In the Matter of an
Application for Permit by:

Mr. J. Scott Benyon, Vice President
Rinker Materials of Florida, Inc.
1501 Belvedere Road
West Palm Beach, Florida 33406
_____________________________/

DEP File No. 0530021-008-AC (PSD-FL-227B)
Florida Crushed Stone Kiln 2
Hernando County

NOTICE OF PERMIT DENIAL

The applicant, Rinker Materials (Rinker), applied on January 11, 2002 to the Department of Environmental Protection for an extension of the permit to construct Kiln 2 at the Florida Crushed Stone facility in Brooksville, Hernando County. Rinker requested that the permit, originally issued in December 1995 and modified in February 1997, be extended until January 30, 2005.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes (F.S.), the Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, and 62-212, and 40 CFR 52.21. The above actions are not exempt from permitting procedures.

The Department hereby denies the permit for the following reasons:

The Department determined that the application for extension was incomplete and mailed timely requests for additional information to the applicant on February 8, February 28, and June 5, 2002. Each request advised the applicant that failure to provide the timely requested information by the applicable date **shall** result in denial of the application. The applicant was already granted extensions of time based on the Department's belief that the applicant was making a diligent effort to obtain the requested information. The applicant has not provided the timely requested information as of the present date, which is beyond the revised applicable date of October 18, 2002. [Rule 62-4.055(1), F.A.C.]

The Department also issued the permit under the authority delegated by EPA to the State of Florida to issue permits under the federal PSD program at 40 CFR 52.21. Approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The (EPA) administrator may extend the 18-month period upon a satisfactory showing that an extension is justified. [40 CFR 52.21 (r)(2)]. It is clear that one or more 18-month periods occurred during which construction was discontinued. Also construction was not completed within a reasonable time. A satisfactory showing has not been made that an extension is justified. Therefore the present approval to construct is now invalid.

There is little or no evidence of any past or on-going construction at the site clearly related to the project. Furthermore, there is no indication that contracts are in effect that will result in a continuous program of construction at the site.

A person whose substantial interests are affected by the Department's permit denial may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this Notice of Permit Denial. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida

Statutes must be filed within fourteen days of receipt of this Notice of Permit Denial. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action; and (g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

This Notice constitutes final agency action unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition which conforms to Rule 62-110.106, F.A.C. Upon timely filing of a petition or a request for an extension of time this Notice will not be effective until further Order of the Department.

If either a petition for administrative hearing or a request for extension of time is not timely filed with the Department, then this Notice shall constitute final agency action. Any party to this order would then have the right to seek judicial review pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the clerk of the Department of Environmental Protection in the Office of General Counsel, Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice of appeal must be filed within thirty days after this order is filed with the clerk of the Department.

Executed in Tallahassee, Florida.

Howard L Rhodes

Howard L. Rhodes, Director
Division of Air Resources
Management

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this Notice of Permit Denial and all copies were sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 11/13/02 to the person(s) listed:

Scott Benyon, Vice President, Rinker*
Chair, Hernando County Commission*
Kay Prince, EPA Region 4
Deborah Getzoff, DEP SWD
Buck Oven, DEP PPSO
Don Elias, RTP Associates
Paul Neil, P.E., RTP Associates

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Victoria Gibson November 13, 2002
(Clerk) (Date)

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1. Article Addressed to:

Hannah Robinson, Chair
Hernando County Board of
County Commissioners
20 N. Main Street
Brooksville, FL 34601

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)* CLERK OF COURT

B. Date of Delivery

C. Signature

X Karen Nicolai ☐ Agent ☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
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Street, Apt. No.; or PO Box No. 1501 Belvedere Road
City, State, ZIP+4 W. Palm Bch., FL 33406

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1. Article Addressed to:

Mr. J. Scott Benyon
Vice President
Rinker Materials of Florida, Inc.
1501 Belvedere Road
West Palm Beach, FL 33406

COMPLETE THIS SECTION ON DELIVERY

A. Received by (*Please Print Clearly*) B. Date of Delivery 11/15/02

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Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

August 30, 2002

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. J. Scott Benyon, Vice President
Rinker Materials of Florida, Inc.
1501 Belvedere Road
West Palm Beach, Florida 33406

Re: DEP File No. 0530021-008-AC (PSD-FL-227B)
Florida Crushed Stone Kiln II, Brooksville, Hernando County

Dear Mr. Benyon:

On August 28 RTP Associates advised via fax and electronic message that Rinker is having difficulty in obtaining accurate cost information to respond to our June 5, 2002 Request for Additional Information. RTP Associates requested on behalf of Rinker a 30 to 45-day extension of the 90-day response time with the understanding that the current 90-day clock runs through September 3, 2002.

The application shall be held in active status as requested for an additional period of 45 days in accordance with Rule 62-4.055(1), F.A.C. Failure to provide the timely requested information by October 18, 2002 **shall** result in denial of the application.

If you have any questions regarding this matter, please call me at 850/921-9523.

Sincerely,

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/aal

Cc: Mike Vardeman, Rinker
Paul Neil, P.E., RTP Associates
Don Elias, RTP Associates
Jerry Kissel, DEP SWD
Gregg Worley, EPA Region IV
John Bunyak, National Park Service

Patty – Please extend time for response until October 18, 2002. Thanks, Al

RTP ENVIRONMENTAL ASSOCIATES, INC. ®
AIR • WATER • SOLID WASTE CONSULTANTS
http://www.rtpenv.com

239 US Highway 22 East
Green Brook, NJ 08812

(732) 968-9600 Voice
(732) 968-9603 Fax

FACSIMILE COVER SHEET

Date: August 28, 2002
Fax #: (850) 922-6979
Pages: 2 (including cover)

To: Mr. Al Linero
FDEP
111 South Magnolia, Suite #4
Tallahassee, FL 32301

From: Donald F. Elias

Project Name: FCS4

Notes: Al,

Please see the following letter RE: Rinker Materials. I have also e-mailed this request to you. → Florida Crushed Stone, Brooksville,

Thanks and have a nice day!

Don Elias

If you should have any questions on the fax or if this fax is not as noted, kindly contact us at (732) 968-9600.

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239 U.S. Highway 22 East
Green Brook, New Jersey 08812-1909 (732) 968-9600
(www.rtpenv.com) **Via E-mail and Fax** (732) 968-9603

August 28, 2002

Mr. Al Linero
Florida Department of Environmental Protection
Bureau of Air Regualtion
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Rinker Materials, Brooksville, Florida Facility

Dear Mr. Linero:

Rinker Materials is in receipt of the Department's June 5, 2002 request for additional information. Although we have been attempting to respond, we have had difficulties in obtaining accurate cost information from the proposed vendor. We are continuing to define accurately the cost-effectiveness of installing SNCR on this project. As you are aware, there is considerable conflicting information concerning costs for a SNCR system on a U.S. cement kiln. It is of key importance that we be able to accurately assess the cost impact of this technology. Therefore, we would like to formally request a 30 to 45-day extension of the 90-day response time. It is our understanding that the current 90-day clock runs through September 3, 2002.

Thank you for your time and consideration, if you would like to discuss this request further, please feel free to contact myself at the above telephone number or Mr. Michael Vardeman or Mr. Scott Benyon at Rinker Materials at

Sincerely,

RTP ENVIRONMENTAL ASSOCIATES, INC.®

Donald F. Elias

Donald F. Elias
Principal

DFE/mpj

cc: M. Vardeman/S. Benyon/W. Corbin/S Heath/Proj. File: FCS4

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1. Article Addressed to:

Mr. J. Scott Benyon
Vice President
Rinker Materials of Florida, Inc.
1501 Belvedere Road
W. Palm Bch., FL 33406

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)* Jeffrey R. Porter

B. Date of Delivery 9-6-02

C. Signature

X [signature] ☑ Agent ☐ Addressee

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Total Postage & Fees	$

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Sent To
J. Scott Benyon
Street, Apt. No.; or PO Box No.
1501 Belvedere Road
City, State, ZIP+4
W. Palm Bch., FL 33406

PS Form 3800, January 2001 See Reverse for Instructions

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

June 5, 2002

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. J. Scott Benyon, Vice President
Rinker Materials of Florida, Inc.
1501 Belvedere Road
West Palm Beach, Florida 33406

Re: DEP File No. 0530021-008-AC (PSD-FL-227B)
Florida Crushed Stone Kiln II, Brooksville, Hernando County

Dear Mr. Benyon:

On May 8 we received a response to our February requests for additional information regarding the revised Best Available Control Technology (BACT) determination for the referenced facility. Based on the submittal, the application for a permit extension is incomplete.

Rinker confirmed our doubts about the ability to achieve the limit of 0.085 pounds of VOC per ton of clinker produced that is already in the permit as requested by the previous project proponent. At this emission rate, the project did not trigger PSD when originally permitted in 1995 and 1997. We therefore do not have reasonable assurance that Rinker can comply with the present permit conditions. A request was made by Rinker in the May 8 submittal to increase the emission limit of VOC to 0.12 lb/ton by submittal of a BACT. This BACT analysis should be submitted as soon as possible in the form of an application for a PSD source of VOC. This can be done promptly based on a similar situation last year at the Rinker Miami Cement Plant.

On May 10, we contacted the professional engineer, Mr. Paul Neil, who sealed the new BACT submittal (and most recent submittal) for all of the pollutants. We advised him that we consider the costs for NO_X control by SNCR to be overstated. We believe the costs are closer to the $1,000,000 bracket than the range of $3,400,000 to 5,400,000 provided in the analysis submitted by Rinker. We suggested to Mr. Neil that he call us back to discuss the matter after reviewing our concerns and are still waiting to hear from him.

We e-mailed to Mr. Neil the enclosed paper by Polysius (the supplier of the Rinker/FCS kiln) that suggests to us that emissions of 1.15 lb NO_X /ton of clinker (250 mg NO_X/m^3) are achievable by a combination of the Polysius Multistage Combustion (MSC) calciner and SNCR. The paper concludes, "The combination of the MSC/SNCR is therefore a good instrument for efficiently and cost-effectively reducing NO_X emissions and thus provides a solution to the challenges of the future".

The Department requested updated drawings and design details. However, the drawings submitted (marked "Change in Progress" and "Preliminary X-XX-2000") do not indicate a finalized design. For example, the drawings do not show the bypass referred to in Rinker's BACT update and May 8 response which states: "Rinker is proposing installation of a bypass at the same time of construction as the new kiln." According to the time line provided in the submittal, a construction contract is scheduled for signing in July 2002. This is more than seven years since receipt of the first application submitted by the previous owner. It should be possible to provide a more recent and complete set of drawings (suitable for our purposes) showing the proposed final design.

As we mentioned in our previous communication, we would appreciate the opportunity to discuss some of the technical matters with you, the process technical consultant (such as Penta), and with your supplier, Polysius.

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. Please note that per Rule 62-4.055(1): *"The applicant shall have ninety days after the Department mails a timely request for additional information to submit that information to the Department.......... Failure of an applicant to provide the timely requested information by the applicable date **shall** result in denial of the application."*

In addition to the above, we expect to receive the PSD application for VOC much sooner than 90 days required for the other completeness issues outlined above. Undue delay could result in the requirement to submit a completely new application.

If you have any questions regarding this matter, please call me at 850/921-9523.

Sincerely,

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/jr
Enclosure

Cc: Mike Vardeman, Rinker
Paul Neil, P.E., RTP Associates
Don Elias, RTP Associates
Jerry Kissel, DEP SWD
Gregg Worley, EPA Region IV
John Bunyak, National Park Service

NO_X-Minderung mit der MSC/SNCR-Kombination: Chancen und Risiken

NO_X reduction with the MSC/SNCR combination: Chances and risks

Dr. R. Erpelding, Krupp Polysius AG

In den letzten Jahren hat der Gesetzgeber die Grenzwerte für NO_x immer weiter heruntergesetzt. Z. Zt. gelten in Deutschland Grenzwerte von 800 mg für bestehende und 500 mg für neue Anlagen. In anderen Ländern sind die Grenzwerte teilweise noch niedriger. Bei Vorlage geeigneter Randbedingungen können mit der gestuften Verbrennung von Polysius die meisten aktuellen Grenzwerte eingehalten werden. Die europäische Kommission hat in ihrem Referenzdokument zu den »best available technologies (bat)«, dem so genannten IPPC-Papier, Grenzwerte zwischen 500 und 200 mg NO_2/Nm^3 als erreichbar und als Stand der möglichen Technik definiert (Bild 1). Aufgrund unterschiedlicher Randbedingungen wird jedoch davon ausgegangen, dass nicht alle Anlagen diese Werte erreichen können.

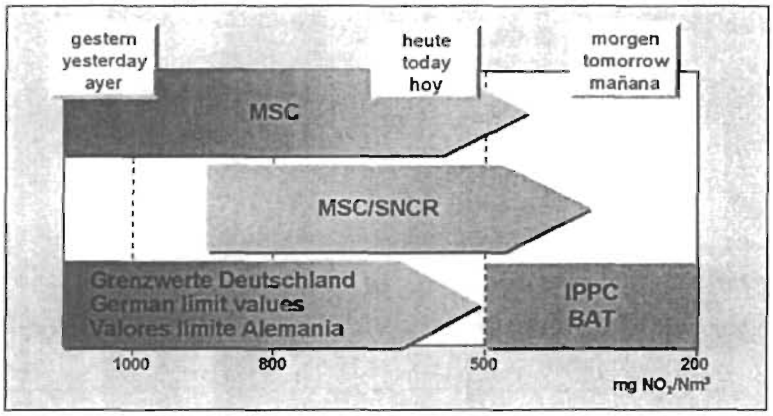

Abb. 1: Emissionsgrenzwerte
Fig. 1: Emissions limits

Ziel der Polysius-Untersuchungen war es zu zeigen, dass die Kombination des MSC mit dem SNCR-Verfahren einen Beitrag dazu leisten kann, die entsprechenden, von der europäischen Kommission in Zukunft zu erwartenden Grenzwerte einzuhalten.

Das MSC/SNCR-Verfahren ist die Kombination der gestuften Verbrennung, bekannt bei Polysius unter Multi Stage Combustion (MSC), mit der selektiven nichtkatalytischen Reduktion mittels Ammoniumträger, z.B. Ammoniakwasser. Bild 2 zeigt den MSC-Calcinator – charakterisiert durch Ofeneinlaufbrenner, Tertiärluftstufung, Mehlstufung und Umlenkkammer, die vor dem ersten Zyklon angeordnet ist. Für das Eindüsen einer ammoniumhaltigen Lösung bei geeignetem Temperaturfenster wurden verschiedene Eindüsstellen untersucht. Dabei zeigte sich, dass vor und nach der Umlenkkammer die besten Ergebnisse bzgl. NO-Reduktion gefunden wurden.

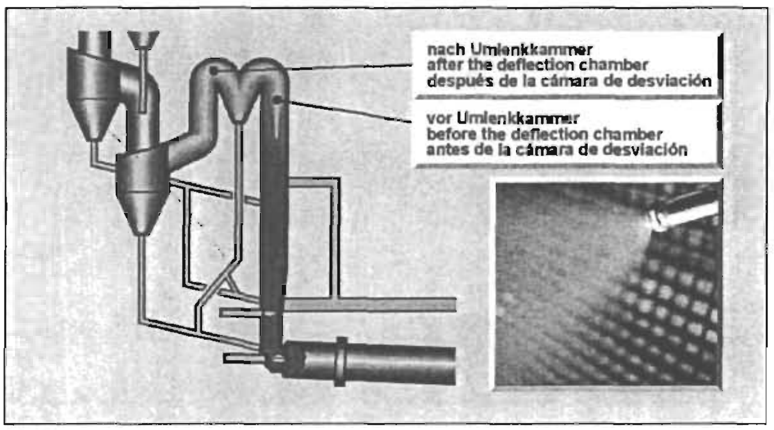

Abb. 2 / Fig. 2: Verfahren/Process: Multi Stage Combustion

Im Bild 3 ist die NO-Minderung als Funktion des Molverhältnisses aufgetragen. Diese Kennlinien sind charakteristisch für jede Anlage. Es wurden drei Anlagen unterschiedlicher Größe (die ent-

In recent years, governments have continuously lowered the limit values for NO_X. At present, limits of 800 mg for existing plants and 500 mg for new plants apply in Germany. In other countries, even lower limits have been set in some cases. With suitable boundary conditions, most current limit values can be observed by using the multi-stage combustion process from Polysius. In its reference document on the best available technologies (bat), the so-called »IPPC Paper«, the European Commission has defined limit values of between 500 and 200 mg NO_2/Nm^3 as achievable and as state of possible engineering (Fig. 1). In view of differing boundary conditions, however, it is assumed that not all plants can achieve these values.

Krupp Polysius carried out trials with the objective of showing that the combination of the MSC with the SNCR process can contribute to compliance with the relevant limit values to be expected from the European Commission in future.

The MSC/SNCR process involves the combination of multi-stage combustion with selective non-catalytic reduction using an ammonium carrier, e.g. ammonia solution. Fig. 2 shows the MSC calciner, characterised by the kiln inlet burner, staggered tertiary air introduction, staggered meal introduction and deflection chamber located before the first cyclone. The trials involved injecting an ammonium-based solution at various points of the calciner, to find the best place to introduce the solution within a suitable temperature window. This revealed that the best results for the NO reduction process were obtained by injecting the solution before and after the deflection chamber.

Fig. 3 shows the NO reduction as a function of the molar ratio. These curves are characteristic for every plant. The trials were carried out at three plants of different sizes, with production sprechenden Durchsatzleistungen lagen zwischen 1.900 und 5.000 tato) vermessen. Es zeigt für alle drei Anlagen ein ähnliches Verhalten, wobei die kleinere Anlage die besseren Minderungsraten aufweist. Untersuchungen haben ergeben, dass dieser Effekt im Wesentlichen darauf zurückzuführen ist, dass das Einmischen einer kleinen Flüssigkeitsmenge in eine große Abgasmenge mit zunehmender Gasmenge und größerem Durchmesser schwieriger wird. Weiterhin fällt auf, dass eine Minderung erst ab einem Molverhältnis von ca. 0,2 festzustellen ist. Dieser Grenzwert wurde für alle Anlagen gefunden. Einerseits liegen die Minderungsraten bei so kleinen Molverhältnissen im Bereich der Basisschwankungen; andererseits ist nicht auszuschließen, dass ein Teil des Ammoniaks oxidiert und so die Minderungswirkung so weit verringert, dass sie gegen Null geht.

capacities of between 1,900 and 5,000 tpd. Although the process ran a similar course at all three plants, the smallest plant shows the best reduction rates. Investigations have shown that this effect is essentially attributable to the fact that the mixing of a small amount of liquid into a large volume of exhaust gas becomes more difficult with increasing gas volume and diameter. Furthermore, it is noticeable that a reduction can be observed only above a molar ratio of approx. 0.2. This limit value was found at all plants. On the one hand, the reduction rates with molar ratios below that figure are within the range of basic fluctuations and, on the other hand, it cannot be ruled out that part of the ammonia oxidises and thus reduces the reduction effect to such an extent that it is practically zero.

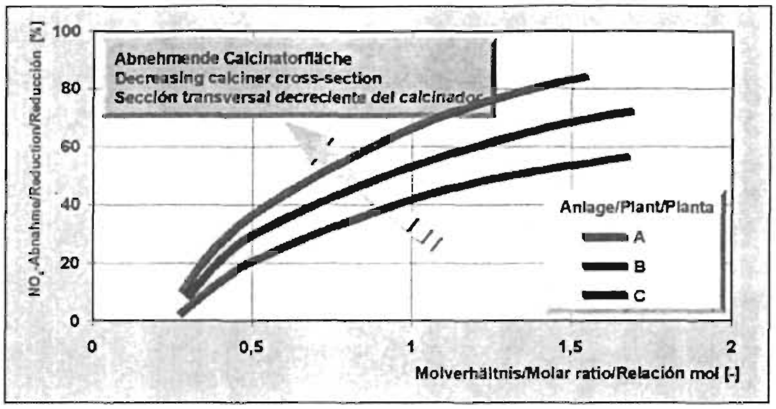

Abb. 3: Molverhältnis → NO_x-Reduktion
Fig. 3: Molar ratio → NO_x reduction

Ähnlich der NO-Minderung wird in Abhängigkeit des Molverhältnisses eine CO-Erhöhung festgestellt (Bild 4): Bis zu Molverhältnissen kleiner 1 ist diese Erhöhung jedoch nicht sehr deutlich und bewegt sich in der Größenordnung von 150 – 350 mg. Oberhalb dieses Molverhältnisses steigen die CO-Konzentrationen jedoch an und können je nach Molverhältnis 600 – 800 mg pro Nm³ erreichen. Wobei diese CO-Erhöhung kein Charakteristikum des kombinierten MSC/SNCR-Verfahrens ist, sondern im Wesentlichen mit dem Einbringen der Ammoniumkomponente zusammenhängt und somit auch beim reinen SNCR-Verfahren zu beobachten ist.

An increase in CO is also linked to the molar ratio (Fig. 4). With molar ratios of less than 1, this increase is only in the order of 150 – 350 mg. Above this molar ratio the CO concentrations increase and can reach 600 – 800 mg per Nm³, depending on the molar ratio. This CO increase is not characteristic of the combined MSC/SNCR process; but is essentially related to the introduction of the ammonium component and is thus also to be observed in the pure SNCR process.

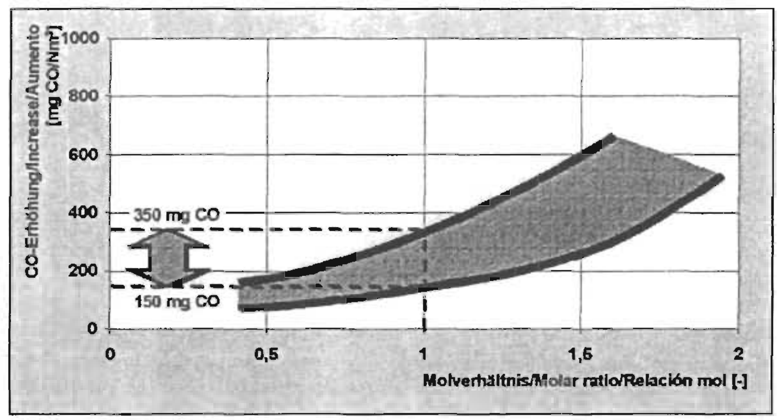

Abb. 4: Molverhältnis → CO-Emission
Fig. 4: Molar ratio → CO emission

Eine weitere Sekundäremission, die ähnlich wie beim SNCR-Verfahren auch beim MSC/SNCR-Verfahren eine Rolle spielt, ist das Ammoniak. In den Versuchen zeigte sich, dass die Betriebsweise einen sehr viel größeren Einfluss auf die Emissionen hat als das Molverhältnis (Bild 5): Im Verbundbetrieb mit zwei Mühlen wurde nahe 1 mg Ammonium pro Nm³ Abgas gemessen; bei nur einer Mühle wurden 10 mg ermittelt; im Direktbetrieb waren

A further secondary emission which, as in the SNCR process, also plays a role in the MSC/SNCR process is ammonia. During the trials it was discovered that the method of operation has a very much greater influence on the emission than the molar ratio (Fig. 5). In interconnected operation with two mills, almost 1 mg of ammonia was measured per Nm³ exhaust gas. In interconnected operation with only one mill the emission was 10 mg, and in direct operation it was almost 20 mg/Nm³. In this case we can therefore conclude that approx. 10 mg ammonia is bound into the raw meal per mill. However this ammonia forms a cyclic

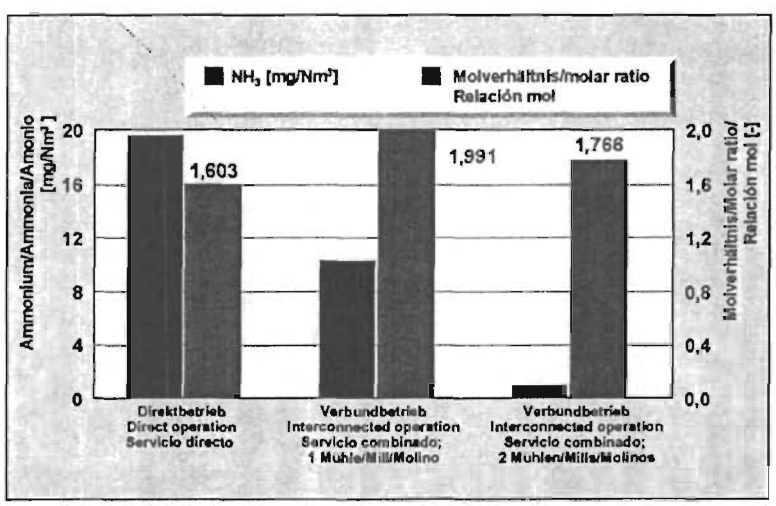

Abb. 5: Sekundäremissionen
Fig. 5: Secondary emissions

es fast 20 mg/Nm³. In diesem Fall kann man also daraus schließen, dass pro Mühle ca. 10 mg Ammoniak in das Rohmehl eingebunden werden. Dieses Ammoniak wird jedoch Kreisläufe zwischen Vorwärmer und Mühle bilden und es kann im Direktbetrieb aufgrund der Kreislaufentlastung zu erhöhten Ammoniakemissionen kommen.

Neben den bisher gezeigten Kennlinien wurden auch Dauerversuche durchgeführt: Im geregelten Betrieb sollte ein vorgegebener Grenzwert eingehalten werden. Dazu wurden verschiedene Setpoints angefahren. Im Bild 6 sind die Stundenmittelwerte für einen längeren Zeitraum dargestellt. Die jeweils eingestellten Setpoints können, unabhängig von der Basisemission, gut eingehalten werden. Bei einer Basisemission mit MSC ohne Ammoniakwasser zwischen 400 und 800 mg wurden 250 mg NO_2 als minimaler Wert eingestellt. Bezogen auf die Basisemission entspricht dies einer Minderungsrate zwischen 38 und 68%.

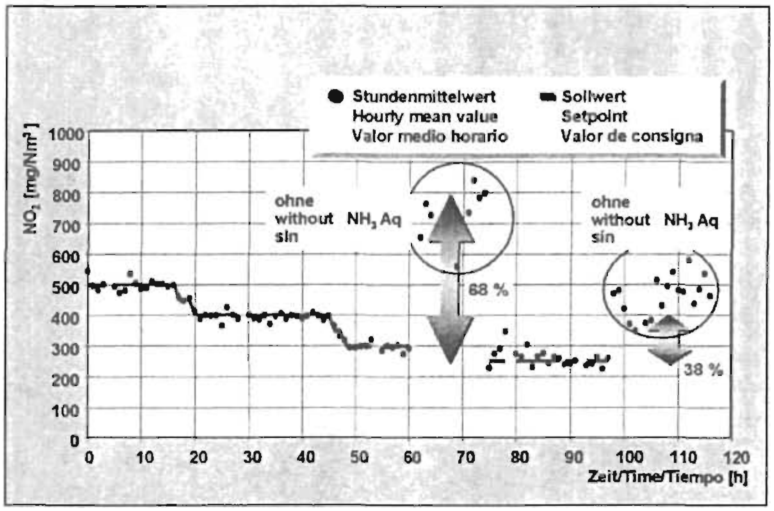

Abb. 6: Geregelter MSC/SNCR-Betrieb
Fig. 6: Controlled MSC/SNCR operation

Welchen Vorteil die Kombination beider Verfahren hat, wird im Rahmen eines wirtschaftlichen Vergleichs einer 3.000 tato-Anlage deutlich (Bild 7): Der Vergleich beruht auf dem Einsatz von 25%-Ammoniakwasser bzw. ein mit Harnstoff auf 5% aufgewertetem Photoabwasser, hier als »PhW« bezeichnet. Die Brennstoffkosten wurden mit 100 DM/t, die Kosten für Ammoniakwasser mit 130 DM/t und die für das Fotoabwasser mit 15 DM/t angenommen. Als Abschreibungszeitraum sind 10 Jahre angesetzt. Bei niedrigen Minderungsraten schneidet die reine MSC-Variante aufgrund der Einsparung von Reduktionsmittel am besten ab. Die SNCR-Varianten generieren ähnlich hohe Kosten. Die höheren Investitionskosten für die Ammoniakanlage werden durch niedrigere Betriebsmittelkosten für den Brennstoff und den Ammoniumträger kompensiert. Bei höheren Minderungsraten ergeben sich die geringsten Kosten durch die Kombination von MSC/SNCR mit Einsatz von Ammoniakwasser. Dies beruht nicht nur auf der höheren Konzentration sondern auch auf der besseren Minderungswirkung des Ammoniakwassers. Bei den hier gemachten Annahmen wird bei Gesamtminderungsraten oberhalb 35 – 45% der Einsatz von MSC/SNCR mit Ammoniakwasser wirtschaftlich interessant.

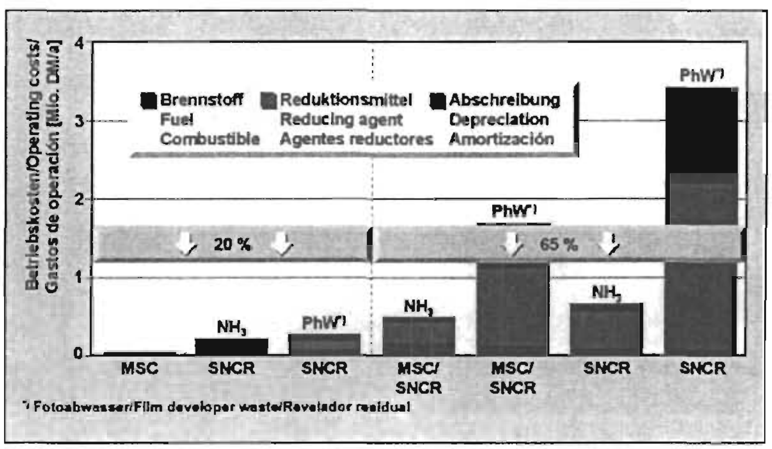

Abb. 7: Vorteile der MSC/SNCR-Kombination
Fig. 7: Advantages of the MSC/SNCR combination

Abschließend sollen die Vorteile der MSC/SNCR-Kombination noch mal im Überblick zusammengefasst werden:

- Der Einsatz der gestuften Verbrennung führt zu einer Verringerung der Grundlast, so dass der Ammoniumträgerverbrauch im Vergleich zum SNCR-Verfahren reduziert werden kann.

process between preheater and mill, and in direct operation increased ammonia emissions can occur due to relief of the cycle.

Apart from the characteristic curves shown so far, long-term trials were also performed in order to test the maintenance of a given limit value in controlled operation. For this purpose the plant was operated at various setpoints. Fig. 6 shows the hourly mean values over a longer period. The setpoints can be precisely achieved, irrespective of the basic emission. At a basic emission for MSC without ammonia solution of between 400 and 800 mg, 250 mg NO_2 was set as the minimum value. Referred to the basic emission, this corresponds to a reduction rate of between 38 and 68%.

The advantages offered by the combination of the two processes become clear from a profitability comparison for a 3,000 tpd plant (Fig. 7). The comparison is based on the use of a 25% ammonia solution and a film developer waste water enriched to 5% with urea, which is referred to here as »PhW«. The fuel costs have been assumed to be 100 DM/tonne, the costs for the ammonia solution as 130 DM/t and for the film developer waste water as 15 DM/t. The depreciation period was assumed to be 10 years. At low reduction rates, the pure MSC variant shows the best results due to the saving on the reducing agent. The SNCR variants both generate similarly high costs. The higher investment costs for the ammonia system are compensated by lower costs for the fuel and the ammonium carrier. At higher reduction rates, the lowest costs are achieved with the combination of MSC/SNCR using ammonia solution. This derives not only from the higher concentration but also from the better reducing effect of the ammonia solution. With the assumptions made here, the use of MSC/SNCR with the ammonia solution becomes economically attractive at total reduction rates above 35 – 45%.

In conclusion, here is a summary of the advantages provided by the MSC/SNCR combination:

- The use of multi-stage combustion leads to a reduction in the basic emission load so that the ammonium carrier consumption can be reduced compared to the SNCR process.
- The use of the SNCR process allows kiln operation without direct coupling to the emission limits, leaving the kiln operator more freedom of action, e.g. when secondary fuels are used, the O_2 content in the kiln can be adapted accordingly.

- Der Einsatz des SNCR-Verfahrens erlaubt es, den Ofenbetrieb nicht mehr direkt an Emissionsgrenzwerte zu koppeln, was dem Ofenfahrer mehr Spielraum bietet; beispielsweise lässt sich beim Einsatz von Sekundärbrennstoffen der O_2-Gehalt im Ofen entsprechend anpassen.
- Aufgrund dessen, dass die Grundminderung mit dem MSC-Verfahren erreicht wird und die Spitzen mit Ammoniak abgefangen werden, sinkt der Ammoniumträgerverbrauch, so dass dieser auch in niedrig konzentrierter Form vom Sekundärrohstoffmarkt bezogen werden kann.
- Schlussendlich steht mit der Kombination des MSC/SNCR-Verfahrens ein gutes Instrument zur Verfügung, um NO_x-Emissionen effizient und wirtschaftlich zu mindern und so zukünftige Herausforderungen zu lösen.

- Due to the fact that the basic reduction is achieved with the MSC process and the peaks are eliminated with ammonia, the ammonium carrier consumption falls. It is therefore even possible to use low-concentration forms available on the secondary raw material market.
- The combination of the MSC/SNCR is therefore a good instrument for efficiently and cost-effectively reducing NO_x emissions and thus provides a solution to the challenges of the future.

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Mr. J. Scott Benyon
Vice President
Rinker Materials of Florida, Inc.
1501 Belvedere Road
West Palm Beach, FL 33406

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LETTER OF TRANSMITTAL

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MAY 10 2002
BUREAU OF AIR REGULATION

To: Al Linero
Florida Department of
Environmental Protection
111 South Magnolia
Tallahassee, FL 32301

Date: May 9, 2002
Project: FCS4

From: Donald F. Elias

We Are Sending You: x Attached ☐ Under Separate Cover
Via: ☐ 1st Class Mail x Federal Express ☐ Hand Delivery
☐ United Parcel Service x Other Faxed to you on 05/08/02

Copies	Date	No.	Description
1	05/06/02		Letter from J. Scott Benyon from Rinker Materials
1	05/06/02		Responses to FDEP Questions and Requests for Additional Information (by RTP Environmental Associates, Inc.)

These are Transmitted as Checked Below:

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BUREAU OF AIR REGULATION

May 6, 2002

Mr. A. Linero
Administrator, New Source Review Section
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RE: - DEP file No. 0530021-008-AC (PSD-FL-227B)
Florida Crushed Stone Kiln II, Brooksville, Hernando County
- Letter Dated February 8, 2002: from A. Linero to Scott Benyon (Rinker Materials Corporation)
- Letter Dated February 28, 2002: from A. Linero to Scott Benyon (Rinker Materials Corporation)

Dear Mr. Linero:

Please find attached responses to questions and requests for additional information specified in the two letters referenced above. These responses were prepared by our consultant, RTP Environmental Associates, Inc. and represent Rinker's position on the issues discussed.

Should you have questions or require further clarification of the information contained herein, please feel free to contact Michael J. Hober or Donald F. Elias of RTP Environmental Associates, Inc. at 732-968-9600 or Mike Vardeman at 305-229-2955.

Sincerely,

Rinker Materials of Florida, Inc. fka
Rinker Materials Corporation

J. Scott Benyon

cc: M. Vardeman / P. Neil / D. Elias / M. Hober / W. Corbin / S. Heath /
Project File: FCS4

Rinker Materials
1501 Belvedere Road | West Palm Beach, FL 33406 | 561.833.5555

RESPONSES TO FDEP QUESTIONS AND REQUESTS FOR ADDITIONAL INFORMATION PREPARED BY RTP ENVIRONMENTAL ASSOCIATES, INC.®

RTP is in receipt of FDEP's letters dated February 8, 2002 and February 28, 2002 requesting additional information relative to the updated BACT submission in support of a request for an extension to the construction permit for the Florida Crushed Stone (FCS) Kiln II. The following discussion presents our response to the specific questions presented in these two letters:

February 8, 2002 Letter

1. Construction Schedule

   Attachment 1 contains an approximate construction schedule as provided by Polysius Corporation.

2. Detailed Description of Emissions Reduction System

   The Department requests information in this comment regarding the kiln burner, the calciner, intelligent process control software, add-on controls, etc. that is requested again in the February 28 letter. To avoid repetition, this information will be presented in the responses to the February 28 letter.

February 28, 2002 Letter

1. Kiln Details

   Attachment 2 contains preliminary Mechanical Process Flow Sheets for the preheater, calciner, kiln and cooler systems. These preliminary design sheets are based on recent upgrades Polysius conducted for the Florida Rock Gainesville, Florida facility kiln.

2. Expert System

   The state-of-the-art, operator controlled process control system to be provided by Polysius with the new FCS kiln will govern the clinker production process to maintain a stable kiln system. As a result of the dynamic nature of clinker formation within the kiln system, the nitrogen oxides (NOx) emissions produced from this system are extremely variable. The stability provided by this control system will indirectly limit the NOx generation by limiting the momentum swings in the process. The system will achieve this enhanced stability by monitoring specific parameters such as temperatures, pressures, and equipment amperage across the system and providing this information to the kiln operators in a logical format. Through better monitoring of plant systems, operators can maintain more stable kiln operations and minimize NOx generation.

3. Kiln Burner Options

Attachment 3 contains general information regarding the Pillard Rotoflam Low-NOx kiln burner systems. As the facility is still in the design phase and the kiln burner system has not yet been selected, the actual system has not been decided. It is true that Polysius has predominantly utilized Pillard designed kiln burner systems in the past. The system provided with the new FCS kiln will, at a minimum, incorporate the low-NOx design principles of the Pillard kiln burners as presented in the information included in Attachment 3.

4. Calciner Details and Options

Our apologies, but we are unclear as to the Department's request for information regarding the past and present design of the calciner, as well as the intent of the request. The FCS Kiln II was originally permitted as a preheater kiln with a Gepol Tower preheater system. This permit was later modified to allow construction of either the original preheater kiln or a preheater-precalciner kiln. The latter modification established aggressive permit limits that were considered by Polysius only to be achievable with a preheater- precalciner kiln. It was decided that kiln II would be a preheater-precalciner kiln and the Department was notified of this decision. Also, the request for 18 months to achieve the established emission levels was made because Polysius expected difficulty in achieving the permitted emission limits and anticipated that some calciner changes may be necessary.

The Department's request to "describe the version that does not operate in staged combustion mode such as provided in the 1996 design" as well as "starting with the same basic configuration, estimate the NOx reduction by SNCR alone" is not possible. As noted in the Department's first comment, the calciner design not incorporating MSC is "obviously out of date." However, a preheater-precalciner kiln contains a calciner vessel for the basic function of calcining the preheated raw meal prior to entrance into the kiln. The advancement of the MSC calciner does not change the function of the calciner, it merely modifies the supply points of secondary and tertiary air to create "reducing" zones and "oxidizing" zones in an attempt to reduce emissions of NOx and CO. The basic components of the calciner remain unchanged. Furthermore, the FCS Kiln II permit has specified a NOx emission limit of 2.8 lbs NOx per ton clinker with and without MSC. Thus, no incremental difference in cost could be derived. The ability to utilize MSC within the calciner will assist Rinker in providing "reasonable assurance" of achieving permitted emission levels. However, no significant design or component changes will be involved relative to the calcining vessel.

The following description, provided by Poysius, focuses on the calciner system that will be constructed for the FCS Kiln II. Subsequent costs for added control will be estimated in the response to question 7 (Cost Estimate for NOx Control by SNCR).

The calciner design for the FCS Kiln II plant will be similar to that provided to, and later modified at Florida Rock's plant near Gainesville incorporating the latest PREPOL MSC technology. The diagram shown on page 2 of the Department's February 28, 2002 letter indicates a combustion chamber mounted alongside the calciner. This design concept is being considered as a possible approach for the FCS plant as well. This design is called the PREPOL MSC-CC by Polysius.

In the PREPOL MSC design, the fuel combustion takes place at the lowest area of the calciner, just above the entrance to the rotary kiln. At this same location, along with most of the preheated atmospheric combustion air, preheated meal from the second cyclone stage is fed into the calciner and combined with the kiln exhaust gases, which have a residual oxygen content of approximately 2%. This combination allows the combustion to be initiated, but not completed, since sub-stoicheometric conditions are achieved at this point. The temperature for this process is about 950-980 degrees Celsius. Under these conditions, a number of complex reactions take place, but the key byproduct of this process is the creation of a large amount of carbon monoxide (CO). At some point along the flow path in the calciner, the balance of the preheated combustion air is added to the calciner, thereby providing the needed oxygen for completion of the fuel combustion, and oxidation of the CO to carbon dioxide (CO_2). To facilitate this oxidation reaction, a deflection chamber is installed at the top of the calciner to initiate turbulence, which produces intimate mixing of the exhaust gases. This mixing has the effect of further oxidizing the remaining CO. To promote greater CO oxidation, longer calciners are designed, which allow for a longer residence time in calciner. Older design concepts utilized a calciner length which provided about 3 seconds of retention, while more recent designs provide up to 6 seconds. Following the deflection chamber is a transition duct to introduce the gases containing the now-calcined meal into the bottom stage cyclone for separation of the meal from the gas, with the meal then flowing through a meal chute to the kiln inlet housing for introduction to the rotary kiln.

Based on information provided by Polysius, little additional costs are involved with the PREPOL MSC calciner system from the design stage. Some additional systems are necessary to fully utilize the MSC process which could cost approximately $100,000. The PREPOL MSC retrofit for the Florida Rock Gainesville facility, because it was a retrofit, cost approximately $750,000. Any "savings from the added ability to burn tires" is not quantifiable as FCS has always been permitted to burn tires as fuel and the application of the PREPOL MSC system will not affect the facility's ability to do so.

5. <u>Tertiary Air and Burnout</u>

The Polysius design provides for introduction of tertiary air, preheated combustion air drawn from the kiln system, along the flow path before the deflection chamber. A discussion of how the calciner system provides for proper CO burnout is provided in No. 4 above.

6. Bypass at FCS Kiln II

The Rinker plant near Miami, FL has experienced accelerated buildup in the kiln due to chlorides. Rinker is in the process of investigating several strategies to eliminate this condition including use of low chloride fuel, purchase of select raw materials, installation of a kiln bypass, or any combination of these.

At the FCS Kiln II facility, Polysius has determined that a bypass system to reduce volatile chloride in the kiln gases should be designed for up to 15% bypass of kiln flue gases for maximum operational flexibility to address short-term fluctuation in fuels and raw materials. Rinker is proposing installation of a bypass at the same time of construction as the new kiln.

7. Cost Estimate for NOx Control By SNCR

As presented in the updated BACT, capital and annual operating costs for SNCR were developed from literature data (PENTA/PCA report) and from a vendor developed cost prepared for the application to modify the existing permit for the Holnam Midlothian, TX facility. The apparent variation in cost was considered to provide an upper and lower range for budgetary costing purposes. Since no U.S. cement kiln has installed SNCR, little data is available from which to develop costs. As referenced in Table 9 of the updated BACT, recent air permit applications for cement kilns were reviewed for SNCR data, all of which concluded that SNCR on a cement kiln was technically infeasible. The application for a permit modification for the Holnam Midlothian facility, submitted in September of 2001, did contain some developed SNCR costs, as SNCR is proposed as a potential alternative to achieve their proposed revised NOx emission limit of 2.8 lbs/ton clinker if unachievable with process controls and MSC. We do not understand why the Department "considers it inadvisable to use scaled cost-estimates" submitted by Holnam. Although the facility underestimated NOx emissions in it's original air permit application, SNCR costs submitted with their recent application to modify the permitted NOx emissions should be applicable.

It is noted that the Holnam SNCR cost is an estimate to retrofit the existing kiln. However, their cost contained a flat "retrofit premium" that was not included in FCS cost estimate. The SNCR cost developed in the Penta/PCA report is actually based on application of SNCR to a utility power plant which is expected to be a more straight-forward application than to a cement kiln. Therefore, it was considered that the expected higher retrofit costs were compensated by the more straight forward application to a utility boiler rather than to a cement kiln. Despite the noted problems with scaling these values, little other data is available from generally accepted literature data, and industry data is relatively nonexistent. However, given the wide range of this data, as well as the uncertainties and risks involved in applying a technology for the first time on a U.S. cement kiln, we do not agree with the Department's conclusion that "By incorporating the SNCR design into the original project and by assuming a much smaller bypass, the capital cost would be cut in half and probably more."

The Department took issue with the cost estimates for "operating, supervisory and maintenance personnel (labor)," claiming that costs were equivalent to 3 "fulltime equivalent employees." The estimated costs for labor, labor supervision, and maintenance labor and materials presented in both the vendor based and literature based SNCR cost estimates were approximated from cost factors provided in the PENTA/PCA document. For kilns with a bypass, these rates are:

Operating Labor	- 4 hours per shift
Maintenance Labor	- 2 hours per shift
Labor Supervision	- 15% of operating and maintenance labor
Maintenance Parts & Supplies	- 10% of purchased equipment costs
Labor Rate	- $32.42 in 1997 dollars

Compared to utilizing these factors exactly as presented, the estimates provided by us appear reasonable.

The estimate for ammonia usage is high, due to a misconception on the cost of aqueous ammonia. Costs provided to RTP for aqueous ammonia delivered were assumed to be based on per ton of aqueous solution instead of per ton of equivalent pure ammonia. Thus, having assumed an approximate 25%, by wt., solution of aqueous ammonia, the costs for pure ammonia would be approximately 25% of the proposed cost. This change would only effect the vendor costs as the PENTA/PCA cost reflects the assumed usage in the document, which the Department apparently considers reasonable. The SNCR costs (vendor supplied) has been revised and is provided in Attachment 4. The reduction in ammonia cost would reduce the SNCR cost-effectiveness value for the vendor supplied costs case to approximately $4,500.00 per ton of NOx removed. Thus, the estimated cost-effectiveness of SNCR now ranges from approximately $4,500.00 to approximately $7,500.00 per ton of NOx removed. This revised range of cost-effectiveness does not change the conclusions presented in the updated BACT. We believe that these costs are potentially understated as vendors are attempting to penetrate a new market. Actual costs are likely to be at or above the upper end of the range presented.

8. Dr. Xeller's Paper

We appreciate the Department's acknowledgement of Dr. Xeller's credibility. To add to the discussion, it is interesting how different interpretations of the same material can be derived. The inclusion of this reference was to highlight that at least one expert was voicing the opinion that perhaps the European Community should consider NOx emissions solutions that "are economically and ecologically favorable and are best suited to the special features of the particular plant." Dr. Xeller goes on to say," For the purposes of process-integrated solutions, which are preferred from the ecological and economic standpoints, the evaluation criteria used in Germany for NOx should be changed; a sliding long-term value should be set as the limit in agreement with other countries instead of the short-term limitation." Furthermore, Dr. Xeller states, "It is considered essential that reliable investigations are carried out in which there is a stepwise transition from pilot plant to demonstration plant and in which the costs are examined and there is a total approach covering all media during the assessment of the particular process." All three statements were part of the summary section of his paper.

While nowhere in this paper could we find a statement to the effect that Dr. Xeller was concerned that the future European standard would be more stringent than the German standard, or the reference to the Federal Department of the Environment report of February 1997 identifying "possible compliance" with an emission level of 0.5 g NOx /m^3, we do not wish to comment on what emission levels Europeans consider as "possible to comply with." European facilities are afforded the luxury of "possibly complying with" a recommended standard because these are considered "target values" by the various governing bodies implementing these emission goals. In the US, emission standards are absolutes. Furthermore, as referenced in the updated BACT, USEPA declined to consider European emissions data when establishing the New Source Performance Standards and Emissions Guidelines for Municipal Waste Combustors citing differences in test methods and averaging times that could significantly skew reported values.

9. "Equivalency" of 2.8 lb NOx/ton in Florida to 2.5 lb/ton in California

We concur with the Department that the equivalency determination is very important when comparing the moisture content of raw materials and the requirement to utilize more fuel to dry this material. Facilities in Florida, such as FCS, begin at an emissions disadvantage to facilities with dryer raw materials, such as the RMC Lonestar Davenport facility in Santa Cruz, CA, because more fuel combustion is necessary to dry the Florida material, which produces more baseline NOx emissions. We do not agree that the determination is dated, as alluded to by the Department. However, we do concur with the Department that in comparing one facility's emissions to another, one must take care to ensure that "all factors (including time, available technology, and raw materials) are equal."

The Department's assumptions that the "model" RMC Lonestar Davenport facility has consistently "achieved the 2.5 lb/ton clinker value before the existence..." of more modern systems and that the "kiln, if built today at the same location using the same raw materials, would be expected to exhibit much lower emissions..." are oversimplifications based on one or several discrete emissions tests and are assumptions unsupported by existing data. As presented on page 29 of the updated BACT, the USEPA 1994 ACT Document presented emissions data collected by the agency. Data presented for the Lonestar Davenport facility ranged from 1.84 –4.02 lbs NOx/ton of clinker. (This data has been provided in Attachment 5)

This clearly exemplifies that the facility did not historically operate continuously below 2.5 lbs NOx/ton clinker. This data set also shows that any single emissions test at 2.5 lbs NOx/ton clinker is within the range of emissions variability demonstrated by the kiln and is not indicative of a continuously achievable emissions level. This inherent short-term variability in kiln emissions is discussed in the updated BACT on pages 39 and 45.

As presented in Table 4 of the updated BACT and further presented in the copies of collected facility permits attached to the updated BACT, the Lonestar (Davenport) facility permit did not contain a NOx limitation in the original USEPA PSD permit. In the most current air permit, the facility is not constrained by a lb NOx/ton limitation. The permit contains a running 2-hour average NOx emission limit of 350 pounds per hour and a running 24-hour average NOx limit of 250 lbs per hour with <u>no corresponding throughput limitation.</u> In addition, the permit contains <u>no limitations on CO and VOC emissions.</u> Thus, the Lonestar Davenport facility permit provides facility operators with significant latitude for which to operate at lower than expected NOx emissions levels with <u>no corresponding limitations on VOC and CO emissions.</u>

Finally, the statement "the model RMC Lonestar kiln exhibited further NOx emission reductions to a long-term range of 325-390 mg/m^3 at 10% O_2 (excess air)," presented in reference 11 of the updated BACT, was referenced to be based on a technical paper, dated 1998 by FLS-Fuller, presenting the results of performance tests conducted at commissioning of a low-NOx calciner retrofit. We fail to see how sufficient time had elapsed to identify a "long-term range" at commissioning of the retrofit. Furthermore, it is stated in reference 11 of the updated BACT that the reference 11 author did not independently verify these claims.

10. <u>Tarmac's Annual Limit</u>

The footnote provided on page 19 of the updated BACT was based on the review of the Tarmac Pennsuco air permit (permit no. 0250020-010-AC). We were not provided a copy of the written correspondence referenced in the Department's letter. It appears that Tarmac's equivalent 24-hour NOx emission limit ranges from 3.46 to 2.88 lbs/ton clinker with the NOx limit decreasing with increased production rate. Rinker is permit bound to meet 2.8 lbs NOx/ton clinker averaged over 24 hours under *all* operating production rates which is even more stringent.

Polysius is not able to provide a written guarantee until the proposed facility design is finalized.

11. Time to Achieve Compliance

Rinker has not tracked the startup and compliance times of individual kilns in Florida. Polysius, the intended kiln supplier, established the 18-month requirement at the time the application for a permit modification was prepared. Thus, the following response was provided by Polysius.

Since the FCS Kiln II is a completely new facility and all of the equipment to be operated will be newly constructed, a concentrated commissioning effort in order to be put into routine and stable plant operation will be required. The most important item is the establishment of stable operations. There are several key modules, or plant areas, that will receive the focus and these generally proceed in a sequential fashion from a process perspective (plant material flow). In the simplest terms, the plant can be divided into the following modules, and each of these sections must reliably operate in order for its successor to be commissioned.

Quarrying
Raw Material Storage/Reclaim
Raw Meal Grinding, Blending, and Kiln Feed
Clinker Production
Cement Production
Cement Storage/Distribution

Each cement plant is uniquely designed and constructed based upon many factors, including natural resources available, plant location, climate, governing laws and regulations, market demands, labor, costs, transportation, and even personal preferences and experiences. There is, therefore, no such thing as a typical cement plant, nor a typical plant startup, and the problems encountered during startup are just as diverse. The equipment installed into any cement plant, like any large industrial plant, is supplied by countless vendors. Small parts are put together to make a machine, which are combined to make a processing system, which are subsequently combined to make the plant. And finally, a debugged process control system is necessary to supervise and allow the equipment to be started, stopped, and reliably interlocked. It is anticipated that all of the parts that create the whole will function as expected, although this is never the case, as unforeseen problems and unexpected events will cause individual machines or the entire plant to shutdown. Both mechanical and electrical failures will contribute to the length of the commissioning phase. Even after the plant equipment is operational, raw material inconsistencies can cause mix changes leading to numerous process and operating problems in the plant, causing the entire process to be repeated. Given that the FCS Kiln I is a preheater kiln, the plant operating staff will be required to learn the unique characteristics of the new plant. Experience by Polysius has shown that at least 3 or 4 months is necessary for a new plant in order to initially achieve a peak of 90 to 100% of rated capacity.

Add to that potential equipment breakdowns, malfunctions, defects, or other unforeseen problems leading to shutdowns, and this time can easily double. In one current plant startup at a Holcim facility in Colorado, the commissioning actually had to be postponed for seven months while equipment repairs and modifications were completed following unforeseen circumstances. Usually, the plant is able to achieve its rated capacity within this initial period, but because of the many initial shutdowns, refractory in critical areas will be weakened and will usually require some replacement on several occasions, leading to additional downtime. It generally takes from nine months to a year for the plant to be able to reliably operate at nominal rated capacity. (Polysius to add discussion expecting objections by FDEP)

In the case of the Florida Rock Gainesville conversion, the overall startup effort required to bring a totally new plant online had already been expended over the previous two years. Thus, it was possible to convert the existing plant's calciner to MSC operation and bring successfully online relatively quickly. However, the proposed plant for FCS will utilize an MSC-designed calciner right from the start, and it will not be a simple matter as was evident in Florida Rock Gainesville. Florida Rock Gainesville also needed a considerable amount of time to troubleshoot the new equipment in order to achieve stable, rated design capacity on a continuous basis.

With one year to 18 months necessary for just a relatively problem-free startup, additional time is expected to adjust and/or modify the calciner to achieve the extremely stringent NOx emission levels specified in the FCS Kiln II. As stated before and in the updated BACT, the FCS Kiln II NOx limit of 2.8 lbs/ton clinker averaged over 24-hours is an aggressive limit with the advanced MSC calciner. Due to this aggressive NOx limitation, along with correspondingly low CO and VOC emission limits, it is not inconsistent to expect that more time will be needed to achieve stable operations in compliance with permit limits. Rinker is relying on the kiln supplier's (Polysius) recommendations for construction and start-up of the Unit II plant. At this time, their recommendation is 18 months for start-up.

12. <u>Stringency of Standard</u>

As presented in Sections 3.5.3 (page 39) and 3.5.4 (page 45) of the updated BACT, recent published articles have presented data showing extreme short-term variation in NOx emissions from cement kilns that can occur over a period of hours and/or days. These variations can be abnormally high or abnormally low and appear to be governed by the complex interactions of the many exothermic and endothermic reactions occurring within the kiln to form clinker. This short-term variability tends to get dampened when emission limit averaging times are extended to 30-day or annual periods. This data has been used to present the basic conclusions that cement kiln emissions limits should be associated with longer term averaging periods (30-day or annual) and that statistical analyses of comparison of the stringency between any specific 24-hour average and annual average emissions per ton of clinker values. However, available information indicates that short-term average limits would be more difficult from a compliance perspective due to the short-term variability in kiln emissions.

It is this short-term kiln variability issue that has caused significant concern from Polysius in providing a guarantee of meeting the FCS emission limit.

13. VOC Emission Limit

Rinker concurs with the Department that, in light of new information and test data not available at the time of permitting the FCS Kiln II, compliance with the established VOC permit limit may not be achievable, especially with the extremely stringent NOx limit in the permit. Therefore, Rinker requests an increase in the previously permitted emission limit of VOC from 0.085 to 0.12 lbs/ton clinker which we are confident is achievable and consistent with emission limits established for other plants in Florida. A BACT review for VOC emissions, as this increase adds VOC to the list of PSD significant pollutants, will be provided later under separate cover.

We trust that these responses have adequately addressed the Department's concerns and shown that the emission limits contained in the FCS Kiln II permit represent BACT.

Reviewed and Sealed By:

PAUL NEIL

46918

5-7-02

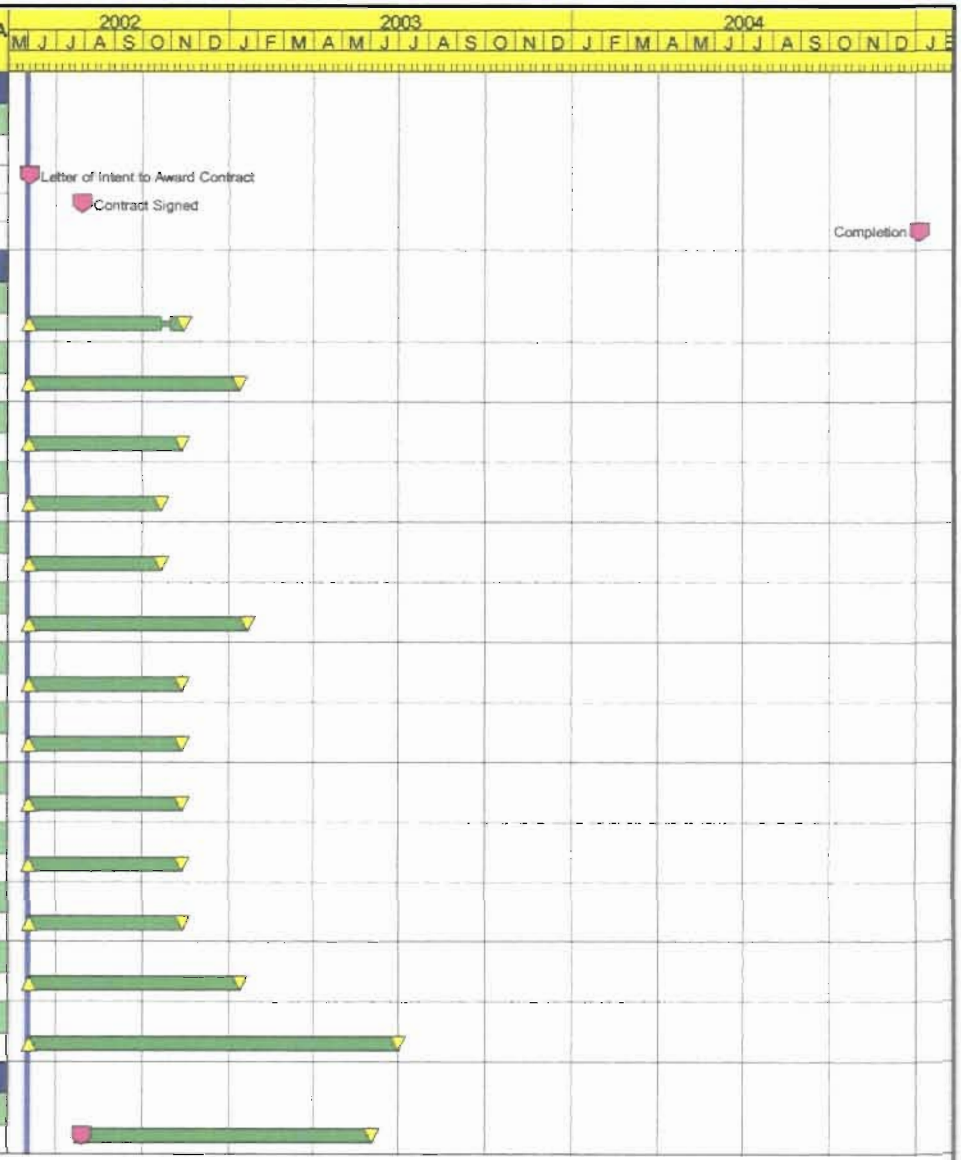
Paul Neil

P.E. Seal

PAUL E. NEIL ★ ENGINEER ★ CERTIFICATE ★ STATE OF FLORIDA ★ REGISTERED

ATTACHMENT
1

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	AREA
Administrative/Milestones					
All Shops/Areas					
Contract Milestone					
1	Letter of Intent to Award Contract	0	03JUN02		01
18	Contract Signed	0	30JUL02		01
90	Completion	0		03JAN05	
Engineering					
+ All Shops/Areas					
		117	03JUN02	13NOV02	01
+ Chapter D: Raw Material Transport & Feed Bins					
		160	03JUN02	13JAN03	03
+ Chapter E: Raw Material Grinding					
		115	03JUN02	11NOV02	04
+ Chapter G: Raw Meal Homogenizing and Storage					
		100	03JUN02	21OCT02	05
+ Chapter H: Kiln Feed Transport & Weighing					
		100	03JUN02	21OCT02	05
+ Chapter K: Preheater/Kiln System					
		165	03JUN02	20JAN03	
+ Chapter L: Clinker Transport and Storage					
		115	03JUN02	11NOV02	08
+ Chapter M: Clinker Tranpsort from Storage					
		115	03JUN02	11NOV02	08
+ Chapter N: Cement Grinding					
		115	03JUN02	11NOV02	09
+ Chapter P: Cement Transport					
		115	03JUN02	11NOV02	10
+ Chapter Q: Cement Storage and Bulk Loading					
		115	03JUN02	11NOV02	10
+ Chapter S: Coal Transport & Grinding					
		160	03JUN02	13JAN03	11
+ Chapter X: Electrical Equipment					
		280	03JUN02	30JUN03	12
Procurement					
+ All Shops/Areas					
		220	30JUL02	02JUN03	



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Early Bar
Progress Bar

Krupp Polysius Corp., Atlanta

7400-7187 Florida Crushed Stone

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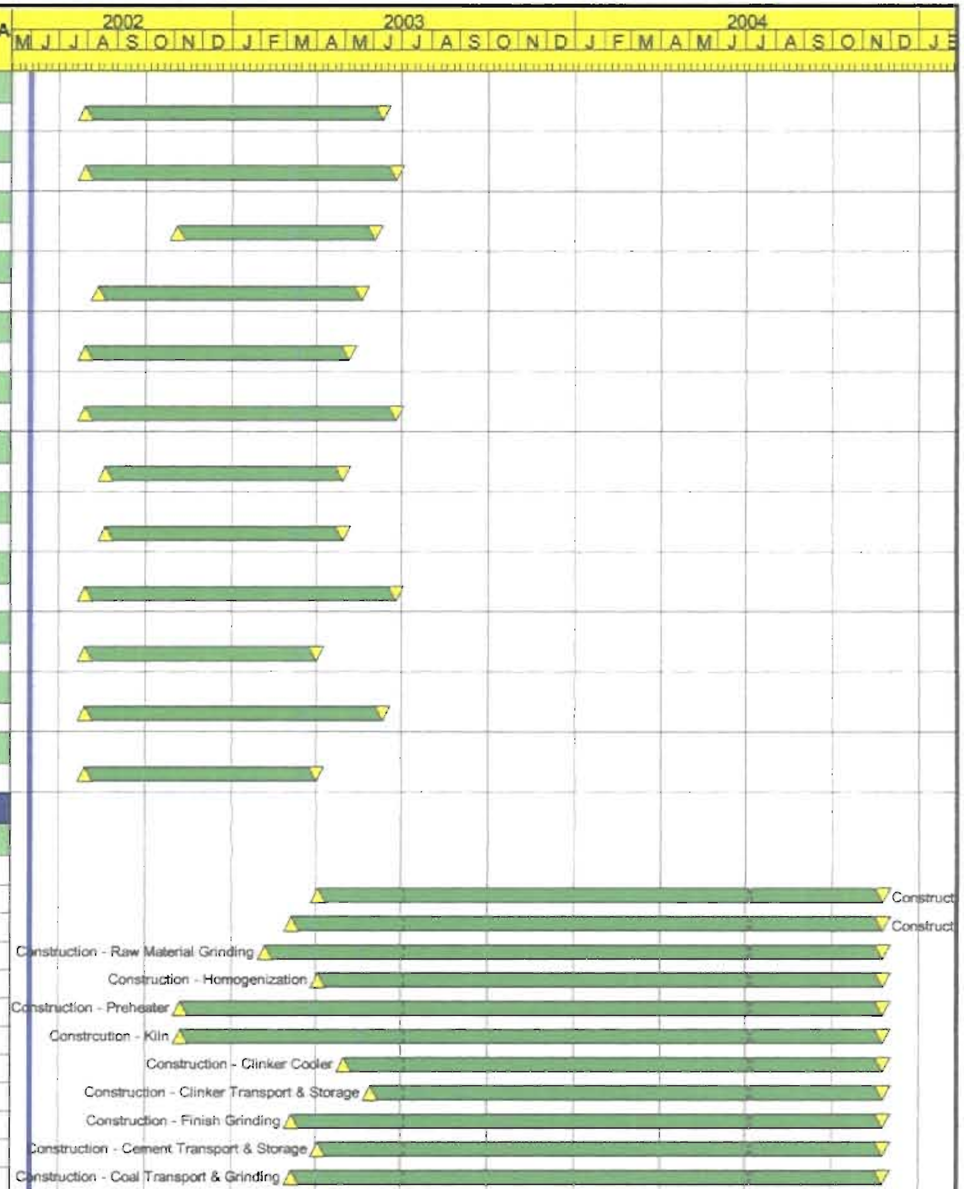
BV00
All
Phase/Shop/AAT: Standard Presentation
Baseline - Prel
Sheet 1 of 3

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	AREA
+ Chapter D: Raw Material Transport & Feed Bins					
		225	30JUL02	09JUN03	03
+ Chapter E: Raw Material Grinding					
		235	30JUL02	23JUN03	04
+ Chapter F: Raw Meal Transport					
		150	05NOV02	02JUN03	05
+ Chapter G: Raw Meal Homogenizing and Storage					
		200	13AUG02	19MAY03	05
+ Chapter H: Kiln Feed Transport & Weighing					
		200	30JUL02	05MAY03	05
+ Chapter K: Preheater/Kiln System					
		235	30JUL02	23JUN03	
+ Chapter L: Clinker Transport and Storage					
		180	20AUG02	28APR03	08
+ Chapter M: Clinker Tranpsort from Storage					
		180	20AUG02	28APR03	08
+ Chapter N: Cement Grinding					
		235	30JUL02	23JUN03	09
+ Chapter Q: Cement Storage and Bulk Loading					
		175	30JUL02	31MAR03	10
+ Chapter S: Coal Transport & Grinding					
		225	30JUL02	09JUN03	11
+ Chapter X: Electrical Equipment					
		175	30JUL02	31MAR03	12
Construction/Erection/Installation					
All Shops/Areas					
3000	Construction - Chapter C: Raw Material Storage	425	04APR03	22NOV04	
4000	Construction - Chapter D: Raw Material Transport	445	07MAR03	22NOV04	
5000	Construction - Raw Material Grinding	465	07FEB03	22NOV04	
6000	Construction - Homogenization	425	04APR03	22NOV04	
7000	Construction - Preheater	530	08NOV02	22NOV04	
8000	Constrcution - Kiln	530	08NOV02	22NOV04	
9000	Construction - Clinker Cooler	405	02MAY03	22NOV04	
10000	Construction - Clinker Transport & Storage	385	30MAY03	22NOV04	
11000	Construction - Finish Grinding	445	07MAR03	22NOV04	
12000	Construction - Cement Transport & Storage	425	04APR03	22NOV04	
13000	Construction - Coal Transport & Grinding	445	07MAR03	22NOV04	



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Early Bar
Progress Bar

Krupp Polysius Corp., Atlanta

7400-7187 Florida Crushed Stone

POLYSIUS

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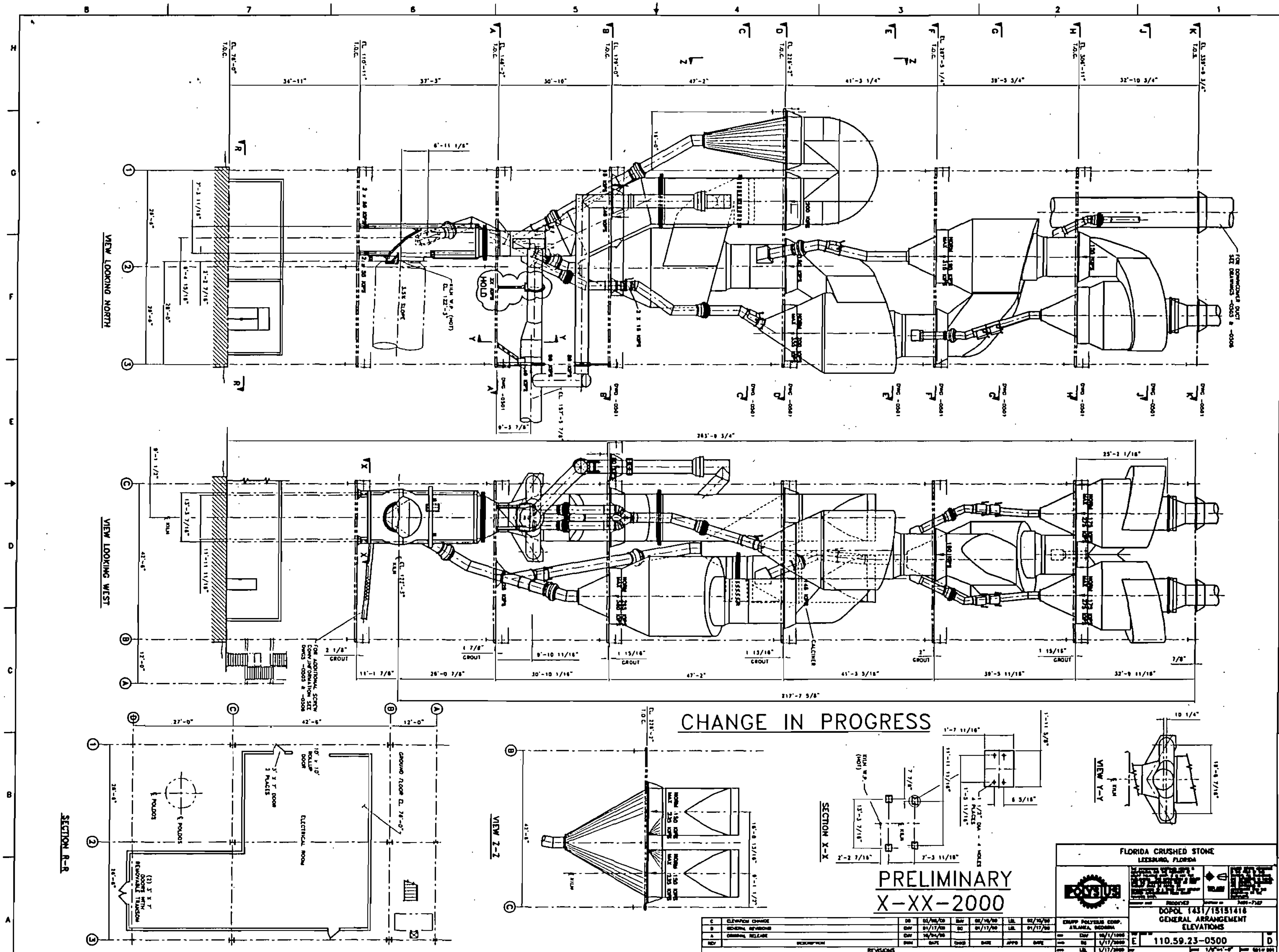
Phase/Shop/AAT: Standard Presentation
Baseline - Prel
Sheet 2 of 3

ATTACHMENT
2



REV	DESCRIPTION	DWN	DATE	CHKD	DATE	APPD	DATE
C	ELEVATION CHANGE	DB	02/08/00	DAV	02/10/00	LBL	02/10/00
B	GENERAL REVISIONS	DAV	01/17/00	BG	01/17/00	LBL	01/17/00
A	ORIGINAL RELEASE	DAV	10/04/99				

REVISIONS

FLORIDA CRUSHED STONE
LEESBURG, FLORIDA

POLYSIUS

KRUPP POLYSIUS CORP.
ATLANTA, GEORGIA

DOPOL 1431/15151416
GENERAL ARRANGEMENT
ELEVATIONS

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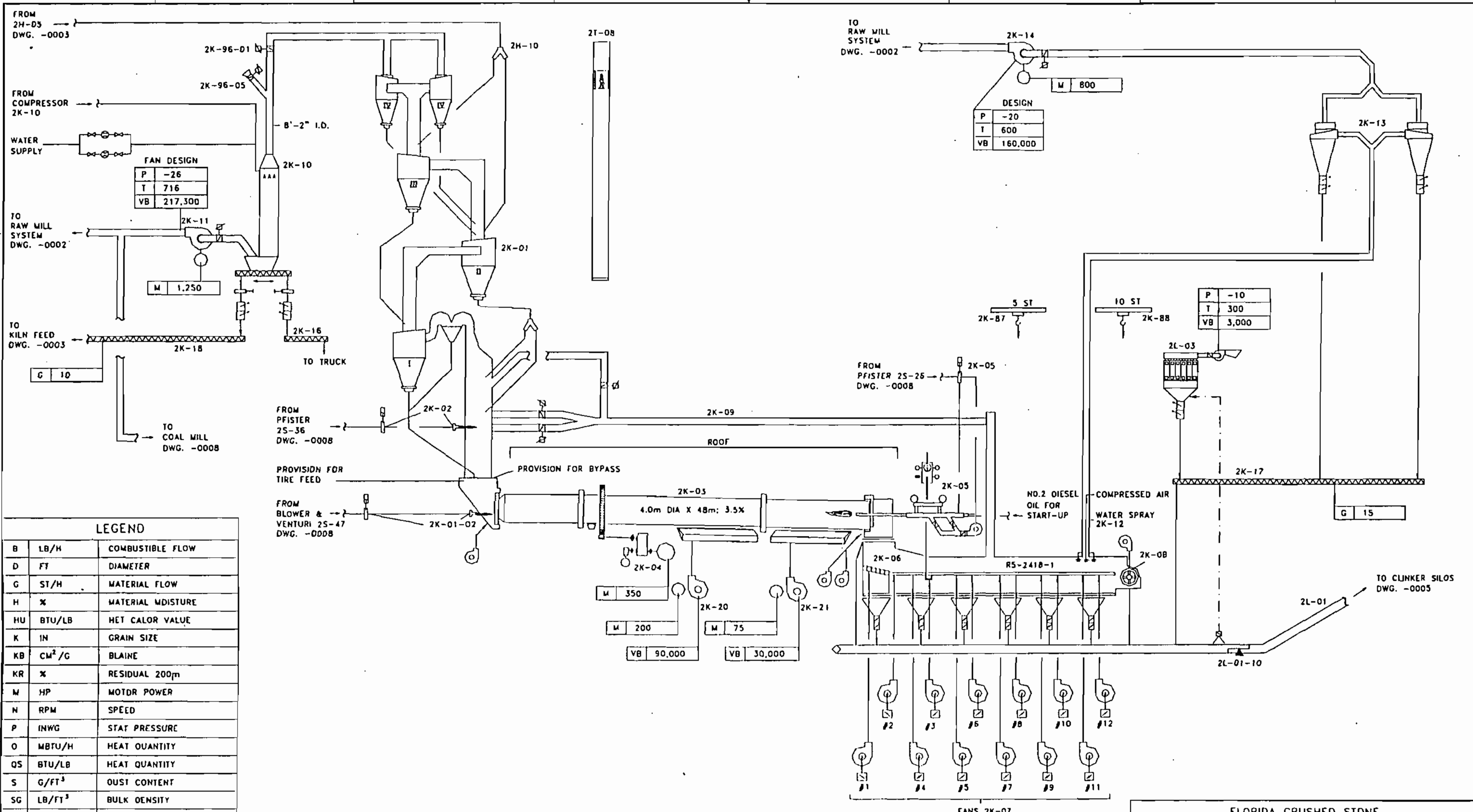


LEGEND

B	LB/H	COMBUSTIBLE FLOW
D	FT	DIAMETER
G	ST/H	MATERIAL FLOW
H	%	MATERIAL MOISTURE
HU	BTU/LB	NET CALOR VALUE
K	IN	GRAIN SIZE
KB	CM^2/G	BLAINE
KR	%	RESIDUAL 200µm
M	HP	MOTOR POWER
N	RPM	SPEED
P	INWG	STAT PRESSURE
Q	MBTU/H	HEAT QUANTITY
QS	BTU/LB	HEAT QUANTITY
S	G/FT^3	DUST CONTENT
SG	LB/FT^3	BULK DENSITY
T	°F	TEMPERATURE
TP	°F	DEW POINT
UT	°F	AMBIENT TEMPERATURE: 25°F WINTER 95°F SUMMER RELATIVE HUMIDITY: 100%
VB	ACFM	GAS FLOW
VN	SCFM	GAS FLOW
VS	SCF/LB	GAS FLOW
VV	FT^3/S	GAS FLOW

PRELIMINARY
07/14/00

FLORIDA CRUSHED STONE
LEESBURG, FLORIDA

POLYSIUS

KRUPP POLYSIUS CORP.
ATLANTA, GEORGIA

BROOKVER — 7401-7187

MECHANICAL PROCESS FLOW SHEET
PREHEATER, KILN & COOLER SYSTEM

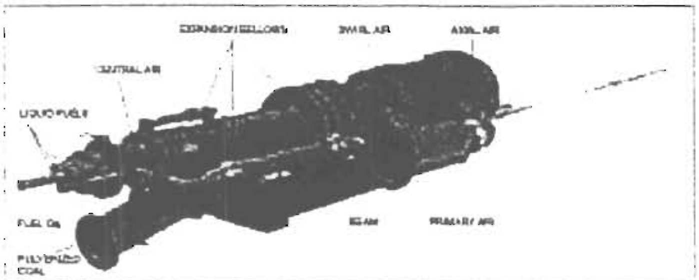
ALC 1/12/2000

D 110.59.23-0004 —

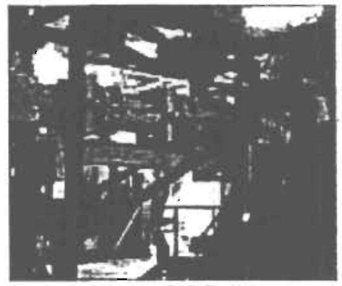
SCALE NONE — SHEET 001 OF 001

ATTACHMENT
3

ROTAFLAM® KILN BURNERS
oil, gas, coal, waste fuels fired



ROTAFLAM® burner



ROTAFLAM® burner on kiln

1 - PRINCIPLE

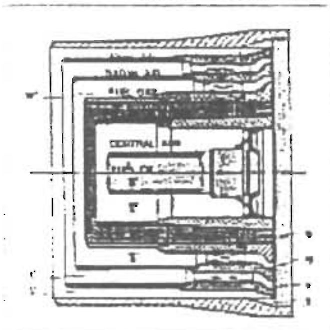
1.1. Optimisation of flame stability
The concept of the ROTAFLAM® burner is based on the experience acquired on the GRC boiler burner which comprises an original flame stabilizer plate (patent 7103504).
The stabilizer plate induces recirculation core eddies which guarantee perfect stability at flame root even at cold start.

1.2. Coal, fuel gas and oil streams on the inside of the two air streams
The aim of this new arrangement is to minimise O_2 concentration at flame root in order to lower the NOx emission

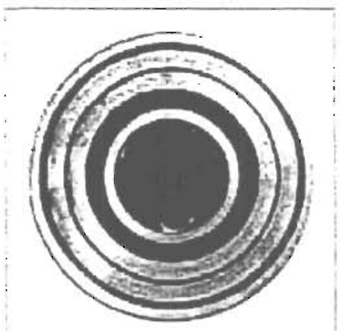
1.3. Outside tube of firing pipe protruding over nozzle
This arrangement avoids a too fast expansion of the air flow (bowl effect) thus enabling better flame shaping

1.4. Axial air injected via separate jets (slots)
As opposed to the continuous annular gap, this new arrangement enables :
- perfect concentricity with outside tube of firing pipe.
- introduction of recirculated combustion gases of high CO_2 content into the flame root, thus reducing free O_2 content

Nozzle for 3 liquid fuels + coal



Extract of PILLARD patent EP 93430017.5



Coaxial nozzle with built-in igniter

2 - OPTIMISATION

In addition to the concept described above a more efficient fuel/air mixing has been achieved by optimisation of the kinetic energy of the axial + swirl air streams i.e. :
- less pressure drop between primary air fan and burner head (velocities down by half),
- no pressure drop through the butterfly valves located on each air stream since flow adjustment is now achieved at burner tip by translation of the burner tubes in relation to each other : this is done manually, or via a hydraulic jack by remote operation. Seal between pipes is ensured by expansion bellows.

Comparaison of kinetic energies (typical values with primary air fan for coal firing) :

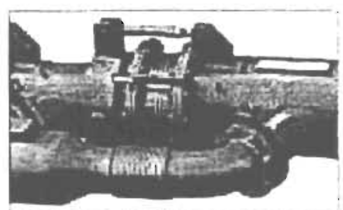
- **3-channel burner**

Static pressure = 120 mbarg.
Pressure at tip Pu = 85 mbarg.
(Due to pressure drop of 25 mbarg through butterfly valves).
Flow Q = 10 % of total
Specific kinetic energy :
Q x Pu = 10 x 85 = 850.

- **ROTAFLAM® burner**

Static pressure = 250 mbarg
Pressure at tip Pu = 240 mbarg
(170 for gas or oil alone)
Flow Q = 6 % of total.
Specific kinetic energy :
Q x Pu = 6 x 240 = 1440.

This shows that the kinetic energy is increased (easier flame shaping adjustment) with primary air flow equivalent to half of that of a conventional burner.



ROTAFLAM® burner - Detail of expansion bellows (see leaflet 9519)

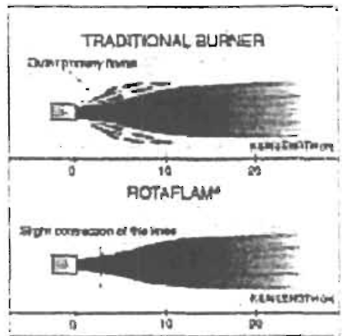
3 - ADVANTAGES

3.1. Better flame shape
Improved configuration of the flame shape over the first few metres results in a reduction of the flame peak temperature.

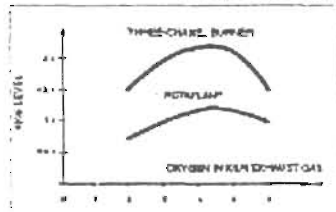
3.2. Fuel saving
Since primary air flow has been reduced by 4 % and replaced by hot secondary air at 700 to 1100°C *(according to process)*, the overall saving on fuel bills is approximately 1.5 %.

3.3. Easier operation
- Tendency to reduce ring formation (better combustion kinetics).
- Better coating (more even temperature).
- Better adjustment possibilities (flame shape).
- Easier start-up at cold (recirculation eddies).
- Earlier switch over to coal (recirculation eddies).
- Less thermal stress to the kiln refractory lining.

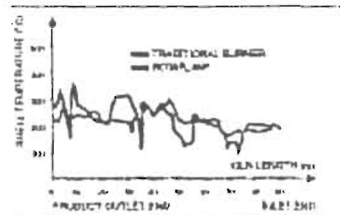
3.4. Tendency to reduce NOx emissions
Reduction in flame temperature and recirculation of combustion gases at the flame root explain the tendency to reduce the NOx emission.



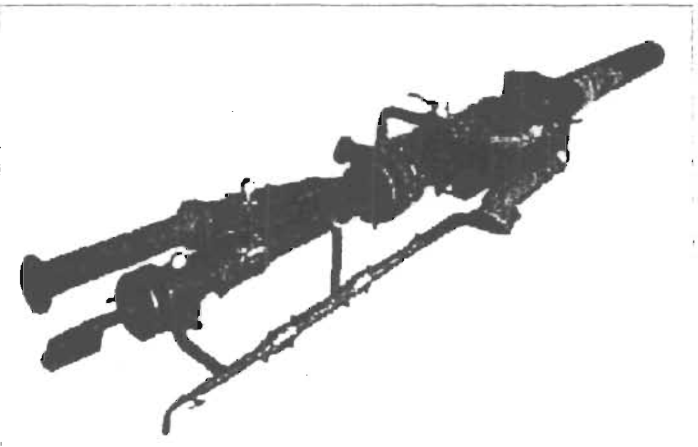
Flame shape comparison



Measurement statistics on NOx emission



Kiln shell temperature profile


General view of the ROTAFLAM burner from cold end

CHARACTERISTICS

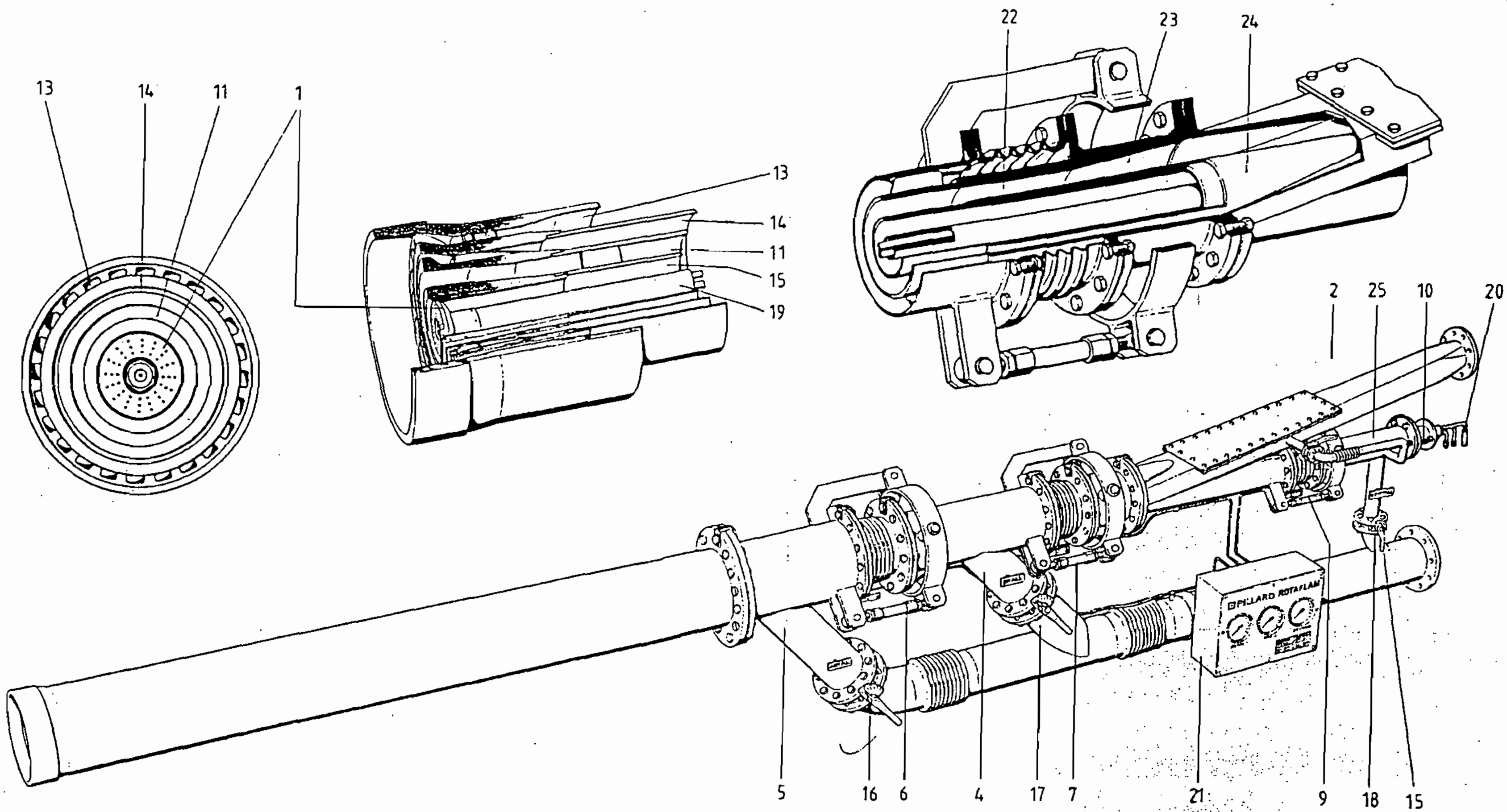
Design	:	*parameters selected according to the type of kiln*
Fuels	:	*all types acceptable, such as liquid, gaseous, pulverized coal, petcoke, anthracite, wastes*
Adjustments	:	*the ROTAFLAM patented features enable flame shaping to suit site conditions*
Range	:	*any heat release from 1 to 180 MW per unit*

The above data is given as indication and is subject to variation

LEAFLET 9102 G Rev. 4

PILLARD
COMBUSTION EQUIPMENT & CONTROL SYSTEMS
GROUPE FIVES-LILLE

FRANCE ... 13272 MARSEILLE cedex 8
GERMANY ... TAUNUSSTEIN
SPAIN ... (MADRID)
ITALY ... ASSAGO (MI)
CHINA (PRC) ... BEIJING



1) Flammenstabilisator
FLAME STABILIZER

2) Kohlenstaub
PULVERIZED COAL

4) Dralluft
SWIRL AIR

5) Axialluft
AXIAL AIR

6) Verstellung Axial
ADJUSTMENT AXIAL AIR

7) Verstellung Drall
ADJUSTMENT SWIRL AIR

9) Verstellung Kohlekanal
ADJUSTMENT COAL DUCT

10) Verstellung Zentralluft
ADJUSTMENT CENTRAL AIR

11) Kohlenstaubkanal
PULVERIZED COAL DUCT

12) Gaskanal
GAS DUCT

13) Axialluftkanal
AXIAL DUCT

14) Dralluftkanal
SWIRL DUCT

15) Zentralluftkanal
CENTRAL AIR DUCT

16) Drosselklappe Axial
AXIAL DAMPER

17) Drosselklappe Drall
SWIRL DAMPER

18) Drosselklappe Zentral
CENTRAL DAMPER

19) Mantelrohr
CENTRAL JACKET TUBE

21) Instrumententafel
PRESSURE GAUGES PANEL

22) Verschleißring
WEAR RING

23) Verschleißkonus
WEAR CONE

24) Verschleißhalbschale
SEMICIRCULAR WEARPLATE

25) Kühlung Kohlenstaub
COOLING COAL DUCT

PILLARD

KB 359

ROTAFLAM®-KO für feste und flüssige Brennstoffe

ROTAFLAM®-KO for pulverized and liquid fuels

1.0 PILLARD-BRENNERAUSRÜSTUNGEN FÜR DREHOFEN

1.1 Allgemeines

PILLARD Brennerausrüstungen für die Befeuerung von Drehöfen bestehen aus dem Brenner, den für seine Bedienung erforderlichen Meß- und Regelgeräten, Armaturen und dem Brennstoffversorgungs- und -aufbereitungssystem.

Der Brenner ist meist in einem Brennerträger verstellbar gelagert und mit den Brennstoffzuführungen und der Primärluftzuführung flexibel verbunden. In Einzelfällen ist auch eine Sekundärluftzuführung vorhanden.

Der Brenner soll die optimale Anpassung des Verbrennungsablaufes und damit der Wärmedarbietung an die Erfordernisse des Ofenbetriebes ermöglichen. Daher ist es von großer Bedeutung, daß mit dem PILLARD Drehofenbrenner die Flammenform durch Verstellung der Brennstoffzuführung und der Primärluft auch während des Betriebes in weiten Grenzen geändert werden kann. Da sich alle Bedienungselemente und Einstellvorrichtungen außerhalb heißer Zonen befinden, werden Störungen vermieden und die gewählten Einstellungen mit großer Genauigkeit über lange Zeit konstant gehalten.

Für die vollständige Verbrennung des zugeführten Brennstoffes ist eine ausreichende Verbrennungsluftmenge (stöchiometrischer Bedarf plus Luftüberschuß) erforderlich.

Die gesamte Verbrennungsluft setzt sich zusammen aus der sogenannten Sekundärluft, die im Normalfall dem Ofen über den Kühler als Heißluft zugeführt wird und der Primärluft, die über den Brenner zur Flammenformung in den Ofen geblasen wird. Aus Gründen der Wirtschaftlichkeit soll der Anteil der meist kalten Primärluft möglichst gering sein.

Bei PILLARD Drehofenbrennern genügt im Normalfall ein Primärluftanteil von 4-6% je nach Ofentyp, Leistung, Brennstoff und zu brennendem Produkt.

Auswahl und Konstruktion der Brennerausrüstungen und des Zubehörs erfolgen stets mit größter Sorgfalt, wobei allgemein der besten technischen Lösung gegenüber der preisgünstigsten der Vorzug gegeben wird, wenn der Kostenaufwand vertretbar ist.

Es liegt dabei die Überlegung zugrunde, daß die Kosten der innerhalb von 2 bis 3 Tagen durch einen Brenner durchgesetzten Brennstoffmenge bereits meist höher liegen als der Preis des Brenners, so daß jede Verbesserung durch entsprechende Einsparungen in sehr kurzer Zeit ausgeglichen wird.

1.2 Anwendungsbereich

PILLARD Drehofenbrennerausrüstungen können in der Normalausführung für jedes in Drehöfen zu verarbeitende Produkt eingesetzt werden. Zur Erzeugung ganz spezieller Flammenformen, für Sonderbrennstoffe und extreme Anwendungsfälle sind Sonderausführungen lieferbar.

1.3 Brennstoffe

PILLARD Drehofenbrennerausrüstungen sind verfügbar für alle flüssigen, gasförmigen und festen Brennstoffe und Kombinationen.

– flüssige Brennstoffe

Je nach örtlicher Versorgungslage kommen neben handelsüblichen Heizölen auch Rohöle und sogenannte Sekundärbrennstoffe aus Produktions- und Recyclingprozessen zum Einsatz. Voraussetzung für die Zerstäubungsfähigkeit ist, daß die Viskosität, gegebenenfalls durch Vorwärmung, weniger als 12cSt (2°E) beträgt.

1.0 PILLARD BURNER EQUIPMENT FOR ROTARY KILNS

1.1 General

PILLARD burner equipment for firing rotary kilns consists of the burner, the measuring and control instruments required for operating the burner, valves, armatures and the fuel preparation system.

The burner is mounted in a burner carriage and consists of the fuel supply system(s) and the primary air system and, if required, also the secondary air system.

The burner is designed to optimally match the combustion process and, thus, the heat supply to the requirements of kiln operation. It is thus of major importance that the PILLARD rotary kiln burner can be used to vary the flame shape within wide limits by adjusting the fuel supply and primary air even during operation. Malfunctions and disturbances are avoided and the selected settings are maintained constant in the long term with great accuracy owing to the fact that all operating controls and setting devices are placed outside the hot zone of the burner head.

A theoretical combustion air quantity (stoichiometric demand plus air excess) is required for complete combustion of the supplied fuel.

The entire combustion air comprises the so-called secondary air, which is normally supplied to the kiln via the cooler as hot air, and the primary air which is fed into the kiln via the burner for flame shaping. For reasons related to economy, the share of (generally cold) primary air should be as low as possible.

On PILLARD rotary kiln burners, type ROTAFLAM®, a primary air rate of 4-6% normally suffices, depending on kiln type, capacity, fuel and product to be burned.

Selection and design are always carried out with the utmost care, and we generally give preference to the best technical solution over the cheapest version, provided the expenditure involved does not exceed a feasible limit.

We base our assumptions on the fact that the cost of the quantity of fuel consumed by a burner within 48 hrs is generally far higher than the price of the burner so that any improvement is compensated for financial thanks to corresponding savings within a very short time.

1.2 Application

The standard version of PILLARD rotary kiln burner equipment can be used for any product to be processed in rotary kilns. Special versions for generating specific flame shapes, for special fuels and for extreme applications are available.

1.3 Fuels

PILLARD rotary kiln burner equipment is available for all liquid, gaseous and solid fuels and combinations thereof.

– liquid fuels

All oil grades with a viscosity less than 12 cSt (2°E) (possibly achieved by preheating) can be used as fuel. The oil should be filtered with a 0.25 mm mesh sieve and should contain no erosive substances or sandlike impurities, in order to avoid inadmissible wear.

[illegible]

Häufigster Brennstoff ist heute Erdgas. Die Brenner können jedoch auch für die Verwendung aller sonstigen brennfähigen Gase konzipiert werden. Hierzu gehören Gase mit besonders niedrigem Heizwert, mit besonders niedrigen Drücken, mit aggressiven Bestandteilen und auch Flüssiggase, die sowohl gasförmig als auch in flüssiger Form verfeuert werden können. Die Brenner können für die Verfeuerung mehrerer verschiedener Gasarten und für die Kombination mit allen festen und flüssigen Brennstoffen ausgelegt werden.

– feste Brennstoffe

Als Brennstoff kommen Braun- und Steinkohlen, Petrolkoks sowie Rückstände aus Produktionsprozessen und Abfallstoffe nach entsprechender Aufbereitung in staubförmigem Zustand zum Einsatz. Die Anforderungen an brenntechnisch relevante Größen, wie flüchtige Bestandteile, Heizwert und zulässigen Aschegehalt sind sehr niedrig. Unter Ausnutzung der neu entwickelten Ausströmgeometrie können Brennstoffe mit niedrigem Heizwert und hohen Ascheanteilen ohne Stützflamme stabil verbrannt werden.

2.0 PILLARD DREHOFENBRENNER TYP ROTAFLAM®

Zur Entwicklung des ROTAFLAM®-Brenners für alle Brennstoffe wurden die Erfahrungen an vielen hundert gelieferten Brennern des Types VR und die Auswertung von Versuchen an mehreren Flammenforschungs- und Hochschulinstituten genutzt.

Hauptziel der Entwicklung waren Energieeinsparung durch drastische Senkung des Primärlufteinsatzes und Umweltentlastung durch Senkung des feuerungsabhängigen Stickoxidausstoßes (NOx).

Diese Ziele wurden erreicht durch:

- gezielte Brennstoffanreicherung im Flammenkern
- Abbau von Temperaturspitzen durch konstruktive Maßnahmen
- Reduzierung des Sauerstoffangebotes im Flammenwurzelbereich durch Minimierung des Primärlufteinsatzes
- strömungstechnisch optimiertes Ausströmsystem
- Variationen der Primärluftströme durch Verstellung der Ausströmgeometrie

2.1 Wirkungsweise der Brenner

Durch den Einsatz des Flammenstabilisators und die Anordnung der Primärluftkanäle außerhalb der Brennstoffzuführung wird ein brennstoffreicher Flammenkern mit starker innerer Rezirkulation erzielt. Dadurch entsteht eine sehr stabile, direkt am Brennerausströmsystem zündende Flamme. Andererseits werden für den Brennprozeß unnötige Temperaturspitzen vermieden.

Durch die reduzierenden Bedingungen im Flammenkern und durch die Vermeidung von Temperaturspitzen, die wesentlich für die Entstehung von Stickoxiden verantwortlich sind, wird die NOx-Emission stark reduziert.

Das Temperaturprofil wird vergleichmäßigt und ermöglicht dadurch eine Erhöhung der Standzeiten der Ofenausklei-dung.

Durch die besondere Gestaltung der Ausströmquerschnitte der Primärluft und durch die maximale Umsetzung des Druckes in Geschwindigkeit wird trotz sehr geringen Massenstromes ein höchstmöglicher Impuls zur weitgehenden Verstellbarkeit der Flammenform erreicht.

– gaseous fuels

All types of gas can be used as fuels for the standard version. Special designs need to be used for gas types with a particularly low calorific value, with particularly low pressure, gases with aggressive components and liquified gases which can also be fired in liquid form. The burners can be designed for firing several different gas types and for a combination with all solid and liquid fuels.

– solid fuels

All commercially available pulverized fuels and, after appropriate treatment, a number of waste materials can be used as fuels. The requirements as regards parameters relevant to firing, such as volatile matter, calorific value and ash content, are not very stringent. Fuels with a low calorific value and high ash content can be burned stable without a pilot flame by utilizing the newly developed ROTAFLAM® burner tip geometry.

2.0 PILLARD ROTARY KILN BURNER TYPE ROTAFLAM®

The experience gained on many hundreds of supplied burners of type VR and the results gained from analysis of trials conducted at several Flame Research Institutes and Technical Universities have been considered in the development of the ROTAFLAM® burner for all fuels.

The main aims of the development were to achieve energy savings by a drastic reduction of primary air consumption and to reduce pollution of environment by a reduction of firing-dependent emission of oxides of nitrogen (NOx).

These aims have been achieved by:

- specific fuel enrichment in the inner zone of the flame
- reducing temperature peaks by implementing design measures
- reducing the oxygen concentration in the flame root zone by minimizing primary air consumption
- aerodynamically optimized burner tip system
- variations in the primary air flows by adjusting the burner tip geometry.

2.1 Function of the burners

Using the flame stabilizer and the arrangement of the primary air circuits outside the fuel supply system achieves a fuel-rich inner zone of the flame with high internal recirculation. On the one hand, this results in a very stable flame which ignites directly at the burner tip system and, on the other hand, this avoids unnecessary temperature peaks for the combustion process.

NOx emission is greatly reduced owing to the reducing conditions in the inner zone of the flame and owing to the avoidance of unnecessary temperature peaks which are essentially responsible for production of oxides of nitrogen (NOx).

The temperature profile is evened out, thus prolonging the service life of the refractory lining.

The special configuration of the outlet cross-sections of the primary air and complete conversion of the pressure to velocity achieve maximum possible thrust which permits extensive adjustability of the flame shape, despite very low mass flow.

Der ROTAFLAM®-Brenner wird allgemein für einen maximalen reinen Primärlufteinsatz von 6% ausgelegt und dann während des Betriebes optimiert. In der Praxis wurde in vielen Fällen ein tatsächlicher Primärluftbedarf in der Größenordnung von nur 5% festgestellt.

2.2 Aufbau der Brenner

2.2.1 ROTAFLAM®-O für flüssige Brennstoffe
nach Zeichnung KB 356

– Zentrales Mantelrohr Pos. 19
Das zentrale Mantelrohr dient zur Aufnahme des Düsenstockes für flüssige Brennstoffe.

– Zentralluftkanal mit Flammenstabilisator Pos. 15 und Pos. 1
Der Zentralluftkanal ist mit einem Flammenhalter zur Stabilisierung der Flamme ausgerüstet. Über diesen Kanal wird ein vernachlässigbar geringer Anteil der Primärluft geführt, um den Flammenstabilisator von Ansätzen freizuhalten. Der Zentralluftkanal kann bei Bedarf für den Einbau eines gas-elektrischen Zündbrenners dimensioniert und verwendet werden.

– Drallkanal Pos. 4
Der Kanal dient zur Zuführung reiner Primärluft. Am Drallkörper wird eine stark rotierend ausströmende Luftkomponente erzeugt. Der Drallkörper ist bei kleineren Durchmessern mit Kreisbogenschaufeln ausgeführt und zeichnet sich durch einen minimalen Druckverlust aus. Der Ausströmquerschnitt ist während des Betriebes stufenlos verstellbar, so daß bei maximal erreichbarer Ausströmgeschwindigkeit die durchgesetzte Luftmenge und damit der flammenbeeinflussende Impuls variiert werden kann.

– Axialkanal Pos. 5
Über den äußeren Brennerkanal wird ebenfalls reine Primärluft zugeführt, die das Ausströmsystem aber in axialer Richtung verläßt. Der ursprüngliche Ringspalt wird am Brenneraustritt in viele Einzelstrahlen aufgeteilt. Hierdurch wird die Spalthöhe stark vergrößert und damit die Zentrierung gegenüber einem reinen Ringspalt optimiert. Außerdem wird die Strahloberfläche des Axialluftstromes und damit dessen Wirkung trotz kleinerer Primärluftmengen vergrößert. Der Austrittsquerschnitt der Einzelöffnungen ist während des Betriebes stufenlos verstellbar, so daß bei gleicher ebenfalls maximal erreichbarer Austrittsgeschwindigkeit die durchgesetzte Axialluftmenge und damit die Flammenform beeinflußt werden kann.

– Verstellvorrichtungen Pos. 6, 7, 10
Die Verstellvorrichtungen für die Ausströmquerschnitte der einzelnen Brennerkanäle können wahlweise mit hydraulischen Zylindern ausgerüstet werden.

– Instrumententafel Pos. 21
Die Drücke in den einzelnen Luftkanälen werden übersichtlich angezeigt.

2.2.2 ROTAFLAM®-G für gasförmige Brennstoffe
nach Zeichnung KB 357

– Zentrales Mantelrohr Pos. 19
Das zentrale Mantelrohr dient meist zur Aufnahme eines Zündbrenners.

– Zentralluftkanal mit Flammenstabilisator Pos. 15 und Pos. 1
Der Zentralluftkanal ist mit einem Flammenhalter zur Stabilisierung der Flamme ausgerüstet. Über diesen Kanal wird ein vernachlässigbar geringer Anteil der Primärluft geführt, um den Flammenstabilisator von Ansätzen freizuhalten.

The ROTAFLAM® burner is generally designed for a maximum pure primary air consumption of 6% and is then optimized during operation. Values in the order of magnitude of only 5% are conventional in practice.

2.2 Design of the burners

2.2.1 ROTAFLAM®-O for liquid fuels
see drawing KB 356

– Central jacket tube item 19
The central jacket tube serves to accommodate the atomizer gun for the liquid fuels.

– Central air circuit with flame stabilizer item 15 and item 1
The central air circuit is equipped with a flame retention baffle for stabilizing the flame. A negligibly small portion of the primary air is ducted via this circuit in order to keep the flame stabilizer free of deposits. The central air circuit can be used for installation of a gas-electric ignition burner.

– Swirl circuit item 4
This circuit is provided with a swirler and serves to supply pure primary air. The swirl air component which is supplied via the internal primary air circuit emerges at the burner tip via a swirler. A strongly rotating air component is generated at this point. The swirler, in the case of small diameters, has circular-arc blades in order to minimize pressure loss. The outlet cross-section can be adjusted steplessly during operation so as to permit the air throughput and, thus, the thrust which influences the flame to be varied at maximum achievable outlet velocity.

– Axial circuit item 5
The outer circuit is an axial circuit which serves to supply pure primary air with axial outlet direction. The original ring gap is subdivided into a large number of individual slots at the burner outlet. This greatly increases the gap height and thus optimizes centering in comparison with a ring gap. In addition, the surface of the axial air stream is increased in size, thus enhancing its effect, despite the lower primary air quantities. The outlet cross-section of the individual openings can be adjusted steplessly during operation so as to permit the axial air throughput and, thus, the thrust which influences the flame to be varied at maximum achievable outlet velocity.

– Adjusting mechanisms item 6,7,10
The adjusting mechanisms for the individual circuits can be equipped with hydraulic cylinders optionally.

– Pressure gauges panel item 21
Pressure indicators for all individual burner circuits.

2.2.2 ROTAFLAM®-G for gaseous fuels
see drawing KB 357

– Central jacket tube item 19
The central jacket tube serves to accommodate the gas-electric ignition burner.

– Central air circuit with flame stabilizer item 15 and item 1
The central air circuit is equipped with a flame retention baffle for stabilizing the flame. A negligibly small portion of the primary air is ducted via this circuit in order to keep the flame stabilizer free of deposits. The central air circuit can be used for installation of a gas-electric ignition burner.

– Drallkanal Pos. 4
Der Kanal dient zur Zuführung reiner Primärluft. Am Drallkörper wird eine stark rotierend ausströmende Luftkomponente erzeugt. Der Drallkörper ist bei kleineren Durchmessern mit Kreisbogenschaufeln ausgeführt und zeichnet sich durch einen minimalen Druckverlust aus. Der Ausströmquerschnitt ist während des Betriebes stufenlos verstellbar, so daß bei maximal erreichbarer Ausströmgeschwindigkeit die durchgesetzte Luftmenge und damit der flammenbeeinflussende Impuls variiert werden kann.

– Axialkanal Pos. 5
Über den äußeren Brennerkanal wird ebenfalls reine Primärluft zugeführt, die das Ausströmsystem aber in axialer Richtung verläßt.
Der ursprüngliche Ringspalt wird am Brenneraustritt in viele Einzelstrahlen aufgeteilt. Hierdurch wird die Spalthöhe stark vergrößert und damit die Zentrierung gegenüber einem reinen Ringspalt optimiert. Außerdem wird die Strahloberfläche des Axialluftstromes und damit dessen Wirkung trotz kleinerer Primärluftmengen vergrößert. Der Austrittsquerschnitt der Einzelöffnungen ist während des Betriebes stufenlos verstellbar, so daß bei gleicher ebenfalls maximal erreichbarer Austrittsgeschwindigkeit die durchgesetzte Axialluftmenge und damit die Flammenform beeinflußt werden kann.

– Kühlvorrichtung für den Gaskanal Pos. 26
Wird der Drehofenbrenner ohne Gas gefahren, muß der Gaskanal mit Kühlluft beaufschlagt werden. Hierzu werden die Doppelabsperrklappen in der Kühlluftleitung voll geöffnet. Bei Gasbetrieb sind die Klappen geschlossen und das Zwischenentlüftungsventil geöffnet. Im Falle einer Undichtigkeit wird hierüber Leckgas ins Freie geleitet.

– Verstellvorrichtungen Pos. 6, 7, 8, 10
Die Verstellvorrichtungen für die Ausströmquerschnitte der einzelnen Brennerkanäle können wahlweise mit hydraulischen Zylindern ausgerüstet werden.

– Instrumententafel Pos. 21
Die Drücke in den einzelnen Luftkanälen werden übersichtlich angezeigt.

2.2.4 ROTAFLAM®-KO für feste und flüssige Brennstoffe -
nach Zeichnung KB 359

– Zentrales Mantelrohr Pos. 19
Das zentrale Mantelrohr dient zur Aufnahme des Düsenstockes für flüssige Brennstoffe, die meist als Anfahr- oder Zweitbrennstoffe eingesetzt werden. Der Düsenstock ist im Normalfall so dimensioniert, daß ein Betrieb bis zur maximalen Feuerungsleistung möglich ist.

– Zentralluftkanal mit Flammenstabilisator
Pos. 15 und Pos. 1
Der Zentralluftkanal ist mit einem Flammenhalter zur Stabilisierung der Flamme ausgerüstet. Über diesen Kanal wird ein vernachlässigbar geringer Anteil der Primärluft geführt, um den Flammenstabilisator von Ansätzen freizuhalten. Der Zentralluftkanal kann bei Bedarf für den Einbau eines gas-elektrischen Zündbrenners dimensioniert und verwendet werden.

– Kohlenstaubkanal Pos. 2
Der Kohlenstaub wird mit einer bestimmten Förderluftmenge durch den Kohlenstaubkanal geführt. Förderluftvolumenstrom und Staubbeladung sind abhängig vom Dosiersystem. Der Förderluftvolumenstrom bleibt in allen Brennstoff-Lastbereichen konstant. Die Kohlenstaubkomponente tritt am Ausströmsystem mit einer schwachen Divergenz und relativ geringer Geschwindigkeit aus. Der Ausströmquerschnitt ist während des Betriebes stufenlos verstellbar, so daß die Geschwindigkeit angepaßt werden kann, um etwaigen Pulsationen im Fördersystem entgegenwirken zu können.

This circuit is provided with a swirler and serves to supply pure primary air. The swirl air component which is supplied via the internal primary air circuit emerges at the burner tip via a swirler. A strongly rotating air component is generated at this point. The swirler, in the case of small diameters, has circular-arc blades in order to minimize pressure loss. The outlet cross-section can be adjusted steplessly during operation so as to permit the air throughput and, thus, the thrust which influences the flame to be varied at maximum achievable outlet velocity.

– Axial circuit item 5
The outer circuit is an axial circuit which serves to supply pure primary air with axial outlet. The original ring gap is subdivided into a large number of individual slots at the burner outlet. This greatly increases the gap height and thus optimizes centering in comparison with a pure ring gap. In addition, the surface of the axial air stream is increased in size, thus enhancing its effect, despite the lower primary air quantities. The outlet cross-section of the individual openings can be adjusted steplessly during operation so as to permit the axial air throughput and, thus, the thrust which influences the flame to be varied at maximum achievable outlet velocity.

– Cooling device for the gas circuit item 26
During firing operation without gaseous fuel the gas circuit has to be supplied with cooling air. For this function the damper combination in the cooling air feeding tube has to be fully opened. During gas operation these dampers have to be closed and the intermediate aeration valve must be opened. In case of untightness leakage gase may leave into atmosphere.

– Adjusting mechanisms item 6,7,8,10
The adjusting mechanisms for the individual circuits can be equipped with hydraulic cylinders optionally.

– Pressure gauges panel item 21
Pressure indicators for all individual burner circuits.

2.2.4 ROTAFLAM®-KO for pulverized and liquid fuels
see drawing KB 359

– Central jacket tube item 19
The central jacket tube serves to accommodate the atomizer gun for the liquid start-up or alternative fuels. This jacket tube is dimensioned such that it permits oil-only operation at nominal load, e.g. in case of malfunction of the pulverized fuel supply system.

– Central air circuit with flame stabilizer
item 15 and item 1
The central air circuit is equipped with a flame retention baffle for stabilizing the flame. A negligibly small portion of the primary air is ducted via this circuit in order to keep the flame stabilizer free of deposits. The central air circuit can be used for installation of a gas-electric ignition burner.

– Pulverized fuel circuit item 2
The pulverized fuel is fed through the pulverized fuel circuit at a specific conveying air flow. The volumetric air flow and pulverized fuel load are depending on the dosing system. The pulverized fuel component emerges at the burner tip with slight divergence at relatively low velocity. The outlet cross-section can be adjusted steplessly during operation so as to permit the velocity to be matched to demand and so as to avoid pulsations in the conveying system.

– Drallkanal Pos. 4
Der Kanal dient zur Zuführung reiner Primärluft. Am Drallkörper wird eine stark rotierend ausströmende Luftkomponente erzeugt. Der Drallkörper ist bei kleineren Durchmessern mit Kreisbogenschaufeln ausgeführt und zeichnet sich durch einen minimalen Druckverlust aus. Der Ausströmquerschnitt ist während des Betriebes stufenlos verstellbar, so daß bei maximal erreichbarer Ausströmgeschwindigkeit die durchgesetzte Luftmenge und damit der flammenbeeinflussende Impuls variiert werden kann.

– Axialkanal Pos. 5
Über den äußeren Brennerkanal wird ebenfalls reine Primärluft zugeführt, die das Ausströmsystem aber in axialer Richtung verläßt. Der ursprüngliche Ringspalt wird am Brenneraustritt in viele Einzelstrahlen aufgeteilt. Hierdurch wird die Spalthöhe stark vergrößert und damit die Zentrierung gegenüber einem reinen Ringspalt optimiert. Außerdem wird die Strahloberfläche des Axialluftstromes und damit dessen Wirkung trotz kleinerer Primärluftmengen vergrößert. Der Austrittsquerschnitt der Einzelöffnungen ist während des Betriebes stufenlos verstellbar, so daß bei gleicher ebenfalls maximal erreichbarer Austrittsgeschwindigkeit die durchgesetzte Axialluftmenge und damit die Flammenform beeinflußt werden kann.

– Kühlvorrichtung für den Kohlenstaubkanal Pos. 25
Während des Feuerungsbetriebes ohne Staubbrennstoff muß der Kohlenstaubkanal mit Kühlluft versorgt werden. Hierzu wird die Drosselklappe in der Kühlluftleitung ganz geöffnet.

– Verstellvorrichtungen Pos. 6, 7, 9, 10
Die Verstellvorrichtungen für die Ausströmquerschnitte der einzelnen Brennerkanäle können wahlweise mit hydraulischen Zylindern ausgerüstet werden.

– Instrumententafel Pos. 21
Die Drücke in den einzelnen Luftkanälen werden übersichtlich angezeigt.

2.2.5 ROTAFLAM®-KG für feste und gasförmige Brennstoffe
nach Zeichnung KB 360

– Zentrales Mantelrohr Pos. 19
Das zentrale Mantelrohr dient meist zur Aufnahme eines Zündbrenners.

– Zentralluftkanal mit Flammenstabilisator Pos. 15 und Pos. 1
Der Zentralluftkanal ist mit einem Flammenhalter zur Stabilisierung der Flamme ausgerüstet. Über diesen Kanal wird ein vernachlässigbar geringer Anteil der Primärluft geführt, um den Flammenstabilisator von Ansätzen freizuhalten.

– Kohlenstaubkanal Pos. 2
Der Kohlenstaub wird mit einer bestimmten Förderluftmenge durch den Kohlenstaubkanal geführt. Förderluftvolumenstrom und Staubbeladung sind abhängig vom Dosiersystem. Der Förderluftvolumenstrom bleibt in allen Brennstoff-Lastbereichen konstant. Die Kohlenstaubkomponente tritt am Ausströmsystem mit einer schwachen Divergenz und relativ geringer Geschwindigkeit aus. Der Ausströmquerschnitt ist während des Betriebes stufenlos verstellbar, so daß die Geschwindigkeit angepaßt werden kann, um etwaigen Pulsationen im Fördersystem entgegenwirken zu können.

– Swirl circuit item 4
This circuit is provided with a swirler and serves to supply pure primary air. The swirl air component which is supplied via the internal primary air circuit emerges at the burner tip via a swirler. A strongly rotating air component is generated at this point. The swirler, in the case of small diameters, has circular-arc blades in order to minimize pressure loss. The outlet cross-section can be adjusted steplessly during operation so as to permit the air throughput and, thus, the thrust which influences the flame to be varied at maximum achievable outlet velocity.

– Axial circuit item 5
The outer circuit is an axial circuit which serves to supply pure primary air with axial outlet. The original ring gap is subdivided into a large number of individual slots at the burner outlet. This greatly increases the gap height and thus optimizes centering in comparison with a pure ring gap. In addition, the surface of the axial air stream is increased in size, thus enhancing its effect, despite the lower primary air quantities. The outlet cross-section of the individual openings can be adjusted steplessly during operation so as to permit the axial air throughput and, thus, the thrust which influences the flame to be varied at maximum achievable outlet velocity.

– Cooling device for the pulverized fuel circuit item 25
During firing operation without pulverized fuel the pulverized fuel circuit has to be supplied with cooling air. For this function the damper in the cooling air feeding tube has to be fully opened.

– Adjusting mechanisms item 6,7,9,10
The adjusting mechanisms for the individual circuits can be equipped with hydraulic cylinders optionally.

– Pressure gauges panel item 21
Pressure indicators for all individual burner circuits.

2.2.5 ROTAFLAM®—KG for pulverized and gaseous fuels
see drawing KB 360

– Central jacket tube item 19
The central jacket tube serves to accommodate the gas-electric ignition burner.

– Central air circuit with flame stabilizer item 15 and item 1
The central air circuit is equipped with a flame retention baffle for stabilizing the flame. A negligibly small portion of the primary air is ducted via this circuit in order to keep the flame stabilizer free of deposits.

– Pulverized fuel circuit item 2
The pulverized fuel is fed through the pulverized fuel circuit at a specific conveying air flow. The volumetric air flow and pulverized fuel load are depending on the dosing system. The pulverized fuel component emerges at the burner tip with slight divergence at relatively low velocity. The outlet cross-section can be adjusted steplessly during operation so as to permit the velocity to be matched to demand and so as to avoid pulsations in the conveying system.

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Florida Crushed Stone (Brooksville, FL)
Estimated Capital Cost for Selective Non-Catalytic
Reduction Utilizing Vendor Cost Data

Cost Component	Cost	Basis of Cost Component
Direct Capital Costs		
SNCR Associated Equipment	$972,350	Vendor Estimate *
Flue Gas Ductwork	$192,670	Vatavuk, OAQPS Control Cost Manual, 1995
Instrumentation	$100,000	Additional Instrumentation for System Integration
Taxes	$77,788	8% of SNCR Associated Equipment
Freight	$97,235	10% of SNCR Associated Equipment
Total Direct Capital Costs (TDCC)	$1,440,043	
Direct Installation Costs		
Foundation and Supports	$115,203	8% of TDCC; OAQPS Control Cost Manual
Handling and Erection	$201,606	14% of TDCC; OAQPS Control Cost Manual
Electrical	$144,004	10% of TDCC; OAQPS Control Cost Manual
Piping	$216,006	15% of TDCC; OAQPS Control Cost Manual
Insulation for Ductwork		Included in Ductwork Total Capital Investment
Painting	$14,500	1% of TDCC; OAQPS Control Cost Manual
Site Preparation	$25,000	Engineering Estimate
Buildings	$50,000	Engineering Estimate
Total Direct Installation Cost (TDIC)	$766,319	
Total Capital Cost (TCC)	$2,206,362	Sum of TDCC and TDIC
Indirect Costs		
Engineering	$220,636	10% of TCC; OAQPS Control Cost Manual
Construction and Field Expenses	$220,636	10% of TCC; OAQPS Control Cost Manual
Contractor Fees	$220,636	10% of TCC; OAQPS Control Cost Manual
Start-up	$44,127	2% of TCC; OAQPS Control Cost Manual
Performance Tests	$66,191	3% of TCC; OAQPS Control Cost Manual
Contingencies	$441,272	20% of TCC; OAQPS Control Cost Manual
Total Indirect Capital Costs (TInDC)	$1,213,498	
Total Direct, Indirect and Capital Costs (TDICC)	$3,419,860	Sum of TCC and TInCC

* Vendor estimate referenced in Environmental Quality Management, Inc.'s application to revise NOx emission limits for the Holnam, Inc. facility in Midlothian, TX was scaled using "six-tenths" rule.

Florida Crushed Stone (Brooksville, FL)
Estimated Capital Cost for Selective Non-Catalytic
Reduction Utilizing Vendor Cost Data

Cost Component	Cost	Basis of Cost Component
<u>Direct Annual Costs</u>		
Operating Personnel	$150,000	5000 hours/year @ $30/hour
Supervisory	$22,500	15% of Operating Costs
Ammonia Solution	$270,586	Assumed Molar Ratio of 1
Power	$22,770	
Maintenance Labor and Materials	$72,002	5% of TDCC
Contingency	$107,600	20% of Direct Annual Costs
Total Direct Annual Costs (TDAC)	$645,458	Vendor Estimate
<u>Indirect Annual Costs</u>		
Overhead	$146,701	60% of Total Labor and Maint. Material Costs
Property Taxes	$14,400	1% of TDCC
Administration	$28,801	2% of TDCC
Insurance	$14,400	1% of TDCC
Heat Rate Penalty	$40,000	Assumed 1000 tons coal at $40/ton
Forced System Shutdown	**	
Annualized Total Direct Capital	$556,411	16.27% Cost Recovery Factor of 10% over 10 years multiplied by TDICC
Total Indirect Annual Costs (TIAC)	$800,713	
Total Annual Costs (TAC)	$1,446,171	Sum of TDAC and TIAC
Cost Effectiveness	$4,519.29	Cost per ton of NOx removed

Note: 320 tons NOx removed per year for 25% removal annual average.

** Estimate based on five forced shutdowns per year due to SNCR system and ancillary systems disruption or failure. Estimated costs in lost product are approximately $250,000 per day for a total of $1,250,000 annually. This would change the cost effectiveness value to $8,426 per ton of NOx removed.

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Plant company, location	Date	Process type	Uncontrolled NO_x emissions ppm @ 3% O_2	Uncontrolled NO_x emissions lb/ton clinker	Reference
Kaiser Cement Co. Permanente, CA	11/27/79	Wet	1936	17.5	34
	12/12/79	Wet	1656	13.4	34
Kosmos Cement Co. Louisville, KY	6/89	Dry - X	396	5.78	35
Lafarge Corporation, Alpena, MI	3/89	Dry	232	4.25	36
Lehigh Portland Cement Co., Waco, TX	8/83	Wet	363 ppm @ 15% O_2	10.2	37
Lone Star Florida/Pennsuco Inc., Miami, FL	7/81	Wet	-	6.35	38
Kiln - 3	7/81	Wet	-	5.55	39
	12/86	Wet	582 @ --	6.83	40
Lone Star Industries Davenport, CA	9/24/80	Semi-Wet	406	3.3	41
	5/82	Dry - C	189 @ 14%	2.36	42
	8/82	Dry - C	-	4.02	43
Mill on	8/83	Dry - C	225 @ 10%	2.37	44
Mill off	8/83	Dry - C	198 @ 10%	2.08	44
Mill on	12/83	Dry - C	221 @ 11%	2.65	45
Mill off	12/83	Dry - C	184 @ 12%	1.84	45
Mill on	3/84	Dry - C	181 @ 11%	2.16	46
Mill off	3/84	Dry - C	206 @ 9%	2.16	46
Sweetwater, TX					
Kiln - 2	6/80	Dry - X	783 @ --	9.14	47
New Orleans, LA					
Kiln - 1	5/82	Wet	350 @ --	4.37	48
Kiln - 2	5/82	Wet	390 @ --	4.0	48
Monolith, Mojave, CA	12/6/79	Wet	642	6.9	22
Riverside Cement Co. Riverside, CA					
Gas fired	9/74	Dry	2400-5200	21.0	20
Coal fired	4/76	Dry	381	2.25	49
Gray kiln - 2					
Baghouse inlet	7/81	Dry	999	8.78	50
Baghouse outlet	7/81	Dry	1427	14.32	50
Gray kiln - 1					
Baghouse outlet	7/81	Dry	451	4.52	50
Gray kiln - 2					
Baghouse inlet	10/81	Dry	1310	14.0	51

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

February 28, 2002

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. J. Scott Benyon, Vice President
Rinker Materials Corporation
1501 Belvedere Road
West Palm Beach, Florida 33406

Re: DEP File No. 0530021-008-AC (PSD-FL-227B)
Florida Crushed Stone Kiln II, Brooksville, Hernando County

Dear Mr. Benyon:

On January 28, 2002 we received an update on the Best Available Control Technology (BACT) that accompanies your extension request dated January 10. On February 8 we sent a preliminary request for additional information and advised that we would request further information following our review of the BACT update.

The application to extend the permit is incomplete. In addition to the information requested earlier, provide the information requested.

1. Kiln Details. Please provide details of the configuration of the kiln and precalciner reflecting a present-day design. The Department received some diagrams prepared in 1996 by Polysius for the previous owners. The design does not show a multistage calciner, which we understand is a key element of the NO_X control strategy. That design is obviously out of date. According to the BACT Update (Page 7), the kiln design (presumably an updated design approved by Rinker) was also prepared and supplied by Polysius. Therefore for the purposes of subsequent questions, we are assuming that Polysius will be the manufacturer.

   Very detailed sheets were provided to the Department in 1998-99 by the applicant and Polysius prior to approval of the Suwannee American project. To reasonably construct the kiln by January 2005, quite a bit of preliminary design engineering would be complete and available to Rinker and the Department. (Rule 62-4.070, F.A.C., Standards for Issuing and Denying Permits)

2. Expert System. Please describe the expert process control system to be provided and its capabilities with respect to minimization of NO_X formation. (Rule 62-4.070, F.A.C. and Rule 62-212.400, F.A.C., Prevention of Significant Deterioration and BACT).

3. Kiln Burner Options. Describe the kiln burner and the features incorporated to minimize NO_X formation. This is a very important point, because the hot side of the kiln is where most of the NO_X is formed that is then reduced by staged combustion in the calciner or SNCR.

   Kiln and kiln burner manufacturers other than Polysius have disseminated quite a bit of information about their products. These include kiln manufacturer F.L. Smidth who supply the Duoflex kiln burner described as having "low primary air consumption with adjustable swirl, adjustable air nozzle area, central fuel injection, etc."

KHD Humboldt-Wedag supplies the "Pyrojet" line of burners with its kilns. Pillard is a burner manufacturer that often supplies burners on Polysius kilns. They make similar claims about their Rotoflam line of burners as Fuller and KHD make about their burners. The characteristics of the F.L. Smidth, KHD, and Pillard burners are at least known to be consistent with minimization of NO_X formation. (Rules 62-4.070 and 62-212.400, F.A.C.)

4. Calciner Details and Options. Describe the calciner, its burners and the features incorporated to minimize NO_X formation.

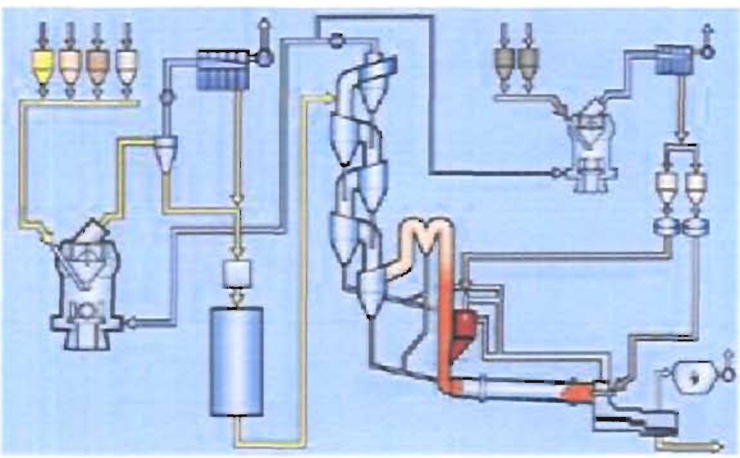
   Initially describe the version that does not operate in staged combustion mode such as provided in the 1996 design. This is the baseline from which further NO_X reductions and costs should be calculated. Polysius has disseminated quite a bit of information about its basic calciners. Such a calciner was installed at Florida Rock and is known as the PREPOL Calciner.

   Then describe the staged combustion version of the calciner. Presumably this is the level of control planned by Rinker based on information in the BACT update. The Polysius version is known as the PREPOL MSC Calciner. A version of this calciner was specified for Suwannee-American Cement.

   Recently, the PREPOL Calciner at Florida Rock was converted to a PREPOL MSC Calciner in order to control NO_X and facilitate tire burning. Polysius would be very aware of the costs of incorporating this feature during initial construction or as a retrofit. Estimate net costs to accomplish this NO_X reduction by staged combustion and include any savings from the added ability to burn tires.

   Again, starting with the same basic configuration, estimate the NO_X reduction by SNCR alone. Also estimate the NO_X reduction by staged combustion together with SNCR. Estimate costs to accomplish this reduction when incorporated into the original design. (Rules 62-4.070 and 62-212.400, F.A.C.)

5. Tertiary Air and Burnout. Describe how tertiary air will used for combustion in the calciner to support single or multistaged combustion followed by completion of burnout (CO conversion). Describe features to provide necessary residence time and turbulence for completion of burnout. These can include cyclonic vessels (such as the KHD Pyrotop, or a Polysius configuration that features a deflection chamber). Following is a diagram from Polysius showing such an arrangement ("M" shaped structure between lower preheater cyclone and calciner).



Note that the decisions made regarding this issue greatly affect the availability of SNCR reagent injection points and the efficacy of NO_X control by SNCR (especially when combined with staged combustion). The excess air, turbulence, and residence are key elements that compensate for the lower reaction rates near the low side of the SNCR temperature window. (Rules 62-4.070 and 62-212.400, F.A.C.)

6. Bypass at FCS Kiln II. According to Page 26 of the RTP Associates report, "To control the volatilized alkali emissions, a part of the kiln exhaust gases are typically bypassed from the downstream units (Precalciner and preheaters). The bypassed gases are quenched to remove alkali and exhausted. This bypass involves a fuel penalty, estimated at 20,000 Btu/ton clinker for every one percent gas bypass. This increased heat requirement contributes to increased NO_X emissions. The FCS Unit II kiln will incorporate a gas bypass for up to 15% of the kiln exhaust gases to prevent buildup of free chloride in the kiln system."

   The raw materials characteristics (no pyrites, low chlorides, etc.) would suggest that Kiln II could function without a bypass in the same manner as the Florida Rock Newberry Plant. The purported need for or existence of a substantial bypass is a predicate for several statements in the BACT update regarding the efficacy of NO_X control by SNCR.

   Please provide the rationale for such a bypass (and necessary capacity) at this project based on assessment of such a need by Polysius (or consultant such as Penta) or a specific requirement by Rinker to the manufacturer to incorporate a bypass of a given capacity into the actual project design.

   The cement kiln design for Suwannee-American does not include a bypass. The Department understands that Rinker in Miami has a scaling problem possibly due to chlorides in the coal. So far no bypass has been installed at that plant. Any conceivable bypass at Brooksville would be very small and much less than 15 percent. (Rules 62-4.070 and 62-212.400, F.A.C.)

7. Cost Estimate for NO_X Control by SNCR. The capital costs of SNCR are given as $3.4 to 5.4 million based on estimates scaled from cases developed by Penta/PCA and Holnam respectively. Such costs are more typical of projects to convert a preheater kiln to a precalciner kiln or to install SCR. The Department does not believe the scaled estimates are applicable to the present projects.

   Both cases cited involve retrofitting existing kilns. Both involve kilns with very substantial bypasses. For example the "model case" from the Penta/PCA report used by Rinker assumes a kiln with a 25 percent bypass such as might be appropriate in other parts of the country (but not Florida). By incorporating the SNCR design into the original project and by assuming a much smaller bypass, the capital cost would be cut in half and probably more.

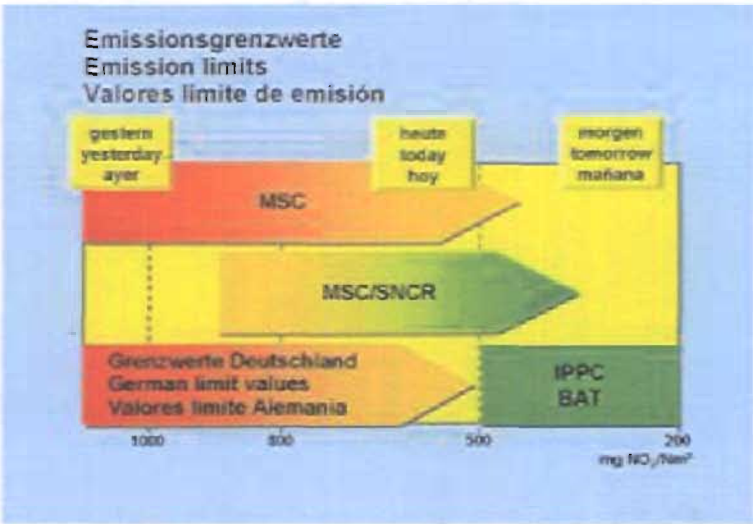
   The Department considers it inadvisable to use scaled cost-estimates submitted by Holman for its Texas Midlothian project (even as a "cross-check"). That project was built on the premise that emissions could be reduced at an existing kiln such that a second kiln could be built without triggering PSD. Instead the long-term emissions are about three times as much as permitted. The State of Texas is considering enforcement for construction of a PSD source without a permit.

   Without enumerating all of the items in the operating costs, we do not believe that it is possible that SNCR can require approximately 3 "fulltime equivalent employees" including operating, supervisory, and maintenance personnel. Further, the estimate of nearly $1,000,000 of reagent per year for Rinker's 100 tons per day Kiln II is almost four times as great as the "worst case" 150 tons per day kiln with 25 percent bypass. (Refer to Penta/PCA report). It is also difficult to imagine five forced shutdowns per year as mentioned in Appendix III. It would certainly seem that the 3 FTE's could help avert such shutdowns.

Accordingly, Rinker should provide updated cost estimates with particular focus on the scenarios discussed in Item 4 above. We understand that Penta did preliminary design work for the previous owners of FCS. They also prepared the NO_X report for the PCA.

Note that the Penta/PCA reductions were based on an existing kiln with a baseline of 3.4 lb NO_X/ton clinker. The analysis by Penta/PCA was premised on a (conservative) reduction of 30 percent by SNCR (and without staged combustion) to 2.4 lb NO_X/ton. That is not a bad assumption based on results at Florida. Obviously a lower value would be expected by the combination of MSC plus SNCR. For example, the MSC might reduce emissions by roughly 30 percent to 2.4 lb/ton. This too is roughly corroborated by the experience at Florida Rock. Addition of SNCR might then only result in a further decrease of 25 percent to something less than 2 lb/ton (without necessarily having a kiln burner known for low NO_X characteristics).

This concept can be more readily appreciated by the following diagram from Polysius. For reference, the present German standard of 500 mg/m^3 (24-hour basis or less) is equal to 2.3 lb NO_X/ton of clinker. We recommend some discussions (perhaps by phone) between Rinker, the Department, and Polysius (or Penta) aimed at clarifying some of these matters and providing experienced cost estimates. (Rule 62-212.400, F.A.C.)



8. Dr. Xeller's paper. The Department appreciates the views (from footnote 26) given by Dr. Xeller but notes that his paper represented the view of the German cement industry in 1998. Interestingly he included a table with the conclusion that SNCR is BAT (Best Available Technique) for NO_X control. He also estimated the capital costs at \$0.5 to 1.5 million (actually less as Euros) as retrofits versus the \$3.4 to 5.4 million estimate provided by Rinker. This same \$0.5 to 1.5 million range is given in a document submitted on behalf of the European Cement Industry (CEMBUREAU) to the European agency responsible for setting BAT. The industry document also conferred BAT status on SNCR for "new plants, major upgrades, existing plants and plant rehabilitations."

Dr. Xeller alluded to the success at Heidelberger Zement with the hope that "the success achieved should not result in further lowering of the limit values." The Heidelberger kiln is at the Leimen facility where a kiln controlled by SNCR achieves approximately 1.3 lb/ton of clinker per the company's annual report. For reference, Heidelberger announced in the Year 2000 Annual Report that: "In Kiefersfelden, Germany, a further cement plant was equipped with an installation to reduce nitrogen oxide emissions by SNCR."

According to Page 42 of the BACT update, Dr. Xeller's 1998 recommendations alluded to problems at Slite, Sweden where "Parallel operation of staged combustion and SNCR led to operational difficulties." It is noted, however, that according to the 1998 SCANCEM report: "Systems for reducing nitrogen oxides were placed in operation in Slite and Skovde earlier during the year. The goal to reduce emissions by 80 percent was achieved." SCANCEM operates Slite and is a subsidiary of Heidelberger Cement.

Dr. Xeller's paper also discusses the development of the German standard for new cement plants. The requirement was based on the committee report under the chairmanship of Professor Putz from the government of North Rhine-Westphalia. According to Dr. Xeller, "On the basis of the objective report by the experts and representatives of the cement industry it was made known in April 1997, about a year after the hearing, that: using the abatement techniques named in the report by the Federal Department of the Environment of February 1997 it is possible to comply with an emission limit of 0.5 g NO_X/m^3 in new plants as daily averages calculated as NO_2 and relative to an oxygen content of 10%." The German Government has since promulgated the value of 0.5 g/m3, possibly with a tighter averaging time. It equates to approximately 2.3 lb/ton of clinker.

Dr. Xeller's concerns had more to do with the possibility that the future European standard might be more stringent than the German standard. In fact the European standard was published in 2001 and proposed a range of 200 – 500 mg NO_X/m^3 (0.9 – 2.3 lb NO_X/ton). The biggest concern now seems to be the prospect of SCR now being tested at a commercial application in Solnhofen Germany to achieve even lower values.

The point is that by now over 20 SNCR installations exist in Europe for a wide variety of configurations. These projects were required despite initial opposition by parts of the industry in Europe. The objections are still in the recent record including papers, presentations, and other documents. Many of these projects have inherently more difficult raw materials to contend with than Florida limestone, not to mention the added costs of retrofits.

9. "Equivalency" of 2.8 lb NO_X/ton in Florida to 2.5 lb/ton in California. On Page 18, the following statement was made: "FDEP, in previous cement kiln BACT reviews, has stated that a NO_X emission value of 2.8 lb NO_X/ton clinker at a Florida kiln is equivalent to 2.5 lb NO_X/ton clinker at other facilities."

   The reference given (footnote No. 6) was reviewed and reads as follows. "In its previous BACT determinations for Florida Rock Industries and Florida Crushed Stone, the Department determined that this value is equal to 2.8 lb/ton clinker when corrected for the additional heat requirement necessary to process the higher moisture limestone mined in Florida."

   The comparisons made by the Department in 1995 were with the RMC Lonestar Cement kiln built in Davenport, California over twenty years ago. Subsequent updates were given by the permit engineer in the June 2001 document referred to by RTP, Associates as footnote No. 11. Reference 11 includes the following statement:

"It is worth noting at this point that according to an article published in 1998, the "model" RMC Lone Star Kiln exhibited further NO_X emission reductions to a "long-term" range of 325 to 390 mg/m^3 at 10 percent excess air during tests associated with conversion to a Low NO_X calciner. These values represent NO_X emissions less than 2 lb/ton of clinker."

The point is that the RMC Lonestar Davenport kiln achieved the 2.5 lb/ton clinker value before the existence of "intelligent" process control software, the latest versions of indirect-fire multi-channel kiln burners, multi-stage combustion, or SNCR. Additionally, the kiln has a significant bypass that would indicate an expectation of higher emissions for which no correction was made. Basically, the RMC Lonestar kiln, if built today at the same place and using the same raw materials, would be expected to exhibit much lower emissions than the one built in the late 1970's. Therefore the "equivalency" of the determinations in Florida to the old determination in California is only applicable as long as all other factors (including time, available technology, and raw materials) are equal.

This is not to say that the RMC Davenport determination is not meaningful. It was obviously very important at a time when very little information was available and prior to the existence of web-based resources.

10. Tarmac's "defacto" Limit. Page 19 contains a statement suggesting that Tarmac's "defacto" annual NO_X limit of 2.38 lb NO_X/ton clinker is not enforceable. The annual cap of 1953 TPY is rolled monthly and is enforceable. Another important fact is that both Polysius and F.L. Smidth/Fuller provided written commitments to meet an annualized emission rate of 2.38 lb/ton of clinker. This was the only case where the commitments of the kiln providers were actually provided to the permitting authority (Miami-Dade DERM).

    Please provide the written guarantees or commitments for NO_X control provided by Polysius for FCS Kiln II. (Rule 62-070, F.A.C.)

11. Time to Achieve Compliance. With the information collected by Polysius on the Florida Rock conversion to the PREPOL MSC, the Department does not believe 18 months are needed to demonstrate compliance with the proposed NO_X limit. It was found that much lower values were realized as soon as the conversion was completed. Please provide the rationale for the 18 months and describe the steps that will be undertaken during the time requested.

12. Stringency of Standard. Provide the rationale for FCS/Rinker's contention that 2.8 lbs NO_X/ton clinker is more stringent than the range of lower values (2.3 - 2.48 lbs NO_X/ ton clinker) on an annual average basis. (Rule 62-212.400, F.A.C)

13. VOC Emission Limit. Provide reasonable assurance such as a manufacturer's guarantee or details regarding raw materials specifications (e.g. mill scale) that emissions of VOC will be 0.085 lb/ton of clinker. It is noted that emissions from Florida Rock and Rinker Miami were greater than this value during compliance testing. The Department intends to require continuous monitoring for VOC. (Rule 62-4.070, F.A.C.)

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. Please note that per Rule 62-4.055(1): *"The applicant shall have ninety days after the Department mails a timely request for additional information to submit that information to the Department.......... Failure of an applicant to provide the timely requested information by the applicable date **shall** result in denial of the application."*

If you have any questions regarding this matter, please call John Reynolds at 850/921-9530.

Sincerely,

A. A. Linero, P.E. Administrator
New Source Review Section

Cc: Mike Vardeman, Rinker
Paul Neil, P.E., RTP Associates
Don Elias, RTP Associates
Jerry Kissel, DEP SWD
Gregg Worley, EPA Region IV
Bunyak, NPS

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1. Article Addressed to:

J. Scott Benyon, Vice President
Rinker Materials Corporation
1501 Belvedere Road
West Palm Beach, FL 33406

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FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of
Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

February 8, 2002

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. J. Scott Benyon, Vice President
Rinker Materials Corporation
1501 Belvedere Road
West Palm Beach, Florida 33406

Re: DEP File No. AC27-274892B (PSD-FL-227B)
Kiln No. 2 – Rinker/Florida Crushed Stone, Hernando Count

Dear Mr. Benyon:

The Department received your request dated January 10, 2002 to extend the expiration date of the construction permit from January 31, 2002 to July 31, 2002 while reviewing a request to further extend the permit until January 31, 2005. On January 28 we received an update on the Best Available Control Technology (BACT) from your consultant, RTP Associates. We are presently reviewing that submittal and will provide you with additional comments in approximately two weeks.

As discussed with your representatives at the meeting of January 15, the permit is extended while we consider the request. The basis is Rule 62-4.080(3), which states, "Upon timely submittal of a request for extension, unless the permit automatically expires by statute or rule, the permit will remain in effect until final agency action is taken on the request". We will focus only on the request to extend the permit until January 31, 2005.

Aside from the BACT update, the following information is required in order to consider the extension request:

1. Because the construction schedule has been deferred by several years, a detailed schedule for the construction of the Kiln No. 2 is required. The basis is Rule 62-212.400(h)2., F.A.C., under "Permit Application Information Required."
2. A detailed description of the emissions reduction system proposed by Rinker as BACT. For the purposes of this project, that means at least the type of kiln burner, the configuration of the calciner, intelligent process control software, add-on controls, etc. These items are readily available from potential bidders such as Polysius, KHD Humboldt-Wedag, and F. L. Smidth. The basis for the request is Rule 62-212.400(h)3., F.A.C. It is also needed in accordance with Rule 62-4.080(3), F.A.C. to provide "reasonable assurance that, upon completion, the extended permit will comply with the standards and conditions required by applicable regulation".

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. Please note that per Rule 62-4.055(1): *"The applicant shall have ninety days after the Department mails a timely request for additional information to submit that information to the Department.......... Failure of an applicant to provide the timely requested information by the applicable date **shall** result in denial of the application."*

If you have any questions regarding this matter, please call me at 850/921-9523.

Sincerely,

[signature] 2/8

A. A. Linero, P.E. Administrator
New Source Review Section

Cc: Mike Vardeman, Rinker
Paul Neil, P.E., RTP Associates
Don Elias, RTP Associates
Jerry Kissel, DEP SWD
Gregg Worley, EPA Region IV

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1. Article Addressed to:

Mr. J. Scott Benyon
Vice President
Rinker Materials Corporation
1501 Belvedere Road
West Palm Beach, FL 33406

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Department of
Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

February 8, 2002

CERTIFIED MAIL - Return Receipt Requested

Mr. Gregg Worley, Chief
Air, Radiation Technology Branch
Preconstruction/HAP Section
U.S. EPA, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Re: Rinker/Florida Crushed Stone, Brooksville, Florida
DEP File No. 0530021-008-AC, PSD-FL-227(B)

Dear Mr. Worley:

We transmitted to Mr. Jim Little via electronic mail, a request for extension and a BACT update proposal submitted by Rinker for Kiln No. 2 at its Florida Crushed Stone (FCS) facility in Brooksville, Hernando County, Florida. The Department issued the original construction permit for Kiln No. 2 in late 1995 for a "preheater" kiln (PSD-FL-227). A permit for an alternative "preheater/calciner" kiln was issued in early 1997 with a permit expiration date of January 31, 2002.

Rinker requests extension of the permit until January 2005 and believes it has demonstrated the adequacy of the original BACT determination. We request your review and comments on their update. The original BACT determination was as follows:

- **PM/PM_{10}**: 0.3 lbs/ton of clinker production (~ 0.2 lb/ton kiln feed). Compare with NSPS requirement of 0.3 lb/ton of kiln feed plus 0.1 lb/ton of kiln feed from clinker cooler.
- **SO_2**: 0.23 lbs/ton of clinker production. (Same as original determination)
- **NO_X**: 2.8 lbs/ton of clinker production. (24-hour basis. Same as original)
- **CO**: 2.0 lbs/ton of clinker production. (Same as original)
- **VOC**: 0.085 lbs/ton of clinker production. (Same as original)

Please provide any comments to my attention by February 25. If you have any questions, please contact either John Reynolds (BACT analysis) at 850/921-9530 or the permit engineer, Greg DeAngelo, at 850/921-9506.

Sincerely,

A A Linero 2/8

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/gpd

Enclosures (transmitted by e-mail)

Cc: John Bunyak, NPS
Dawn Durham, Hernando County
Jerry Kissel, DEP SWD

Rinker
MATERIALS™

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JAN 11 2002
BUREAU OF AIR REGULATION

January 10, 2002

Mr. Al Linero
Florida Department of Environmental Protection
Bureau of Air Regulation
111 South Magnolia, Suite 4
Tallahassee, FL 32301

Re: Florida Crushed Stone - kiln2 Permit AC27-274892 (A) and PSD-FL-227 (A)

Dear Mr. Linero:

As discussed previously with the Department, Rinker Materials is requesting an extension until January 30, 2005 of their permit to construct kiln2. At this time, after an extensive effort costing over $100,000, we have prepared updated BACT analyses that incorporate the latest data from the most recent 38 permits for plants operating in the United States. European experience is also discussed. Due to the short time before the expiration of the current permit, we are asking for a 6 month extension (or whatever is appropriate) to allow the Department to review and finalize the 3 year extension.

We are currently scheduled to meet with you at 1:30pm on January 15, 2002 at your offices to discuss this issue further. We appreciate your consideration and look forward to meeting with you at that time.

Should you have any questions prior to the meeting, please feel free to contact either Donald F. Elias of RTP Environmental Associates, Inc. at 732-968-9600 or Mike Vardeman at 305-229-2955.

Sincerely,

RINKER MATERIALS CORPORATION

J. Scott Benyon
Vice President

cc: M.Vardeman/ D. Elias / D. Dee / Project File: FCS4

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JAN 28 2002

BUREAU OF AIR REGULATION

Via Federal Express

January 25, 2002

Mr. Al Linero
Florida Department of Environmental Protection
Bureau of Air Regulation
111 South Magnolia, Suite 4
Tallahassee, FL 32301

Re: Florida Crushed Stone – Kiln #2 Permit AC27-274892 (A) and PSD-FL-227 (A)

Dear Mr. Linero:

I have enclosed a copy of the updated BACT analyses for the above referenced permit. As requested in our letter of January 10, 2002 and discussed in our meeting on January 15, 2002, it is our understanding that this submission begins an automatic extension of our current permit, and no further action is necessary on Rinker Materials part to continue the existing permit past the January 30, 2002 expiration date. If this is not the case, please notify either Mike Vardeman at 305-229-2955 or myself at the above telephone number as soon as possible.

We appreciate the Department's assistance in this matter. As you review the attached documents, should you have any questions please feel free to contact Mike Vardeman of Rinker Materials, Michael Hober or myself at RTP Environmental Associates, Inc.

Sincerely,

RTP ENVIRONMENTAL ASSOCIATES, INC.®

Donald F. Elias

Donald F. Elias
Principal

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JAN 28 2002

BUREAU OF AIR REGULATION

cc: G. Deangelo / M. Vardeman / D. Dee / M. Hober / S. Heath / Project File: FCS4

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JOHN BUNYAK
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Mr. Gregg Worley
Air Planning Branch
US EPA - Region 4
61 Forsyth St.
Atlanta, GA 30303

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Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

May 17, 2001

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Don Elias, Prinicpal
RTP Environmental Associates
239 U.S. Highway 22 East
Green Brook, New Jersey 08812

Re: Florida Crushed Stone Kiln 2
Permit AC27-274892(A)

Dear Mr. Elias:

This is in reply to your memoranda dated January 29 and May 8, 2001 regarding the approach to a re-determination of the Best Applicable Control Technology (BACT) applicable to the planned facility.

I would refer you to the Portland Cement Association to get a list of projects announced in recent years and then to the particular states that reviewed the projects. I refer you to the European Integrated Pollution Prevention and Control Bureau and their report "Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries". The document is available at eippcb.jrc.es/

The European IPPC report has important information on nitrogen oxides emission control indicating that selective non-catalytic reduction (SNCR) had been installed at 15 plants in Europe by the year 2000 and that SCR was installed at a new plant in Germany. The German national standard (similar to an NSPS) is 500 mg/m^3 (roughly 2.3 lb/ton) on a short-term averaging basis. Examples of facilities where the target value is roughly 1 pound per ton of clinker are mentioned.

The document is also a good source of information regarding dust control. It indicates that much lower emissions can be realized than the limits included in typical permits. The report does not thoroughly address CO or VOC, but does highlight possible introduction of oily raw materials directly into the kiln to avoid evolution of VOC.

The permit issued to TXI at Midlothian is important because it required the first regenerative thermal oxidation system at a cement plant for CO and VOC. The resulting emission limits for these pollutants are probably the lowest in the country. The permit issued to Holnam at Midlothian is also important because it requires achievement of a NO_X emissions cap of 1540 tons per year. This equates to a long-term NO_X emission limit of 1.2 lb/ton of clinker. This is the lowest value in a permit in the United States.

Despite all of the references to sulfur dioxide from cement plants in the literature, it appears that this is not as important for cement plants in Florida. Therefore you do not need to conduct a very exhaustive review on this pollutant. The preheater/calciner design will insure that sufficient scrubbing of kiln gases by finely divided lime occurs prior to exhaust. Since the raw materials do not contain pyrites, the phenomenon of roasting in the preheater section to yield SO_2 will not occur to an appreciable degree.

I note that you included an existing preheater kiln in Siggenthal, Switzerland. The mentioned plant burns some dried sewage sludge in the main kiln burner. The active coke filter effectively removes volatile metals and cleans up remaining SO_2 and ammonia slip (from SNCR). These species are bled off via recycling of cement kiln dust to product rather than to the pyroprocess. Note that the plant has been in existence for quite a number of years and does not reflect what a new plant would need to achieve for NO_X control.

Along the same limes, I refer you to Jura Cement in Wildegg, Switzerland that has a preheater/calciner kiln built in the mid-1980's. This plant has a multi-stage combustion calciner and SNCR for NO_X control. It also has a tire gasification unit. Again, the limits may not reflect what would be required of a new plant in Switzerland. It is instructive in that it demonstrates that MSC can be combined with SNCR.

I recommend removal of your Tarmac references as they are for wet process kilns that will be replaced with a single preheater/calciner kiln. The new kiln will meet a limit of 2.38 lb/ton of clinker to avoid triggering PSD. I recommend inclusion of the Lonestar Davenport Plant in Santa Cruz California in your review. This preheater/calciner plant was permitted to achieve 2.5 lb/ton of clinker on a 24-hour basis at least 20 years ago. The plant met the objective prior to the existence of MSC technology, more advanced kiln burners, or SNCR.

Finally, I recommend that you also review the California Cement Colton Plant. This old "long kiln dry process" plant was recently able to significantly reduce NO_X emissions from roughly 6 lb/ton of clinker to less than 3 lb/ton of clinker. It may shed light on how the choice of kiln burner technology may contribute to reduction of NO_X.

We will conduct a proper review of the proposal when we receive it. This letter addresses only the obvious items and would require a much more exhaustive review to actually opine on what has been omitted in your initial compilation. If you have any questions regarding this matter, please call me at 850/921-9523.

Sincerely,

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/al

Cc: Mike Vardeman, Rinker (FCS)

RTP ENVIRONMENTAL ASSOCIATES INC.®

MEMORANDUM

RECEIVED

MAY 14 2001

BUREAU OF AIR REGULATION

TO: John Reynolds

FROM: Donald F. Elias SPH, for

DATE: May 8, 2001

SUBJECT: Facilities List for BACT Update for Florida Crushed Stone

RTP Environmental Associates, Inc. (RTP) has compiled a preliminary list of facilities for inclusion in the updated BACT review for the Florida Crushed Stone facility in Brooksville, FL. The sites included on the attached list comprise the most recent permitting actions and most stringent emissions limitations we have been able to identify to date. We are in the process of obtaining and verifying permit limits and test data for these facilities. Please review the attached list. Please notify us if we have omitted a facility that should be evaluated.

cc: A. Linero/M. Vardeman/W. Corbin/M. Hober/S. Heath/Proj. File: FCS4

FAXED

Florida Crushed Stone [Brooksville, FL]
BACT Review – Facility List
Air Emission Limits Information

Company Name & Location	Permit Date	Source Operation	PM Limit	NO_x Limit	SO_2 Limit	CO Limit	VOC Limit	Basis	Comments
Blue Circle [Calera, AL]	10/25/2000	96 tph CL							
California Portland Cement [Mojave, CA]									
National Cement Co. [Lebec, CA]	03/25/1996	1,000,000 tpy CL							
CSR – Rinker [Miami, FL]	10/31/2000 Final Title V	137 tph CL							
Florida Crushed Stone [Brooksville, FL]	02/10/1997	83 tph CL							
Florida Mining & Materials [Brooksville, FL]	02/01/1993 01/13/1995								
Florida Rock [Brooksville, FL]									
Florida Rock Ind. [Newberry, FL]	01/26/2001	95.8 tph CL							
Southdown [Brooksville, FL]	09/2000 Final Title V	90 tph CL							
Suwannee American [Branford, FL]	05/2000	105 tph CL							
Tarmac American Pennsuco [Medley, FL]	10/26/2000 Final Title V	Kiln 2=25 tph CL							
Tarmac American Pennsuco [Medley, FL]	10/26/2000 Final Title V	Kiln 3=87.5 tph CL							
Southdown [Victorville, CA]	6/1999								
Illinois Cement Co. [LaSalle, IL]	04/15/1999								
Lone Star Industries, Inc. [Greencastle, IN]	04/16/1999 01/08/2001	183 tph CL							
Kosmos [Louisville, KY]	04/18/2001	125 tph CL							

Company Name & Location	Permit Date	Source Operation	PM Limit	NO_x Limit	SO_2 Limit	CO Limit	VOC Limit	Basis	Comments
LaFarge Corp. [Sugar Creek, MO]	03/24/1998	1,028,599 tpy CL							
Great Star Cement [Las Vegas, NV]	02/27/1996	1,000,000 tpy CL							
Carolina Cement Co. [Castle Hayne, NC]	06/30/1993 07/22/1994	77.9 tph CL							
Ash Grove [Durkee, OR]	04/01/1998 02/18/1998	113 tph CL							
Puerto Rican Cement Co. [Ponce, PR]	05/06/1998	4,100 tpd CL							
Holnam, Inc. [Midlothian, TX]	06/2000	291.67 tph CL							
TXI Operations LP [Midlothian, TX]	Title V Not Final Yet †	Kiln 5 2,200,000 tpy CL							
Ash Grove Cement Co. [Nephi, UT]	01/05/2000 Final Title V	170 tph KF							
Holnam, Inc. [Morgan, UT]	05/2001 ‡	2310 tpd CL							
Roanoke Cement [Cloverdale, VA]	05/07/1997	131 tph CL							
Ash Grove Cement Co. [Seattle, WA]	08/01/1991								
Holnam, Inc. [Seattle, WA]	08/01/1991 06/17/1993								
Mountain Cement [Laramie, WY]	01/31/1996 05/12/1999	45.3 tph coal 29 tph CL							
HCB (Holderbank) [Siggenthal, Switzerland]									

Note: CL = Clinker KF = Kiln Feed tpy = tons per year tpd = tons per day tph = tons per hour

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

‡ Holnam Inc. [Morgan, UT] - Intent to Approve PSD Major Modification, dated March 28, 2001. Approval expected May 2, 2001.

MEMORANDUM

TO: Al Linero

FROM: Donald F. Elias

DATE: January 29, 2001

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FEB 05 2001
BUREAU OF AIR REGULATION

SUBJECT: BACT for Florida Crushed Stone Kiln No. 2

We are in the process of updating the Best Available Control Technology Review for the Kiln No. 2 permit for CSR Rinker. It is our understanding that CSR Rinker has met with FDEP and has requested to extend the Construction Permit until 2005. The following steps are proposed for the BACT analyses:

1) Review the BACT/RACT/LAER Clearinghouse, prepare a list of recent BACT determinations for similar sources, and determine the current status of these sources with various state agencies and/or owners-operators.
2) Review the BACT list with the Department, document any additional recent BACT determinations, and determine the status of these additional sources with various state agencies and/or owners-operators.
3) Compile and review BACT determinations by the Department for similar sources.
4) Review available technical publications, including the two listed by the Department, as well as other peer-reviewed articles on available control technologies for cement kilns.
5) Complete the top-down BACT analyses and prepare a BACT determination based on available materials for PSD-significant pollutants, giving particular emphasis to operating facilities (as compared to permit limits for facilities which are not yet constructed and/or operating).

At this time, I would appreciate a list of any additional facilities or permits that you are aware of that are not contained in the BACT/RACT/LAER Clearinghouse. We will be in contact with you through our review process to ensure that all current facilities are included.

Should you have any comments on the above scope, or additional information that you feel would be pertinent for the BACT, please feel free to contact either Bill Corbin or myself at (732) 968-9600.

cc: M. Vardeman
W. Corbin
Project File: FCS3