test was conducted during the period 1130-1633 on November 21, 1991. Prior to the test on November 21, 1991, the plant had operated for seven days with whole-tire TDF providing 15 percent of the heat input to the kiln in order to assure equilibrium operating/emissions conditions had been achieved.

During the whole-tire TDF test period, TDF provided 14.6 percent of the heat input to the cement plant; or approximately 39.8 MMBTU per hour heat input. The TDF firing rate corresponding to this heat input averaged 1.2 tons per hour over the three one hour TDF test periods.

During the baseline period, the particulate matter emission rate averaged 11.36 pounds per hour and during the TDF test period, the particulate matter emission rate averaged 9.61 pounds per hour. The allowable particulate matter emission rate is 49.4 pounds per hour.

During the baseline period, the total hydrocarbons emission rate averaged 3.6 pounds per hour and during the TDF test period averaged 1.22 pounds per hour as measured by EPA Method 25A. Emission rates of individual organic compounds generally ranged from 0.001 - 0.0001 pounds per hour under both baseline and TDF test conditions.

The nitrogen oxides emission rate averaged 353 pounds per hour during the baseline period and 199 pounds per hour during the TDF test period. The allowable nitrogen oxides emission rate is 359 pounds per hour.

During the baseline period, the carbon monoxide emission rate averaged 58.5 pounds per hour and during the TDF test period averaged 79.9 pounds per hour.

During the baseline period, benzene emissions averaged 0.0013 pounds per hour, and during the TDF test period, averaged 0.0006 pounds per hour.

The results of the testing demonstrate that the use of TDF has no effect on the emissions from the plant. The small change in carbon monoxide emissions while firing TDF is not significant; i.e., the change would be less than that defined by Rule 17-2.500(2)(e)2, FAC even with the plant operating 8760 hours per year. The change that did occur was, in all probability, the result of normal fluctuations in plant operations. The fact that neither total hydrocarbon emissions nor the emissions of individual hydrocarbons changed during the firing of TDF confirm that the change in carbon monoxide emissions resulted from plant operating fluctuations and not from a reduced combustion efficiency.

2.0 PROCESS DESCRIPTION

The Florida Crushed Stone CPL plant consists of a Portland cement plant, a power and a lime calciner. The Portland cement plant has a permitted kiln feed rate of 123.5 tons per hour and a permitted clinker production rate of 75 tons per hour. The plant is normally fired with coal at a maximum rate of 10.0 tons per hour, resulting in a heat input rate of approximately 240 MMBTU per hour. During the baseline test period, the coal feed rate to the plant averaged 9.1 tons per hour (at 12550 BTU per pound) for an average heat input rate of 228.4 MMBTU per hour. During the TDF test period, the coal feed rate averaged 8.2 tons per hour and the TDF feed averaged 1.2 tons per hour for a total heat input rate of 245.5 MMBTU per hour. During the baseline test period, the kiln feed rate averaged approximately 120 tons per hour and the clinker production rate averaged approximately 78 tons per hour. During the TDF test periods, the kiln feed rate averaged approximately 119 tons per hour and the clinker production rate averaged approximately 77 tons per hour. The cement plant operating data for both test periods are summarized in Tables 1 and 2.

5. SUMMARY OF RESULTS

The results of the particulate matter emission measurements conducted during the period November 13 - 21, 1991 are summarized in Tables 1 and 2. During the baseline test period, the particulate matter emission rate averaged 11.36 pounds per hour, compared with an allowable particulate matter emission rate from the CPL plant of 0.4 pounds per ton of feed or 49.5 pounds per hour. During the TDF test period, the particulate matter emission rate averaged 9.61 pounds per hour.

During the baseline test, the cement kiln was fired with coal at a rate of 9.1 tons per hour and during the TDF test period, the cement kiln was fired with a combination of coal and TDF. The coal feed rate during the TDF test was 8.2 tons per hour (205.8 MMBTU/hr) and the TDF feed rate averaged 1.2 tons per hour (39.7 MMBTU/hr). The heat input supplied by TDF averaged 14.6 percent of the total kiln heat input.

During the baseline test, the nitrogen oxides emission rate averaged 353 pounds per hour compared with an allowable nitrogen oxides emission rate from the CPL cement and lime plant of 2.9 pounds per ton of feed or 359 pounds per hour. During the TDF test period, the nitrogen oxides emission rate averaged 199.1 pounds per hour.

During the baseline test period, the carbon monoxide emission rate averaged 58.5 pounds per hour and during the TDF test period, the carbon monoxide emission rate averaged 79.9 pounds per hour. The change in emissions is, in all probability, due to fluctuations in plant operating conditions rather than a reduction in combustion efficiency during the TDF tests as the test data show a decrease in total and volatile hydrocarbon emissions during the TDF tests.

During the baseline test period, the total hydrocarbon emission rate averaged 3.6 pounds per hour and during the TDF test period, the total hydrocarbon emission rate averaged 1.2 pounds per hour. Benzene emissions, a specific volatile organic compound, averaged 0.0013 pounds per hour during the baseline test and 0.0006 pounds per hour during the TDF test. A summary of these data is presented in Table 4.

Field data sheets, field notes, plant operating data and the results of fuel analyses are included in the Appendix of the report. All of the CEM emissions data are summarized in Table 3.

TABLE 3

BASELINE
NOVEMBER 13, 1991

Run	Flow (dscfm)	NOx (ppm)	NOx (lb/hr)(1)	CO (ppm)	CO (lb/hr)	VOC (ppm)	VOC (lb/hr)(2)	PM (lb/hr)
1	491,906	123	434	29.6	63.5	1.04	3.5	25.14
2	441,021	76	240	28.6	55.0	1.14	3.4	10.75
3	462,192	116	384	28.2	56.9	1.22	3.9	11.96
Avg	465,039	105	353	28.8	58.6	1.13	3.6	11.36(3)

TDF
NOVEMBER 21, 1991

Run	Flow (dscfm)	NOx (ppm)	NOx (lb/hr)(1)	CO (ppm)	CO (lb/hr)	VOC (ppm)	VOC (lb/hr)(2)	PM (lb/hr)
1	330,016	89	210.6	51.5	74.2	0.51	1.15	10.00
2	324,764	75	174.6	63.8	90.4	0.59	1.31	9.07
3	328,980	90	212.3	52.4	75.2	0.53	1.20	0.76
Avg	327,920	85	199.1	55.9	79.9	0.54	1.22	9.61

(1) As NO_2
(2) As propane
(3) Runs 2 and 3

Emissions:

NOx = $(ft^3/min)(60\ min/hr)(10^{-6})(Conc\text{-}ppm)(46/385)$

CO = $(ft^3/min)(60\ min/hr)(10^{-6})(Conc\text{-}ppm)(28/385)$

VOC = $(ft^3/min)(60\ min/hr)(10^{-6})(Conc\text{-}ppm)(44/385)$

TABLE 4

SUMMARY OF BENZENE
BASELINE AND TDF EMISSION RATES

CPL, BROOKSVILLE, FLORIDA
NOVEMBER 13 - 21, 1991

Run	Benzene Emission Rate Baseline (lbs/hr)	Benzene Emission Rate TDF (lbs/hr)
Run 1	(1)	0.675×10^{-3}
Run 2	(1)	0.614×10^{-3}
Run 3	1.31×10^{-3}	0.497×10^{-3}
Average	1.31×10^{-3}(1)	0.595×10^{-3}

(1) Runs 1 and 2 could not be analyzed due to high CO_2 concentrations; CO_2 released during calcining of raw feed.

Calculations:

$$\text{Emissions (lb/hr)} = \frac{\text{ng}}{20\ \text{l}} \times 28.32\ \frac{\text{l}}{\text{ft}^3} \times Q\ \frac{\text{ft}^3}{\text{min}} \times 60\ \frac{\text{min}}{\text{hr}} \times \frac{1}{453.6 \times 10^3}\ \frac{\text{lb}}{\text{ng}}$$

$$= (\text{ng})(Q\ \text{ft}^3/\text{min}) \times 1.873 \times 10^{-6}$$

Baseline Q = 465,039 dscfm

TDF Q = 327,920 dscfm

ATTACHMENT A5

TABLE 4-15
"EMISSION FACTOR DOCUMENTATION FOR AP-42
SECTION 11.6, PORTLAND CEMENT MANUFACTURING"

TABLE 4-15. SUMMARY OF NONCRITERIA POLLUTANT EMISSION FACTORS FOR PORTLAND CEMENT KILNS

Pollutant	Type of control	No. of tests	No. of kilns	Average emission factor kg/Mg	lb/ton	Factor rating	References
Ag	FF	1	1	3.1E-07	6.1E-07	D	76
Al	ESP	1	1	0.0065	0.013	E	78
As	ESP	1	1	6.5E-06	0.000013	E	78
As	FF	1	1	6.0E-06	1.2E-05	D	76
Ba	ESP	1	1	0.00018	0.00035	D	77
Ba	FF	1	1	0.00023	0.00046	D	76
Be	FF	1	1	3.3E-07	6.6E-07	D	76
Ca	ESP	1	1	0.12	0.24	E	78
Cd	ESP	1	1	4.2E-06	8.3000E-06	D	77
Cd	FF	1	1	1.1E-06	2.2000E-06	D	76
Cl	ESP	6	2	0.34	0.68	E	18,42,43,44
Cl	FF	1	1	0.0011	0.0021	D	76
Cr	ESP	1	1	3.9E-06	7.7000E-06	E	77
Cr	FF	1	1	7.0E-05	0.00014	D	76
Cu	FF	1	1	0.0026	0.0053	E	74
F	ESP	1	1	0.00045	0.00090	E	43
Fe	ESP	1	1	0.0085	0.017	E	78
HCl	ESP	2	2	0.025	0.049	E	40,78
HCl	FF	2	2	0.073	0.14	D	64,76
Hg	ESP	1	1	0.00011	0.00022	D	77
Hg	FF	2	2	1.2E-05	2.4E-05	D	4,76
K	ESP	5	2	0.0090	0.018	D	18,42,43
Mn	ESP	1	1	0.00043	0.00086	E	78
NH3	FF	1	1	0.0051	0.010	E	64
NH4	ESP	6	2	0.054	0.11	D	18,42,43,44
NO3	ESP	1	1	0.0023	0.0046	E	43
Na	ESP	6	2	0.020	0.038	D	18,42,43,44
Pb	ESP	1	1	0.00036	0.00071	D	77
Pb	FF	1	1	3.8E-05	0.000075	D	76

TABLE 4-15. (Continued)

Pollutant	Type of control	No. of tests	No. of kilns	Average emission factor kg/Mg	lb/ton	Factor rating	References
SO3	ESP	2	2	0.042	0.086	E	18
SO3	FF	5	2	0.0073	0.014	D	17,24,55
SO4	ESP	6	2	0.10	0.20	D	18,42,43,44
SO4	FF	8	2	0.0036	0.0072	D	24,27,57
Se	ESP	1	1	7.5E-05	0.00015	E	78
Se	FF	1	1	0.00010	0.00020	E	74
Th	FF	1	1	2.7E-06	5.4000E-06	D	76
Ti	ESP	1	1	0.00019	0.00037	E	78
Zn	ESP	1	1	0.00027	0.00054	D	77
Zn	FF	1	1	0.00017	0.00034	D	76
1,2,3,4,6,7,8 HpCDD	FF	1	1	1.1E-10	2.2E-10	E	74
C3 benzenes	ESP	1	1	1.3E-06	2.6000E-06	E	78
C4 benzenes	ESP	1	1	3.0E-06	6.0E-06	E	78
C6 benzenes	ESP	1	1	4.6E-07	9.2000E-07	E	78
acenaphthalene	FF	1	1	5.9E-05	0.00012	E	74
acetone	ESP	1	1	0.00019	0.00037	D	77
benzaldehyde	ESP	1	1	1.2E-05	0.000024	E	78
benzene	ESP	1	1	0.0016	0.0031	D	77
benzene	FF	1	1	0.0080	0.016	E	74
benzo(a)anthracene	FF	1	1	2.1E-08	4.3E-08	E	74
benzo(a)pyrene	FF	1	1	6.5E-08	1.3E-07	E	74
benzo(b)fluoranthene	FF	1	1	2.8E-07	5.6E-07	E	74
benzo(g,h,i)perylene	FF	1	1	3.9E-08	7.8E-08	E	74
benzo(k)fluoranthene	FF	1	1	7.7E-08	1.5E-07	E	74
benzoic acid	ESP	1	1	0.0018	0.0035	D	77
biphenyl	ESP	1	1	3.1E-06	6.1000E-06	E	78
bis(2-ethylhexyl)phthalate	ESP	1	1	4.8E-05	0.000095	D	77
bromomethane	ESP	1	1	2.2E-05	0.000043	E	77
carbon disulfide	ESP	1	1	5.5E-05	0.00011	D	77

TABLE 4-15. (Continued)

Pollutant	Type of control	No. of tests	No. of kilns	Average emission factor kg/Mg	lb/ton	Factor rating	References
chlorobenzene	ESP	1	1	8.0E-06	0.000016	D	77
chloromethane	ESP	1	1	0.00019	0.00038	E	77
chrysene	FF	1	1	8.1E-08	1.6E-07	E	74
di-n-butylphthalate	ESP	1	1	2.1E-05	0.000041	D	77
dibenz(a,h)anthracene	FF	1	1	3.1E-07	6.3E-07	E	74
ethylbenzene	ESP	1	1	9.5E-06	0.000019	D	77
fluoranthene	FF	1	1	4.4E-06	8.8E-06	E	74
fluorene	FF	1	1	9.4E-06	1.9E-05	E	74
formaldehyde	FF	1	1	0.00023	0.00046	E	74
freon 113	ESP	1	1	2.5E-05	5.0E-05	E	78
indeno(1,2,3-cd)pyrene	FF	1	1	4.3E-08	8.7E-08	E	74
methyl ethyl ketone	ESP	1	1	1.5E-05	3.0E-05	E	77,78
methylene chloride	ESP	1	1	0.00025	0.00049	E	78
methylnaphthalene	ESP	1	1	2.1E-06	4.2000E-06	E	78
naphthalene	FF	1	1	0.00085	0.0017	E	74
naphthalene	ESP	1	1	0.00011	0.00022	D	77
phenanthrene	FF	1	1	0.00020	0.00039	E	74
phenol	ESP	1	1	5.5E-05	0.00011	D	77
pyrene	FF	1	1	2.2E-06	4.4E-06	E	74
styrene	ESP	1	1	7.5E-07	1.5000E-06	E	78
toluene	ESP	1	1	0.00010	0.00019	D	77
total HpCDD	FF	1	1	2.0E-10	3.9E-10	E	74
total OCDD	FF	1	1	1.0E-09	2.0E-09	E	74
total PCDD	FF	1	1	1.4E-09	2.7E-09	E	74
total PCDF	FF	1	1	1.4E-10	2.9E-10	E	74
total TCDF	FF	1	1	1.4E-10	2.9E-10	E	74
xylenes	ESP	1	1	6.5E-05	0.00013	D	77

ESP = electrostatic precipitator.
FF = fabric filter.

ATTACHMENT A6

TABLE 3-2
MINOR SOURCE EMISSIONS

TABLE 3-2

MINOR SOURCES AND EMISSIONS

NO.	EMISSION UNIT DESCRIPTION	PLOT PLAN E7-150.000.10-327618 EMISSION UNIT LEGEND NUMBER	EMISSION UNIT EQUIPMENT NUMBER	DUST COLLECTOR EQUIPMENT NUMBER	PROCESS RATE	GRAIN LOADING	FLOWRATE	EMISSIONS	
					(tons/hr)	(grains/acf)	(ACFM)	lbs/hr	tons/yr
1	Iron Ore Bin	53	2D-61[a]	2D-63[a]	2.0	0.01	3000	0.26	1.13
2	Fly Ash Bin	56	2D-64[c]	2D-67[c]	7.0	0.01	3400	0.29	1.28
3	Filter Dust Bin	55	2D-72[c]	2D-75[c]	25.0	0.01	4500	0.39	1.69
4	Raw Meal Transport	62	2F-03[c]	2F-14[c]	160.0	0.01	1000	0.09	0.38
5	Lime Silo Storage	75	2F-21[c]	2F-30[c]	300.0	0.01	4000	0.34	1.50
6	Raw Meal Storage & Homogenizing Silos	63	2G-01[c]	2G-12[c]	160.0	0.01	17,000	1.5	6.40
7	Kiln Feed System	64	2H-05, 2E-66[c]	2H-15[c]	130.0	0.01	7200	0.62	2.70
8	Gypsum Storage Bin	72	2L-14[d]	2L-08[d]	150.0	0.01	2000	0.17	0.75
9	Clinker Transport	71	2L-03[d]	2L-16[d]	75.0	0.01	2000	0.17	0.75
10	Belt Conveyor	34	2M-08[d]	2M-08[d]	120.0	0.01	4500	0.39	1.69
11	Finish Mill Discharge Vent	73	2N-02[e]	2N-13[e]	15.0	0.01	40,000	3.43	15.0
12	Finish Mill Sepol Separator	73	2N-08[e]	2N-20[e]	120.0	0.01	115,000	9.86	43.20
13	Cement Storage Silo A	74	2Q-01, 2Q-20[e]	2Q-15A[e]	120.0	0.01	4620	0.40	1.70
14	Cement Storage Silo B	74	2Q-01, 2Q-20[e]	2Q-15B[e]	120.0	0.01	4620	0.40	1.70
15	Cement Silo Discharge Hopper	74	2Q-01, 2Q-20[e]	2Q-17[e]	540.0	0.01	3000	0.26	1.13
16	Coal Transport Conveyor	68	2S-03[d]	2S-04[d]	100.0	0.01	2000	0.17	0.75
17	Coal Storage Bin	69	2S-10[d]	2S-07[d]	100.0	0.01	2000	0.17	0.75
	TOTAL								82.50

[a]Plate #1 titled "*Raw Material Storage and Handling*", permit application Attachment B.
[b]Plate #2 titled "*Raw Mill System*", permit application Attachment B.
[c]Plate #3 titled "*Raw Material, Storage, Homogenizing Silo, and Kiln Feed*", permit application Attachment B.
[d]Plate #4 titled "*Preheater, Kiln, Cooler, and Coal System*", permit application Attachment B.
[e]Plate #5 titled "*Finish Grinding System*", permit application Attachment B.

ATTACHMENT A7

VEHICULAR TRAFFIC EMISSION CALCULATIONS

AUTO TRAFFIC

90 persons x(1/1.25) cars/employee x 350 trips/yr x 2 miles/trip

= 50,000 miles/yr

Emissions

Part. Matter

Roads = 0.012 lb/mile x 50,000 miles x 1/2000 = 0.3 tpy

Auto = 0.6 g/mi x 1/453.6 x 50,000 x 1/2000 = <0.1

CO	=	76.5 g/mi x( )	= 4.2
HC	=	10.8 g/mi x( )	= 0.6
NO_x	=	4.9 g/mi x( )	= 0.3
SO_2	=	0.2 g/mi x( )	= <0.1

TRUCK TRAFFIC

20,800 trucks/yr x 2 mi/trip = 41,600 miles/yr

Emissions

Part. Matter

Roads = 0.024 lb/mi x 41,600 x 1/2000 = 0.5 tpy

Auto = 1.3 g/mi x 1/453.6 x 41,600 x 1/2000 = 0.1

CO	=	28.7 g/mi x ( )	= 1.3
HC	=	4.6 g/mi x ( )	= 0.2
NO_x	=	20.9 g/mi x ( )	= 1.0
SO_2	=	2.8 g/mi x ( )	= 0.1

RAIL TRAFFIC

Assume one locomotive will operate on-site 6 hours per day for 30 days/year at a fuel consumption rate of 100 gal/hour.

6 hr/day x 30 day/yr x 100 gal/hr = 18×10^3 gal #2 fuel/yr

Emissions

Part. Matter @ 25 lb/1000 gal	=	0.2 tpy
CO @ 130 lb/1000 gal	=	1.2
HC @ 94 lb/1000 gal	=	0.9
NO_x @ 370 lb/1000 gal	=	3.3
SO_2 @ 57 lb/1000 gal	=	0.5

TOTAL SECONDARY EMISSIONS

PART MATTER	–	1.2 tpy
CO	–	6.7 tpy
HC	–	1.7 tpy
NO_x	–	4.6 tpy
SO_2	–	0.7 tpy

ATTACHMENT A8

TRUCK TRAFFIC SUMMARY

TABLE 3-3

TRUCK TRAFFIC SUMMARY

	TRUCK ROUTE	DISTANCE (Miles) (Road Conditions)	TRUCK FREQUENCY (Loads)	UNIT II KILN INCREASE (Factor)
	FCS CEMENT PLANT			
1.	Cement Shipments	1.6 - Paved	Year: 24,300 Month: 2,070 Week: 480 Day: 93	x2
2.	Baghouse Dust	1.9 - Paved	Year: 255 Month: 21 Week: 5 Day: 1	x2
3.	Cement Rail	2.0 - Track	Year: 130 Month: 11 Week: 3 Day: 2	x2
4.	Screenings/Cement	0.3 - limerock	Year: 2,700 Month: 230 Week: 52 Day: 9	x2
5.	Limerock/Cement	2.8 - Paved 0.8 - limerock	Year: 7,000 Month: 580 Week: 135 Day: 23	x2
6.	Grinding Aid	1.6 - Paved	Year: 12 Month: 1 Week: -- Day: --	x2
7.	Black Beauty	1.9 - Paved	Year: 12 Month: 1 Week: -- Day: --	x2
8.	Mill Scale	1.9 - Paved	Year: 720 Month: 60 Week: 14 Day: 3	x2
9.	TDF	1.3 - Paved	Year: 728 Month: 60 Week: 14 Day: 2	x2

TABLE 3-3
(concluded)

TRUCK TRAFFIC SUMMARY

	TRUCK ROUTE	DISTANCE (Miles) (Road Conditions)	TRUCK FREQUENCY (Loads)	UNIT II KILN INCREASE (Factor)
10.	Fly ash/E-Cat	1.9 - Paved	Year: 3,120 Month: 260 Week: 60 Day: 12	x2
11.	Gypsum	2.2 - Paved	Year: 1,820 Month: 152 Week: 35 Day: 7	x2
	GENERAL PLANT			
1.	Coal Receiving	2 - Truck	Year: 51 Month: 5 Week: 1 Day: --	x1.08
2.	General Warehouse	1.4 - Paved	Year: 1,560 Month: 130 Week: 30 Day: 6	x1.10
3.	Fuel Delivery	1.8 - Paved	Year: 72 Month: 6 Week: -- Day: --	x1.8
4.	Waste Pick-up * Construction Debris * General Waste * Scrap Metal	1.4 - Paved	Year: 156 Month: 13 Week: 3 Day: --	N/A

APPENDIX B

PROCESS DESCRIPTION
PROCESS FLOW SHEETS

PROCESS LAYOUT AND DESCRIPTION
FLORIDA CRUSHED STONE

Site Description

The Florida Crushed Stone Company (FCS) currently operates a dry-process cement kiln (Unit I) with a nominal capacity of 600,000 tons per year (tpy) of cement. FCS is proposing to construct an identically sized cement kiln (Unit II) at the facility. The facility site also contains a coal-fired power plant. Presently, exhaust air from the power plant and the cement plant pass through a single dust collector and exit out a single exhaust stack. FCS is proposing to install a second dust collector and a second exhaust stack adjacent to the existing stack, to serve the proposed cement plant exclusively.

The power plant is not shown on the attached drawings due to the limited interaction with the cement kiln. There is some material flow between the power plant and the existing Unit I cement plant. Approximately twenty thousand CFM of exhaust gasses from the power plant flows to the Unit I plant to serve as primary combustion air. In addition, flyash collected from the power plant, which serves as an additive to the kiln feed, provides 25% - 30% of the needs of the Unit I plant. Additional raw materials are purchased to supply the balance of the Unit I kiln requirements, and all of the Unit II kiln requirements. With respect to electricity generated in the power plant, 100% is sold to the local utility and none is utilized in either cement plant. Hence, there is no connection between the proposed kiln and the power plant.

Attachment B1 presents a two page description of the basic processes involved in cement manufacturing, as well as some background information on cement chemistry and kiln technology. The background information was copied from a guide-book published by La Nouvelle Librairie in collaboration with the Polysius Company.

Material Flow Diagram

Attachment B2 presents a material and gas flow diagram for a single cement plant. Operating parameters are for typical actual operating conditions of the facility and are not meant to represent maximum operating conditions of the facility or permit limiting criteria. Two modes of operation are presented in the diagram, compound operation and direct operation. Compound operation describes the operation of the facility when exhaust air from the raw mill is merging with the exhaust air from the kiln and clinker cooler prior to entering the kiln dust collector and exiting the exhaust stack. Direct operation describes the gas flow when the raw mill is not in operation and the only flow out of the exhaust stack is coming from the kiln and clinker cooler exhaust.

The material and gas flow from two cement kilns operating simultaneously would result in the exhaust gas conditions represented in the diagram for each kiln's respective exhaust stack.

Mechanical Process Flow Sheets

Attachment B3 is a set of five process flow diagrams for a single cement plant, as well as a legend for abbreviations used in the diagrams. Shown on the diagram are process throughput parameters at various points in the system, as well as rated air flow rates from the minor source dust collectors referred to in Table 3-2 in the application (Attachment B4). Table 3-2 also indicates the equipment numbers for the process equipment and dust collectors shown on the process flow diagrams.

ATTACHMENT B1

PROCESS DESCRIPTION

Introduction:

The manufacture of cement entails five basic process stages. They are as follows:

- Quarrying and Crushing
- Prehomogenizing
- Drying, Grinding, and Separating
- Pyroprocessing : Preheater, Kiln, and Cooler
- Finish Grinding

Each stage in the process influences a corresponding factor which governs the behavior of the cement. Therefore the quality of the cement is determined by the following factors:

- Proportion of constituents in the raw mix
- Homogeneity of the mix
- Fineness of grinding of the raw mix
- Degree of burning and rate of cooling
- Finish grinding of the clinker

Crushing:

The existing crushing plant is used for the new kiln line.

Prehomogenization:

The raw material stockpile serves as a buffer store between the working time of the quarry and the continuous working schedule of the grinding and burning plants. Moreover, stockpiling and reclaiming provide a suitable average (prehomoginized) composition for feeding to the mill. The existing stockpile is used for the new kiln line.

Drying, Grinding, and Separating:

Pyroprocessing stipulates that the raw material fed to the kiln system must have both a low moisture content and a fine particle size. Grinding and drying usually occur simultaneously within the grinding mill. The heat generated by the grinding process provides some of the energy required for drying of the raw material. In addition, the introduction of hot exit gases from the kiln into the grinding mill expedite the drying of the material. Particle size classification systems such as cyclones and separators ensure that the coarse particles return for further milling, and the fine particles accumulate in silos. The silos serve to further homogenize the material with the use of aeration systems located at the bottom of the silo.

Pyroprocessing:

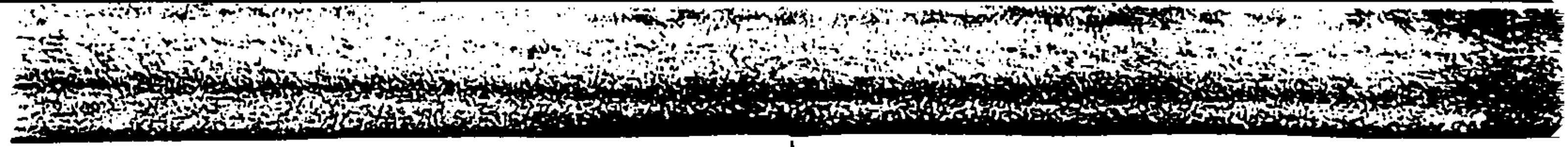
In the preheater heat is exchanged between the gas and solid material according to the counter-flow principle. The preheater stands vertically, and the material is fed from the top, while the hot gas enters from the bottom. The preheater's incorporated cyclones serve to separate the gas from the powdered material. The kiln receives the exiting preheated material.

Calcining of the material takes place in the kiln. As the material inside the kiln traverses along the kiln's length, it becomes the intermediate product in cement manufacture known as clinker. The resultant product, finally, exits the kiln and enters a cooler.

The cooler's primary purpose is to recover the heat contained in the hot clinker. As the clinker exits the cooler, it travels to the finish grinding process.

Finish Grinding:

The clinker, along with about 5% Gypsum, is ground to fine powder in grinding mills. After grinding, the powder is stored in cement silos.



Modern technology

Almost simultaneous discoveries

In the flood of new discoveries during the 18th century, essential inventions for the manufacturing of binders were made at about the same time in Europe and America.

The first artificial cements

In 1750, John Smeaton, an English engineer, was commissioned to build the Eddystone lighthouse in Cornwall. He made many experiments based on various limestones, tuffs and gypsums, in fresh water and salt water. He discovered that for his purpose the best hydraulic binder was obtained from a limestone containing a large amount of argillaceous material.

Towards 1812, the Frenchman Louis Vicat perfected Smeaton's discovery, proving the importance of clays in hydraulic binders.

He became the inventor of artificial hydraulic limes and his work was another step towards the present-day formula for cement.

Portland cement

In 1824 the Englishman Joseph Aspdin took out a patent for the manufacture of cement (from the Latin word *caementum:* binder, mortar), produced by firing an artificial mixture of two ingredients: limestone and clay, in the ratio of 3 to 1.

A colour which evoked the cliffs of the Portland peninsula

This material was called Portland because of its colour, very similar to that of the cliffs of the Portland peninsula on the south coast of England.

In comparison with the manufacture of lime, which allowed great latitude in the selection of the raw materials, the preparation of the raw cement mixture necessitated a very precise chemical composition.

Over the decades the development of Portland cement very quickly pushed the manufacture of hydraulic lime into the background. Twenty years after Aspdin, Isaac Charles Johnson improved the manufacture of Portland cement by increasing the burning temperature up to the plastic phase.

Modernization of kilns

First, static, shaft kilns...

The first cement kilns of modern times were static shaft kilns, identical with those used for the making of lime. The first horizontal rotary kiln (about Ø1,50 × 7,60 m long) was built and operated by the Englishman Frederick Ransome.

From 1898 the Polysius Company launched into the manufacture of this new type of kiln. A burning process which remains, even today, the basis for worldwide cement production had just been introduced.

This process, which was then a wet process, was improved and towards the end of the twenties the same company perfected a semi-dry process of drying and decarbonation with the Lepol ® grate.

... then rotary, horizontal kilns

It brought about a fundamental improvement in the process of cement burning in a rotary kiln, while reducing the consumption of fuel by a third.

Contrary to most other cement plant constructors, Polysius showed interest as far back as 1930 in the dry process which was to develop mainly after the Second World War.

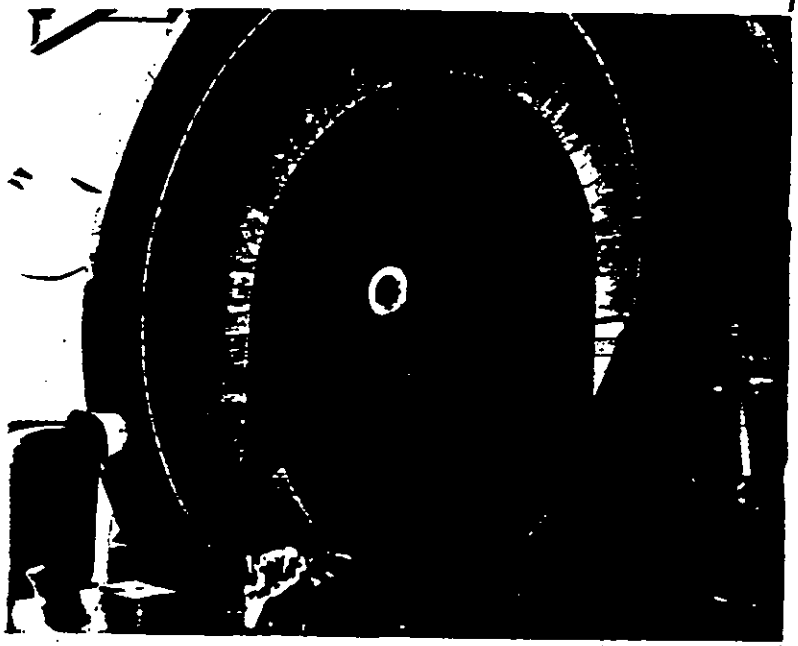
Around 1960, following the improvement of the kiln with Dopol ® cyclone preheaters, the calcining line took on its present-day form with three heat exchangers:

- The cyclone preheater (the most common), with or without a precalciner, in which the gases and the product circulate in the same direction (parallel streams).
- The rotary kiln, in which the product moves in counterflow to the gases.
- The counterflow cooler, or perpendicular flow cooler in the case of grates traversed by cooling air.

There are other types of preheaters: counterflow (Gepol ® type) or perpendicular (Lepol ® type). The perfection of fluidized beds should also be noted, both for preheating and for cooling.

Present-day binders

Since the 19th century, the rise in the importance of concrete has been accompanied by more and more severe requirements



ln hood, with burner and brickwork.

Progress towards diversification

for the properties and qualities of the finished product. R.H. Bogue noted in 1952 that engineers have recognized the existence of very strict rules for making concrete, and have applied themselves to making known the right methods for manufacturing and treatment.

Binders, and more particularly cements, have evolved in the same way, and while diversifying, cement has gained in quality, stability and precision. Many methods have been perfected, each satisfying rigorous selection standards.

WHAT IS CEMENT?

When a new cement plant is to be built, the first job for the engineer is to decide which manufacturing process is most suitable in regard to the raw materials available.

A hydraulic binder

Cement is a mineral powder of greyish appearance and practically impalpable. It is obtained by grinding and burning (at about 1450°C) a mixture of limestone and clay. The product of the burning, called clinker, is mainly a combination of lime, silica, alumina and ferric oxide.

Cement hardens while hydrating

Cement is obtained by grinding clinker and calcium sulphate, usually added in the form of gypsum (see frame). Cement is a hydraulic binder, that is, one which forms with water a plastic paste "setting and hardening progressively, even when covered and even under water" (definition of French Standard NF P 15-301).

The anhydrous constituents, present in the form of polygonal crystals which are quite regular and homogeneous, combine with water and decompose. When hydrated they crystallize again, taking many different forms: needles, sticks, prisms, various polyhedrons, etc.

These crystals develop during mixing and adhere to the granular additives of concrete: sand, gravel, pebbles, etc. The phenomenon of hydration takes place with a rise in temperature. It is hydration which constitutes the setting of the cement. Contrary to popular belief, cement does not "dry" but sets while hydrating.

RAW MATERIALS IN CEMENT MANUFACTURE

- Calcium carbonate: $CaCO_3$
- Alumina: Al_2O_3(aluminium oxide)
- Silica: SiO_2(silicon dioxide)
- Iron oxide: Fe_2O_3(ferric oxide)

These substances are usually found naturally in the form of limestone, marl and clays.

These rocks contain other substances, such as; titanium oxide (TiO_2), manganese oxide (Mn_2O_3), magnesium carbonate (CO_3Mg), sulphuric anhydride (SO_3), phosphate (P_2O_5), sodium oxide (Na_2O), potassium oxide (K_2O), chlorine (Cl). Standards and technical requirements limit some of these in the finished product.

Cement and lime, not to be confused

There are three criteria which differentiate the two materials:

Three criteria for differentiation

• **The chemical composition:** the relationship between the four main constituents of cement is defined quantitively within very narrow limits. For lime there is much greater latitude in the proportions.

• **The burning temperature:** clinker is burnt at a temperature of about 1450 to 1550°C (sintering). Lime is not sintered, but only decarbonated and burnt at a temperature of 1050° to 1150°C. Sintering is achieved when there is a commencement of softening, without complete melting of the material. Decarbonation is the decomposition of carbonates by the elimination of CO_2.

• **The setting behaviour:** although lime sets without any additional matter other than water, it is necessary to add 4% of gypsum (hydrated calcium sulphate) to the clinker to obtain cement. The addition of gypsum has the effect of regulating the setting time, the crushed and ground clinker having a very variable setting time which makes it unusable on its own.

The composition of the cement raw mix

Clay, an extra component

The main component of the mix is limestone, which is rich in calcium carbonate ($CaCO_3$). Clay is used as an additive and serves as a vector of the hydraulic components. These rocks supply the main constituents of the raw material for cement (see frame). These raw materials are prepared and measured to form the raw mix.

Calculation of the raw mix

Le Chatelier was one of the first to insist on rigorous controls being imposed on the percentage of lime, and particularly of free lime (not chemically combined), in the clinker. Since then many formulae have been suggested for the proportioning of the raw mix.

For many years the formulae were based on very long chemical analyses which were impossible to carry out during manufacture. This is why cement makers only checked titration in carbonates. This should be 76 to 78% for the manufacture of ordinary cement. The perfection of X-ray analysis machines has enabled complete and rapid analyses to be effected nowadays, directly by the plant laboratory, and in parallel with production. Among the various methods of calculation, the following mathematical moduli are particularly note-worthy.

Cements rich in lime

The lime standard

As cements rich in lime develop more strength than those poor in lime, the percentage of lime is kept as high as possible.

Kuehl defined the lime standard as index of the percentage of lime in a cement (simplified formula):

$$LS = \frac{100\,CaO}{2.8\,SiO_2 + 1.1\,Al_2O_3 + 0.7\,Fe_2O_3}$$

This formula expresses the ratio between the lime present in the mix and the quantity of lime that can be bound by the hydraulic factors during the normal process of burning and cooling of the clinker.

By fast cooling of the clinker after burning, it is possible to keep the same conditions of balance at ambient temperature as existed at 1450°C and which are expressed by the lime standard.

The lime standard enables the operator to evaluate the behaviour of the mix and forecast the quality of the cement.

The higher the lime standard, the stronger the cement

The higher the lime standard, the stronger the cement, but the more difficult the calcining will be.

The general rule is :
- from 90 to 93 for normal strength cement;
- from 93 to 96 resistant cement;
- from 96 to 98 for a maximum-strength cement.

If the lime standard is higher than 100, the ingredients are not in balance. The hydraulic factors no longer suffice to saturate all the lime present. The free lime has a negative effect on the volume stability and on the strength. Also a high lime standard causes an increase in the specific heat consumption necessary for the burning.

Lime deficiency
Contrary to the lime standard, lime deficiency shows the quantity of lime which is missing from the mix thus preventing complete saturation of the hydraulic factors. It is given by the formula:

$$\frac{2.8011\,SiO_2 + 1.65\,Al_2O_3 + 0.3512\,Fe_2O_3}{SiO_2 + Al_2O_3 + Fe_2O_3 + CaO}$$

It is the difference between, on the one hand, the total lime needed to combine with all the silica, alumina and ferric oxide in the minerals of the clinker, and on the other hand, the lime actually combined with these three oxides.

The silica modulus
This shows the ratio between the silica and the agents of the fusion phase, alumina and ferric oxide (sesquioxides) and is given by the formula:

$$SM = \frac{SiO_2}{Al_2O_3 + Fe_2O_3}$$

For the optimal conditions of use of the kiln, the silica modulus should be adjusted to between 2.2 and 2.8. A higher value signifies an increased percentage of silica, to the detriment of the fusion agents Al_2O_3 and Fe_2O_3. A lower value facilitates burning but the relative increase in fusion agents can cause excessive coating in the sintering zone, prejudice the good working of the kiln and reduce the quality of the finished cement.

The iron modulus
It gives the ratio between the alumina and the ferric oxide:

$$IM = \frac{Al_2O_3}{Fe_2O_3}$$

It is normally from 1.6 to 2.4.

Clinker minerals

On firing, the components of the raw mix decompose and combine to form new chemical combinations: these are the clinker minerals (see frame: "The four main constituents of clinker").

Cement manufacturers have adopted the habit of simplifying the written expression of these combinations, using the letters C for CaO (lime), S for SiO_2 (silica), A for Al_2O_3 (alumina), and F for Fe_2O_3 (ferric oxide).

Lime: much less strong

Tricalcium silicate (or C_3S)
It is essential for the quality of the cement. For a high-strength cement, a high C_3S content is needed. The lime standard of the raw mix should therefore be between 90 and 98 and the firing temperature above 1250°C, which is the threshold of formation of C_3S. The latter usually appears in the form of

THE FOUR MAIN CONSTITUENTS OF CLINKER

Lime, silica and ferric oxide are brought into the clinker by the following natural raw materials: chalk, limestone, clay and marl. When clinker is formed in the kiln they are raised to a high temperature and combine to form other minerals, which react in the presence of water. These are:

- **C_3S: Tricalcium silicate or Alite**
High strength and medium heat release on setting: helps hardening.

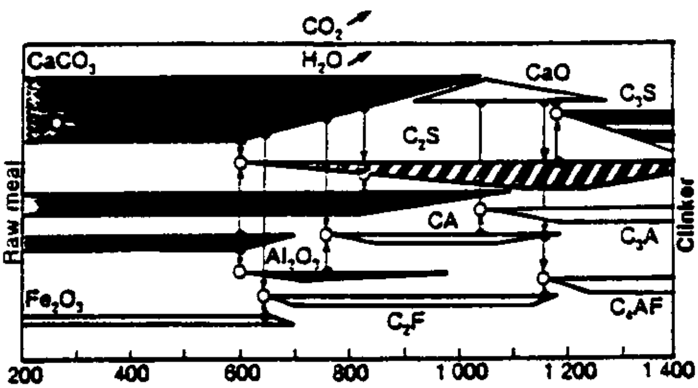
- **C_2S: Dicalcium silicate or Belite**
Slow setting and hardening, small heat release on setting.

- **C_3A: Tricalcium aluminate or Celite**
Rapid hydrolysis. Development of large quantities of heat, rapid hardening, large shrinkage.

- **C_4AF: Tetracalcium aluminoferrite or Brownmillerite**
Small reaction with water, small shrinkage (almost inert).

The mineralogical composition is established by optical microscopy, diffraction or X-rays.

Transformation of the mineral phases



Burning temperature in °C

From 650 to 1 050 °C

I	$Al_2O_3\ 2\,SiO_2\ 2\,H_2O + 5\,CaCO_3$	$\rightarrow CA + 2\,C_2S + 2\,H_2O + 5\,CO_2$
II	$Fe_2O_3 + 2\,CaCO_3$	$\rightarrow C_2F + 2\,CO_2$
III	$C + O_2$	$\rightarrow CO_2$
IV	$SiO_2 + 2\,CaCO_3$	$\rightarrow C_2S + 2\,CO_2$
V	$CaCO_3$	$\rightarrow C + CO_2$

From 1 250 to 1 450 °C

VI	$C_2F + CA + C$	$\rightarrow C_4AF$
VII	$CA + 2\,C$	$\rightarrow C_3A$
VIII	$2\,C + S$	$\rightarrow C_2S$
IX	$C_2S + C$	$\rightarrow C_3S$

large, well defined hexagonal crystals. Lime burnt at lower temperatures contains little or no C_3S and does not have the same qualities of initial strength.

Dicalcium silicate (or C_2S)
It has rounded, and often grooved grains. Its presence improves the behaviour on burning, but it can cause deposits to form in the burning area and so be detrimental to the operation of the kiln.

Tricalcium aluminate (or C_3A)
It is the interstitial vitreous material in which the crystals of alite or belite appear. This material crystallizes rapidly on cooling and gives the cement high initial strength. Because C_3A is sensitive to sulphates, the amount has to be reduced in certain special cements, for example, those destined for hydraulic works.

Tetracalcium aluminoferrite (or C_4AF).
It is also an interstitial material made up of prismatic crystals. Having but a slight reaction with water, it only causes a small temperature rise on setting and little tendency to shrinkage.

Additional components
With a carefully prepared raw mix and a mature clinker temperature, the amount of free lime, that lime not chemically combined, is about 0.2% to 2%. Larger amounts indicate poor operation of the kiln and a relative drop in the quality of the clinker (excessive formation of C_3S to the detriment of C_2S and a lime standard below 100).

In the same way, excessive amounts of magnesia cause problems of expansion. This is why cement standards limit the amounts of free CaO, MgO and of other components of which some only appear as trace elements in cement.

Strict controls on the composition for the safety of the mason and the user

In small quantities the various additional components have hardly any effect on the quality of the clinker or, if they evaporate, on the natural environment. However, research into the pollution and noxiousness of certain products justifies the care given by researchers and scientists to the limitation of these products, which in solid form and bound up in the granules of clinker are

ATTACHMENT B2

MATERIAL AND GAS FLOW DIAGRAM

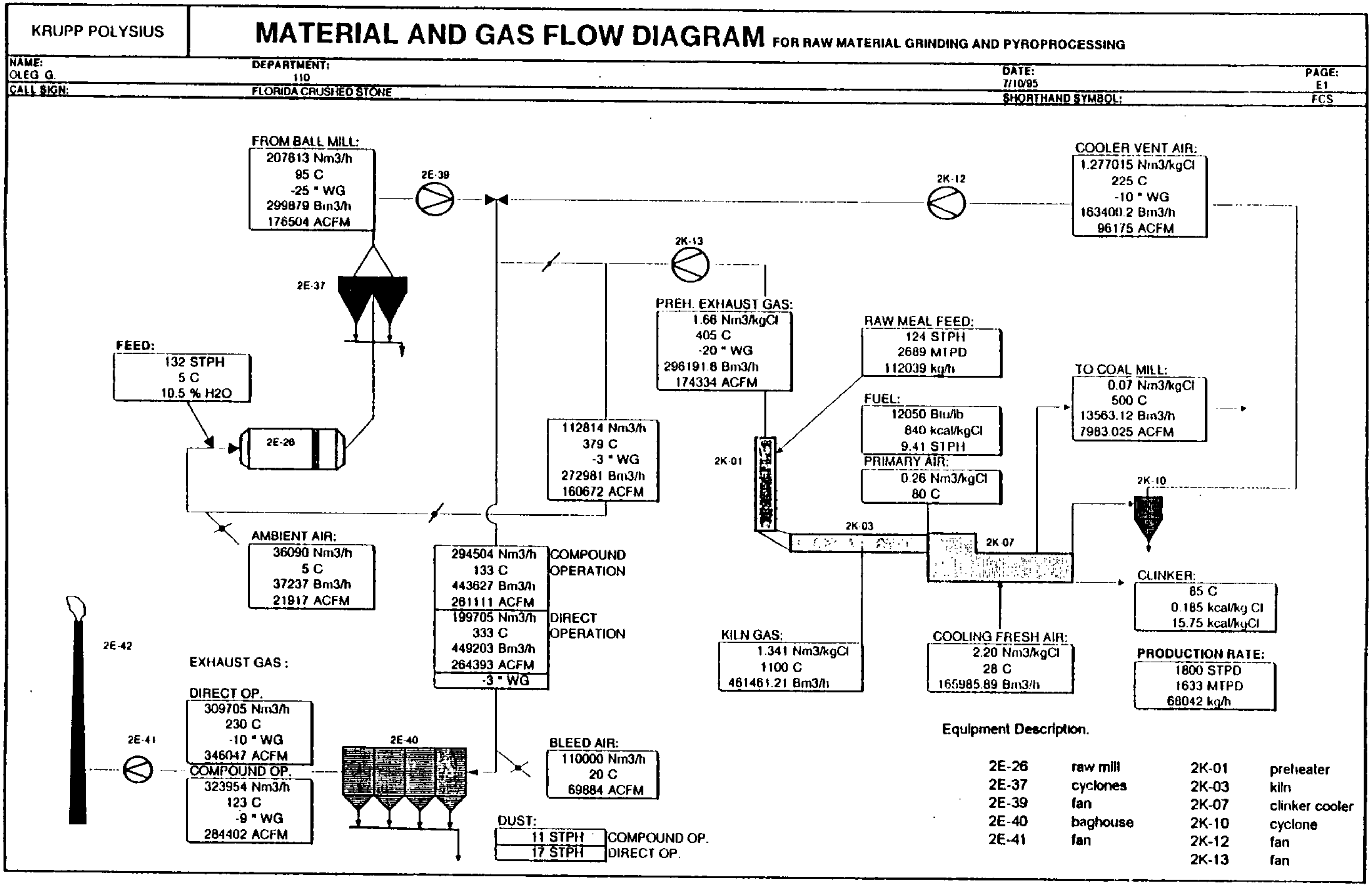

KRUPP POLYSIUS
MATERIAL AND GAS FLOW DIAGRAM FOR RAW MATERIAL GRINDING AND PYROPROCESSING
NAME:
OLEG G.
DEPARTMENT:
110
CALL SIGN:
FLORIDA CRUSHED STONE
DATE:
7/10/95
PAGE:
E1
SHORTHAND SYMBOL:
FCS
FROM BALL MILL:
207613 Nm3/h
95 C
-25 " WG
299879 Bm3/h
176504 ACFM
2E-39
2K-12
COOLER VENT AIR:
1.277015 Nm3/kgCl
225 C
-10 " WG
163400.2 Bm3/h
96175 ACFM
2K-13
2E-37
PREH. EXHAUST GAS:
1.66 Nm3/kgCl
405 C
-20 " WG
296191.8 Bm3/h
174334 ACFM
RAW MEAL FEED:
124 STPH
2689 MTPD
112039 kg/h
FEED:
132 STPH
5 C
10.5 % H2O
TO COAL MILL:
0.07 Nm3/kgCl
500 C
13563.12 Bm3/h
7983.025 ACFM
FUEL:
12050 Btu/lb
840 kcal/kgCl
9.41 STPH
2E-26
112814 Nm3/h
379 C
-3 " WG
272981 Bm3/h
160672 ACFM
2K-01
PRIMARY AIR:
0.26 Nm3/kgCl
80 C
2K-10
2K-03
AMBIENT AIR:
36090 Nm3/h
5 C
37237 Bm3/h
21917 ACFM
294504 Nm3/h
133 C
443627 Bm3/h
261111 ACFM
COMPOUND OPERATION
199705 Nm3/h
333 C
449203 Bm3/h
264393 ACFM
DIRECT OPERATION
-3 " WG
2K-07
CLINKER:
85 C
0.185 kcal/kg Cl
15.75 kcal/kgCl
2E-42
KILN GAS:
1.341 Nm3/kgCl
1100 C
461461.21 Bm3/h
COOLING FRESH AIR:
2.20 Nm3/kgCl
28 C
165985.89 Bm3/h
PRODUCTION RATE:
1800 STPD
1633 MTPD
68042 kg/h
EXHAUST GAS :
DIRECT OP.
309705 Nm3/h
230 C
-10 " WG
346047 ACFM
COMPOUND OP.
323954 Nm3/h
123 C
-9 " WG
284402 ACFM
2E-41
2E-40
BLEED AIR:
110000 Nm3/h
20 C
69884 ACFM
DUST:
11 STPH COMPOUND OP.
17 STPH DIRECT OP.
Equipment Description.
2E-26 raw mill
2E-37 cyclones
2E-39 fan
2E-40 baghouse
2E-41 fan
2K-01 preheater
2K-03 kiln
2K-07 clinker cooler
2K-10 cyclone
2K-12 fan
2K-13 fan

Figure 1

ATTACHMENT B3

MECHANICAL PROCESS FLOW SHEETS

LEGEND

B	LB/HR	COMBUSTIBLE FLOW
D	FT	DIAMETER
G	STPH	MATERIAL FLOW
H	%	MATERIAL MOISTURE
HU	BTU/LB	NET CALORIC VALUE
K	IN	GRAIN SIZE
KB	CM^2/G	BLAINE
KR	%	RESIDUAL
M	HP	MOTOR POWER
N	RPM	SPEED
P	IN. WG	STATIC PRESSURE
Q	MM BTU/HR	HEAT QUANTITY
QS	BTU/LB	HEAT QUANTITY
S	GR/SCF	DUST CONTENT
SG	LB/FT^3	BULK DENSITY
T	DEG F	TEMPERATURE
TP	DEG F	DEW POINT
UT	DEG F	AMB. TEMPERATURE
VB	ACFM	GAS FLOW
VN	SCFM	GAS FLOW
VS	SCF/LB	GAS FLOW
VV	FT^3/S	GAS FLOW

PROJECT NO.

CHAPTER

SHEET

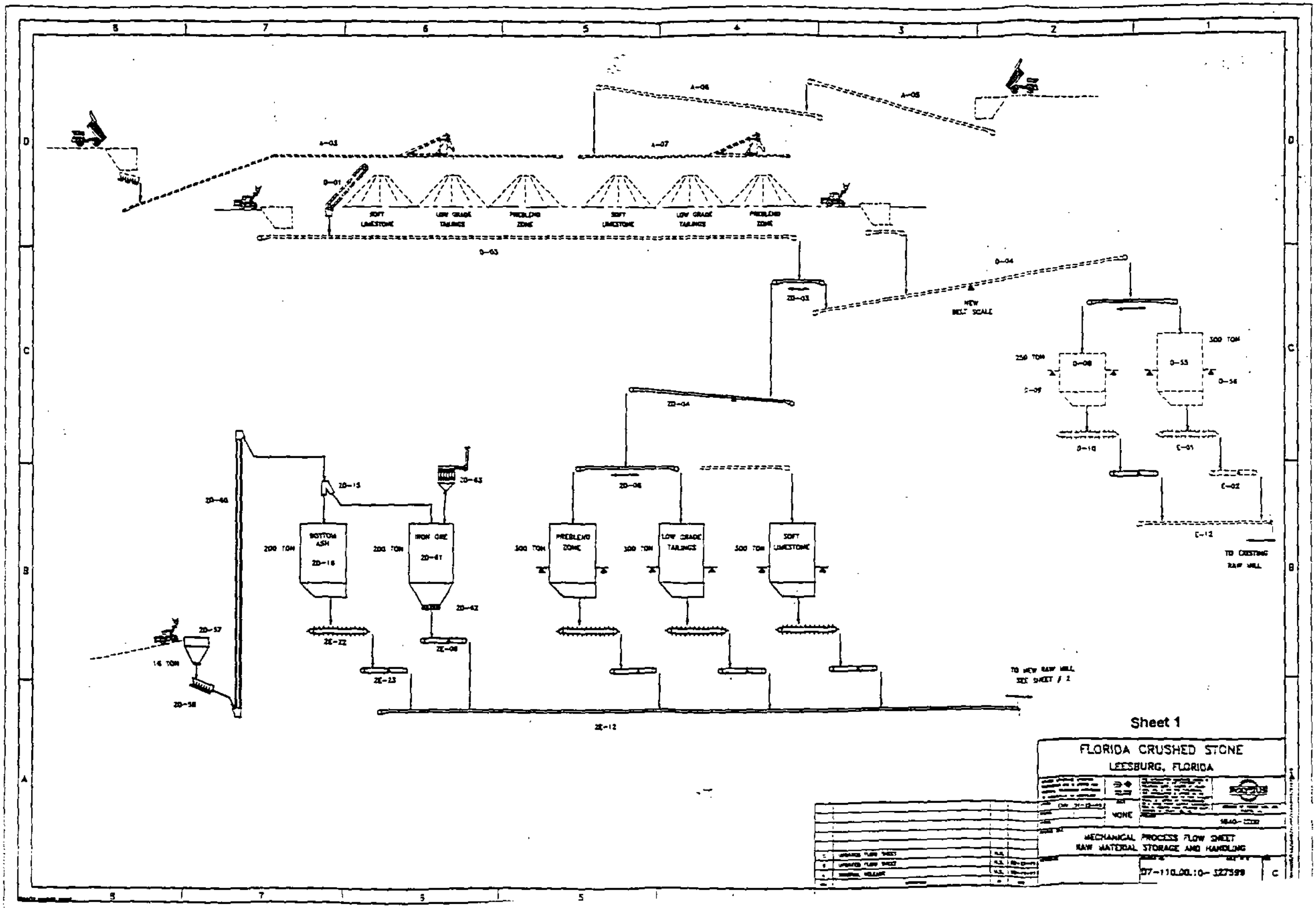
ENGINEER

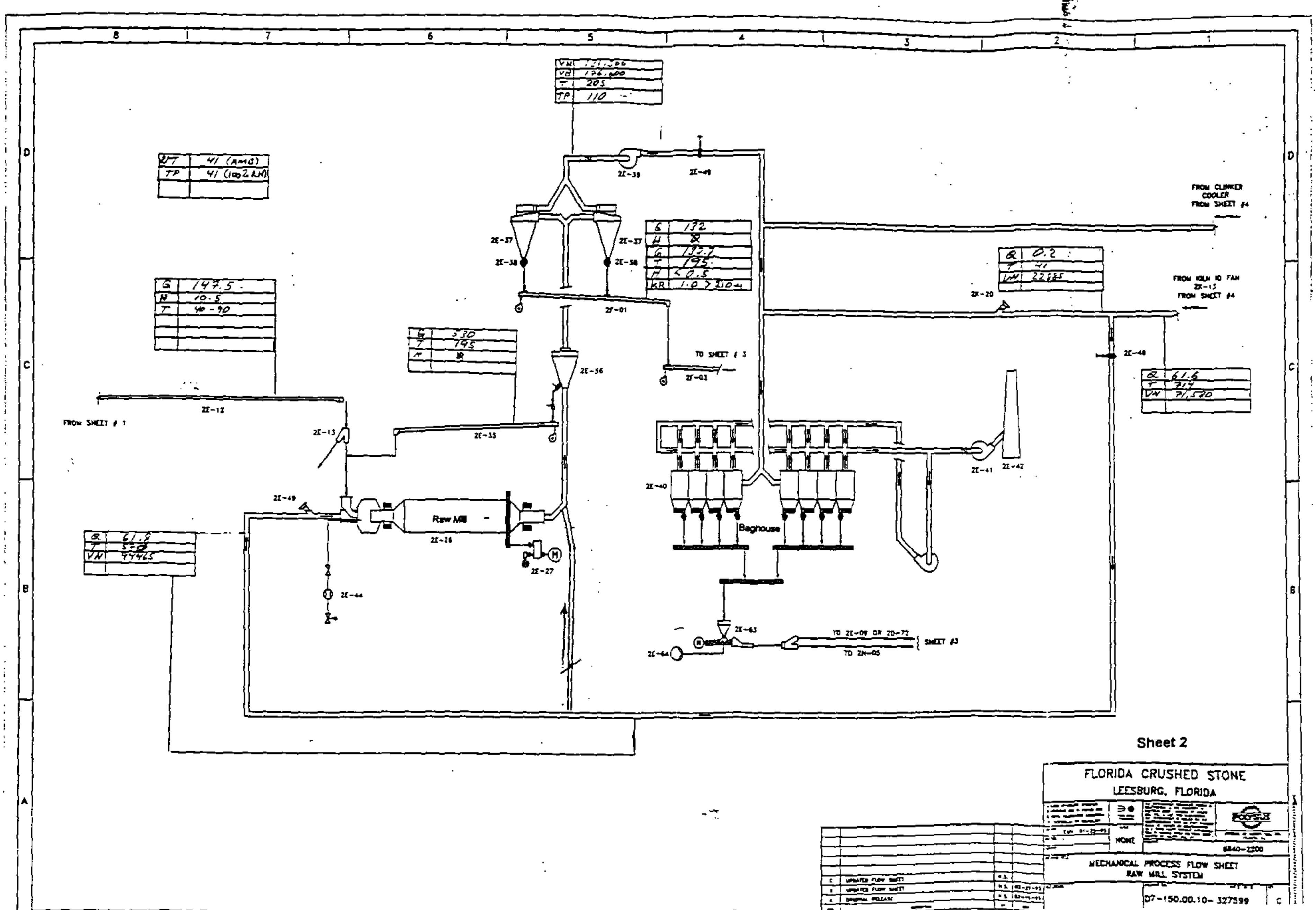
DATE

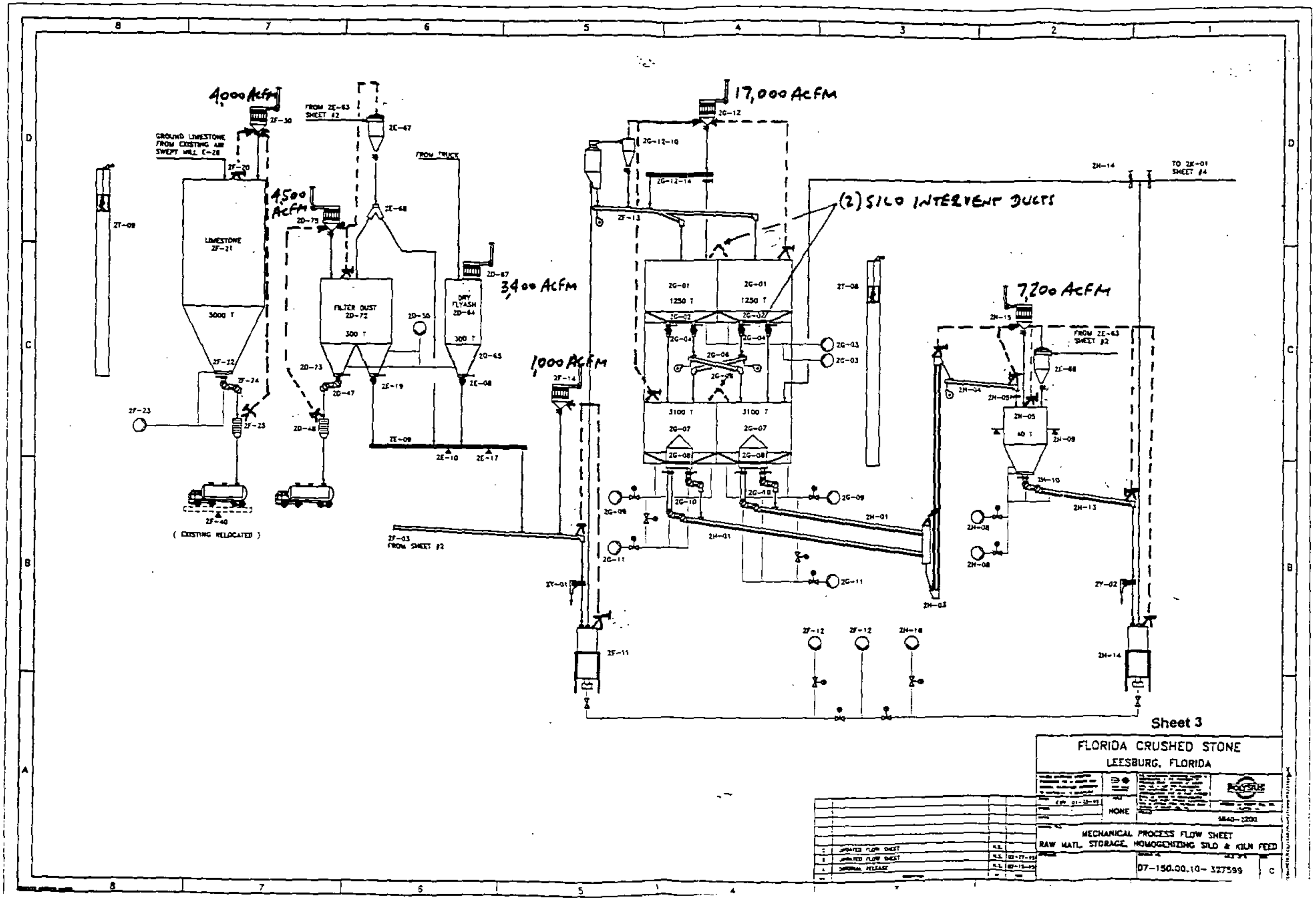
DRAWN BY:

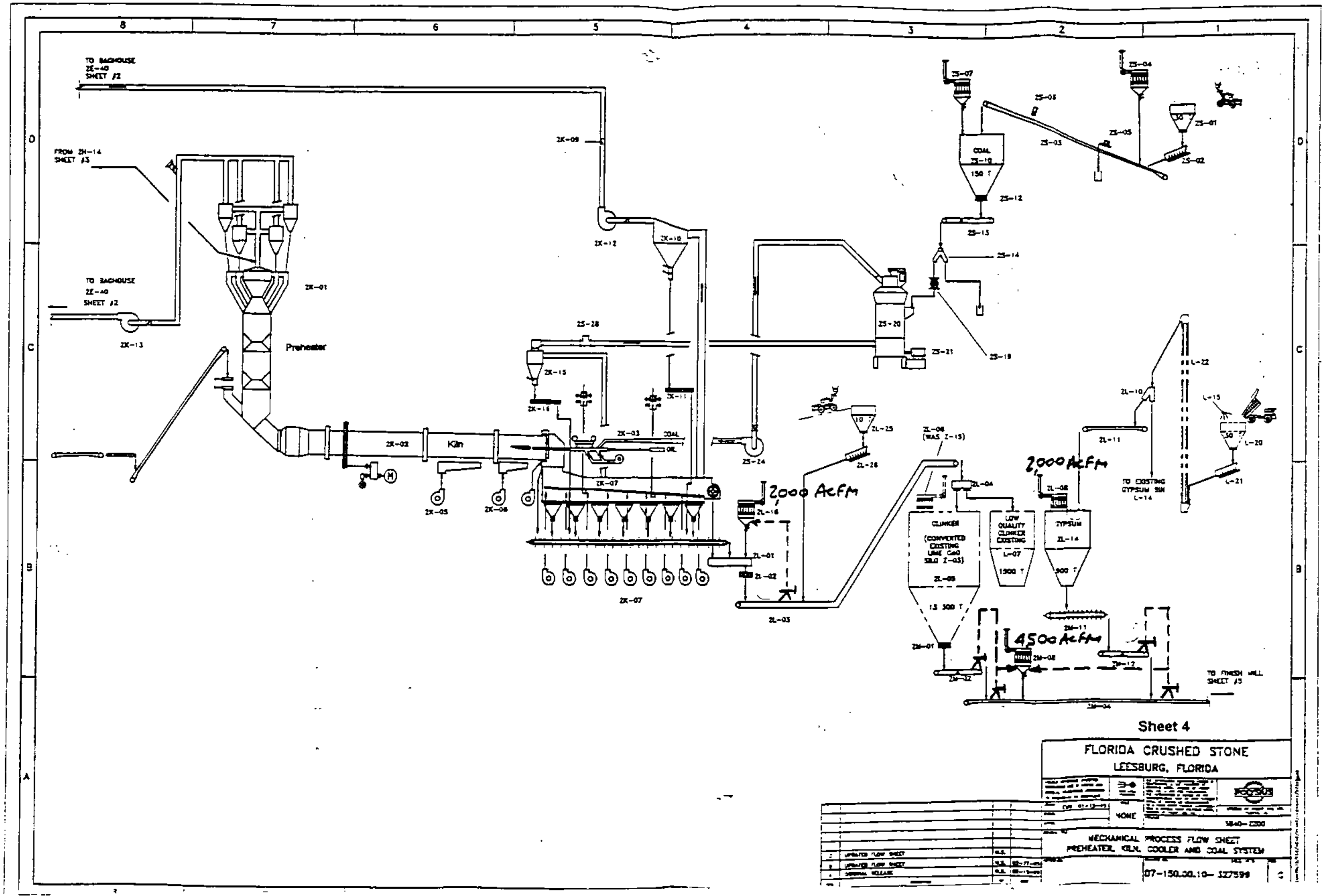
APPROVED BY:

LEGEND


A-06
A-05
A-07
D-01
SOFT LIMESTONE
LOW GRADE TAILINGS
PREBLEND ZONE
D-03
D-04
ZD-03
NEW BELT SCALE
250 TON
300 TON
D-08
D-55
D-56
D-10
E-01
E-02
E-12
TO EXISTING RAW MILL
ZD-04
ZD-06
ZD-15
ZD-63
ZD-60
BOTTOM ASH
200 TON
ZD-16
IRON ORE
200 TON
ZD-61
ZD-62
PREBLEND ZONE
300 TON
LOW GRADE TAILINGS
300 TON
SOFT LIMESTONE
300 TON
ZD-57
16 TON
ZD-58
ZE-22
ZE-08
ZE-23
ZE-12
TO NEW RAW MILL
SEE SHEET # 2
Sheet 1
FLORIDA CRUSHED STONE
LEESBURG, FLORIDA
NONE
MECHANICAL PROCESS FLOW SHEET
RAW MATERIAL STORAGE AND HANDLING
C


Raw Mill
Baghouse
FROM SHEET # 1
TO SHEET # 3
FROM CLINKER COOLER FROM SHEET #4
FROM KILN ID FAN
FROM SHEET #4
SHEET #3
Sheet 2
FLORIDA CRUSHED STONE
LEESBURG, FLORIDA
MECHANICAL PROCESS FLOW SHEET
RAW MILL SYSTEM
D7-150.00.10- 327599


4000 AcFM
2F-30
GROUND LIMESTONE FROM EXISTING AIR SWEPT MILL E-28
2F-20
LIMESTONE 2F-21
3000 T
2F-22
2F-24
2F-23
2F-25
2F-40
(EXISTING RELOCATED)
2T-09
4500 AcFM
2D-75
FROM 2E-63 SHEET #2
2E-47
2E-48
FILTER DUST 2D-72
300 T
2D-73
2D-47
2D-48
2E-19
2D-56
FROM TRUCK
2D-67
3400 AcFM
DRY FLYASH 2D-64
300 T
2D-65
2E-08
2E-09
2E-10
2E-17
2F-03 FROM SHEET #2
1000 AcFM
2F-14
2Y-01
2F-11
17,000 AcFM
2G-12
2G-12-10
2G-12-14
2F-13
(2) SILO INTERVENT DUCTS
2G-01
1250 T
2G-02
2G-04
2G-06
2G-03
3100 T
2G-07
2G-08
2G-09
2G-10
2G-11
2H-01
2H-03
2F-12
2H-18
2T-08
2H-14
TO 2K-01 SHEET #4
7200 AcFM
2H-15
FROM 2E-63 SHEET #2
2E-68
2H-04
2H-05
40 T
2H-09
2H-10
2H-13
2H-08
2Y-02
2H-14
Sheet 3
FLORIDA CRUSHED STONE
LEESBURG, FLORIDA
NONE
MECHANICAL PROCESS FLOW SHEET
RAW MATL. STORAGE, HOMOGENIZING SILO & KILN FEED
07-150.00.10-327599
C
UPDATED FLOW SHEET
UPDATED FLOW SHEET
INTERNAL RELEASE



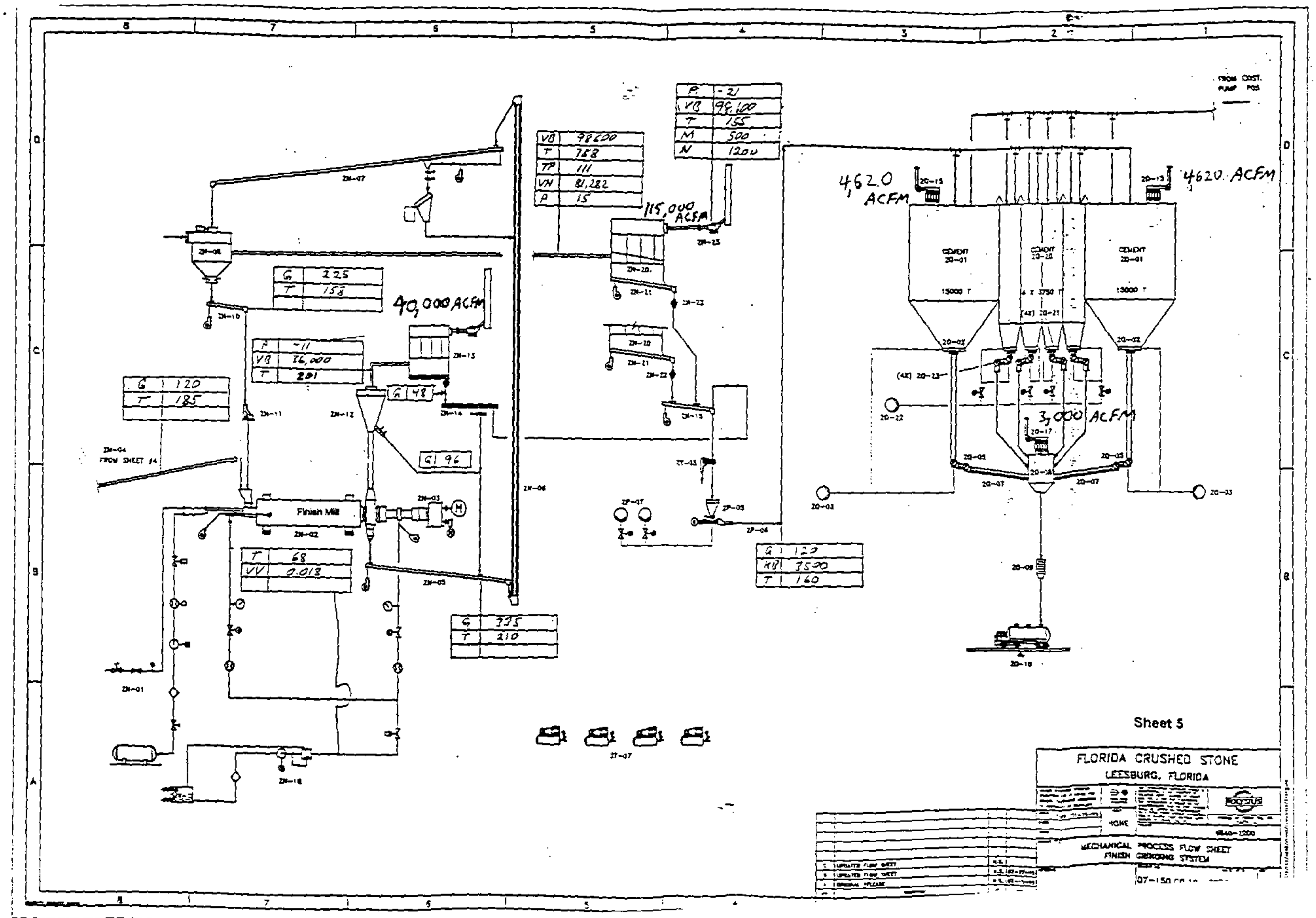
Sheet 4

FLORIDA CRUSHED STONE
LEESBURG, FLORIDA

MECHANICAL PROCESS FLOW SHEET
PREHEATER, KILN, COOLER AND COAL SYSTEM

NONE

07-150.00.10-327599


FROM CONST. PUMP POS
P -21
VB 98,100
T 155
M 500
N 1200
VB 98600
T 158
TP 111
VH 81,282
P 15
115,000 ACFM
4,620 ACFM
4620 ACFM
CEMENT 20-01
15000 T
4 X 3750 T
(4X) 20-21
(4X) 20-23
20-22
3,000 ACFM
20-17
20-05
20-07
20-03
20-33
20-09
20-10
ZN-07
ZN-08
G 225
T 158
40,000 ACFM
ZN-10
ZN-13
P -11
VB 36,000
T 201
G 120
T 185
ZN-11
ZN-12
G 48
ZN-14
G 96
ZN-04 FROM SHEET #4
Finish Mill
ZN-02
ZN-03
M
ZN-06
T 68
VV 0.018
ZN-05
G 335
T 210
ZN-01
ZN-16
ZN-20
ZN-21
ZN-22
ZN-23
ZN-15
ZT-13
ZP-07
ZP-05
ZP-04
G 120
KB 3500
T 160
ZT-07
Sheet 5
FLORIDA CRUSHED STONE
LEESBURG, FLORIDA
NONE
MECHANICAL PROCESS FLOW SHEET
FINISH GRINDING SYSTEM
UPDATED FLOW SHEET
ORIGINAL RELEASE

Mechanical Process Flow
Sheets Available upon
Request (5)

ATTACHMENT B4

TABLE 3-2
MINOR SOURCES AND EMISSIONS

TABLE 3-2

MINOR SOURCES AND EMISSIONS

NO.	EMISSION UNIT DESCRIPTION	PLOT PLAN E7-150.000.10-327618 EMISSION UNIT LEGEND NUMBER	EMISSION UNIT EQUIPMENT NUMBER	DUST COLLECTOR EQUIPMENT NUMBER	PROCESS RATE	GRAIN LOADING	FLOWRATE	EMISSIONS	
					(tons/hr)	(grains/acf)	(ACFM)	lbs/hr	tons/yr
1	Iron Ore Bin	53	2D-61[a]	2D-63[a]	2.0	0.01	3000	0.26	1.13
2	Fly Ash Bin	56	2D-64[c]	2D-67[c]	7.0	0.01	3400	0.29	1.28
3	Filter Dust Bin	55	2D-72[c]	2D-75[c]	25.0	0.01	4500	0.39	1.69
4	Raw Meal Transport	62	2F-03[c]	2F-14[c]	160.0	0.01	1000	0.09	0.38
5	Lime Silo Storage	75	2F-21[c]	2F-30[c]	300.0	0.01	4000	0.34	1.50
6	Raw Meal Storage & Homogenizing Silos	63	2G-01[c]	2G-12[c]	160.0	0.01	17,000	1.5	6.40
7	Kiln Feed System	64	2H-05, 2E-66[c]	2H-15[c]	130.0	0.01	7200	0.62	2.70
8	Gypsum Storage Bin	72	2L-14[d]	2L-08[d]	150.0	0.01	2000	0.17	0.75
9	Clinker Transport	71	2L-03[d]	2L-16[d]	75.0	0.01	2000	0.17	0.75
10	Belt Conveyor	34	2M-08[d]	2M-08[d]	120.0	0.01	4500	0.39	1.69
11	Finish Mill Discharge Vent	73	2N-02[e]	2N-13[e]	15.0	0.01	40,000	3.43	15.0
12	Finish Mill Sepol Separator	73	2N-08[e]	2N-20[e]	120.0	0.01	115,000	9.86	43.20
13	Cement Storage Silo A	74	2Q-01, 2Q-20[e]	2Q-15A[e]	120.0	0.01	4620	0.40	1.70
14	Cement Storage Silo B	74	2Q-01, 2Q-20[e]	2Q-15B[e]	120.0	0.01	4620	0.40	1.70
15	Cement Silo Discharge Hopper	74	2Q-01, 2Q-20[e]	2Q-17[e]	540.0	0.01	3000	0.26	1.13
16	Coal Transport Conveyor	68	2S-03[d]	2S-04[d]	100.0	0.01	2000	0.17	0.75
17	Coal Storage Bin	69	2S-10[d]	2S-07[d]	100.0	0.01	2000	0.17	0.75
	TOTAL								82.50

[a]Plate #1 titled "*Raw Material Storage and Handling*", permit application Attachment B.
[b]Plate #2 titled "*Raw Mill System*", permit application Attachment B.
[c]Plate #3 titled "*Raw Material, Storage, Homogenizing Silo, and Kiln Feed*", permit application Attachment B.
[d]Plate #4 titled "*Preheater, Kiln, Cooler, and Coal System*", permit application Attachment B.
[e]Plate #5 titled "*Finish Grinding System*", permit application Attachment B.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1875 Century Boulevard
Atlanta, Georgia 30345

IN REPLY REFER TO:

JUN 16 1995

RECEIVED
JUN 23 1995
Bureau of
Air Regulation

Mr. C. H. Fancy
Chief, Bureau of Air Regulation
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

Dear Mr. Fancy:

In April we submitted comments on the Prevention of Significant Deterioration permit application for a new cement kiln (kiln #2) proposed by Florida Crushed Stone. The kiln would be located 20 km southeast of Chassahowitzka Wilderness Area, a Class I air quality area, administered by the Fish and Wildlife Service. Our initial review determined that the application was incomplete. We subsequently received additional information from the applicant, but still find significant omissions in the application. The enclosed technical review comments detail our concerns.

To clarify our concerns, we believe that it would be helpful for us to speak with a representative of your office by telephone. Therefore, we ask you to please contact Ms. Ellen Porter of our Air Quality Branch in Denver, Colorado, at 303/969-2617 at your earliest convenience.

Sincerely yours,

Jerome M Butler
for Noreen K. Clough
Regional Director

Enclosure

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

June 16, 1995

Mr. Tom Mountain
Environmental Manager
Florida Crushed Stone Company
Post Office Box 1508
Brooksville, Florida 34605-1508

Re: Modification Request PA 82-17, Cement Kiln

Dear Mr. Mountain:

The Bureau of Air Regulation's has the following comments on the material supporting the site certification/PSD modification received from RTP Environmental Associates, Inc. on April 21, 1995, :

1. Please supply the basis for the calculations of emissions (lb/hr, ton/yr and/or lb/MMBTU, lb/ton, if applicable) for each pollutant emitted (criteria and non-criteria) as a result of this project. Include all asumptions, reference materials, and engineering calculations.

2. Pursuant to Rule 62-212.200(2) and Rule 62-212.400(2)(e), F.A.C., please supply calculations for the last two (2) years of operation. Compare past actual emissions with the future potential emissions for each criteria and non-criteria pollutants emitted as a result of this project.

3. Provide a process flow diagram that will show this project as proposed. Include all scenarios proposed (page 3-16 of the application submitted in March 13,1995).

4. Both Central Power and Lime (CPL) and Florida Crushed Stone (FCS) were authorized under the same Certification (PA 82-17). The recent modification of CPL's operation and the one proposed for FCS also relate to the same Certification. It appears to us, therefore, that they are under common ownership , control, and contiguous (in fact integrated). Therefore emissions from both operations need to be considered together for PSD review (especially the modeling). The expansion should be considered as a project beyond the baseline applicable to the existing power plant and cement plant. This could have some ramifications on the BACT determination. Please re-evaluate the BACT analysis to see what level of control is indicated when the two operations are considered together.

5. Please provide in a chronological order the different permitting activities that has ocurred at this facility since the beginning of its operation.

6. Please address the comments in the attached National Park Service correspondence.

If you have any questions on this matter, please write to Al Linero, P.E. Supervisor or call Marty Costello, P.E. (BACT engineer), Cleve Holladay (metereologist), John Glunn (air toxic specialist) or Teresa Heron (review engineer) at (904) 488-1344.

Sincerely,

Hamilton S. Oven

Hamilton S. Oven, P.E.
Administrator, Siting
Coordination Office

cc: Teresa Heron
Chip Collette
Tony Cleveland