BEST AVAILABLE COPY

5/28/80

UN CLUB ROAD
BOX 3858
ST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR

JACOB D. VARN
SECRETARY

WARREN G. STRAHM
SUBDISTRICT MANAGER

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTH FLORIDA SUBDISTRICT

APIS # 50/13/0020/18,01,04 & 06
Class A; 3,4,5, & 6

APPLICANT: Mr. Albert W. Townsend
Coordinator of Ecological Planning
Lonestar Florida/Pennsuco, Inc.
Post Office Box 2035, P.V.S.
Hialeah, Florida, 33012

PERMIT/CERTIFICATION NO. AC 13-27742

COUNTY: Dade

PROJECT: Lonestar Florida/ Pennsuco, Inc.

Coal Handling/Converson for Kilns 1,2 & 3

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Chapter 17-2, Florida Administrative Code. The above named applicant, hereinafter called Permittee, is hereby authorized to perform the work or operate the facility shown on the approved drawing(s), plans, documents, and specifications attached hereto and made a part hereof and specifically described as follows:

To construct and to modify air pollution sources by installing a 38 ton/hr. coal handling system and making modifications to Kilns 1,2, and 3 in order to be able to utilize coal as a primary fuel source. The coal handling system, operating 24 hrs./day, 7 days/wk., 52 wks./y consists of: A 23 ton/hr. mill with cyclone and 4 baghouses emitting 3.1 lbs./hr. particulate through an emission point 80 feet above ground level (A.G.L.); a 15 ton/hr. mill with cyclone and 3 baghouses emitting 2.1 lbs./hr. particulate through an emission point 80 feet A.G.L.; Feedbin and elevator emitting 0.3 lbs./hr. particulate through a common point 90 feet A.G.L.; and(front ender) hopper and weigh feeders emitting 0.3 lbs./hr. particulate through a common point 68 feet A.G.L. The conversion to coal will result in sulfur dioxide emission increases up to 56.7 lbs./hr. allowable (each) for Kilns 1 and 2 and to 26.3 lbs./hr. allowable for Kiln 3.

In accordance with: Specifications and attachments contained in Application to Construct Air Pollution Sources dated February 8, 1980 and letters dated May 8, 1980 and May 22, 1980 (none are attached).

Located at: 11000 Northwest 121 Street, Hialeah, Dade County, Florida
UTM COORDINATES: Zone 17;562.8 KmE.; 2861.7 KmN.

Serving: A wet process portland cement manufacturer- (SIC# 3241).

Subject to General Conditions 1 through 13 and Specific Conditions 1 through 11.

PERMIT NO.: AC 13-27742 - Lonestar Florida/Pennsuco, Inc.
APPLICANT: Mr. A. W. Townsend, Coordinator of Ecological Planning

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions:, and as such are binding upon the permittee and enforceable pursuant to the authority of Section 403.161(1), Florida Statutes. Permittee is hereby placed on notice that the department will review this permit periodically and may initiate court action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations indicated in the attached drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit shall constitute grounds for revocation and enforcement action by the department.

3. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information: (a) a description of and cause of non-compliance; and (b) the period of non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

4. As provided in subsection 403.087(6), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

5. This permit is required to be posted in a conspicuous location at the work site or source during the entire period of construction or operation.

6. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Section 403.111, F.S.

7. In the case of an operation permit, permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

8. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant, or aquatic life or property and penalities therefore caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, except where specifically authorized by an order from the department granting a variance or exception from department rules or state statutes.

9. This permit is not transferable. Upon sale or legal transfer of the property or facility covered by this permit, the permittee shall notify the department within thirty (30) days. The new owner must apply for a permit transfer within thirty (30) days. The permittee shall be liable for any non-compliance of the permitted source until the transferee applies for and receives a transfer of permit.

10. The permittee, by acceptance of this permit, specifically agrees to allow access to permitted source at reasonable times by department personnel presenting credentials for the purposes of inspection and testing to determine compliance with this permit and department rules.

11. This permit does not indicate a waiver of or approval of any other department permit that may be required for other aspects of the total project.

12. This permit conveys no title to land or water, nor constitutes state recognition or acknowledgement of title, and does not constitute authority for the reclamation of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

13. This permit also constitutes:

[X] Determination of Best Available Control Technology (BACT)
[X] Determination of Prevention of Significant Deterioration (PSD)
[ ] Certification of Compliance with State Water Quality Standards (Section 401, PL 92-500)

PERMIT NO.: AC-13-27742 - Lonestar Florida/Pennsuco, Inc.
APPLICANT: A.W. Townsend, Coordinator of Ecological Planning

SPECIFIC CONDITIONS:

1. Application for permit to operate to be submitted at least sixty (60) days prior to the expiration date of this permit.

2. The applicant shall retain the engineer-of-record for inspection of the construction of the plant. The form DER 17-1.122(20) (Certificate of Completion of Construction) satisfactorily completed with a $20.00 fee, may be submitted in lieu of an application for an operation permit.

3. The ability to secure low sulfur coal (2 percent sulfur max.) in needed quantities shall be verified. Such verification shall be submitted along with a sulfur analysis of the coal fired in each kiln during sulfur dioxide emission testing to the Department of Environmental Regulation, South Florida Subdistrict Office and to Metropolitan Dade County Environmental Resources Management no later than twenty (20) days after completion of tests.

SOV

4. Kilns 1, 2 and 3 shall each be tested for nitrogen oxides, sulfur dioxide and particulate emissions in accordance with the Code of Federal Regulations (CFR) number 40 CFR 60 Appendix A, Methods 1 through 7, prior to application for operation permit. Reports shall be submitted to the Department of Environmental Regulation, South Florida Subdistrict Office and to Metropolitan Dade County Environmental Resources Management no later than twenty (20) days after completion of tests.

Test

5. Kilns 1,2,3 and Coal Handling System emission points shall each be observed for visible emissions in accordance with Code of Federal Regulations (CFR) number 40 CFR 60 Appendix A, Method 9, entitled "Visual Determination of the Opacity of Emissions from Stationary Sources, " prior to application for operation permit. Reports shall be submitted to the Department of Environmental Regulation, South Florida Subdistrict Office and to Metropolitan Dade County Environmental Resources Management no later than twenty (20) days after completion of tests.

VE

6. Emissions must not exceed the Best Available Control Technology determinations approved for this project April 8, 1980:

Particulate from coal handling systems - 0.01 grains/dscf & 5% opacity

SO_2 emission

Sulfur dioxide from Kilns 1 & 2 - 1.42 lb./ton dry feed
Sulfur dioxide from Kiln 3 - 0.19 lb./ton dry feed

7. Testing of emissions must be accomplished at approximately the rates as stated in the permit. Failure to submit the input rates or operation at conditions which do not reflect actual operating conditions may invalidate the data.

PERMIT NO.: AC-13-27742 - Lonestar Florida/Pennsuco, Inc.
APPLICANT: A.W. Townsend, Coordinator of Ecological Planning

SPECIFIC CONDITIONS CONTINUED:

8. Fugitive particulates generated at this site shall be adequately controlled. Fugitive dust to be controlled by dust suppressant(s), or other methods, approved by the Department.

9. There shall be no discharges of liquid effluents or contaminated runoff from the plant site.

10. Emissions reductions referenced in the May 22, 1980 letter incorporated as part of the construction application for this permit, shall be required to be completed prior to issuance of an operation permit for the sources permitted herein.

11. Emission reductions shall be accomplished; under appropriate construction permits, by surrending operation permits, by modifying affected permits and/or by any other method deemed necessary by this Department for adequate documentation.

Expiration Date: May 31, 1982

______ Pages Attached.

Issued this 28TH day of MAY, 1980.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Signature
Warren G. Strahm
Subdistrict Manager

WGS:TAT:mh

DER FORM 17-1.122(63) 4/4 (1/80)

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

BOB GRAHAM
GOVERNOR

JACOB D. VARN
SECRETARY

MEMORANDUM

TO: Ron Fahs, Intergovernmental Coordination

THRU: Bill Thomas

FROM: Carl Bock

DATE: June 19, 1980

SUBJ: Lonestar/Pennsuco Construction Application

The Bureau of Air Quality Management has reviewed your letter of June 11, 1980 concerning Lonestar/Pennsuco Incorporated's intent to apply for an air construct permit. A BACT review was performed on the application on April 7, 1980 (copy attached). The construction permit was issued by the Palm Beach office in April of 1980. The Bureau is in concurrence with the EPA's intent to issue a permit.

CB:caa

State of Florida

DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee	
To:	Loctn.:
To:	Loctn.:
To:	Loctn.:
From:	Date:

TO: Jacob D. Varn

FROM: Steve Smallwood

DATE: April 7, 1980

SUBJECT: BACT Determination - Lonestar Florida/Pennsuco, Inc., Dade County

Facility: A modification to a Portland Cement plant involving a change from oil/gas to coal as the primary fuel. The change will consist of constructing a 38 ton-per-hour coal handling facility to supply three existing cement kilns: Kilns No. 1 and No. 2 each with a raw material input rate of 40 tons per hour, and kiln No. 3 with a raw material input rate of 142 tons per hour. Emissions from the three kilns are controlled by electrostatic precipitators.

Potential emissions of applicable criteria pollutants from use of coal versus use of gas or oil are:

Coal Handling System

Source	Particulate Emission (ton/yr)
23 Ton Mill	13,500
15 Ton Mill	9,000
Feedbin and elevator	1,300
Hopper and weight-feeder	1,300

Cement Kilns

Source	Pollutant Emissions	
Kiln No. 1	Particulate (ton/yr)*	
	Coal Fired	24,966
	Gas Fired	24,966
	Oil Fired	24,966

*See "Cement Kilns", Page 5

	Sulfur Dioxide (ton/yr)	
	Coal Fired	248.4
	Gas fired	19.7
	Oil Fired	198.6
	Nitrogen Oxide (ton/yr)	
	Coal Fired	185.3
	Gas fired	741.3
	Oil Fired	491.0
Kiln No. 2	**As for Kiln No. 1**	
Kiln No. 3	**Particulate** *	
	Coal Fired	87,381
	Gas Fired	87,381
	Oil Fired	87,381
	Sulfur Dioxide (ton/yr)	
	Coal Fired	115.1
	Gas Fired	10.3
	Oil Fired	95.9
	Nitrogen Oxides (ton/yr)	
	Coal Fired	648.7
	Gas Fired	2474.7
	Oil Fired	1638.1

*See "Cement Kilns", Page 5

BACT Requested by the Applicant:

Coal Handling/Pulverizing System

Source	Allowable Particulate Emissions	
	lbs/hr	ton/yr
23 Ton Mill	3.1	13.5
15 Ton Mill	2.1	9.0
Feedbin & Elevator	0.3	1.3
Hopper & Weight Feeder	0.3	1.3

Emissions to be attained with four baghouses each having collection efficiency of 99.9%, and outlet loading of 0.01 grains/dscf.

Cement Kilns

Source	Allowable Sulfur Dioxide Emission lbs/hr	Allowable Sulfur Dioxide Emission ton/yr
Kiln No. 1	56.7	248.4
Kiln No. 2	56.7	248.4
Kiln No. 3	26.3	115.1

Date of Receipt of a Complete Application:

February 8, 1980

Date of Publication in the Florida Administrative Weekly:

February 27, 1980

Date of Publication in A Newspaper of General Circulation:

February 18, 1980, The Miami Herald

Study Group Members:

Willard Hanks, DER Bureau of Air Quality Management, Tallahassee;
John Svec, DER Bureau of Air Quality Management, Tallahassee

Study Group Recommendations:

Coal Handling & Pulverizing Systems

	Allowable Emissions Particulate (lb/hr)	Opacity
23 Ton Mill		
John Svec	3.1	20 percent
Willard Hanks	3.1 (0.01 gr/dscf)	5 percent
15 Ton Mill		
John Svec	2.1	20 percent
Willard Hanks	2.1 (0.01 gr/dscf)	5 percent
Feedbin & Elevator		
John Svec	0.3	20 percent
Willard Hanks	0.34 (0.01 gr/dscf)	5 percent
Hopper & Weight Feeder		
John Svec	0.3	20 percent
Willard Hanks	0.34 (0.01 gr/dscf)	5 percent

Cement Kilns	Allowable Emissions Sulfur Dioxide (lb/hr)
Kiln No. 1	
John Svec	56.7
Willard Hanks	56.7
Kiln No. 2	
John Svec	56.7
Willard Hanks	56.7
Kiln No. 3	
John Svec	26.3
Willard Hanks	26.3

BACT Determination by Florida Department of Environmental Regulation:

Coal Handling & Pulverizing Systems

	Maximum Allowable Particulate Emission
23 Ton Mill	3.1 lb/hr (0.01 grains/dscf), and 5% opacity
15 Ton Mill	2.1 lb/hr (0.01 grains/dscf), and 5% opacity
Feedbin & Elevator	0.3 lb/hr (0.01 grains/dscf), and 5% opacity
Hopper & Weight Feeder	0.3 lb/hr (0.01 grains/dscf), and 5% opacity

Cement Kilns

Maximum Allowable Emissions

Sulfur Dioxide

Kiln No. 1	1.42 lb/ton dry feed; not to exceed 56.7 lb/hr.
Kiln No. 2	1.42 lb/ton dry feed; not to exceed 56.7 lb/hr.
Kiln No. 3	0.19 lb/ton dry feed; not to exceed 26.3 lb/hr.

Justification of DER Determination:

Coal Handling & Pulverizing System

Addition of the coal handling and pulverizing system constitutes a modification of a major emitting facility. Actual emissions from the system will result in 25.1 tons per year above the baseline; potential emissions will exceed 250 tons per year. The facility is thus subject to Chapter 17-2.04(6) FAC, Prevention of Significant Deterioration (PSD) regulation and to Chapter 17-2.03 FAC, Best Available Control Technology (BACT) regulation.

The applicant proposed four bag-collectors with emissions of 0.01 grains/dscf and an opacity limitation of 20 percent to meet the BACT regulation requirements. The proposed control equipment and particulate emission limitation was found representative of BACT. However, the applicant's proposed 20% opacity was considered excessive relative to the 0.01 grains particulate/dscf emission standard. Five percent opacity was selected as BACT because it corresponds realistically with a 0.01 grains/dscf emission standard.

Cement Kilns

The switch from oil to coal will result in increase of emissions for one pollutant: sulfur dioxide. Although coal is considered a "dirtier" fuel than oil or gas because of its higher ash content, it should be noted that potential emissions of particulate from a cement kiln are not strongly dependent on the type of fuel burned. This is due to two factors:

(1) When the kilns burn oil or gas, ash must be added as one of the raw materials. With the coal conversion, the ash added to the system will be reduced or eliminated since it will be available directly from the coal combustion.

(2) Ash whether from combustion or raw material is a minor contributor when compared to total process materials.

Applicant has committed to no increase in actual particulate emissions, a reasonable committment in view of (1) and (2) above. Since there will be no increase in actual particulate emissions, this facility is not subject to BACT for particulate for the modifications to the kilns.

With respect to nitrogen oxides, the applicant has provided adequate data (see attachment A) showing that, in the Portland Cement industry, burning coal produces less NO_x emissions than burning oil or gas.

The only pollutant emission from the kilns subject to the Best Available Control Technology regulation is sulfur dioxide: actual sulfur dioxide emissions will increase by 119 tons per year over the baseline. The applicant proposes to control sulfur dioxide limiting the sulfur content in the coal to 2%. In addition over 90 percent of the sulfur dioxide resulting from coal combustion is expected to be captured by the limestone in the kilns; the applicant stack test reports document this removal efficiency resulting from reaction of sulfur dioxide with the limestone in the kiln. To achieve greater removal of sulfur dioxide would require additional control equipment. The cost of installing and operating this equipment cannot be justified economically by the minimal improvement on ambient air impact. Therefore, the proposed emission level was considered acceptable as BACT. There are no applicable federal NSPS standards.

Details of the Analysis May be Obtained by Contacting:

Victoria Martinez, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Managment
2600 Blair Stone Road
Twin Towers Office Building
Tallahassee, Florida 32301

Recommendation from: Bureau of Air Quality Management

By: Steve Smallwood
Steve Smallwood

Date: April 8, 1980

Approved by: Victoria [illegible] /for
Jacob D. Varn

DATE: April 8, 1980

SS:caa

Attachment

ATTACHMENT A
BACT APPLICATIONS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

0250020-NA-AC
PSD-FL-050
6/2/1980

REF: 4AH-AP

Mr. Albert W. Townsend
Coordinator of Ecological Planning
Lonestar Florida/Pennsuco, Inc.
P. O. Box 122035
Palm Village Station
Hialeah, Florida 33012

Re: PSD-FL-050 Fuel Conversion on 3 Kilns

Dear Mr. Townsend:

Review of your February 11, 1980 application to construct a coal handling facility and to convert three existing kilns to coal firing (PSD-FL-050) near Hialeah, Florida has been completed. The construction is subject to rules for the Prevention of Significant Deterioration (PSD) of air quality, contained in 40 CFR 52.21.

It has been determined that the modification, as described in the application meets all applicable requirements of the PSD regulations, subject to the conditions in the conclusion section to the Final Determination (enclosed). EPA has performed the Preliminary Determination concerning the proposed modification, and published a request for public comment on May 29, 1980.

Only one comment was received, that being from your company. In response to that comment, condition 11 has been reworded to clarify the exact definition of what averages constitute a compliance performance test for each of the various pollutants.

Authority to construct a modification to a Stationary Source is hereby issued, subject to the conditions in the Final Determination. This Authority to Construct is based solely on the requirements of 40 CFR 52.21, the Federal regulations governing significant deterioration of air quality. It does not apply to other permits issued by this agency or permits issued by other agencies.

Information regarding EPA permitting requirements can be provided if you contact Mr. Joe Franzmathes, Director, Office of Program Integration and Operations, at (404) 881-3476. Additionally, construction covered by this Authority to Construct must be initiated within 18 months from the receipt of this letter.

The United States Court of Appeals for the D.C. Circuit issued a ruling (December 14, 1979) in the case of Alabama Power Co. vs. Douglas H. Costle (78-1006 and consolidated cases) which has significant impact on the EPA Prevention of Significant Deterioration (PSD) program and permits issued thereunder. The ruling will require modification of the PSD regulations and could affect permits issued under the existing program. You are hereby advised that this permit may be subject to reevaluation. Please be advised that a violation of any condition issued as part of this approval, as well as any construction which proceeds in material variance with information submitted in your application will be subject to enforcement action.

Authority to Construct will take effect on the date of this letter. The complete analysis which justifies this approval has been fully documented for future reference, if necessary. Any questions concerning this approval may be directed to Kent Williams, Chief, New Source Review Section (404) 881-4552.

Sincerely yours,

Thomas W. Devine
Director
Air and Hazardous Materials Division

TWD:JWP:clu

Enclosure

cc: S. Smallwood
Florida Department of Environmental Regulation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

MAY 30 1980

REF: 4AH-AF

Mr. Joe Allen
Lonestar Florida/Pennsuco, Inc.
411 West Putnam Avenue
Greenwich, Connecticut 06830

Re: Proposed Fuel Conversion
Kilns and Addition of Coal
Handling System
PSD-FL-050

Dear Mr. Allen:

EPA Region IV has reviewed your application to convert the type of fuel used in the kilns at your plant under the provisions of Prevention of Significant Deterioration Regulations (40 CFR 52.21) and has made a preliminary determination of approval with conditions. Please find enclosed two copies of the Preliminary Determination.

A public notice will be run in the near future in a local newspaper, the Miami Herald. A copy of the summary and your application will be open to the public review and comment for a period of 30 days. The public can also request a public hearing to review and discuss specific issues. At the end of this period, EPA will evaluate the comments received and make a final determination regarding the proposed construction.

Should you have questions regarding this information, please contact Mr. Kent Williams of my staff at 404/881-4552 or Mr. Jeffrey L. Shumaker of TRW Inc. at 919/541-9100. TRW is under contract to EPA and its personnel are acting as authorized representatives of the Agency in providing aid to the Region IV PSD program.

Sincerely yours,

Tommie A. Gibbs, Chief
Air Facilities Branch

TAG:JLS:jt

Enclosure

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO.

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION) KAHEL	STARNES	INITIAL / DATE
2. BLOMMEL	THOMAS	INITIAL / DATE
3. BARKER	GEORGE	INITIAL / DATE
4. Hodge		INITIAL / DATE

REMARKS:

1) Advise our review Engineer / Thomas

2) File: Lonestar

INFORMATION
- REVIEW & RETURN
- REVIEW & FILE
- INITIAL & FORWARD

DISPOSITION
- REVIEW & RESPOND
- PREPARE RESPONSE
- FOR MY SIGNATURE
- FOR YOUR SIGNATURE
- LET'S DISCUSS
- SET UP MEETING
- INVESTIGATE & REPT
- INITIAL & FORWARD
- DISTRIBUTE
- CONCURRENCE
- FOR PROCESSING
- INITIAL & RETURN

FROM: STEVE SMALLWOOD Steve

DATE 6-9-80

PHONE

PM
5-8-89
atlanta, GA

file copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4APT-APB-cdw

MAY 8 1989

RECEIVED

MAY 11 1989

DER-BAQM

Mr. Scott Quaas
Environmental Specialist
Tarmac Florida, Inc.
P.O. Box 2998
Hialeah, Florida 33012

Re: Lonestar/Tarmac, Florida Cement, Inc.
Pennsuco Cement Production Plant (PSD-FL-050)

Dear Mr. Quaas:

This is to confirm the recent telephone conversation with Mark Armentrout of my staff regarding your March 22, 1989, letter to me which contained emission test data for Pennsuco Cement Plant's No. 3 kiln.

As you recall, Mr. Armentrout reiterated that PSD regulations require that net emission increases (or decreases) be determined by obtaining the difference in new allowable emission rates and either old actual emissions or old allowable emissions, whichever is lower. In this case, the current allowable emission rates and the old actual emission data contained in your March 22 were used. According to our calculations, particulate matter (PM), sulfur dioxide (SO_2), and nitrogen oxides (NO_x) will be subject to a PSD review.

EPA will consider modifying the permit to allow burning of petroleum contaminated soil if the current allowable emission rates for these pollutants are lowered such that the significance levels are not exceeded, thus avoiding a PSD review. However, it appears that a PSD review will be required for benzene, since it is unlikely that the kiln will be capable of destructing 100 percent of the benzene contained in the petroleum contaminated soil.

By copy of this letter we are notifying the Florida Department of Environmental Regulation of this matter.

If you have any comments or questions, please feel free to contact me or Mr. Armentrout of my staff at (404) 347-2864.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

cc: Mr. C. H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

copied: L. Brooks, SE Dist
P. Wong, DERM
CHF/BT

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

AIR-4

ATLANTA GA. MAY - 8 '89
U.S. OFFICIAL MAIL
PENALTY FOR PRIVATE USE $300
U.S. POSTAGE
0.25
P.B. METER 6250488

Mr. C.H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Dept. of Environ. Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

20

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.
1. ☒ Show to whom delivered, date, and addressee's address. (Extra charge)
2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to: Mr. Albert W. Townsend Group Manager, Real Estate & Environmental Tarmac Florida, Inc. 455 Fairway Drive Hillsboro Executive Center North Deerfield Beach, FL 33441	4. Article Number P 702 175 483 Type of Service: ☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature – Addressee X	8. Addressee's Address (ONLY if requested and fee paid) DEERFIELD ... 1988
6. Signature – Agent X Julie Luff	
7. Date of Delivery 05-18-88	

PS Form 3811, Mar. 1987 ★ U.S.G.P.O. 1987-178-268 DOMESTIC RETURN RECEIPT

P 702 175 483

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Albert W. Townsend, Group Mgr. ~~Tarmac Florida, Inc.~~	
Street and No. 455 Fairway Drive	
P.O., State and ZIP Code Hillsboro Executive Ctr. N. Deerfield Beach, FL 33441	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 05/13/88 Permit: Kiln No. 3 Fuel Mod.	

PS Form 3800, June 1985

PM
5-8-89
Atlanta, GA

BEST AVAILABLE COPY

file copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

RECEIVED

MAY 11 1989

DER - BAQM

4APT-APB-cdw
MAY 8 1989

Mr. Scott Quaas
Environmental Specialist
Tarmac Florida, Inc.
P.O. Box 2998
Hialeah, Florida 33012

Re: Lonestar/Tarmac, Florida Cement, Inc.
Pennsuco Cement Production Plant (PSD-FL-050)

Dear Mr. Quaas:

This is to confirm the recent telephone conversation with Mark Armentrout of my staff regarding your March 22, 1989, letter to me which contained emission test data for Pennsuco Cement Plant's No. 3 kiln.

As you recall, Mr. Armentrout reiterated that PSD regulations require that net emission increases (or decreases) be determined by obtaining the difference in new allowable emission rates and either old actual emissions or old allowable emissions, whichever is lower. In this case, the current allowable emission rates and the old actual emission data contained in your March 22 were used. According to our calculations, particulate matter (PM), sulfur dioxide (SO_2), and nitrogen oxides (NO_x) will be subject to a PSD review.

EPA will consider modifying the permit to allow burning of petroleum contaminated soil if the current allowable emission rates for these pollutants are lowered such that the significance levels are not exceeded, thus avoiding a PSD review. However, it appears that a PSD review will be required for benzene, since it is unlikely that the kiln will be capable of destructing 100 percent of the benzene contained in the petroleum contaminated soil.

By copy of this letter we are notifying the Florida Department of Environmental Regulation of this matter.

If you have any comments or questions, please feel free to contact me or Mr. Armentrout of my staff at (404) 347-2864.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

cc: Mr. C. H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

[illegible] DERM
[illegible]

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

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Mr. C.H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Dept. of Environ. Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

TARMAC FLORIDA, INC.

P.O. Box 2998
Hialeah, Florida 33012

March 22, 1989

RECEIVED
APR 3 1989
DER - BAQM

Mr. Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

RE: Tarmac Florida, Inc.
Pennsuco Cement Production Plant
PSD-FL-050

Dear Mr. Miller:

I have reviewed your January 19, 1989 letter addressed to Ms. Stephanie Brooks of the Florida Department of Environmental Regulation (FDER) regarding the proposed burning of petroleum-contaminated soils at the referenced facility. Tarmac has requested the FDER to modify our State operation permit to allow the burning of petroleum contaminated soils in Kiln No. 3 at the production plant. While all correspondence to the FDER regarding the proposed trial burns of the soils were copied to EPA-Region IV, no request for PSD permit modification was anticipated as there was no reason to belief that allowable emission rates for regulated pollutants would be exceeded. The compliance test conducted August 8, 1989 confirmed that belief. Tarmac, therefore, was somewhat surprised by receipt of your January 19th letter, and your determination a PSD review would be required for PM and SO_2 based on calculations that net emissions increase of those pollutants exceeded their respective significance levels.

Tarmac believes the use of only three (3) compliance tests to determine the "actual emissions" as defined by PSD regulations, one of which did not include PM testing, does not provide a representative measure of normal source operation. Because compliance tests at the Pennsuco production facility are normally conducted only once per year, a two-year period does not provide

---

a representative sampling of source specific emissions. Tarmac respectfully requests that a different time period be used for the PSD review determination. The attached sheet *Kiln #3 Compliance Emission Test Data* provides test data for the facility since the last PSD permit revision requested in 1982. The average of the data for these tests were subtracted from the actual emissions during the August 1988 test conducted using contaminated soils. The results from calculations of the "recent actual" minus the "old actual" in tons per year are below the significance levels for the respective pollutants. Accordingly, no PSD review should be required for the facility to burn petroleum contaminated soils at the rate tested during the August 1988 trial burn.

Tarmac would appreciate your review of the above and the enclosed emission data and advising me as to your final decision concerning PSD applicability. Should you or your staff require additional information or have any questions please do not hesitate to call me at (305)823-8800.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

cc: A. Townsend - Tarmac, Corporate
D. Stotts - Peeples, Earl & Blank
C. Fancy - FDER, Tallahassee
S. Brooks - FDER, W. Palm Beach

Tarmac

Kiln #3 Compliance Emission Test Data

TARMAC FLORIDA, INC.
AIR EMISSION SOURCE INVENTORY

Test Date	Clinker Produced	Kiln Feed	TSP	TSP Allowable[1]	SO2	SO2 Allowable[2]	NOx	NOx Allowable[3]
03/18/83	90.4	138.8	12.17	41.64	160.49	415.84	NA	NA
03/05/84	89.2	137.0	20.08	41.10	748.30*	410.32	NA	NA
05/16/85	87.5	133.0	26.27	39.90	495.95*	400.00	749.15*	592.00
05/31/85	87.6	132.8	16.81	39.84	388.58	400.00	681.42*	592.00
08/30/85	86.7	133.0	19.90	39.90	380.50	398.82	581.04	586.95
12/18/86	85.3	133.5	15.33	40.05	164.29	392.40	657.55*	577.50
04/28/87	85.9	130.7	NA	NA	288.42	395.14	417.22	581.54
12/22/87	87.4	133.1	18.62	39.93	364.14	402.04	504.44	591.69
07/05/88	85.1	133.5	12.62	39.91	323.88	391.46	454.30	576.12
* not used in average								
AVERAGE ====================>			[17.73]		[295.76]		[489.25]	

Test with contaminated soil.								
08/09/88	86.4	132.9	[22.92]	39.87	[281.06]	397.44	[474.37]	584.92

RECENT ACTUAL
 - OLD ACTUAL

	TSP	SO2	NOx
(LBS/HR) ===============>	[5.19]	[-14.70]	[-14.88]
(TPY)[4] ===============>	[20.34]	[-57.61]	[-58.31]

[1] permit limit -- 0.3 lb/ton of dry feed to kiln
[2] permit limit -- 4.60 lb/ton of clinker produced
[3] permit limit -- 6.77 lb/ton of clinker produced
[4] based on average operating hours 1983-1988 = 7838 hours

Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Bob Martinez, Governor   Dale Twachtmann, Secretary   John Shearer, Assistant Secretary

June 14, 1988

Mr. Albert W. Townsend
Group Manager, Real Estate & Environmental
Tarmac Florida, Inc.
455 Fairway Drive
Hillsborough Executive Center North
Deerfield Beach, Florida 33441

Dear Mr. Townsend:

Re: Kiln No. 3 Fuel Modification

In response to your phone call to me concerning the Department's May 13, 1988, letter to you, the Bureau of Air Quality Management still wants to obtain the information requested in our February 12, 1985, letter to Mr. Chiles prior to amending any air permit for kiln No. 3.

If the study of the test burn shows no increase in emissions, then the use of RDF fuel is not a modification by definition. The state will be able to amend the permit for kiln No. 3 to authorize the use of RDF fuel. If the study during the test burn shows an increase in air emissions, its use in kiln No. 3 is a modification that will require a new permit.

Any trial burn needs to comply with all applicable regulations. We are unaware of any specific requirement in the hazardous waste regulations that would affect the proposed trial burn.

Sincerely,

C.H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/plm

cc: Pat Wong, Dade Co.
Isadore Goldman, SE Dist.

● **SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

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2. ☐ Restricted Delivery †(Extra charge)†

3. Article Addressed to:	4. Article Number
Mr. Albert W. Townsend Group Mgr., Real Estate & Env. Tarmac Florida, Inc. 455 Fairway Dr. Hillsborough Executive Ctr. North Deerfield Beach, FL 33441	P 778 940 850 Type of Service: ☐ Registered ☐ Insured XX Certified ☐ COD ☐ Express Mail Always obtain signature of addressee or agent and DATE DELIVERED.
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6. Signature – Agent X	
7. Date of Delivery	

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PM

DEERFIELD BEACH, FL ANNEX
JUN 17 1988
USPS

PS Form 3811, Mar. 1987 ★ U.S.G.P.O. 1987-178-268 DOMESTIC RETURN RECEIPT

P 778 940 850

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TOTAL Postage and Fees	$
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PS Form 3800, June 1985

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary

May 13, 1988

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Albert W. Townsend
Group Manager, Real Estate & Environmental
Tarmac Florida, Inc.
455 Fairway Drive
Hillsboro Executive Center North
Deerfield Beach, Florida 33441

Dear Mr. Townsend:

Re: Kiln No. 3 Fuel Modification

Thank you for the copy of your April 12, 1988, letter to Mr. Bruce Miller which mentioned your plans for a trial burn of RDF in kiln No. 3. The trial burn needs to comply with the applicable requirements of the hazardous waste regulations, specifically Rule 17-3.330, FAC.

Prior to amending any air pollution permit for kiln No. 3, the Department would like to obtain the information requested in our February 12, 1985, letter to Mr. A. L. Chiles, Jr. when the burning of RDF was initially proposed. Tarmac Florida, Inc. will also need to submit an Application for Transfer of Permit (DER Form 17-1.201(1)) for each existing permit that Lonstar Florida/Pennsuco, Inc. has to the Department.

If you have any questions on this matter, please call Willard Hanks at (904) 488-1344 or write to me at the Department's Tallahassee address.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management

CF/WH/ss

Attachment: DER Feb. 12, 1985 letter

cc: Mr. Bruce Miller, EPA
Mr. Pat Wong, Dade Co.
Mr. Isadore Goldman, SE District

● **SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.
1. ☒ Show to whom delivered, date, and addressee's address. † *(Extra charge)* †
2. ☐ Restricted Delivery † *(Extra charge)* †

3. Article Addressed to:
Mr. Albert W. Townsend
Group Manager, Real Estate & Envi-
ronmental Tarmac Florida, Inc.
455 Fairway Drive
Hillsboro Executive Center North
Deerfield Beach, FL 33441

4. Article Number
P 702 175 483

Type of Service:
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6. Signature — Agent
X Julie Lug

7. Date of Delivery 05-18-88

8. Addressee's Address *(ONLY if requested and fee paid)*

DEERFIELD ANNEX MAY 18 1988 USPS

PS Form **3811**, Mar. 1987 ★ U.S.G.P.O. 1987-178-268 **DOMESTIC RETURN RECEIPT**

P 702 175 483

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P.O., State and ZIP Code Deerfield Beach, FL 33441	
Postage	$
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Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date 05/13/88 Mailed: Permit: Kiln No. 3 Fuel Mod.	

PS Form 3800, June 1985

Bill T
Willard / Maggie / file

Tarmac

TARMAC FLORIDA, INC.

455 Fairway Drive
Hillsboro Executive Center North
Deerfield Beach, Florida 33441

Telephone:
Deerfield Beach (305) 481-2800

RECEIVED

APR 19 1988

DER - BAQM

April 12, 1988

Mr. Bruce Miller, Chief Air Programs Branch
United States Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, GA 30365

Re: PSD-F1-050, Lonestar Florida/Pennsuco, Inc.

Dear Mr. Miller:

Tarmac Florida, Inc. has taken over the operation of the cement plant covered under the referenced permit. If there are any permit modifications or changes necessary due to this please let me know. Secondly, Tarmac Florida, Inc., is in the process of preparing for a trial burn in mid June of refuse derived fuel (RDF) in kiln #3. We expect to be able to replace 15% of our heat requirements with the RDF. The RDF will be restricted to only household refuse which has been processed to achieve a 2" to 5" size product with aluminum, ferrous metals and glass removed. We do not anticipate increased emissions of particulate, sulfur dioxide or nitrogen oxides. Compliance testing is being required by the Florida Department of Environmental Regulation and Dade County Environmental Resources Management of these parameters as well as a visible emissions evaluation. We will submit a copy of the test results to you as soon as they become available. If any additional information is needed please let us know.

Sincerely,

Albert W. Townsend
Group Manager
Real Estate & Environmental

AWT/ldp

cc: FDER
DCERM
K. Riveira
T. Mendez
G. Goddard
S. Quaas

LONESTAR FLORIDA CEMENT, INC.
Cement Plant
11000 N.W. 121 Way
Medley, Florida 33178
P.O. Box 122035
Hialeah, Florida 33012
(305) 823-8800

DER
FEB 3 1986
BAQM

January 30, 1986

Mr. Williard Hanks
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: Lonestar's Pennsuco Cement Plant, Miami, Florida
Location of New Gas Sampling Ports
Kiln No. 3 Exhaust Stack

Dear Mr. Hanks:

As per our discussion with Mr. Tom Tittle of the Southeast Florida District, D.E.R., and his subsequent discussions with the Bureau of Air Quality Management in Tallahassee, we are enclosing Lonestar's drawings (2) showing locations and details of four new gas sampling ports in the existing exhaust stack of our No. 3 kiln. These ports are 90° apart and they are located at the same elevation, in the same plane, as the previous sampling ports.

The four new ports will allow us to take stack gas samples while the existing SO_2/NO_x monitor is in operation at any specific time. The existing SO_2/NO_x monitor always interfered with our annual Kiln No. 3 particulate emissions testing because the monitor was located in one of the four required sampling ports used in the testing procedures.

During our last kiln outage, these four new ports were installed in the exhaust stack. Our Drawing FP-C-556-L (enclosed) shows details of a typical port in the brick liner or wall of the stack. We grouted this 3" Ø stainless steel pipe sleeve (nipple) with cap in the inside brick liner of the stack (same as other ports).

As now we can foresee no problems in future stack tests (port locations, removing SO_2/NO_x monitor, etc); we are hereby withdrawing Lonestar's

Mr. Williard Hanks
Page Two
January 30, 1986

request for an alternate sampling procedure.

If you have any questions, please feel free to contact me at Lonestar in Miami, (305) 823-8800.

Sincerely,

A. L. Chiles, Jr.

A. L. Chiles, Jr.
Engineering Manager

ALC:lyn
Enclosures
cc: Tom Tittle
    Dennis Stotts

LONESTAR FLORIDA CEMENT, INC.
Cement Plant
11000 N.W. 121 Way
Medley, Florida 33178
P.O. Box 122035
Hialeah, Florida 33012
(305) 823-8800

DER
JUL 30 1986
BAQM

July 28, 1986

Patty -
please handle

Mr. C. H. Fancy, Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: Company Name Change

Dear Mr. Fancy:

Please note that our Company name has changed slightly as follows:

Lonestar Florida Cement, Inc.

Our mailing address is the same as before:

P. O. Box 122035
Hialeah, Florida 33012

Our street address also remains the same as before:

11000 N. W. 121st Way
Medley, Florida 33178

Please change your records accordingly. Thank you.

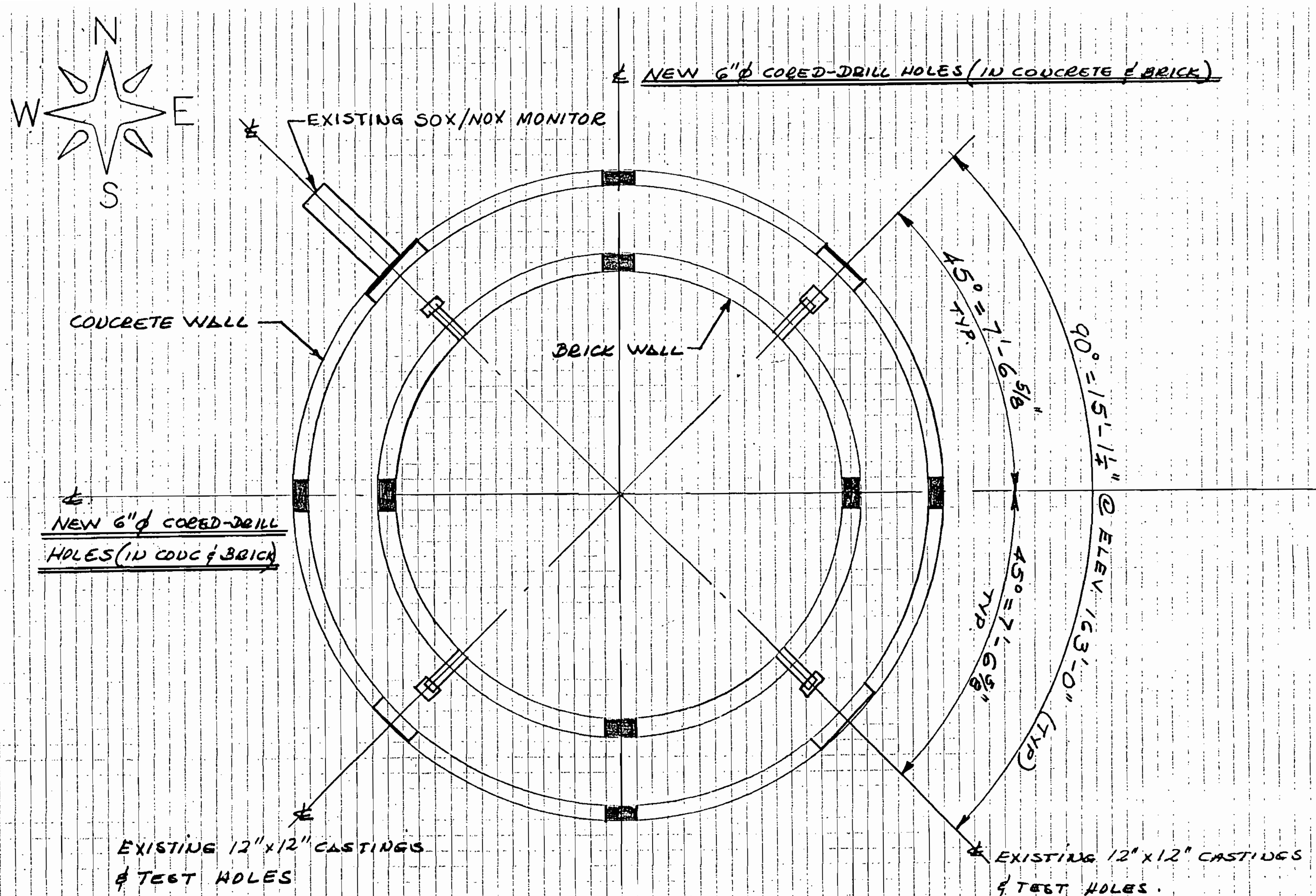
Sincerely,

A. L. Chiles, Jr.

A. L. Chiles, Jr.
Engineering Manager

ALC:edr

10-9-86
Mr. Chiles implied no plans to submit applic. for permit to construct in near future
[illegible]



K-3 STACK

LAYOUT OF (8) NEW 6"ϕ CORED-DRILL TEST HOLES

Scale: None.

R. Diaz
1-20-86

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 9, 1985

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. A. L. Chiles, Jr.
Lonestar Florida Pennsuco, Inc.
P. O. Box 122035 - PVS
Hialeah, Florida 33012

Dear Mr. Chiles:

We have reviewed your July 23, 1985 request for higher emission stardards for Lonestar's No. 3 kiln. This office was involved in establishing the emission standards for the No. 3 kiln. The standards were based on the data supplied by Lonestar in both their July, 1980 application for the permit to construct and the November, 1982 request to increase the allowable sulfur dioxide emissions for all three kilns. We believe the kiln, as it was being operated at that time, would meet the emission limits established by the Best Available Control Technology determination and listed in the revised construction permit AC 13-054054.

The attachments to your July 23 letter described modifications that have been made to the kiln since the construction permit was issued. The major modification was a change in the method of operation to manufacture a different product which required a different mix of raw material, more fuel per ton of product, and higher kiln temperatures. It was also noted that the sulfur content in the raw material has increased. Each of these changes increased the potential of the kiln to emit air pollutants. Lonestar should have applied for a permit to modify the kiln prior to manufacturing a new product. We understand that the kiln, as it is presently operated, cannot comply with both the sulfur dioxide and nitrogen oxide emission standards simultaneously.

The construction permit for this kiln that authorized the use of coal has expired. A construction permit does not authorize commercial operation of an air pollution source prior to confirming compliance with the emission standards and submitting a complete application for permit to operate. If Lonestar is unable to comply with the conditions in the construction permit, then the continued operation of the kiln is in violation of state permit No. 13-054054 and the air pollution control regulations. If Lonestar believes the kiln must be operated out of compliance with the regulation, then the Company should try to negotiate a Consent Order with the Department.

Also, as the method of operation of the No. 3 kiln has changed, it is not appropriate to amend the expired state construction permit. If Lonestar plans to operate the kiln under different circumstances than the data in the 1980 application for permit to construct was based on, as was stated in attachment to your July 23 letter, then the Company needs to submit a complete, new, application for permit to construct to the Department. The application would have to address all criteria pollutants and, if any pollutant has a significant net emissions increase, would be subject to the PSD regulations. This requires a BACT determination for each criteria pollutant that has a significant net emissions increase.

By copy of this letter, we are notifying EPA of the status of the No. 3 kiln so that they may take whatever action is appropriate for violations of federal permit No. PSD-FL-050.

If you have any questions on how to proceed in resolving this matter, please call Willard Hanks or write me at the Department's Tallahassee address.

Sincerely,

C. H. Fancy P.E.
Deputy Chief
Bureau of Air Quality
Management

CF/WH/p

cc: James T. Wilburn
Roy Duke
Dade County

P 085 152 633

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P.O., State and ZIP Code	
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Restricted Delivery Fee	
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Return receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
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★ U.S.G.P.O. 1984-446-014

PS Form 3800, Feb. 1982

PS Form 3811, July 1983

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1. ☐ Show to whom, date and address of delivery.
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3. Article Addressed to:

Mr. A. L. Chiles, Jr.
Lonestar Florida Pennsuco, Inc.
P. O. Box 122035 - PVS
Hialeah, Florida 33012

4. Type of Service:	Article Number
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TB

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5. Signature – Addressee
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6. Signature – Agent
X Florence Valdes

7. Date of Delivery

HIALEAH FL PALM VILLAGE STA. AUG 16 1985 USPO

8. Addressee's Address (ONLY if requested and fee paid)

PM
7-23-85
Miami, FL

LONESTAR FLORIDA PENNSUCO, INC.

Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

DER
JUL 25 1985
BAQM

July 23, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. James T. Wilburn, Chief
Air Management Branch
Enviromental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Re: EPA Permit No. PSD-FL-050
DER Permit No. AC13-054054
(Lonestar's Cement Plant - Miami Florida)

Dear Mr. Wilburn:

In reference to the above mentioned EPA and DER permits; and, also based on a comprehensive study by our consultant, Enviromental Science and Engineering, Inc., we are enclosing a request to revise the SO_2/NO_x emission limits for our Kiln #3, but maintaining the same limits for the Pennsuco Cement Plant.

Supporting computer model printouts are to be sent you under separate cover.

Lonestar respectively requests that these revised SO_2/NO_x limits be approved in order for us to operate an efficient kiln and produce good quality cements.....in our continuing efforts to "fight" foreign clinker and cement imports.

Sincerely,

A. L. Chiles, Jr.

A. L. Chiles, Jr.
Manager Engineering

ALC:gkf
Enclosures

cc: Messrs: C. H. Fancy
Tom Tittle
Art Bolivar/Patrick Wong

REQUEST TO REVISE SO_2/NO_x
EMISSION LIMITS FOR KILN NO. 3
LONESTAR FLORIDA HOLDING, INC.
PENNSUCO CEMENT PLANT

Submitted to:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region IV
and
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
and
METRO-DADE COUNTY DEPARTMENT OF
ENVIRONMENTAL RESOURCES MANAGEMENT

7/26
Patty -
This will be
a revision to
permit. Willard
did it last time

Prepared by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

ESE No. 85-153-0100-2110

July 22, 1985

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 BACKGROUND INFORMATION

Lonestar Florida Pennsuco, Inc. was originally issued a Prevention of Significant Deterioration (PSD) permit for its Hialeah, Florida, portland cement plant by the U.S. Environmental Protection Agency (EPA) on July 8, 1980. The PSD permit (PSD-FL-050) was for the conversion of Kilns 1, 2, and 3 to coal. The permit specified certain emission limits for sulfur dioxide (SO_2) and nitrogen oxides (NO_x).

Subsequent to issuance of the PSD permit, Lonestar converted Kiln 3 to coal and also implemented energy-efficiency improvements in the kiln. The first compliance test was conducted in July 1981. This test showed compliance with the allowable NO_x emission limits, but the measured levels of SO_2 [506 pounds per hour (lb/hr)] far exceeded the allowable level (27.51 lb/hr) (see letter of January 5, 1982, in Appendix A). An additional compliance test and an in-house test were conducted by Lonestar in April and May of 1982. These tests displayed results similar to the first compliance test, with SO_2 emissions far exceeding the allowable limits (see letter of June 18, 1982, in Appendix A).

On the basis of these test results, Lonestar requested from EPA on November 19, 1982, a revision of its PSD SO_2 emission limits (see Appendix A). No revision of the NO_x limits were requested at that time. The requested SO_2 levels were 100 lb/hr for Kilns 1 and 2 each, and 400 lb/hr for Kiln 3. Based upon Lonestar's submittal, EPA revised Lonestar's PSD permit on December 28, 1984. The revised SO_2 limits were 125 lb/hr SO_2 from Kilns 1 and 2 each, and 400 lb/hr from Kiln 3. The revised permit required Lonestar to conduct a series of SO_2 compliance tests to demonstrate compliance with the revised standard. On March 22, 1985, the Florida Department of Environmental Regulation (DER) issued a construction permit (AC13-054054) which was consistent with the EPA PSD permit.

Compliance tests to demonstrate compliance with the revised PSD permit were conducted in May 1985. Although the tests showed compliance with the SO_2 emission limits, the margin of compliance was small. In addition, the tests showed that both the SO_2 and NO_x emission limits could not be attained simultaneously on a continuous basis. As a result of the recent source test results and the necessity of Lonestar to maintain clinker product quality, which restricts certain operating parameters within the kiln, Lonestar is now requesting a revision to the current SO_2 and NO_x emission limits contained in the EPA PSD and DER construction permits. Subsequent sections of this report discuss current permit conditions and their basis, production practices, historic test data, alternative control technologies, and the proposed emission limit revisions.

2.0 CURRENT PERMIT LIMITS AND REQUIREMENTS RELATING TO SO_2/NO_x

2.1 DER PERMIT NO. AC 13-054054 (ISSUED MARCH 22, 1985; EXPIRED MAY 28, 1985)

This DER air construction permit, issued for the conversion of Kilns 1, 2, and 3 to coal, specifies the following SO_2 emission limits:

Source	Max Emission Limit	Emission Limit
Kiln 1	125 lb/hr SO_2	5.0 lb SO_2/ton of clinker produced
Kiln 2	125 lb/hr SO_2	5.0 lb SO_2/ton of clinker produced
Kiln 3	400 lb/hr SO_2	4.6 lb SO_2/ton of clinker produced

In order to comply with the Dade County Ambient Air Quality Standards (AAQS) for SO_2, only the following fuel mixes are allowed and were defined as Best Available Control Technology (BACT):

	Fuel Mix			
Source	1	2	3	4
Kiln 1	Gas	Coal or Oil	Coal or Oil	Oil
Kiln 2	Coal or Oil	Gas	Coal or Oil	Oil
Kiln 3	Coal or Oil	Coal or Oil	Shutdown	Oil

Source emission tests were required to demonstrate compliance with the SO_2 limits and also to demonstrate no actual emission increase in NO_x emissions. An NO_x emission limit was not specified in the permit.

2.2 EPA PERMIT NO. PSD-FL-050 (ISSUED JULY 8, 1980; REVISED DECEMBER 28, 1984)

The EPA PSD permit limits SO_2 emissions to the same levels as specified in the DER air construction permit for each kiln. Only two kilns are allowed to operate on coal at the same time. In addition, the coal sulfur content was limited to the following, whichever is more restrictive:

1. 1.75 percent as a monthly average;
2. 2.0 percent as a maximum; and
3. A sulfur content coal that consistently meets the SO_2 emission limits.

The maximum coal sulfur content was to be determined by a stack test program.

NO_x emissions were limited in the EPA permit to the following:

Kiln	Emission Limit
1	118 lb/hr or 4.73 pounds per ton (lb/ton) clinker, whichever is less
2	118 lb/hr or 4.73 lb/ton clinker, whichever is less
3	592 lb/hr or 6.77 lb/ton clinker, whichever is less

Compliance tests were to be performed using EPA Method 6 for SO_2 and Method 7 for NO_x. The Method 7 tests were to consist of at least four grab samples per run, taken at approximately 15-minute intervals.

3.0 BASIS FOR ESTABLISHMENT OF CURRENT SO_2/NO_x EMISSION LIMITS

3.1 SO_2 EMISSION LIMITS

The original air construction permit applications for the Lonestar Kilns 1, 2, and 3 coal conversion proposed SO_2 emission limits of 56.7 lb/hr for Kilns 1 and 2 each and 26.3 lb/hr for Kiln 3. The SO_2 emission rates for all kilns were based upon a maximum of 2.0 percent sulfur in coal and 0.08 percent sulfur in the raw feed (as SO_3). Kilns 1 and 2 emissions were further based upon a stack test on Kiln 1 conducted in June 1979, while firing 2.4 percent sulfur fuel oil. The calculated SO_2 absorption efficiency of Kiln 1 was 91.3 percent. Similarly, Kiln 3 was also tested at the same time, and the SO_2 absorption efficiency was calculated to be 98.7 percent. These inherent SO_2 control efficiencies formed the basis of the original emission limits. There was no information available at that time that coal firing would result in significantly different SO_2 removal efficiencies within the kiln. Subsequently, on July 8, 1980, EPA issued the federal PSD permit (PSD-FL-050), and on May 28, 1980, DER issued the state permit (AC 13-27742) approving the originally proposed emission limits.

Lonestar converted only Kiln 3 to coal, due to economic conditions, and conducted initial compliance tests in July 1981. These initial tests showed SO_2 emissions to be as high as 500 lb/hr. In correspondence to EPA dated January 5, 1982 (Appendix A), Lonestar attributed the high emissions to the hotter operation of the kiln (due to energy efficiency improvements). It was stated that high excess oxygen (O_2) levels in the kiln were required to obtain high sulfur absorption into the clinker, but too high of an excess O_2 level will cause too high of a back-end kiln temperature, affecting product quality. In addition, it was noted that there was a high probability of not meeting the NO_x limits at the higher excess O_2 levels.

Additional SO_2/NO_x testing was conducted on Kiln 3 in April and May of 1982. The first tests in April exceeded the 400 lb/hr limit on Kiln 3, but the May tests showed that SO_2 levels could be controlled to under the 400 lb/hr level.

On the basis of these results, in November 1982, Lonestar requested from EPA a revision to the SO_2 emission limits for Kilns 1, 2, and 3. The requested levels were 125 lb/hr for Kilns 1 and 2 each and 400 lb/hr for Kiln 3. Lonestar submitted along with this request, and in a subsequent submittal (letter to DER dated June 13, 1983), information related to the air quality impact of the requested emission limits and a BACT evaluation. The BACT evaluation discussed add-on control equipment (i.e., baghouses, flue gas desulfurization, etc.), use of low-sulfur coal, and process variables which affect SO_2 emissions.

On August 6, 1984, DER issued the Preliminary Determination and proposed federal PSD permit for the SO_2 revision. This included an engineering evaluation and BACT determination which concurred with Lonestar's assessment of the SO_2 removal capabilities of Kilns 1, 2, and 3 and its assessment of alternative SO_2 emission control technologies. Due to the uncertainties surrounding the SO_2 removal capabilities of the kilns, which were estimated to achieve a maximum 75 percent removal, Lonestar might need to burn coal with a sulfur content as low as 1 percent in order to meet the revised SO_2 emission limits. The PSD Final Determination was issued by DER on November 9, 1984, and EPA revised the federal PSD permit (PSD-FL-050) on December 28, 1984. The Final Determination and final permit did not deviate from the Preliminary Determination and draft permit.

3.2 NO_x EMISSION LIMITS

The original air construction permit applications for the Lonestar Kilns 1, 2, and 3 coal conversion proposed an NO_x emission limit of 1.69 lb/ton clinker produced when burning coal. The basis for this emission rate was a series of NO_x emission tests conducted in 1979 on Kiln 3 when burning both oil and gas (see Appendix A). Maximum emissions were on gas and were determined to be 6.77 lb/ton clinker produced. Hilousky (1977) indicated that conversion of a cement kiln from gas to coal firing should result in a 75-percent reduction in NO_x emissions (see Appendix A). On this basis, the estimated coal-fired NO_x emission rate was proposed as 1.69 lb/ton of clinker produced.

Subsequently in 1980, Lonestar conducted additional NO_x emissions testing while firing gas and oil in Kilns 1 and 2. Based upon these test results and because of the uncertainty in meeting the originally proposed NO_x emission rates, Lonestar proposed that the NO_x emission limits be revised to equal those measured when firing gas (i.e., no increase in NO_x emissions over those from gas firing) (see Appendix A for April 25, 1980 correspondence). The revised emission limit proposed at that time was 830 lb/hr from the entire Pennsuco facility. Based upon further discussions between EPA and Lonestar, the NO_x emission limits specified in the original EPA PSD permit was 592 lb/hr or 6.77 lb/ton of clinker produced for Kiln 3 and 118 lb/hr or 4.7 lb/ton clinker produced for Kilns 1 and 2.

These original NO_x limits were based entirely upon emission measurements while burning gas and oil in the Lonestar kilns. Emission test data for coal firing was not available for Lonestar or from other cement kilns in the United States, except for the kiln discussed in the article in Appendix A. The clinker product being produced at that time was also significantly different than that produced at Lonestar today (see discussion in Section 4.0).

4.0 PAST AND CURRENT PRODUCTION PRACTICES

Primarily due to the foreign imports of clinker and cement, the Lonestar plant has changed its manufacturing process in order to compete and survive in the cement industry within the state of Florida. Prior to 1983, this plant was basically a Type I cement manufacturing operation with other types of cement being manufactured on a smaller scale. With foreign products entering U.S. ports, this plant was forced to change its manufacturing process to produce a Type I/II cement plus other specialty cements. This change occurred at Lonestar in 1983.

In order to maintain compressive strengths and manufacture a good quality Type I/II product, more calcium carbonate was added to the chemical formulation of the raw kiln feed. By doing this, the tricalcium silicate (C_3S) content of the product remained the same to maintain Type I strengths in the new Type I/II product. The increased calcium carbonate content requires more fuel to calcine and combine with the silica, aluminum, and iron components of the mix to produce the C_3S as well as the other required mineral structures. The higher fuel requirements lead to greater SO_2 emissions. The increased SO_2 emisisons are offset somewhat by a higher volumetric flow rate through the kiln to support the combustion process. The additional oxygen acts to absorb a portion of the additional SO_2 generated from the fuel. However, the higher kiln heat requirements, and therefore kiln temperatures, act to increase NO_x emissions (see discussion in subsequent sections). Thus, the change in clinker product since 1983 at Lonestar has contributed to the higher SO_2 and NO_x levels indicated by the recent source test results.

Another factor which can significantly affect SO_2 emissions from cement kilns is the sulfur content of the raw feed material. Since 1981, Lonestar has utilized bottom ash from various coal-fired power plants as a source of alumina, silica, and iron. These substances are required in the raw feed to produce acceptable clinker. The sources of the bottom ash have varied over the years as Lonestar seeks the cheapest supply available. Because the supply of bottom ash has varied, the sulfur content of the bottom ash and ultimately of the raw feed has also varied. The effects of this variability on potential SO_2 emissions from Kiln 3 are discussed further in Section 5.0.

Another effect of the current domestic cement economy and foreign cement imports is that Kilns 1 and 2 at Lonestar have not operated since June 1982. At this time, it is not anticipated that these kilns will operate at any time within the near future. Also, due to these same economic conditions related to foreign clinker and cement imports, the General Portland cement plant in Miami, Florida was shut down last year. This year, General Portland's cement plant in Tampa, Florida shut down their kiln operations; however, they continued to operate their grinding mill facilities--grinding foreign clinker into cement.

5.0 EVALUATION OF SO_2 AND NO_x EMISSIONS TEST DATA

Since Lonestar converted Kiln 3 to coal in 1981, several emissions tests have been conducted for SO_2 and NO_x emissions. Presented in Table 5-1 are the results of those tests for which SO_2 or NO_x emissions and the oxygen content of the kiln gases were measured. These tests constitute 18 individual SO_2 runs, during which several NO_x grab samples were also obtained. Additional in-house SO_2 tests were conducted in March 1983 and March 1984; however, concurrent NO_x samples and oxygen levels in the kiln were not measured.

The source emission tests were conducted at or near the maximum capacity of Kiln 3 [87.5 tons per hour (TPH) clinker], ranging from 79.0 to 87.6 TPH. Coal feed rate and sulfur content were relatively constant for all the tests, ranging from 13.5 to 16.5 TPH and from 1.28 to 1.96 percent sulfur (% S), respectively. The percent SO_3 in the raw feed was also fairly uniform, ranging from 0.09 to 0.22, except for the May 16, 1985 tests, which ranged from 0.44 to 0.60 percent.

All source tests were conducted using EPA Method 6 for SO_2 and EPA Method 7 for NO_x. The O_2 content of the flue gases exiting the kiln were also measured during the tests. The oxygen measurement is taken at the feed end of the kiln, which is opposite the end from the combustion zone.

Review of the test data shows that compliance with the SO_2 emission limit for Kiln 3 of 400 lb/hr is achievable. The May 24, 1985 and May 31, 1985 tests averaged 375 lb/hr and 388 lb/hr SO_2, respectively. The test of May 12, 1982, averaged 280 lb/hr SO_2. All of these tests were run under kiln O_2 levels which averaged between 2 and 3 percent. The May 16, 1985 and April 30, 1982 tests exceeded the emission limit, and kiln O_2 levels averaged between 1.9 and 2.0 percent. Thus, it appears, under current operating conditions in the kiln, a kiln O_2 content of greater than 2.0 percent would be required to comply with the SO_2 standard. However, compliance may only be marginal, as the best test results were only 6 percent below the emission limit.

Table 5-1. Summary of SO_2/NO_x Testing, Lonestar Kiln 3 Burning Coal

Test Date	Raw Feed Rate (TPH) (dry)	Raw Feed % SO_3 (dry)	Coal Rate (TPH)	Coal % S (as fired)	Clinker Rate (TPH)	Clinker % SO_3 (dry)	Kiln % O_2	Flue Gas SO_2 (lb/hr)	Flue Gas NO_x (lb/hr)	Flue Gas Flow Rate (ACFM)	Flue Gas Flow Rate (DSCFM)	Flue Gas % H_2O	Flue Gas Temp. (°F)	Individual NO_x (lb/hr) 1	Individual NO_x (lb/hr) 2	Individual NO_x (lb/hr) 3	Individual NO_x (lb/hr) 4	SO_2 Removal Efficiency (%)
04/30/82																		
1	138.28	0.17	16.5	1.40	85.6	0.19	1.4	864	405	330,025	153,911	27.79	357	364	408	451	395	
2	138.28	0.17	16.5	1.44	85.6	0.19	1.3	709	511	319,869	147,463	27.94	365	459	472	581	533	
3	138.28	0.22	16.5	1.56	85.6	0.19	2.9	332	695	316,722	145,883	28.16	363	662	656	706	756	
Average	138.28	0.19	16.5	1.47	85.6	0.19	1.9	635 STD 400 #/hr	537	322,205	149,086	27.96	362					54.3 100 % SO_2
05/12/82 In-house test submitted to EPA																		
1	127.59	0.11	13.9	1.68	79.0	0.82	3.4	319	793		155,886		343	838	747	--	--	
2	127.59	0.11	13.5	1.52	79.0	1.27	2.9	295	523	319,286*	149,023	27.73*	344	529	516	--	--	
3	127.59	0.11	14.4	1.48	79.0	0.84	2.8	265	464		149,124		346	463	465	--	--	
4	127.59	0.12	14.4	1.28	79.0	0.86	3.1	197	438		153,814		343	458	417	--	--	
5	127.59	0.10	14.4	1.36	79.0	1.03	2.9	265	218	320,478†	151,523	27.62†	344	229	207	--	--	
6	127.59	0.10	15.5	1.36	79.0	0.72	1.6	579	347		148,903		352	329	364	--	--	
Average	127.59	0.11	14.4	1.45	79.0	0.92	2.8	320	464	319,882	151,379	27.68	345					77.1
05/16/85																		
1	133.5	0.44	14.90	1.56	87.5	0.11	1.75	535	643	318,126	141,902	29.2	379	518	734	520	799	
2	132.8	0.56	14.55	1.86	87.5	0.08	2.2	439	855	310,068	143,367	26.7	378	572	953	836	1,057	
3	132.7	0.60	14.65	1.64	87.4	0.22	2.0	514	750	319,034	147,152	26.5	382	788	846	639	727	
Average	133.0	0.53	14.70	1.69	87.5	0.14	2.0	496	749	315,743	144,140	27.5	380					87.0
05/24/85																		
1	132.8	0.09	14.75	1.96	87.2	0.16	2.3	380	732	332,881	152,149	26.4	392	894	293	744	998	
2	132.5	0.14	14.50	1.93	87.3	0.14	2.3	357	809	322,952	146,703	26.6	395	757	833	760	885	
3	132.3	0.11	14.50	1.88	87.7	0.06	2.2	388	768	331,212	148,867	27.4	395	731	850	793	698	
Average	132.5	0.11	14.58	1.92	87.4	0.12	2.3	375	770	329,015	149,240	26.8	394					78.0
05/31/85																		
1	132.8	0.18	14.60	1.96	87.6	0.18	3.0	384	647	336,040	154,249	25.9	394	575	658	585	769	
2	132.8	0.14	14.60	1.93	87.6	0.14	2.6	409	618	333,299	149,830	26.9	401	667	607	626	573	
3	132.8	0.16	14.55	1.86	87.6	0.16	2.7	372	779	341,786	153,083	27.3	400	680	605	1,019	812	
Average	132.8	0.16	14.58	1.92	87.6	0.16	2.8	388	681	337,042	152,387	26.7	398					80.0

*Average of runs 1 through 3.
†Average of runs 4 through 6.

Source: Lonestar Florida Holding, Inc., 1985.

An additional factor to be considered in review of the recent SO_2 test results is that Kiln 3 was shut down for annual maintenance in April 1985. The SO_2 tests were conducted just after the annual maintenance, when the kiln was operating at optimum fuel efficiency. Over time, the kiln will experience a slow degradation in fuel efficiency, requiring more fuel to be burned to produce the same amount of clinker. Increased SO_2 emissions will result from the additional fuel burned. Although the two most recent SO_2 tests on Kiln 3 complied with the 400 lb/hr limit, the margin of compliance was small, and future tests may result in levels above the limit.

S correct
fuel high ~1.9%

A total of five compliance or in-house tests are shown in Table 5-1. Of these five, only one test showed simultaneous compliance with both SO_2 and NO_x allowable levels (May 12, 1982 test). During this test, the kiln O_2 level was relatively high, averaging 2.8 percent.

The test of May 31, 1985, was conducted under similar kiln O_2 levels (average of 2.8 percent), and the average SO_2 emissions were 388 lb/hr (below the allowable level of 400 lb/hr). During this test, however, NO_x emissions averaged 681 lb/hr, in excess of the 592 lb/hr allowable level. These tests, as well as the other test data, emphasize the highly variable nature of NO_x emissions from the kiln and the problem of meeting both the SO_2 and NO_x emission limits simultaneously while firing coal in Kiln 3.

A statistical analysis of the source test data was performed to determine if any correlation exists between SO_2 emissions, NO_x emisions, and kiln O_2 level. Shown in Figure 5-1 are measured SO_2 emissions plotted against NO_x emissions. As shown from this figure, there is no direct correlation between SO_2 and NO_x emisisons. It is concluded that the relationship is a complex function of several parameters, as discussed in Sections 3.0 and 6.0.

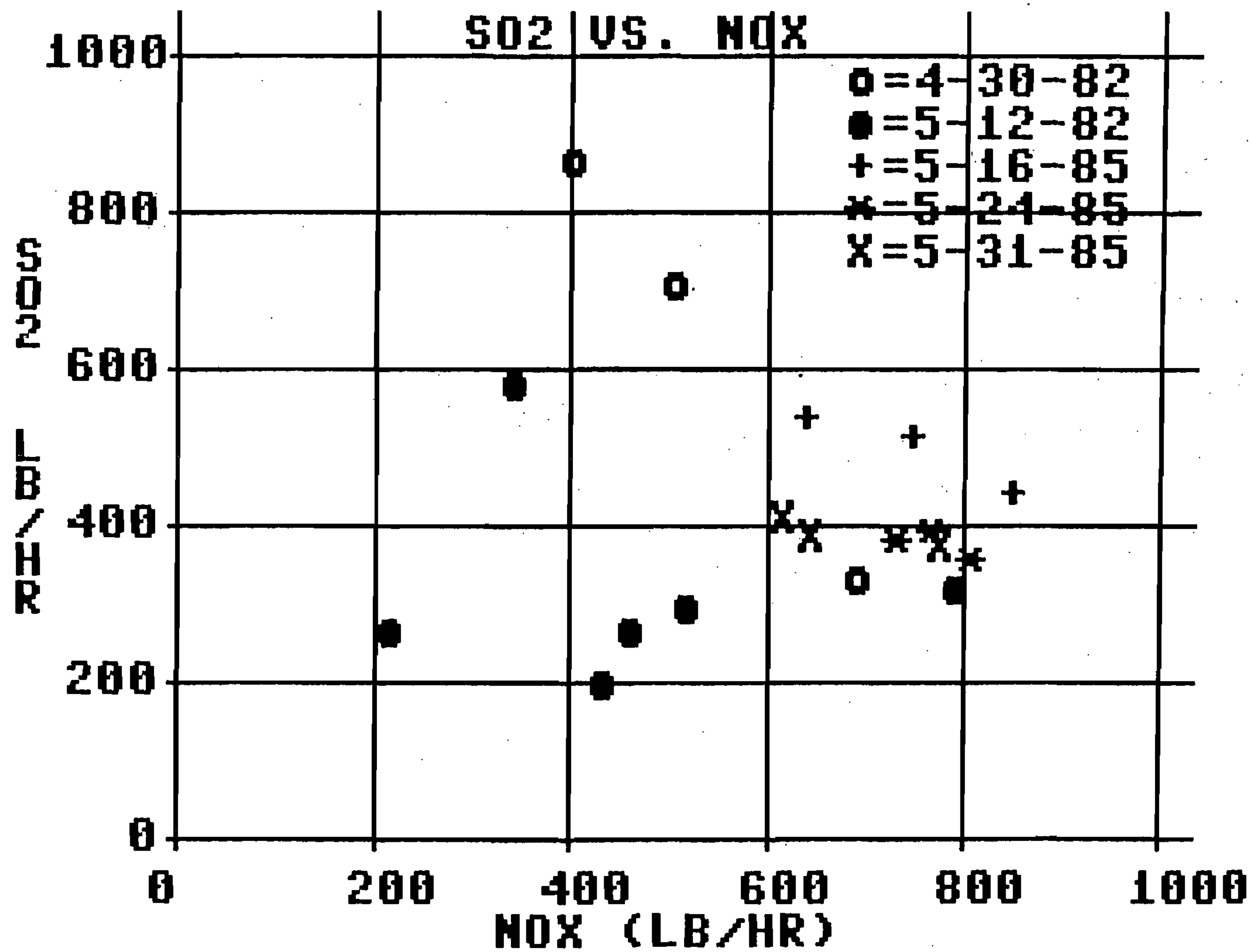

Figure 5-1
SO_2 VERSUS NO_X EMISSIONS, KILN 3 BURNING COAL

SOURCE: ESE, 1985.

LONESTAR FLORIDA HOLDING, INC.

Presented in Figure 5-2 is the relationship between SO_2 emissions and kiln O_2 content. This figure shows a very strong correlation between SO_2 and kiln O_2 (an expected result, as discussed in Sections 3.0 and 6.0) and suggests a linear relationship. To test this relationship, a linear regression analysis was performed on the data. The following equation was found to describe the line of best fit:

$$SO_2\ (\mathrm{lb/hr}) = 996 - 238\ (\%O_2)$$

This line is shown in Figure 5-2. The correlation coefficient (R) for this line of best fit is -0.88, indicating a fairly good correlation.

Although many of the tests were conducted at kiln O_2 levels ranging from 2 to 3 percent, clinker product quality considerations dictate that a more desirable O_2 level in the kiln is about 1 percent. As the O_2 level in the kiln increases (indicating increased volumetric flow rate through the kiln), heat is lost from the kiln, and the energy efficiency decreases. If this condition persists, the quality of the clinker becomes degraded.

As discussed in Section 4.0, the Type I/II product presently produced at Lonestar has a high C_3S content and requires more heat to process than the previous Type I product. If heat in the kiln decreases to unacceptable levels, either more fuel must be added to compensate, which in turn lowers the O_2 content in the kiln (the additional combustion consumes the O_2), or the air flow rate through the kiln must be lowered, which also lowers the O_2 in the kiln.

Presented in Figure 5-3 are measured NO_x emissions as a function of kiln O_2. As shown, no correlation is evident between these two variables. This supports the conclusion that NO_x emissions are primarily a function of the temperature in the kiln. The Lonestar plant uses their NO_x stack monitor as one of their burning controls in operating the kiln--as the

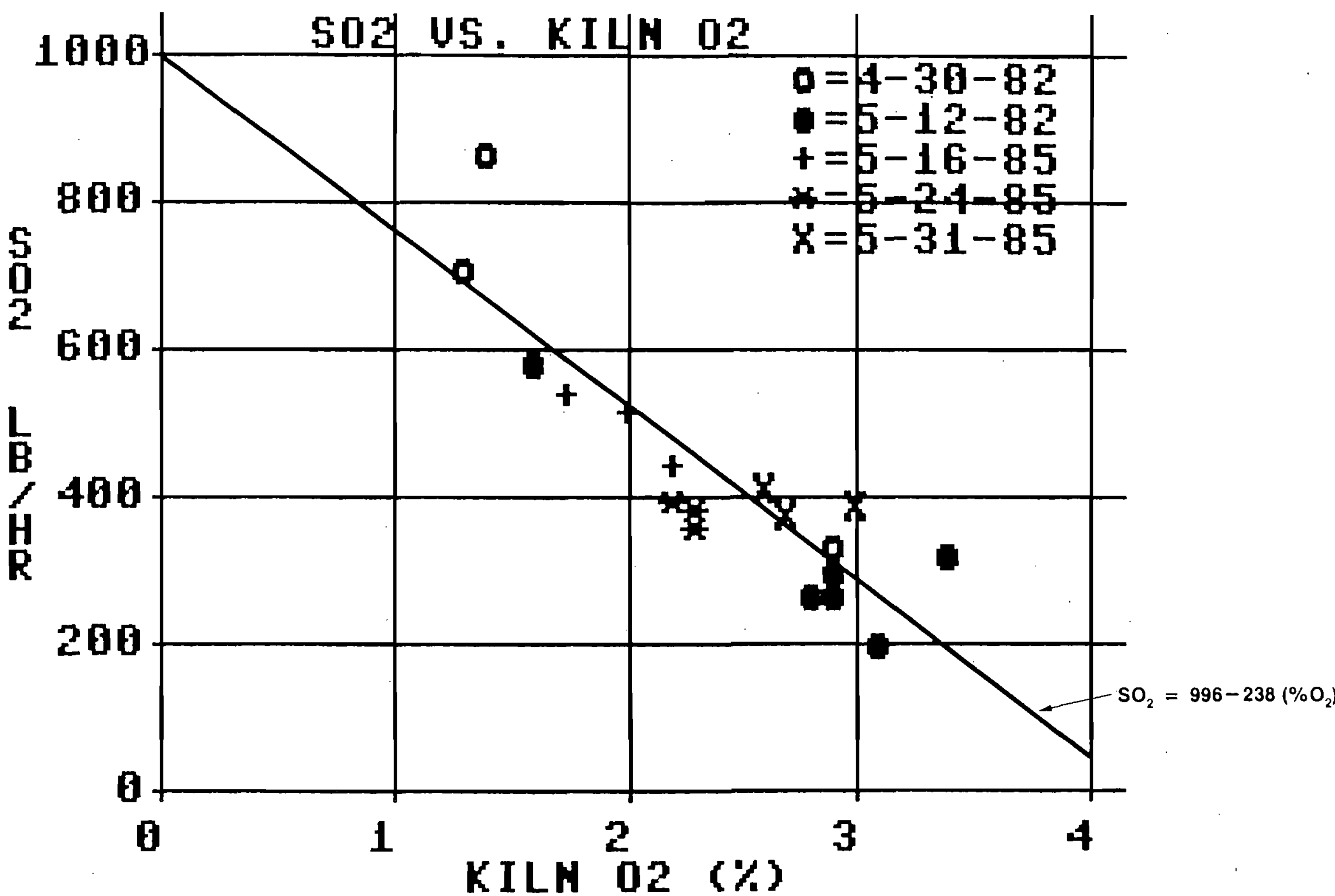

Figure 5-2
SO_2 EMISSIONS VERSUS KILN O_2,
KILN 3 BURNING COAL

SOURCE: ESE, 1985.

LONESTAR FLORIDA HOLDING, INC.

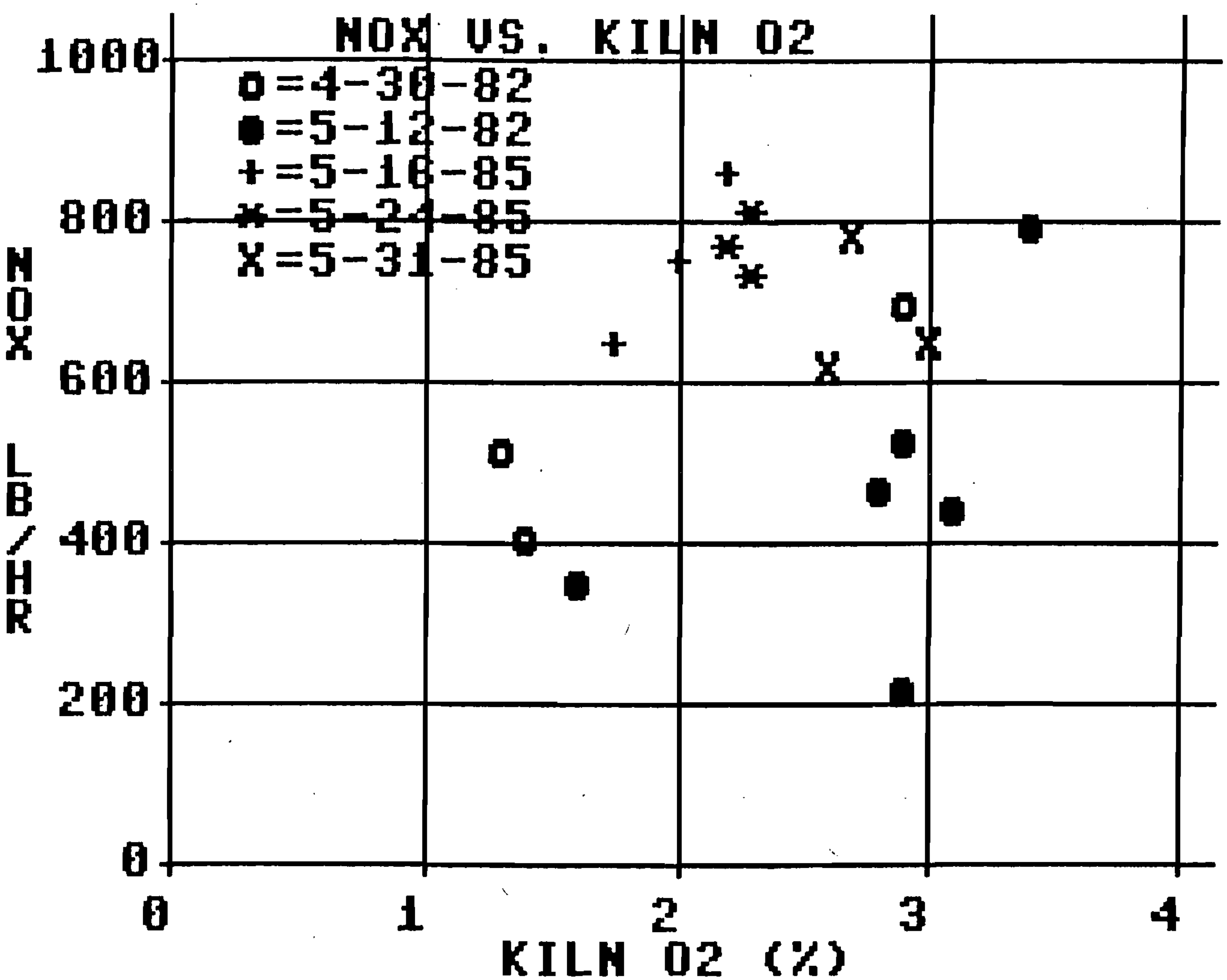

Figure 5-3
NO_X EMISSIONS VERSUS KILN O_2,
KILN 3 BURNING COAL

SOURCE: ESE, 1985.

LONESTAR FLORIDA HOLDING, INC.

NO_x increases, the kiln temperature also increases--and vice versa. It also indicates that achieving compliance with the SO_2 emission limits by increasing the kiln O_2 will not ensure compliance with the NO_x emissions limit for Kiln 3.

Correlations were also attempted between SO_2 emissions and clinker sulfate (SO_3) content and between kiln O_2 and clinker SO_3 contents. No correlation between these variables was found. However, these are the results of short testing periods. Actually, as O_2 goes up in kiln exit gases, SO_3 absorption in the clinker goes up and SO_2 stack emissions go down. It takes approximately 5 hours for the raw feed to travel the length of the kiln to the discharge end. As a result, emission tests performed on the kiln exhaust gases are not representative of clinker product sampled during the same time period as the emission tests. [illegible]

As discussed in Section 4.0, another factor which can significantly affect SO_2 emissions from cement kilns is the sulfur content of the raw feed material. In Lonestar's original permit application for the coal conversion, the maximum sulfur in the raw feed was stated to be 0.08 percent (as SO_3, on a dry basis). At the maximum raw feed input rate of 141.75 TPH, the maximum potential SO_2 emissions from the raw feed was calculated as follows:

$$141.75 \text{ tons/hr} \times 2{,}000 \text{ lb/ton} \times 64 \text{ lb } SO_2/80 \text{ lb } SO_3 \times 0.0008 = \boxed{181.4 \text{ lb/hr}}$$ potential

Thus, the sulfur in the raw feed would have contributed only about 10 percent to the total potential SO_2 due to the raw feed and coal feed (SO_2 due to coal feed was calculated as 1,840 lb/hr). ← depends on S Content

(181.4 + 1840)(1 - .75) = 505+ #/hr emission

Review of Table 5-1 shows a high degree of variability in the SO_3 contents of the raw feed, which range from 0.11 to 0.53 percent (dry basis, average of test series). Based upon the raw feed rates shown, potential SO_2 emissions due to the raw feed would vary between 224 and

1,128 lb/hr. These potential emissions are significantly higher than were envisioned in the original permit application and contribute to the problem of consistently meeting the current SO_2 emission limits for Kiln 3.

SO_2 removal efficiencies for Kiln 3 based upon the theoretical sulfur input to the process are also shown in Table 5-1. The average efficiency based upon the averages of the test runs for each date was calculated. These results indicate a very high inherent SO_2 removal efficiency for the kiln, ranging from 54 percent to 87 percent. Four of the five averages are above 77 percent. This level of SO_2 removal exceeds the 75 percent removal considered by DER to be the maximum obtainable on the kilns at Lonestar (reference DER Preliminary Determination, 1984, in Appendix).

Product has changed

6.0 CONTROL TECHNOLOGIES

Lonestar has addressed various alternative SO_2 and NO_x control technologies in the course of receiving the original state and federal air construction permits for the coal conversion and in receiving revised permits with new SO_2 emission limitations. The following discussion summarizes the previous evaluations and findings, and addresses any new technologies or studies conducted recently.

6.1 NO_x CONTROL TECHNOLOGIES

The original federal PSD permit and Final Determination, issued on July 8, 1980, addressed BACT for NO_x emissions from the three coal-fired kilns at Lonestar's Pennsuco plant. Published test data and references were presented that indicated a substantial reduction in NO_x emissions when cement kilns are converted from natural gas to coal. The reduction was attributed to the characteristics of the flame, with coal flames being longer and lazier with lower temperatures in the center of the flame. However, a high potential for fuel derived NO_x was cited. Also, AP-42 factors and New Source Performance Standards for utility boilers indicated the potential for increased NO_x emissions when firing coal instead of gas. EPA concurred with Lonestar that operating conditions could be found which would result in no net increase in NO_x emissions above those due to gas firing.

Recently, additional studies have become available addressing control technologies for NO_x emissions from cement kilns. An article entitled "Evaluation of Combustion Variable Effects on NO_x Emissions from Mineral Kilns" (excerpts attached) evaluated NO_x emissions from a wet process cement kiln. The pertinent conclusions of the study were as follows:

1. NO_x emissions were found to decrease as O_2 content within the kiln decreased. Only a weak correlation was found. Normal variations in coal nitrogen content, burnability of the feed material, and temperatures within the kiln all could significantly affect emissions.

2. A stronger correlation between SO_2 emissions and O_2 content was found, with SO_2 decreasing as O_2 increases. Normal variations in coal and feed sulfur contents could have a significant effect on kiln SO_2 emissions.
3. Normal variations in process operation (e.g., burning zone temperature, feed composition, and fuel properties) can affect both NO_x and SO_2 emissions.
4. For the particular kiln tested, 55 percent of the coal sulfur was emitted as SO_2.
5. The thermal efficiency of the kiln decreased as the O_2 content in the kiln increased (indicates that as O_2 is increased to reduce SO_2, more fuel is required to compensate for the lower thermal efficiency, thereby increasing potential SO_2 emissions).

These conclusions agree well with the results and conclusions reached for Lonestar's Kiln 3 (in Section 5.0).

The subscale laboratory program conducted in the study identified several variables which may affect NO_x emissions from cement kilns. These variables are: fuel injection velocity, combustion air preheat, furnace wall temperature, carrier gas composition, and excess O_2. Approaches suggested to reduce NO_x were:

- Reduce fuel injection velocity. This variable has a strong effect on NO_x emissions, but it can reduce flame geometry often essential for product quality.
- Reduce oxygen content of carrier gas. This approach would substantially lower NO_x emissions while preserving the flame geometry. increased SO_2 emissions
- Reduce furnace wall temperature. This can be achieved by enclosing the primary combustion zone of the flame in a water/air cooled shroud to prevent the radiation of the flame to the hot refractory or by the re-injection of cement dust in a

shroud surrounding the flame to provide a heat sink for radiation from the flame and hence reduce the flame temperature.

- Distribute cold combustion air to near burner flame zone. The approach involves injecting a layer of cold air in the mixing region between the fuel/carrier jet and the preheated combustion air to act as a shield and minimize NO_x produced with high levels of preheat. Optimizing the amount of cold air would minimize the potential adverse impact on efficiency.

These studies were performed at the subscale (laboratory) level, but their feasibility and effectiveness have not been demonstrated at the pilot scale level, let alone at an actual operating kiln installation.

A report entitled "Application of Advanced Combustion Modifications to Industrial Process Equipment: Subscale Test Results" (excerpts attached) also described results of subscale testing on cement kilns. The study evaluated the following combustion modification techniques and found the stated maximum NO_x reduction achievable with each:

Sulfur injection:	12-20 percent reduction
Water injection:	14 percent reduction
Kiln dust injection:	14 percent reduction
Fly ash injection:	28 percent reduction

Kiln dust injection is used on Lonestar's Kiln 3. This process, called "insulfation," takes the dust collected in the precipitator and recycles it back into the kiln. As a result, Lonestar is already practicing one of the control techniques evaluated in this study.

Based on the above review, there are no new proven technologies for reducing NO_x emissions from coal-fired cement kilns. The only feasible, proven, cost-effective technology is control of process variables. However, process variables are restricted within certain limits by product quality considerations. Because of the many factors involved in

NO_x formation in the kiln, emissions can vary substantially from hour to hour. In addition, measures which act to reduce SO_2 emissions (i.e., increase excess O_2) may increase NO_x emissions.

6.2 SO_2 CONTROL TECHNOLOGIES

Subsequent to conversion of Kiln 3 at Lonestar to coal, it became apparent that the original SO_2 limits in the air construction permits could not be met. In a letter dated January 5, 1982 to EPA, Lonestar discussed possible reasons for not being able to achieve the anticipated SO_2 absorption in the kiln. Among these reasons were (1) that coal flames were shorter and more intense than oil flames (which formed the basis for the SO_2 absorption efficiencies), (2) coal firing results in a coating on the kiln bricks and thus better heat retention, and (3) because of other energy improvements to Kiln 3, it was now operating hotter than it did when burning oil. High excess oxygen levels in the kiln were needed to give high sulfur absorption, but excess oxygen also effects kiln operating temperature and heat transfer to the back end of the kiln and must be closely monitored to prevent melting. It was also noted that as SO_2 absorption increases (i.e., SO_2 emissions decrease), NO_x emissions increase.

On November 19, 1982, Lonestar submitted a control technology analysis to EPA in support of its SO_2 emission limit revision request (attached in Appendix). In this analysis, kiln operating variables that affect SO_2 emissions and alternative control technologies were evaluated. Alternative controls included baghouses versus electrostatic precipitators (ESP). Lonestar stated that it already had ESPs installed, and that baghouses might achieve about 12 percent greater overall SO_2 absorption than ESP, but this conclusion was based upon limited test data. Retrofitting baghouses on Kiln 3 at Lonestar was estimated to cost about $3.3 million (1981 dollars, capital and installation costs). It was concluded that control of excess oxygen in the kiln is the most cost-effective means of controlling SO_2 emissions.

Lonestar presented additional control technology evaluations in a letter to DER dated June 13, 1983 (see Appendix). This letter evaluated flue gas desulfurization equipment and rejected such add-on equipment based upon its high cost and stated that Lonestar was already achieving 75 to 80 percent removal of potential SO_2 emissions. The cost of firing lower sulfur coals was evaluated (1.75, 1.0, and 0.75 percent S), and it was shown that the cost of firing lower sulfur coal (i.e., 1.0 or 0.75 percent S) would cost between $0.88 million and $1.76 million, annually. This was considered to be a significant economic burden and a competitive disadvantage to Lonestar.

The EPA PSD permit for the revised SO_2 emissions limits for Kilns 1, 2, and 3 included BACT determination by DER. The preliminary determination concluded that, based on test data submitted by Lonestar, the average SO_2 removal efficiency of Kiln 3 was 75 percent when the flue gas oxygen was above 2.8 percent. The data did not show that an SO_2 removal efficiency of greater than 75 percent could be consistently achieved on the existing system. Flue gas desulfurization systems were considered not feasible for the Lonestar plant at that time. It was indicated that 1 percent S coal might need to be burned in order to meet the revised emission limits, depending upon raw feed sulfur and absorption efficiency in the kiln. These conclusions were also adopted in the PSD Final Determination, issued by DER on November 9, 1984.

As the preceding discussion indicates, Lonestar has previously evaluated all feasible options for controlling SO_2 emissions (i.e., FGD systems, low sulfur coal, and controlling process variables). The conclusions reached previously for FGD and low sulfur coal are considered applicable today. These alternatives are too costly and would place a severe economic burden on Lonestar at a time when they are already under severe economic hardships. The only feasible alternative for Lonestar is the control of process variables to increase sulfur absorption in the system. However, as discussed in Section 4.0, the type clinker product Lonestar now produces restricts these variables. In addition, as shown in Table 5-1, Lonestar is achieving between 50 percent and 90 percent SO_2 absorption in Kiln 3, and the last three emission tests indicate SO_2 removal efficiencies between 78 and 87 percent.

The following theoretical calculation shows the SO_2 removal efficiency required of Kiln 3 to achieve an SO_2 emission rate of $\boxed{\text{650 lb/hr}}$ assuming design process input rates (as specified in the original permit application).

Design Parameters

0.08 percent SO_3 in raw feed

2.0 percent S in coal ← High

Sulfur Input:

Raw feed: 283,500 lb/hr x 0.0008 x 32/80 = 90.72 lb/hr

Coal: 46,000 lb/hr x 0.02 = 920 lb/hr (460#/hr @1% S in Coal)

Total = 1,010.72 lb/hr — 550.72 w/ 1% S Coal

1 lb S = 2 lb SO_2

1,010.72 x 2 = 2,021.44 lb/hr SO_2 — 1101.44 #SO_2/hr w/ 1% S Coal

Maximum emitted 650 lb/hr SO_2

Efficiency = [(2,021.44 - 650)/2,021.44] x 100 = 67.8 percent — lower than they meet

(1101 - 400)/(1101) = 64% allow to meet std

The following presents the theoretical SO_2 removal efficiency based upon SO_2 emissions of 650 lb/hr and process input rates reflective of the three May 1985 emission tests. High!

Maximum SO_2 emissions = 650 lb/hr

Feed rates based upon data in Table 5-1 (May 1985 tests)

Raw feed rate (dry) = 132.8 tons/hr

Percent SO_3 in raw feed (dry) 0.11 - 0.53 percent — initially said 0.08%

Coal firing rate: 14.62 tons/hr 29,240 ~~0.00~~ #/hr

Percent S in coal: 2.0 percent maximum High

Sulfur Input

Raw feed: 132.8 tons/hr x 0.11 / 100 x 32/80 = 0.0584 tons/hr

132.8 tons/hr x 0.53 / 100 x 32/80 = 0.2815 tons/hr

Coal: 14.62 tons/hr x 2.0 / 100 = 0.2924 tons/hr

Total sulfur input = 0.3508 to 0.5739 tons/hr

1 lb S = 2 lb SO_2

Potential SO_2 emissions = 0.7016 to 1.1478 tons/hr

SO_2 Removal Efficiency

SO_2 emissions = 650 lb/hr = 0.325 tons/hr

Efficiency = [(In - Out)/In] x 100

= [(0.7016 - 0.325) / 0.7016] x 100 = 53.4 percent

= [(1.1478 - 0.325) / 1.1478] x 100 = 71.7 percent

Efficiency Range = 53.4 to 71.7 percent low

would meet requested limit

7.0 PROPOSAL TO REVISE CURRENT SO_2 EMISSION LIMITS

The Lonestar facility is currently allowed to emit a total of 650 lb/hr of SO_2, with 125 lb/hr from Kilns 1 and 2 each, and 400 lb/hr from Kiln 3. Considering (1) the difficulty in simultaneously meeting the current SO_2 and NO_x emission limits for Kiln 3, (2) the need to maintain clinker product quality, and (3) the remote probability of restarting Kilns 1 and 2, Lonestar proposes the following:

1. Limit total SO_2 emissions from Kiln 3 to 650 lb/hr, and
2. Leave Kilns 1 and 2 on shut down status. (These kilns have not operated since June 1982.)

This proposal will not increase total permitted SO_2 emissions from the Lonestar facility of 650 lb/hr. In addition, the Dade County AAQS will not be threatened by this proposal. The Kiln 3 stack has a greater volumetric flow rate and therefore has a greater plume rise compared to Kilns 1 and 2. Therefore, shifting the entire 250 lb/hr SO_2 from Kilns 1 and 2 to Kiln 3 will actually result in an improvement (reduction) in maximum predicted ground-level SO_2 concentrations.

To demonstrate compliance with the national, State of Florida, and Dade County SO_2 AAQS in the vicinity of the Lonestar plant, an atmospheric dispersion modeling evaluation was conducted. The EPA- and DER-approved Industrial Source Complex Short-Term (ISCST) model was used to estimate annual, 24-hour, and 3-hour SO_2 impacts due to Lonestar and nearby significant sources for comparison to State of Florida AAQS. Highest, second-highest concentrations were used for short-term averaging times (24 hours or less), since these standards can be exceeded once per year at each receptor. To evaluate compliance with Dade County AAQS, annual, 24-hour, 4-hour and 1-hour concentrations were examined. Maximum predicted short-term (24 hours or less) concentrations were used, since Dade County AAQS are never to be exceeded. A 5-year meteorological data base (1970 to 1974) from Miami International Airport was used in conjunction with the ISCST.

For Class I PSD impacts, 33 discrete receptors were placed on the boundary of the Class I area (Everglades National Park). For short-term averaging times, highest, second-highest predicted concentrations at each receptor were utilized.

Class II PSD increment consumption and maximum impact concentrations were determined by executing the ISCST with a radial receptor grid placed around the Lonestar plant. Receptors ranged from 0.4 kilometer (km) to 2.8 km with a 0.3 km radial grid spacing. Lonestar and Resource Recovery were determined to be the only significant increment consuming sources in the area. Highest, second-highest concentrations were utilized for short-term averaging times.

Lonestar's interaction with other sources was also examined in two additional 5-year ISCST model executions; i.e., receptors were placed downwind of Resource Recovery and South Florida Materials (formerly Houdaille) in the directions aligning Lonestar with these sources. Since the modeling for receptors around Lonestar showed that Lonestar by itself will comply with all ambient air quality standards, the purpose of this modeling was to determine if Lonestar would cause or contribute to exceedances of the AAQS in the vicinity of these other sources. A 0.2 km receptor spacing was utilized in these model runs.

Predicted short-term concentrations were refined with the ISCST for cases where standards were predicted to be approached or exceeded. Based on the modeling results, refinements were performed for only the 4-hour averaging time since the Dade County 4-hour AAQS was being approached. A 0.1 km receptor spacing was utilized to refine the concentrations.

Stack parameters used in the modeling are shown in Table 7-1. The parameters for Kiln 3 are those measured during the May 16, 1985 source test and represent the lowest volumetric flow rate and stack temperature from the most recent tests. These values will result in lower plume rise in the model and will provide a conservative estimate of maximum air quality impacts. A conversation with Mr. Art Bolivar of Metro-Dade County Environmental Resources Management revealed that Alton Box, which was evaluated in previous Lonestar So_2 modeling studies, is now burning natural gas in its boiler. Therefore, this source was not considered in the present modeling study. Mr. Bolivar also provided updated stack parameters for South Florida Materials based on a particulate stack test of April 17, 1985. These parameters were used in the present study and are shown in Table 7-1.

Table 7-2 presents the maximum air quality impacts on PSD Class I and Class II increments and Florida and Dade County AAQS. The dispersion modeling analysis predicted that Class I and Class II area impacts will not exceed the allowable PSD increments, and no Florida or Dade County AAQS will be exceeded with Kilns 1 and 2 offline and Kiln 3 burning coal with 650 lb/hr SO_2 emissions. The increment consumption values shown in Table 7-2 are conservative since they reflect the entire emissions from Kiln 3 as being increment consuming. Only emissions above those due to natural gas firing in Kiln 3 are increment consuming, and the shut down of Kilns 1 and 2 would provide increment expansion.

Comparison of the revised SO_2 impacts shown in Table 7-2 with previous Lonestar SO_2 impacts (i.e., Kilns 1 and 2 limited to 125 lb/hr each and Kiln 3 to 400 lb/hr SO_2) shows that the revised SO_2 impacts are all less than the previous impacts, except for the 1-hour averaging time. The 1-hour maximum impacts are still well below the Dade County AAQS. This analysis shows that the current proposal to operate Kiln 3 only and not increase total SO_2 emissions will result in a net air quality improvement.

Table 7-1. Stack Parameters Used in Lonestar Modeling Evaluation

Source	SO_2 Emission Rate (lb/hr)	SO_2 Emission Rate (g/sec)	Stack Height (m)	Stack Diameter (m)	Stack Gas Velocity (m/sec)	Stack Temp. (°K)
Kiln #3	650.0	81.9	61.0	4.33	10.11	466
South Florida Materials	18.9	2.38	11.6	1.20	22.1	405
Resource Recovery	111.1	14.00	45.7	2.70	14.00	489

Sources: Lonestar Florida Holding, Inc., 1985.
ESE, 1985.

Table 7-2. Summary of Lonestar Modeling Results, Kiln 3 Burning Coal

Scenario	Maximum Concentrations (μg/m³)*				
	Annual	24-Hour	4-Hour	3-Hour	1-Hour
Class I Increment Consumption†					
Lonestar Only	0.3	2.7	NA	10.0	NA
Lonestar and Resource Recovery	0.3	2.9	NA	10.0	NA
Allowable Class I Increments**	2.0	5.0	NA	25.0	NA
Class II Increment Consumption†					
Lonestar Only	1.5	12.1	NA	50.2	NA
Lonestar and Resource Recovery	1.6	12.2	NA	50.2	NA
Allowable Class II Increments**	20	91	NA	512	NA
Total Air Quality Impacts					
Receptors in Vicinity of Lonestar	2.1	13.4	49.7	50.2	143.9
Receptors in Vicinity of South Florida Materials (Houdaille)††	1.4	17.2	47.0	48.0	73.4
Receptors in Vicinity of Resource Recovery††	0.7	10.2	29.6	29.2	66.5
Dade County AAQS***	NA	28.6	57.2	NA	286.0
Florida AAQS**	60	260	NA	1,300	NA

Note: NA = Not applicable.

*Total air quality impacts for 24-hour, 4-hour, and 1-hour averaging times are based upon maximum predicted impacts. All other 24-hour, 4-hour, and 1-hour impacts, as well as all 3-hour impacts, are based upon highest, second-highest predicted concentrations.

†Values shown assume that all Lonestar emissions consume increments; therefore, numbers are conservative.

**Short-term standards (i.e., averaging time 24 hours or less) can be exceeded once per year.

††Receptors were placed downwind of indicated source in direction which aligned Lonestar with the respective source.

***Standards never to be exceeded.

Source: ESE, 1985.

8.0 PROPOSAL TO REVISE CURRENT NO_x EMISSION LIMITS

The Lonestar facility is currently allowed to emit a total of 828 lb/hr of NO_x. Kilns 1 and 2 are allowed to emit 118 lb/hr each, while Kiln 3 is allowed 592 lb/hr. Considering (1) the difficulty in simultaneously meeting both the current SO_2 and NO_x emission limits for Kiln 3, (2) the necessity to produce a specialty cement product which restricts kiln operating parameters, and (3) the remote possibility of restarting Kilns 1 and 2, Lonestar proposes the following:

1. Limit total NO_x emissions from Kiln 3 to 828 lb/hr, and
2. Leave Kilns 1 and 2 on shut down status (these kilns have not operated since June 1982).

This proposal will not increase total NO_x emissions from the Lonestar facility of 828 lb/hr. Based upon the atmospheric dispersion modeling evaluation presented in Section 7.0 and by ratioing the SO_2 emissions to the NO_x emissions from Kiln 3, the maximum annual average NO_x impact from Kiln 3 emitting at the proposed limit of 828 lb/hr is 1.9 $\mu g/m^3$. This maximum impact is well below the national, DER, and Dade County NO_x AAQS of 100 $\mu g/m^3$ annual average concentration.

9.0 CONCLUSIONS

The significant conclusions of this study are summarized as follows:

- The original emission limits for SO_2/NO_x when firing coal in Lonestar's cement kilns were based on source tests conducted on gas and oil firing and available literature.
- Lonestar has changed its clinker product from Type I cement to Type I/II cement and specialty cements since original permit limits were established. In addition, the source of certain constituents in the raw feed has varied. This has, in turn, changed the raw feed composition and burning conditions in the kiln.
- Source testing has demonstrated that, under current kiln burning conditions, the current SO_2/NO_x emission limits cannot be simultaneously met.
- Alternative control technologies for SO_2/NO_x, such as add-on control equipment and low sulfur, are not considered warranted or economically feasible.
- The propsed SO_2/NO_x emission limits for Kiln 3, in conjunction with the shut down of Kilns 1 and 2, will not increase total emission to the atmosphere and compliance with all air quality standards is predicted.

An additional consideration on Lonestar's behalf is its plan to utilize Refuse Derived Fuel (RDF) in Kiln 3. RDF is expected to be used in Kiln 3 (hopefully late this year) in order to help reduce fuel costs and at the same time help with the local "waste disposal" problem. By burning RDF, Lonestar will eventually reduce fuel (coal) usage by as much as 25 percent. Consequently, a considerable improvement is expected in SO_2 stack emissions. In addition Lonestar used 40,000 tons of the ash from the Dade County municipal waste disposal plant in 1984 for iron and alumina raw materials.

REFERENCES

Energy and Resource Consultants, Inc. n.d. An Assessment of the Impact of Reducing Emissions in Five Critical Industries for the Purpose of Acid Deposition Mitigation. Boulder, Colorado.

Florida Department of Environmental Regulation. n.d. Best Available Control Technology (BACT) Determination. Lonestar Florida Pennsuco, Inc., Dade County. Tallahassee, Florida.

Florida Department of Environmental Regulation. 1984a. Preliminary Determination--Lonestar Florida Pennsuco, Inc. PSD-FL-050, Request for Revision. Tallahassee, Florida.

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Hilovsky, R.J. 1977. NO_x Reductions in the Portland Cement Industry with Conversion to Coal-Firing. Presented at the 1977 EPA Emission Inventory/Factor Workshop, Raleigh, North Carolina.

Hunter, S.C., Carter, W.A., Tidona, R.J., and Buening, H.J. 1982. Application of Advanced Combustion Modifications to Industrial Process Equipment: Subscale Test Results. Irvine, California. EPA-600/7-82-021.

Lonestar Florida/Pennsuco, Inc., Cement and Aggregate Division. 1980. Letter to Mr. Jack Preece dated April 25, 1980. Hialeah, Florida.

Lonestar Florida/Pennsuco, Inc., Cement and Aggregate Division. 1982a. Letter to Mr. Tommie A. Gibbs dated January 5, 1982. Hialeah, Florida.

Lonestar Florida/Pennsuco, Inc. 1982b. Letter to Mr. Thomas W. Devine dated June 18, 1982. Fort Lauderdale, Florida.

Lonestar Florida/Pennsuco, Inc., Cement and Aggregate Division. 1982c. Letter to Mr. Thomas W. Devine dated Novmber 19, 1982. Hialeah, Florida.

Lonestar Florida/Pennsuco, Inc., Cement and Aggregate Division. 1982d. Best Available Control Technology. Hialeah, Florida.

Lonestar Florida Pennsuco, Inc., Cement and Aggregate Plant. 1983. Letter Mr. Clair Fancy dated June 13, 1983. Hialeah, Florida.

Lonestar Florida Pennsuco, Inc. 1984. Letter to Mr. C.H. Fancy dated October 24, 1984. Hialeah, Florida.

Tidona, R.J., Carter, W.A., Buening, H.J., Cherry, S.S., and Mansour, M.N. 1983. Evaluation of Combustion Variable Effects on NO_x Emissions from Mineral Kilns. Irvine, California. EPA-600/7-83-045.

U.S. Department of the Interior, National Park Service. 1984. Letter to Mr. C.H. Fancy dated September 25, 1984. Atlanta, Georgia.

APPENDIX A

LONESTAR FLORIDA/PENNSUCO, INC.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

January 5, 1982

Mr. Tommie A. Gibbs
Air Facilities Branch
U. S. Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Reference: Lonestar's P.S.D. Permit #FL-050

Dear Mr. Gibbs:

As you are aware, the referenced permit issued by E.P.A. was for the conversion of our three portland cement kilns to coal. This authorization established an emission limiting standard on particulates, sulfur dioxide, and oxides of nitrogen. Lonestar elected to convert Kiln #3 first with Kilns #1 and #2 to follow. When the kiln was converted, stack tests were made to determine compliance with the emission standards. The particulate emissions were well below the allowable emissions; 17.09 lbs./hr. versus an allowable of 53.06 lbs./hr. The oxides of nitrogen emissions were 582.45 lbs./hr. with an allowable of 620.80 lbs./hr. or "tests shall be run to optimize the operating conditions towards a minimum emissions of nitrogen oxides." Emissions of sulfur dioxide were 505.59 lbs./hr. with an allowable emission rate of 27.51 lbs./hr. These emission rates were calculated using the allowable lbs./ton times the process weight.

As you can see, the sulfur dioxide emissions were far in excess of the permitted value. I believe at this time, it is appropriate to explain how the sulfur dioxide emissions standards were established for Kiln #3.

When Lonestar acquired Maule Industries physical assets, it also assumed the air pollution operational permits. The permit on Kiln #3 allowed firing of the kiln either by natural gas or No. 6 fuel oil and permit provisos only required compliance testing for particulates. During 1976 and for this permit (coal conversion) in 1979, No. 6 oil was burned and tests performed showing a sulfur absorption rate of 98%+ (copy of 1979 test report was included in the coal conversion application). With this documentation, Lonestar in "good faith" negotiated a permit using this absorption efficiency and gave up the old permit which did not limit sulfur dioxide emissions. The permit was issued allowing firing of 23 tons/hr. and a sulfur content of 2%. original permit

During the compliance testing of July 15, 1981, the kiln burned 1.3% sulfur coal at a rate of 17.5 tons/hr. In other words, the usage and sulfur content of the coal is substantially lower than the permitted rate. Absorption of the lower amount of sulfur input (into the process) was approximately 55%.

Calculations in the application shows an input of 1010.72 lbs./hr. of sulfur while actual testing was performed at 558.1 lbs./hr. of sulfur input and approximately 4% higher production of clinker or a substantially lower ratio of sulfur input to clinker during testing that what was shown in the application.

Your letter of November 16, 1981, requested an analysis of why our sulfur absorption was lower than what we had anticipated using test data. As you are aware, a wet process rotary kiln consists of a relatively long steel tube receiving slurry at a given water content at the feed end, then drying, calcining, and burning the raw material to form clinker. To perform this function, heat is necessary. When the absorption tests were performed high sulfur oil was burned which has a flame characteristic that is longer, less intense, and burns the clinker further up into the kiln. Coal flames, on the other hand, are much shorter, more intense, and burns the clinker closer to the nose of the kiln. Coal also has the added advantage of forming a better coating on the bricks in the kiln giving better brick life and most important better heat retention. Along with this coal conversion, Lonestar upgraded the kiln in various ways to promote greater energy efficiency by installing better chain systems (heat recovery and transfer), reduce air inleakage around the firing hood and various other less apparent upgrades which all contribute to better usage of the energy input and helped account for the lower than permitted tons of coal per ton of clinker usage. With this better energy usage in mind, it is easy to see that the kiln is operating hotter than it did when burning oil.

less coal per clinker ?

To get high sulfur absorption, a kiln must operate at a high level of excess oxygen. While our kiln is operating in a oxidation atmosphere (to prevent combustibles getting into the precipitators), we must closely monitor the amount of excess oxygen because as it increases the heat transfer to the back-end will increase and the temperatures will climb in excess of the chains maximum design temperature and melting will occur. Therefore, we are now running at the maximum back-end temperature without melting.

chain melt if temp gets too high

Another matter to consider is that when the oxygen is increased sulfur is absorbed into the product, but nitrogen oxides increase substantially with the high probability of us not meeting the emission standards set for this kiln and contributing to the non-attainment problem which Dade County has for photochemical-oxidants.

(lower SO_2 E) (raise NO_x E) Hurt Dade Co. [illegible]

We are embarking on certain further improvements to the system which we feel will drop our sulfur emissions without overly increasing our nitrogen oxides emissions.

We have made some of these improvements, but we are now suffering from the economic crunch and this kiln is operating at only 80% of capacity and is scheduled for shut down by the end of January. When we are able to start-up and run at 100% capacity, we will schedule a stack test to determine the success of our improvements.

Enclosed is a computer model using the tested sulfur oxide emission rate on Kiln #3 and showing Kilns #1 and #2 burning natural gas which is the case. As you can see at the present, we are in compliance with all federal, state, and county ambient air quality standards for sulfur dioxide.

Even though we are in compliance with the applicable ambient air quality standards with which the Clean Air Act and NSPS standards are based on, we are still not able to meet our BACT permit at this time. can't meet BACT

One more point to make is that we are confident that we can continue to secure coal contracts which will provide us with 2% sulfur coal. continue to get 2% S coal

When the economic situation turns favorable for our operation, we will then re-test our Kiln #3 to quantify our emissions and make the appropriate requests to rectify the discrepancy between our permit and the actual emissions. At this time, we are skeptical of the smaller Kilns #1 and #2 being able to meet their BACT emission limitations, but feel that negotiations on these would be frivolous until we have resolved Kiln #3. Don't think Kilns 1+2 can meet BACT

Lonestar wishes to continue it's good working relationship with E.P.A. and opens it's doors to any assistance or questions you may have.

Sincerely,

Albert W. Townsend

Albert W. Townsend
Coordinator of Ecological Planning

AWT/dc

enclosure

CC: C. Metzgar
D. Coppinger/T. Mendez
M. Reid
F.D.E.R./enclosure
D.C.E.R.M./enclosure
D. Buff, E.S.E.

LONESTAR FLORIDA PENNSUCO, INC.
6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

June 18, 1982

Mr. Thomas W. Devine, Director
Air & Waste Management Division
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, GA 30365

Reference PSD-FL-050; KILN # 3

In accordance to your letter of March 4, 1982 and pursuant to Section 114(a) of the Clean Air Act, enclosed please find a source test for particulate, sulfur dioxide and nitrogen oxides on our Kiln #3 conducted April 30, 1982. results listed in table

In conjunction with the source test a pre-test meeting was held with Mr. Jim Littell of EPA in which it was decided that due to an obstruction of one sampling ports, three ports would be utilized with an expanded number of sampling points per port. This decision was predicated upon two conditions. One, that the source test could be used to satisfy the Section 114 requirements and by Lonestar to generate data necessary to renegotiate our emission limiting standard for Kiln #3. Two, once a revised emission limiting standard has been established, if necessary, we would retest Kiln #3 for full compliance purposes using required test methods. USED 3 PORTS

As you can see from the results of the source test, our sulfur dioxide emissions during the test were 635 pounds per hour. These tested emissions surprised us in the light of the on-going improvements to the kiln system to reduce the sulfur dioxide emissions from the level reported during the initial July 15, 1981 test. An expanded source test consisting of six one hour sampling periods was conducted in-house on May 11, 1982, and showed a marked increase in sulfur absorption in the kiln system with a resultant reduction of sulfur dioxide emissions. The results of this expanded test showed sulfur dioxide emissions to be in a more realistic range of 300 pounds per hour.

This test data along with revised modeling analysis addressing all significant changes, and other necessary information needed for consideration of a revised emission limitation, is being put together for proper submittal. Unfortunately, the current economic situation has caused a shutdown of the entire cement production facilities which may cause a delay in acquiring some of the necessary information.

Additionally, please note the corrections on Page 1, and 2 and Page 2 of the Appendix C to the submitted test report. Should you need anything further regarding the source test, please feel free to contact me.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

Attachments
SQ/jh
cc: D. Coppinger
A. Townsend
T. Mendez

LONESTAR FLORIDA/PENNSUCO, INC.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

November 19, 1982

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

RE: PSD-FL-050; Lonestar Florida/Pennsuco, Inc.; Kilns 1, 2 and 3; Request for Revision of Sulfur Dioxide Emission Limitations

Dear Mr. Devine:

In accordance with my letter to you dated November 2, 1982, the following items are enclosed to assist your office in revising the above referenced permit:

1) A revised air quality modeling analysis addressing significant changes which would influence the model predictions and which shows compliance with applicable ambient air quality standards.

2) A revised BACT analysis showing that alternate controls for SO_2 emissions are unwarranted. Retrofitting the three existing kilns with additional or alternative control devices would have only minimal effect on emissions, would have an insignificant effect on reducing ambient air impacts, and would prohibit the company from implementing the complete conversion of its kilns to coal. The analysis also contains an explanation of operating variables in a Portland cement kiln and the resulting effect on SO_2 emissions.

3) A summary of recent stack tests including SO_2 absorption calculations with resulting emission estimates for kiln 3.

Mr. Thomas W. Devine, Director
November 19, 1982
Page 2

Based upon these materials Lonestar respectfully requests a revision to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr.
Kiln 2	100 lbs/hr.
Kiln 3	400 lbs/hr.

We look forward to answering any questions you may have and meeting with you at an early date to discuss this request.

Sincerely,

Scott Quaas

SCOTT QUAAS
Environmental/Specialist

cc: S. Smallwood-DER

PS Form 3811, Jan. 1979 — RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

● SENDER: Complete items 1, 2, and 3. Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one.)
   - [x] Show to whom and date delivered.............—¢
   - [ ] Show to whom, date and address of delivery...—¢
   - [ ] RESTRICTED DELIVERY Show to whom and date delivered.............—¢
   - [ ] RESTRICTED DELIVERY. Show to whom, date, and address of delivery.$____

   (CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:
Mr. S. Smallwood
Florida Dept. Environmental Reg.
Twin Towers Office Bldg.
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☆GPO 1979-288-848

LONESTAR FLORIDA PENNSUCO, INC.
BEST AVAILABLE CONTROL TECHNOLOGY

Operating Variables that Affect SO_2 Emissions

During the operation of a wet process cement kiln there are several process variables that will affect the emission of SO_2 from the kiln's stack.

The major variable is the oxygen content of the kiln and its possible reduction/oxidation zones. The sulfur that has the potential to form SO_2 comes from the kiln feed, fuel and insulflated dust. Depending on the oxygen content in the kiln, the sulfur from the kiln feed will either stay as an oxidized sulfur compound or will be reduced to SO_2. Oxygen contents below about 0.5 percent will tend to generate SO_2 while higher oxygen contents will retain the sulfur with the feed and eventually in the clinker. This is basically a surface reaction of sulfur oxides on MgO and CaO particles and proceeds until $MgSO_4$ or $CaSO_4$ have encapsulated the particle and it has diffused to its interior.

higher O_2 lowers SO_2 emission

As the fuel burns, sulfur oxides are formed in the oxidizing area of the flame. With sufficient oxygen and contact in the kiln with the feed material, compounds such as calcium sulfate are formed and retained in this material.

As the feed material is calcinated and reaches the point of insipient fusion (clinker formation), potassium and sodium oxides are volatized and combined with available sulfur oxides to form alkaline salts in a gas reaction. These salts are very fine particles that are caught in the pollution control equipment downstream of the kiln. The return of all the dust to the kiln (insulflation) is performed as Lonestar's kiln #3. The insulflated sulfates are eventually retained with the clinker as were the sulfates in the feed material and sulfur oxides from the fuel.

The overall effect of excess oxygen in the kiln is that less than 0.5 percent will enhance SO_2 emissions and excess oxygen in the range of 0.5-1.5 percent will significantly reduce emissions. + higher The use of excess oxygen greater than 1.5 percent can cause operational problems (too hot of a backend kiln temperature, improper clinker burning zone, kiln dusting) as well as wasting fuel by heating the excess air. The use of too little excess oxygen causes incomplete combustion and very unstable operating conditions. When an electrostatic precipitator (ESP) is used, the carbon monoxide generated can cause explosive conditions in the ESP.

operation problems with high excess O_2

Other variables for the emission of SO_2 are sulfur content of fuel, chemistry of kiln feed and kiln dust, NO_x formation and unstable kiln conditions. These factors can be significant as to

SO_2 generation, but for the specific long term operating conditions at Lonestar's kilns they are not considered as important for this analysis as is excess oxygen content.

Control Technology Available

The two types of particulate control equipment typically used to meet New Source Performance Standards (NSPS) and Best Available Control Technology (BACT) review criteria are electrostatic precipitators (ESP) and baghouses. Historically, there has been very little success in using baghouses on wet process kilns due to condensation, temperature and maintenance problems. Baghouses are usually multicompartmental with thousands of fiberglass bags for filtering the dust from the kiln gases. The collection is done on the dust cake which forms on the dirty side of the bags. When a kiln is started or stopped, there is potential for the filter cake temperature to fall below the dew point unless heated by a separate heat source. If condensation does occur (the usual moisture content of the exhaust gases is 30 percent) this cake will harden and permanently blind the bag. Another major problem with baghouses has been the inability to sustain the high operational temperatures without gas conditioning equipment (dilution air). During unstable kiln conditions this can become a problem to adequately cool or heat the bags to prevent excursions of their temperature limits or cooling below the dew point.

Another operational problem with baghouses has been maintaining the thousands of bags. The fiberglass fibers will fatigue with time or fail due to condensation or temperature and can develop pin hole leaks that will necessitate patching or bag replacement. Therefore, a routine maintenance program is a necessity to monitor the conditions of the bags and maintain the reliability of the system.

ESP's, such as those presently installed at Lonestar's kilns, do not have condensation, temperature, or maintenance problems. They do not require any auxiliary heating and can take relatively large fluctuations in gas temperatures without problem. An ESP is designed to have extensive internal maintenance during annual kiln shutdowns and not on a daily basis. It has multi-stages that the gases must travel through (not just a thin filter cake) for collection of the kiln dust. These stages are individually controlled as to voltage, amperage and cleaning cycle. Operational problems in one stage can be compensated for by externally adjusting the other stages. ESP's do not have the daily maintenance problems associated with baghouses.

With regard to SO_2 emissions, approximately 75 percent of the SO_2 is absorbed by the proper burning of the kiln and is incorporated in the clinker. EPA has stated that due to the gases having to pass through the filter cake an additional 50 percent removal of the remaining 25 percent (that is, 75% SO_2 removal

approximately 12 percent) of the SO_2 may be achieved. This was developed through review of limited testing data on several kilns in the early 1970's; however, no actual tests comparing both control devices under the same operating kiln conditions have been performed.

Furthermore, the reasonableness of that 50 percent additional removal is questionable. In a baghouse system, the gases quickly move from the inlet manifold to a compartment and through a filter cake (approximately 1/4 inch thick) and back to the clean air plenum. The residence time in the collector is much less than in a precipitator. The additional residence time in an electrostatic precipitator (ESP) allows for longer reaction time with the dust particles for good absorption.

Environmental Impacts

The ambient air quality impacts due to conversion of Lonestar's kilns are addressed in the accompanying dispersion modeling evaluation. The predicated impacts reflect SO_2 emissions using ESP's. Lonestar's maximum annual and highest, second-highest short-term predicted SO_2 impacts with ESP control are shown below in terms of percentages of the AAQS and PSD increments consumed:

Percentage of Air Quality Standards

Consumed by Lonestar Kilns 1, 2 and 3

Averaging Time	Class I Increments	Class II Increments	Florida AAQS	Dade County AAQS
Annual	15%	11%	5%	N/A
24-Hour	58%	18%	6%	59%
4-Hour	N/A	N/A	N/A	97%
3-Hour	56%	12%	5%	N/A
1-Hour	N/A	N/A	N/A	37%

N/A - Not applicable

Retrofitting all three kilns with baghouses, and adopting the undocumented assumption of 50% additional removal of the SO_2, would reduce the percentages by one half. With existing ESP control, however, Lonestar's impacts are predicted to be less than 20 percent of Class II increments and Florida AAQS. Therefore, reducing these impacts by 50 percent would not produce significant air quality benefits. In the case of Class I PSD increments and Dade County AAQS (the most stringent standards), Lonestar's impacts do not exceed 60 percent of those standards, except for the 4-hour Dade County AAQS. Therefore, even if a 50% reduction is assumed to be achievable, the ultimate benefit to the environment of such a reduction is not significant.

The impacts presented in this analysis represent the combination of maximum Lonestar production capacity and worst case meteorological conditions. For the majority of time, actual impacts due to Lonestar are expected to be far below these predicted levels.

ECONOMIC ANALYSIS

An economic analysis was performed for retrofitting baghouses on kilns 1, 2 and 3. The analysis was performed using procedures described in the August 1978 through November 1978 issues of the Journal of the Air Pollution Control Association (Volume 28, Nos. 8-11) in a series of articles entitled "Capital and Operating Costs of Selected Air Pollution Control System."

Purchased Equipment Costs:

	K 1	K 2	K 3
Flow rate, ACFM	82,000*	82,000*	311,400
Air/Cloth Ratio	2:1	2:1	2:1
Total Net Cloth Area (ft^2)	41,000	41,000	156,000
Total Gross Cloth Area (ft^2)	46,000	46,000	164,000
Insulated, suction baghouse	243,000	243,000	815,500
Bag Filters $	96,000	96,000	342,000
Fans & Motors $	13,000	13,000	41,000
1977 $	352,000	352,000	1,198,500
X 1.6 = 1981 $	563,200	563,200	1,917,500
Gas Conditioner	25,000	25,000	50,000
Total 1981 $	588,200	588,200	1,967,500

* Average of Kilns 1 and 2

Installation Costs:

Item	Cost Factor
Foundations & Supports	0.04
Erection & Handling 0.50 x 2	1.0 (retrofit)
Electrical	0.08
Piping	0.01
Insulation	0.07
Painting	0.02
Engineering/Supervision	0.10
Construction & Field Expense	0.20
Construction Fee	0.10
Start-up	0.01
Performance Test	0.01
Contingencies	0.03
Total	1.67

Total Installation Costs:

K1-	588,200
K2-	588,200
K3-	1,967,500

$ 3,143,900 x 1.67 = $5,250,313

Total Costs:

Total equipment and installation costs are estimated at:

$3,143,900 + $5,250,313 = $8,394,213

This does not include operating or maintenance costs.

Cost Benefit Analysis

Although no test data is presented to support the claim of an additional 50 percent SO_2 removal through the baghouse, for purposes of this analysis the 50 percent removal was assumed. Kilns 1, 2 and 3 are proposed to emit a total of 600 lb/hr of SO_2. Based upon maximum capacity and year-round operation, a reduction of 50 percent in emissions would equal 1,314 tons per year of SO_2. The total cost of installing baghouses on kilns 1, 2 and 3 is estimated above at $8,400,000. This cost is extremely high and does not include the substantially higher maintenance/operation costs of a baghouse. Considering that the existing ESP system is already removing up to 80 percent of the potential SO_2 emissions from the kiln system, the additional costs a baghouse system would impose upon Lonestar are not warranted.

Summary

The question of SO_2 emission control in a wet process cement kiln is not one of control equipment (which one has better control) but concerns the maintaining of sufficient excess oxygen to drive the SO_2 into the clinker material. At Lonestar's facilities the oxygen is maintained in this range (above 0.5 percent) not only for SO_2 control but to provide for complete combustion of the

coal and economic benefits. Additionally, SO_2 emissions will be controlled by utilizing coal having a sulfur content of 2 percent or less.

Alternative controls for SO_2 emissions were rejected since retrofitting the three existing kilns with additional or alternative control devices would have only a minimal effect on emissions and would have an insignificant effect on reducing ambient air impacts. The costs of retrofitting would prohibit the company from implementing the complete conversion of its kilns to coal.

1979 NOx Tests Kiln 3 Burning
Gas and Oil

Firing Gas + Oil

EMISSION ESTIMATES

Results of Nitrogen Oxides Stack Tests on Kiln No. 3 at LSF/P

Date	Process Rate (dry tons/hr)	Fuel	Run	Oxygen Content in Kiln (%)	NO_2 Emissions (lbs/hr)	NO_2 Emissions (ppm)
3/27/79	150.9	Gas	1	1.7	544*	544
	150.9	Gas	2	1.7	864*	863
	150.9	Gas	3	1.7	514*	514
	150.9	Gas	4	1.7	790*	789
	150.9	Gas	5	1.7	295*	294
	150.9	Gas	6	1.7	382*	381
AVERAGE					565*	564
3/30/79	150.1	Oil	1	2.1	312	288
	150.1	Oil	2	2.1	331	306
	150.1	Oil	3	2.1	279	258
	150.1	Oil	4	2.1	478	442
	150.1	Oil	5	2.1	469	434
AVERAGE					374	346

*Based on the same gas flow rate as oil firing.

NO_x REDUCTIONS IN THE PORTLAND CEMENT INDUSTRY WITH CONVERSION TO COAL-FIRING

Presented at the 1977
Environmental Protection Agency
Emission Inventory/Factor Workshop
Raleigh, North Carolina - September 13-15, 1977

By

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Introduction

The cement industry is one of the nation's most energy-intensive industries - where more energy is consumed producing a dollar's worth of product than for any other major product. A report issued by the Cost of Living Council in 1973 shows that the energy cost for cement was 43 percent of the product. This figure has continued to rise with the increasing cost of fuel.. The cement plants of Southern California have used natural gas as fuel, with oil as a standby energy source. The high availability of natural gas, ease of handling and its cheap cost compared to other fuels were the major factors for continuing its use. However, with the growing shortage of natural gas, estimates by the California Public Utilities Commission that no gas supplies will be available to major industries by 1980 and large price increases (38 percent in 1975) for gas, the cement industry began conversion to fuel oil and coal.

The South Coast Air Quality Management District (SCAQMD) has four cement companies (operating six different facilities) under its jurisdiction. All of these facilities are located in the Eastern Zone of the District, with five plants in San Bernardino County and one plant in Riverside County. The SCAQMD was formed on February 1, 1977, as a successor agency of the Southern California APCD. That APCD, in turn, had been formed on

July 1, 1975, from the Los Angeles, Orange, Riverside and San Bernardino County APCD's. All data referenced in this report was collected by the same group of personnel - although the organization changed names.

Background

The San Bernardino County APCD began source testing for NO_x emissions in 1969-70 for all industries in the county for both compliance and emission inventory information. The larger industries in the county were also tested on an annual basis, beginning in 1972. Variations in NO_x emissions from one facility were observed, but investigation as to the cause was not pursued at that time. The emission inventories showed that the cement industry comparatively was a very large NO_x emitter (Table I) in San Bernardino County.

TABLE I

NO_x Emissions from
San Bernardino County Cement Plants

Facility	NO_x Emissions (Tons/Day)*
California Portland Cement Co., Colton	19.10
Riverside Cement Co., Oro Grande	25.66
Kaiser Cement & Gypsum Corp., Lucerne Valley	20.42
Southwestern Portland Cement Co., Victorville	7.0
Southwestern Portland Cement Co., Black Mountain	13.44
TOTAL	85.62

*Based on an average rate of 80% production, natural gas for fuel. NO_x is reported as NO_2.

Fuel Changes and Effects Upon Pollutants

Riverside Cement Company and California Portland Cement Company filed applications in 1974 with the District to convert their rotary kilns to coal-firing. Review of these applications, in considering the possible changes in emissions, led to the analysis of the data collected from source tests on cement kilns. Analysis of these data revealed:

(1) The sulfur in the fuel oil was absorbed in the clinker manufacturing process (as sulfates or sulfides) and only very small amounts of sulfur dioxide would be emitted to the atmosphere. It was expected, therefore, that the sulfur in the coal also would be absorbed and would not cause any violation (500 ppm limit) of the District's SO_2 rules.

(2) Existing air pollution control equipment could adequately control any increase in particulate matter expected from coal use.

(3) The use of fuel oil showed a reduction in NO_x emissions, compared to NO_x from natural gas.

It is believed that when burning fuel oil in the cement kiln that it can more readily be burned with a flame that is less oxidizing than the flame resulting from natural gas combustion. (It would appear to be a "lazy" flame pattern when viewed through flame ports.) With these differences in the kinetics of combustion in the kiln, the result is lower NO_x generation when burning fuel oil in the cement kiln - compared to natural gas. The use of coal for fuel should result in an even further reduction of NO_x emissions since it typically produces a longer, "lazier" flame (with lower temperature in the center of the flame) than does fuel oil combustion in the cement kiln. In reviewing applications from the cement plants, the "Permits to Construct" were approved since it was calculated that an overall reduction in emissions into our air basin would occur.

Oil produces less NO_x than gas

Coal should produce less NO_x

The conversion to coal was completed by November 1974 for the Riverside Cement Company and by May 1975 for the California Portland Cement Company. Southwestern Portland Cement Company and Kaiser Cement & Gypsum Corporation switched over from natural gas to fuel oil combustion in 1976. Source testing of these units has indicated that a substantial reduction occurred in NO_x emissions into the atmosphere.

TABLE II

NO_x Reductions in Cement Kilns
Due to Fuel Changes

FACILITY	NO_x EMISSIONS[1] (TONS/DAY) Gas	Oil	Coal	PERCENT REDUCTION
California Portland Cement	19.10	4.58[2]	3.50	76[2]/81.7
Riverside Cement	25.66	----	7.75	69.7
Kaiser Cement & Gypsum	20.42	15.46	----	24.2
Southwestern Portland Cement (Victorville)	7.0	4.30	----	38.2
Southwestern Portland Cement (Black Mountain)	13.44	12.06	----	10.2
TOTAL	85.62	43.07		49.7

(1) Based on 80% production rate. NO_x is measured as NO_2.

(2) Not used at this facility since conversion to coal.

Table II shows that larger reductions in NO_2 emissions are accomplished with conversion to coal-firing versus oil-firing. With the growing scarcity of petroleum products, there would be more advantages in the long run for cement plants to convert to coal-firing (directly from natural gas) rather than to oil-firing; even though a conversion to oil-firing would somewhat reduce NO_x emissions into the atmosphere. Kaiser Cement & Gypsum Corporation has filed an application for coal conversion with the District, and Southwestern Portland Cement Company has approved funds for coal conversion.

Test Methods and Procedures

Two test methods were used in obtaining the data (Appendix A) presented in this report. The Phenoldisulfonic Acid (PDS) method, which is the approved California Air Resources Board and U. S. Environmental Protection Agency reference method, was used along with a continuous electrochemical cell analyzer (Envirometrics) and recorder. Both methods well complimented each other although the analyzer was not obtained until 1972. Some early PDS data was considered invalidated when it was indicated that NO_x concentrations were over 1,000 ppm. For NO_x values near or over 1,000 ppm, the chemist performing the PDS analysis must be aware of the potentially high concentration so proper steps in the preparation of aliquot portions can be taken to assure accuracy in the analysis.

The continuous analyzer revealed variations in emissions throughout the process operations (Figure 1). For example, the concentration range for one test was 950 to 1,650 ppm NO_x, with an average of 1,490 ppm. For this example, the PDS values could vary greatly depending upon when the "grab sample" was taken, with respect to hitting "peaks" or "valleys" in the NO_x versus time curve.

Emission Factors

The five plants tested have different configurations of exhaust gas ducting and different types of control systems. This resulted in different excess-air concentrations for each test site. To obtain a correlation of NO_x emissions into the atmosphere, emission factors were generated. These are listed in Tables III, IV and V and divided into categories dependent upon (1) fuel use, (2) type of process and (3) production rate.

Conclusions and Recommendations

Table VI is a summary of the emission factors generated, and Figures 2, 3 and 4 are plots of the emission factors versus kiln capacity. The following conclusions are indicated from this data:

(1) Emission factors vary greatly depending upon fuel, type of process and kiln size.

(2) There is a significant reduction in NO_2 emissions when either oil or coal is used for fuel, versus natural gas. It appears that greater reductions in emissions are available for coal-firing versus oil-firing (Table II).

(3) The emission factors for wet-process operations tend to be lower than for those with dry-process operations (Table VI).

(4) As the capacity of the kiln increases, the emission factor decreases for dry-process operations (Figures 2 and 3) while the reverse is indicated for wet-process operations (Figures 2 and 4). There can, however, be a larger NO_x variation between kilns of the same size - especially the smaller units (Figures 2 and 3).

NO_x emissions vary

(5) The emission factor and NO_x reduction from natural gas-firing versus oil-firing, for dry-process kilns of 100,000 lbs/hr of clinker, were much greater than for a 175,000 lbs/hr kiln (respectively 4.53 lbs/ton and 76% reduction versus 12.05 lbs/ton and 10.2% reduction).

(6) The NO_x emission factors depend upon a number of variables, and the use of only one factor should be discouraged in estimating NO_x emissions from cement kilns.

Some of the more important variables have been covered in this paper although other factors, such as diameter of kiln, length of fire zone and dwell-time before emitting into the atmosphere, should be investigated before developing a family of curves for cement kiln NO_x emission factors.

TABLE III

Emission Factors for Cement Kilns
Using Natural Gas

Kiln	Raw Material Feed (1,000 lbs/hr)	Emission Factor (lbs. NOx/ton) Raw Material Feed	Emission Factor (lbs. NOx/ton) Clinker
Dry Process Units*			
RC1	64	14.3	22.4
RC2	64	13.9	21.8
RC3	64	12.6	19.7
RC4	64	13.7	21.4
RC5	64	12.5	19.6
RC6	65.7	15.8	24.7
CP1	161	13.6	20.5
CP2	161	11.9	18.7
BM	264	10.9	16.9
BM	240	11.7	18.1
Wet Process Units			
SW5	29	18.7	28.9
SW6	39	3.9	6.1
	49	9.5	14.6
SW7	40	3.3	5.1
	50	5.2	8.1
SW8	38	5.6	8.6
	46	6.5	10.0
SW9	40	8.3	12.7
	41	15.3	23.6
KC1	92.4	3.2	5.0
KC2	92.4	4.1	6.4
KC3	184	6.6	10.3
	184	6.0	9.4

*RC = Riverside Cement, Oro Grande; CP = California Portland Cement, Colton; BM = Southwestern Portland Cement, Black Mountain; SW = Southwestern Portland Cement, Victorville; KC = Kaiser Cement & Gypsum, Lucerne Valley

TABLE IV

Emission Factors for Cement Kilns
Using Fuel Oil

Kiln	Raw Material Feed (1,000 lbs/hr)	Emission Factor (lbs. NO_x/ton) Raw Material Feed	Emission Factor (lbs. NO_x/ton) Clinker
Dry Process Units			
CP1	168	1.6	2.6
	168	4.1	6.9
CP2	168	2.9	4.9
	168	2.8	4.6
BM	240	10.5	16.1
Wet Process Units			
SW7	49	3.7	5.7
SW8	49	7.9	12.2
SW9	41	2.3	3.5
KC1	92	2.8	4.4
	92	2.9	4.5
KC2	92	3.0	4.7
	92	3.1	4.8
KC3	184	5.1	7.9

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Coal
NO_x
Emission
Factors

TABLE V

Emission Factors for Cement Kilns
Using Coal

Kiln	Raw Material Feed (1,000 lbs/hr)	Emission Factor (lbs. NO_x/ton) Raw Material Feed	Clinker
Dry Process Units			
RC2	64	1.4	2.2
	64	3.6	5.7
RC3	64	4.4	6.9
	64	4.9	7.6
RC4	64	5.4	8.5
	64	5.6	8.6
RC5	64	6.2	9.7
	64	6.2	9.6
RC6	65.7	4.1	6.4
CP1	161	2.0	3.3
	171	2.9	4.7
CP2	159	2.4	3.7
	157	1.9	3.1

MAX

9.7 # NO_x / Ton Clinker

TABLE VI

Summary of NO_2 Emission Factors
for Cement Kilns (lbs. NO_x/ton of Clinker)

Fuel	Type of Cement-Manufacturing Process	Range	Average
Gas	Dry	16.9 to 24.7	20.4
Gas	Wet	5.0 to 28.9	11.5
Oil	Dry	2.6 to 16.1	7.0
Oil	Wet	3.5 to 12.2	5.9
Coal	Dry	2.2 to 9.7	6.2
Coal	Wet	0.72	

APPENDIX A

TEST DATA USED FOR REPORT

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Unit	Capacity Bbl/day	Test Date	Raw Material lbs/hr	Clinker Production Tons/hr	Fuel	Flowrate DSCFM	NO_2 Emissions PPM	NO_2 Emissions lbs/hr	Emission Factor Raw Material (lbs/ton)	Emission Factor Cl
Dry Process										
CP1	6,500	12/28/76	151,000 (+ 20,400 coal)	50	Coal	138,555	220	221.9	2.94 (2.6)	4 (4
		6/15/76	161,000	50	Coal	150,000	150	165.1	2.0	3
		10/12/73			Gas	140,500	1,000	1,023.2	13.5	20
		1/28/70	168,000		Oil	127,900	142	132.3	1.6	2
		4/28/70			Oil	127,900	372	346.5	4.1	6
CP2	6,500	12/28/76	159,000	50	Petroleum Coke & Oil	139,597	183	186.0	2.4	3
		6/15/76	157,780	49	Coal	135,000	157	154.7	1.96	3
		10/12/73			Gas	146,600	880	939.4	11.9	13
		4/28/70	168,000		Oil	188,041	178	243.7	2.9	4
		1/28/70			Oil	188,000	169	231.4	2.8	4

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Unit	Capacity Bbl/day	Test Date	Raw Material lbs/hr	Fuel	Flowrate DSCFM	NO_2 Emissions PPM	NO_2 Emissions lbs/hr	Emission Factor Raw Material (lbs/ton)
Wet Process								
KC1	4,000	3/5/76	136,400 Solids (92,300)	Oil	77,939	493	279.8	4.1 (2.8)*
				Oil	78,630	503	288.0	4.3
		5/2/72	142,588	Gas	60,933	770	341.7	4.8
KC2	4,000	12/14/76	136,137 Solids (92,300)	Oil	57,100	710	294.9	4.4 (3.0)*
					57,012	780	324.0	4.8
		5/2/72	142,588	Gas	55,185	1,082	434.8	6.1
KC3	8,000	12/16/76	273,100 Solids (184,615)	Oil	119,072	1,180	1,023.0	7.5 (5.1)*
					108,443			
		10/15/73	292,786	Gas	99,600	2,000	1,450.6	9.9 (6.6)*
		5/2/72	276,255	Gas	90,973	1,880	1,245.5	9.0 (6.0)*

*Raw material feed of dry product excluding water

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Unit	Capacity Bbl/day	Test Date	Raw Material lbs/hr	Clinker Production Tons/hr	Fuel	Flowrate DSCFM	NO2 Emissions PPM	NO2 Emissions lbs/hr	Emission Factor Raw Material (lbs/ton)	Emission Factor Cl
Dry Process										
RC1	2,600	3/19/74			Gas	48,917	1,288	458.6	14.3	2
RC2	2,600	5/25/76	64,000	20.51	Coal	45,990	135	45.2	1.4	
					Coal	44,478	360	116.6	3.6	
		3/19/74			Gas	44,478	1,392	447.6	13.9	2
							(1,050-1,640)			
RC3	2,600	5/25/76	64,000	20.51	Coal	46,520	417	141.2	4.4	
					Coal	40,295	535	156.9	4.9	
		3/19/74			Gas	40,295	1,380	404.9	12.6	1
							(990-1,520)			
RC4	2,600	5/25/76	64,000	20.51	Coal	59,940	398	173.7	5.4	8
					Coal	~ 59,000	170	73.0	5.6	8
		3/19/74			Gas	~ 44,000	1,375	440.0	13.7	2
							(1,160-1,400)			
RC5	2,600	5/25/76	64,000	20.51	Coal	58,794	465	199.1	6.2	9
					Coal	58,800	460	196.9	6.2	9
		3/19/74			Gas	~ 48,900	1,128	401.6	12.5	19
							(920-1,200)			
RC6	3,000	11/12/75	63,000	20.19	Coal	44,462	400	129.5	4.1	0
	3,000	7/28/74	65,700	21.05	Gas	36,710	1,158	520.4	15.8	24
						17,997	1,609			

Unit	Capacity Bbl/day	Test Date	Raw Material lbs/hr	Clinker Production Tons/hr	Fuel	Flowrate DSCFM	NO2 Emissions PPM	NO2 Emissions lbs/hr	Emission Factor Raw Material (lbs/ton)	Emission Factor Clinker
Solids - Wet Process										
SW5	1,300	4/26/74	29,150	9.5	Gas	25,319	1,490 (950-1,650)	274.7	18.7	28.9
SW6	2,200	3/21/74	49,300	16.0	Gas	38,373	836 (700-900)	233.6	9.5	14.6
		5/12/70	39,720	12.9	Gas	29,681	362	78.2	3.9	6.1
SW7	2,200	5/12/70	40,610	13.1	Gas	30,948	297	66.9	3.3	5.1
		5/1/70	50,240	16.2	Gas	42,821	420	130.9	5.2	8.1
		4/29/76	49,318	16.0	Oil	38,240	330	91.9	3.7	5.7
SW8	2,200	5/12/70	38,610	12.5	Gas	27,747	535	108.1	5.6	8.6
		3/21/74	46,200	15.0	Gas	32,500	636	150.4	6.5	10.0
		4/29/76	49,641	16.1	Oil	40,900	659	196.3	7.9	12.2
SW9	2,200	3/21/74	40,400	13.1	Gas	36,333	631	166.9	8.3	12.7
		4/29/76	41,603	13.5	Oil	37,459	179	48.8	2.3	3.5
		6/11/75	41,600	13.5	Gas	36,200	1,212	319.4	15.3	23.6
Dry Process										
Blk Mtn	9,500	7/12/74	264,000	85.3	Gas	86,340	2,300	1,445.6	10.95	16.9
		6/11/75	240,000	77.5	Gas	86,340	2,230	1,401.6	11.68	18.1
		4/30/76	240,000	77.9	Oil	86,340	2,000	1,257.1	10.47	16.1

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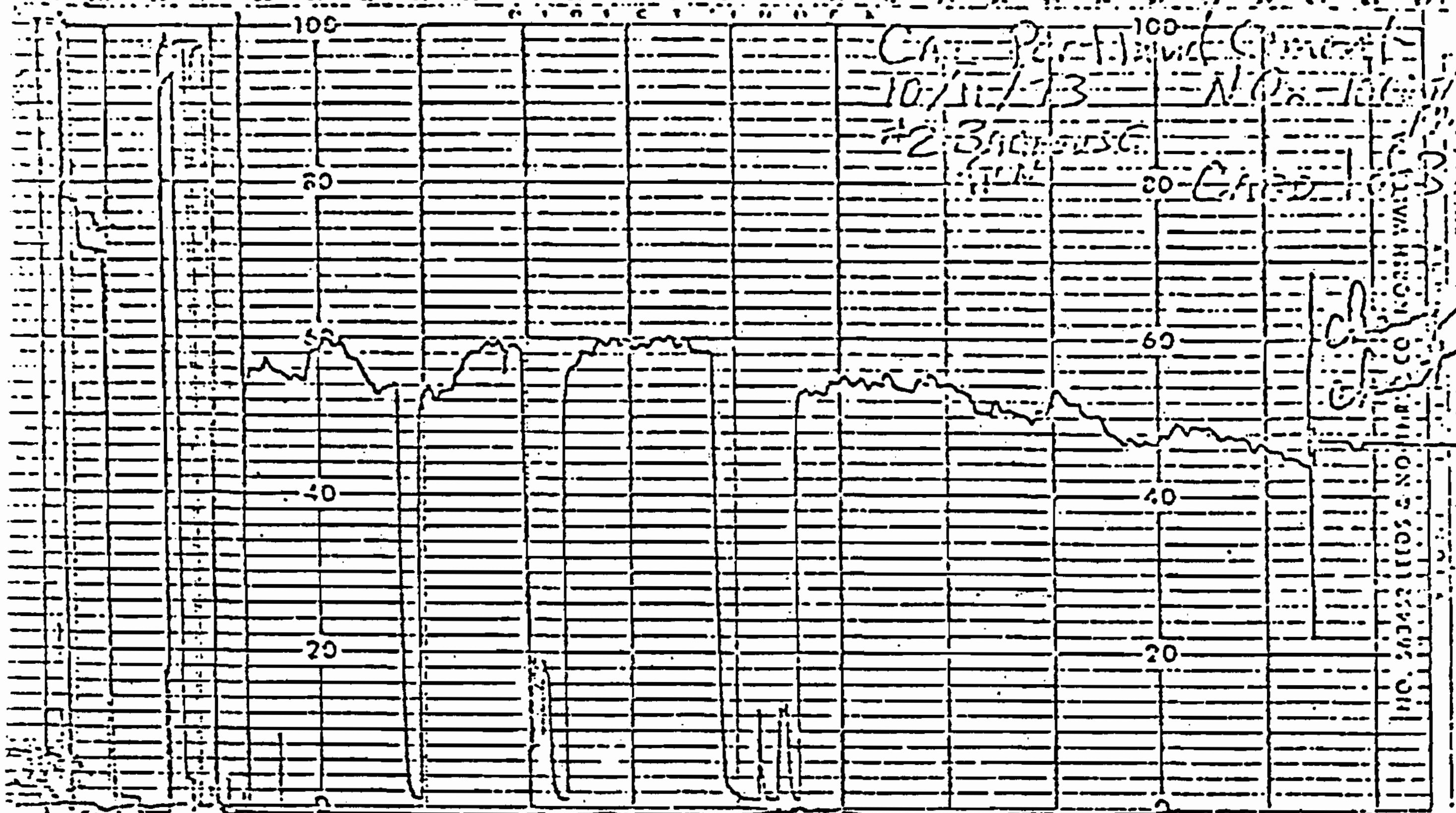

CLASSIFICATION INDEX

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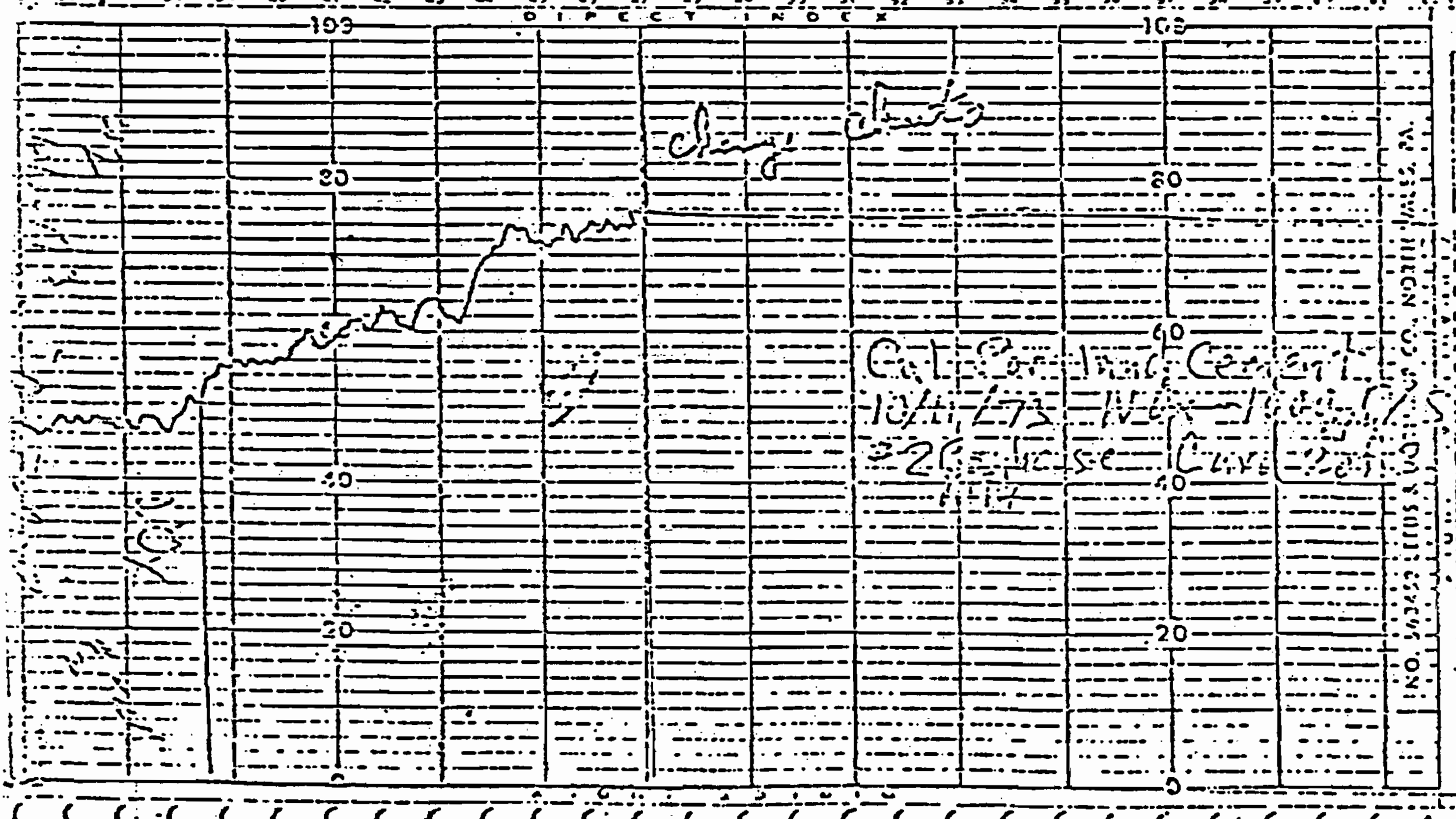

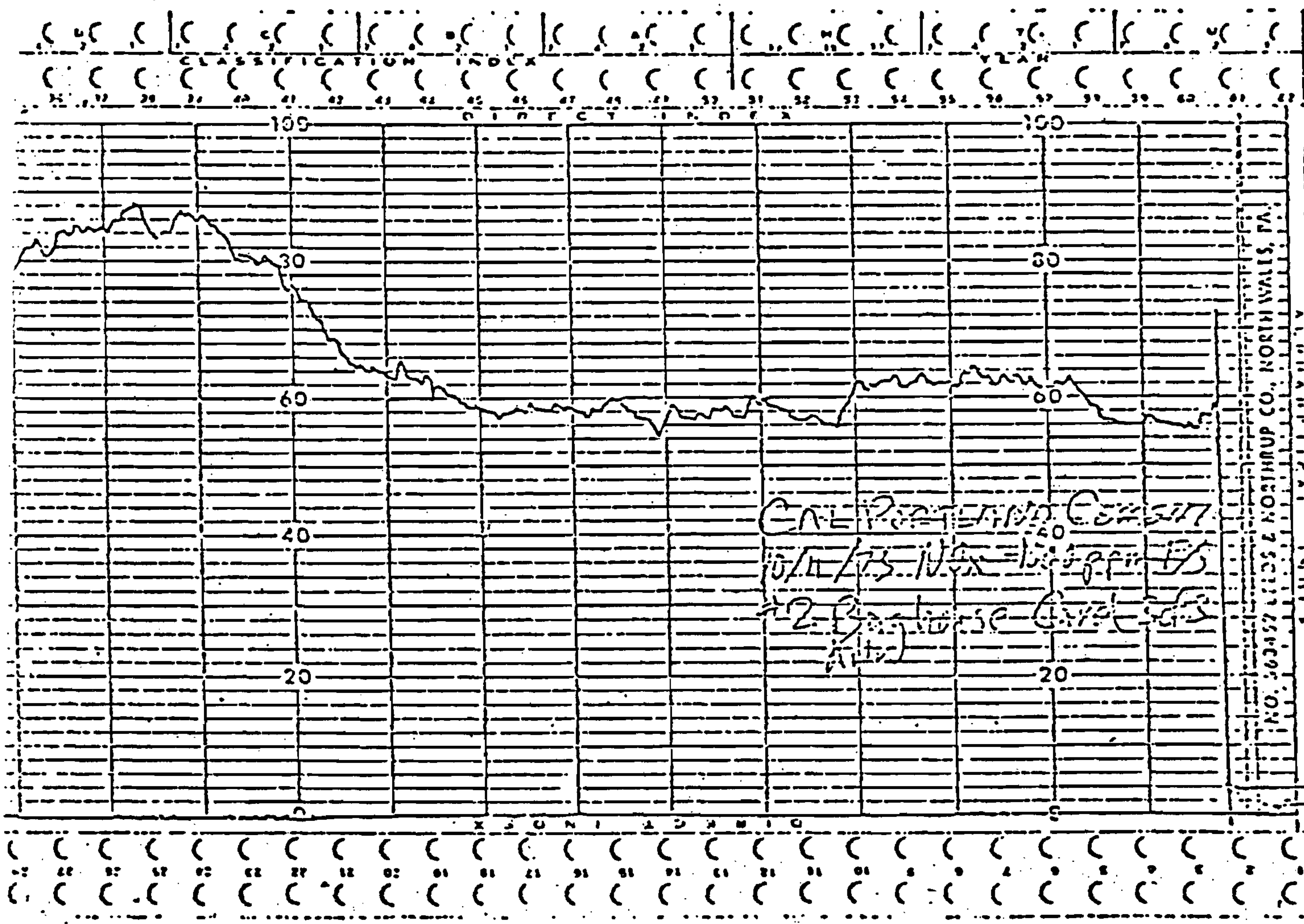
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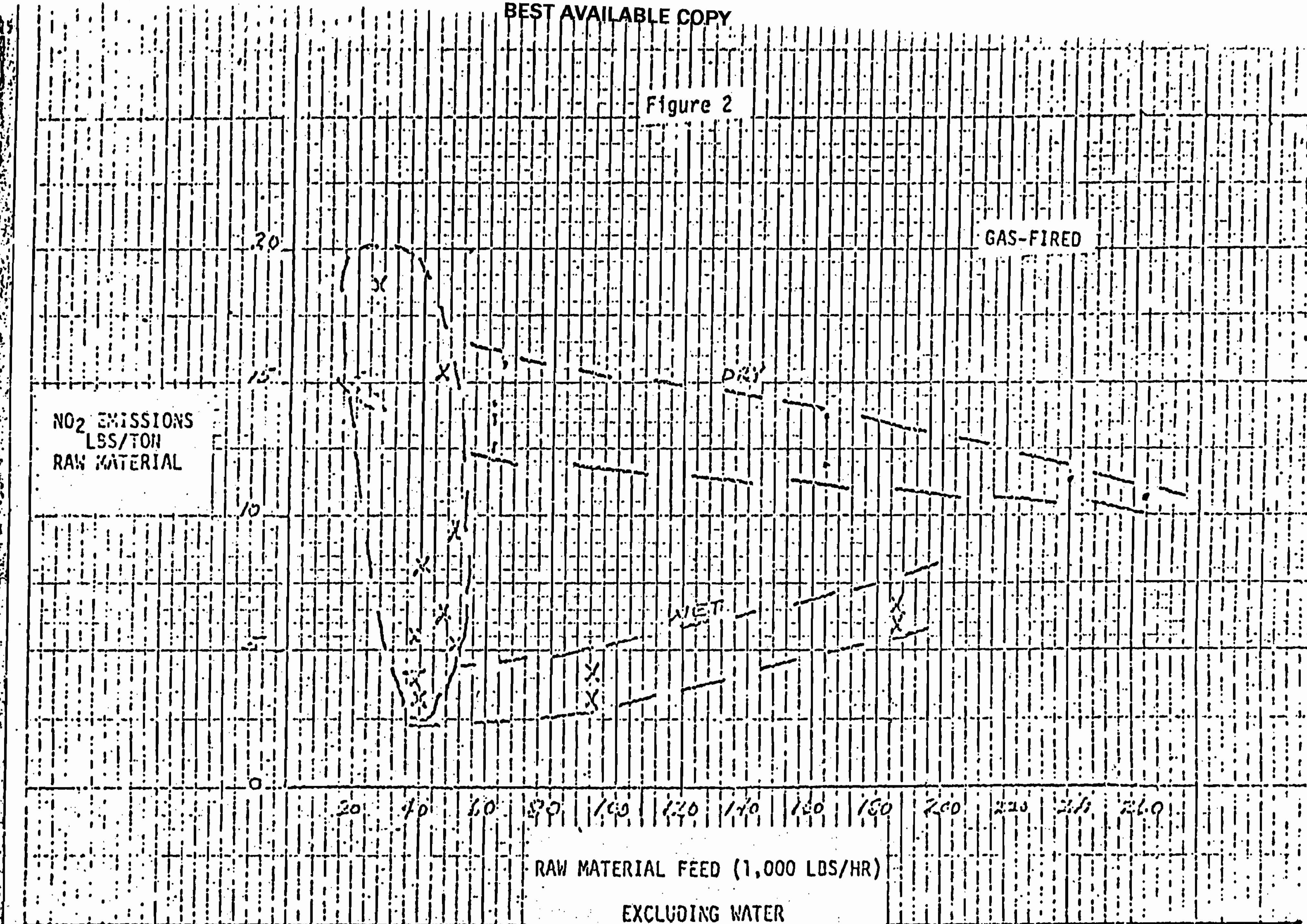


Figure 2
GAS-FIRED
NO2 EMISSIONS LBS/TON RAW MATERIAL
20
15
10
5
0
DRY
WET
20
40
60
80
100
120
140
160
180
200
220
240
260
RAW MATERIAL FEED (1,000 LBS/HR)
EXCLUDING WATER

Figure 3

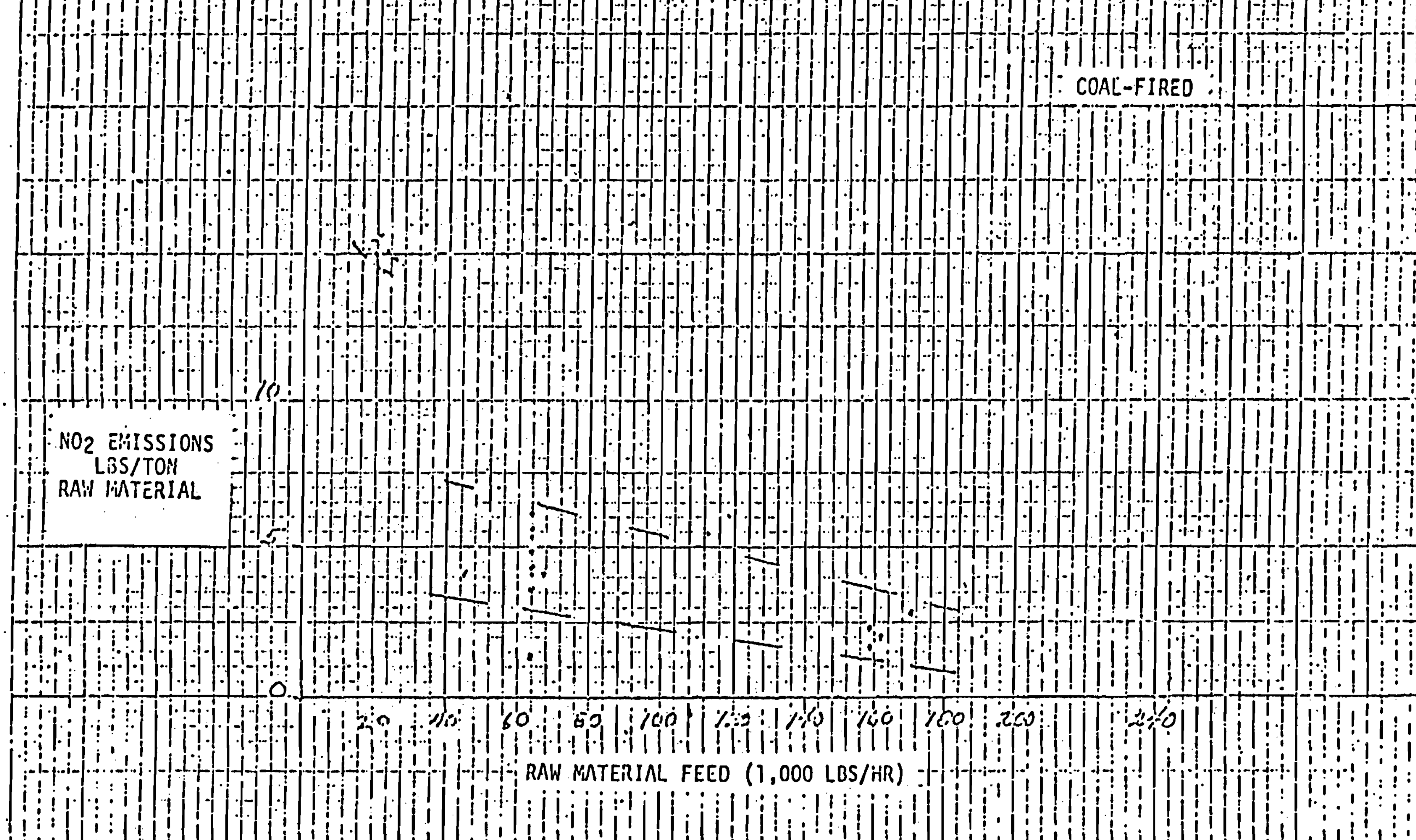
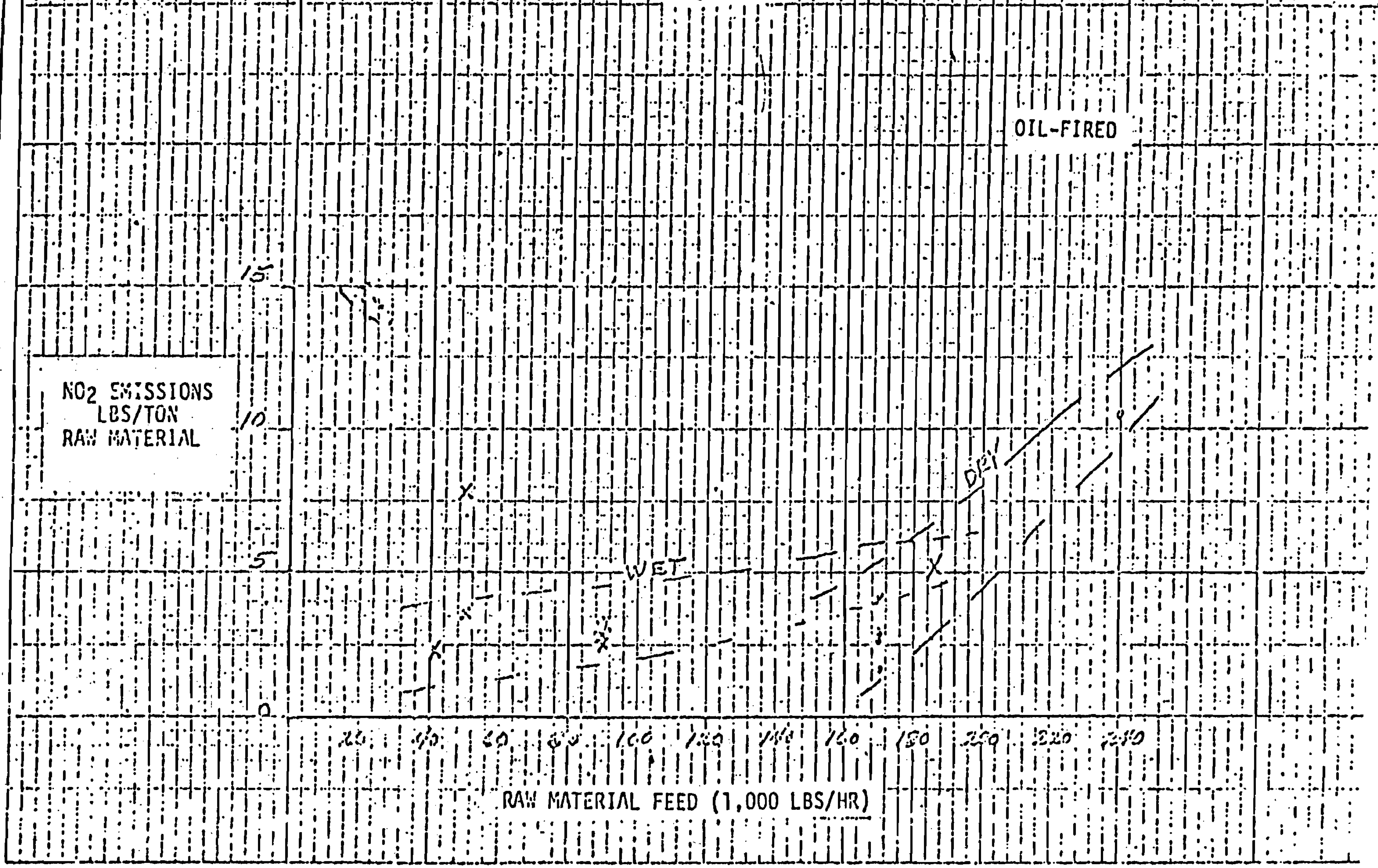

COAL-FIRED
NO2 EMISSIONS LBS/TON RAW MATERIAL
RAW MATERIAL FEED (1,000 LBS/HR)

Figure 4


OIL-FIRED
NO2 EMISSIONS
LBS/TON
RAW MATERIAL
15
10
5
0
DRY
WET
20
40
60
80
100
120
140
160
180
200
220
240
RAW MATERIAL FEED (1,000 LBS/HR)

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LONESTAR FLORIDA/PENNSUCO, INC.

Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

April 25, 1980

Mr. Jack Preece
T.R.W. Environmental Engineering Division
Progress Center
3200 E. Chapel Hill Road/Nelson Highway
P. O. Box 13000
R.T.P., N. C. 27709

RE: Lonestar Florida Pennsuco, Inc.: Coal Conversion

Dear Mr. Preece:

This letter is to supplement the above captioned application, pursuant to our conversations of April 17th and 18th, and our meeting of March 11, 1980. As we discussed, Lonestar has conducted several nitrogen oxide (NOx) emissions tests on our small Portland cement kilns.

The object of these tests was to arrive at a realistically attainable emission level of NOx, which we could adhere to and at the same time produce high quality clinker. This, we found, was a most difficult determination since our test results reveal that NOx emissions vary significantly from hour to hour. These kinds of variances can be expected with any fuel fired in a cement kiln. The test data, attached, is somewhat inconclusive. The proposed fuel conversion to coal from natural gas, however, should not increase NOx emissions, and such emissions should substantially decrease.

As you know , it is well-documented in several E.P.A. publications that little is known about NOx control technologies for Portland cement kilns. Lonestar nevertheless will make every reasonable effort to minimize these emissions and at the same time produce high quality cement clinker. With these objectives in mind, we have investigated low NOx burners, in the past, but studies have shown that the state-of-the-art has not been achieved to reduce NOx in this manner without jeopardizing product quality. (Please see attached list of references.)

We therefore propose a NOx emission level of 830 pounds per hour, from the entire Pennsuco facility. This is a reduction from existing gas-fired NOx emissions from the Pennsuco plant, which, although it can vary, has been measured as high as 903 pounds per hour as shown in our application. With respect to oil, Lonestar has used oil on only four occasions in the past three years, and each instance was for environmental testing purposes only.

Co won't meet NOx STD if Quality prod. Kenco

We believe that this level is realistic, provided it is recognized that NOx emissions tend to vary significantly as discussed above. Lonestar will adhere to this proposed level except in the event that the quality of the cement clinker becomes unacceptable.

Finally, our permit application states that the nitrogen content of our coal will be typically about 3%. I am now advised that this figure is approximately 1.7%, and the application should be adjusted accordingly.

1.2% N in coal

Please do not hesitate to contact me should you have any further questions.

Sincerely,

Albert W. Townsend

Albert W. Townsend
Coordinator of Ecological Planning

AWT/dc

CC: T. Gibbs, U.S.E.P.A.
J. Bauch, D.E.R.
E. Anderson, D.C.E.R.M.

DATE	FUEL	# NOx/HR.	TONS OF CLINKER/HR.	# NOx/TONS OF CLINKER
3/20	gas	211.5	21.25	9.95
3/20	gas	109.1	21.25	5.13
3/20	gas	107.4	21.25	5.05
3/20	gas	101.8	21.25	4.79
3/20	gas	96.7	21.25	4.55
3/20	gas	95.4	21.25	4.49
3/20	gas	91.2	21.25	4.29
3.20	gas	57.1	21.25	2.69
3/20	gas	86.5	21.25	4.07
3/20	gas	89.1	21.25	4.19
3/20	gas	124.5	21.25	5.86
3/20	gas	35.6	21.25	1.68
Average		100.49		4.73
3/21	oil	148.0	25	5.92
3/21	oil	125.8	25	5.03
3/21	oil	147.7	25	5.91
3/21	oil	140.8	25	5.63
3/21	oil	143.7	25	5.75
3/21	oil	267.6	25	10.70
3/21	oil	252.6	25	10.10
3/21	oil	114.1	25	4.56
3/21	oil	81.4	25	3.26
3/21	oil	141.3	25	5.65
3/21	oil	217.8	25	8.71
3/21	oil	233.5	25	9.34
Average		167.86		6.71
3/29	gas	156	25	6.24
3/29	gas	53	25	2.12
3/29	gas	77	25	3.08
3/29	gas	63	25	3.08
3/29	gas	95	25	2.52
3/29	gas	121	25	3.8

3/29	gas	126	25	4.84
3/29	gas	94	25	5.04
3/29	gas	59	25	3.76
3/29	gas	80	25	3.2
3/29	gas	40	25	1.6
3/29	gas	67	25	2.68
Average		85.92		3.44

4/8	oil	113.3	25	4.53
4/8	oil	128.13	25	5.13
4/8	oil	125.23	25	5.01
4/8	oil	107.53	25	4.30
4/8	oil	80.34	25	3.21
4/8	oil	105.06	25	4.20
4/8	oil	111.24	25	4.45
4/8	oil	131.43	25	5.26
4/8	oil	94.35	25	3.77
4/8	oil	114.95	25	4.6
4/8	oil	88.58	25	3.54
4/8	oil	128.54	25	5.14
Average		110.7		4.43

This nitrogen oxides cap is derived as follows:

Kiln #1 25 tons clinker/hr. x 4.7 #/ton = 117.5 #/hr.
Kiln #2 25 tons clinker/hr. x 4.7 #/ton = 117.5 #/hr.
*Kiln #3 87.5 tons clinker/hr. x 6.8 #/ton = 595 #/hr.
Total # of Nitrogen Oxides = 830 #/hr.

original NO_x STOC,

*Kiln #3 was tested in April, 1979 and test results are in the initial coal conversion submittal.

REFERENCES

1) United States Environmental Protection Agency publication, "Multimedia Assessment and Environmental Research Needs of the Cement Industry", May 1979.

2) United States Environmental Protection Agency publication, "Control Techniques for Nitrogen Oxides Emissions from Stationary Sources, Second Edition, January 1978.

3) United States Environmental Protection Agency publication, "Review of Standards of Performance for New Stationary Sources - Portland Cement Industry, March 1979.

EPA-600/7-83-045
August 1983

EVALUATION OF COMBUSTION VARIABLE EFFECTS ON NO_x EMISSIONS FROM MINERAL KILNS

by

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Contract No. 68-02-2645

EPA Project Officer: Robert E. Hall

Industrial Environmental Research Laboratory
Office of Environmental Engineering and Technology
Research Triangle Park, NC 27711

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
WASHINGTON, D.C. 20460

ABSTRACT

Results of tests performed on a lime kiln, precalciner cement kiln and conventional wet process cement kiln are presented and discussed. Where applicable, the effectiveness of excess air variations on pollutant emissions are quantified and compared to previous results. Mass balances were also calculated for the two cement kilns.

Lower excess air (oxygen reduced from 4.4 percent to 2.8 percent) was found to produce a 23 percent reduction in NO_x for the lime kiln. A linear regression of the data obtained for a conventional coal-fired wet process cement kiln predicted a 38 percent NO_x reduction when the oxygen was reduced from 2 percent to 1.5 percent. However, a regression of the data predicted a 47 percent increase in SO_2 emissions when the O_2 was lowered over the same range. Combustion modifications were not implemented on the precalciner cement kiln.

2% → 1.5% O_2
38% red. NO_x
47% inc. SO_2

A combustion tunnel was designed, fabricated and operated to determine the effect of burner operating variables on cement kiln near-flame NO_x production. The effects of combustion air preheat, carrier air dilution and fuel injection velocity were the primary variables assessed for both natural gas and coal.

At the subscale level, reducing the carrier air oxygen content from 20.9 percent to 11 percent had a significant effect on NO_x, reducing the emissions by 19 percent. Lowering the fuel injection velocity from 61.0 m/s (200 ft/sec) to 30.5 m/s (100 ft/sec) reduced NO_x by 37 percent. Reducing the combustion air temperature also has a significant impact on NO_x emissions. However, this may not be a viable control on economic grounds.

SECTION 5.0

ROTARY WET CEMENT KILN - LOCATION 9

This coal-fired wet process kiln is 127 m (415 ft.) long and 3.7 m (12 ft.) in diameter. Figure 5-1 is a sketch of a conventional process kiln. All testing was performed with the sample line located between the kiln exit and the electrostatic precipitator (ESP).

Testing was conducted at each of three conditions:

1. As found -- kiln operating under normal conditions with no attempt to control oxygen.

2. Baseline -- oxygen level maintained at nominal value.

3. Oxygen variation -- intentional variations in oxygen level.

Table 5-1 presents the kiln operating conditions (clinker rate and fuel input) and measured gaseous emissions.* Figure 5-2 is a plot of NO_x versus oxygen for all the data except those measured under kiln start-up conditions (tests 9-26 through 9-28). Also shown in this figure are the results of a linear regression between NO_x and O_2, i.e.:

$$NO_x \text{ (ppm)} = a + b \text{ (\%}O_2\text{)}$$

40%, variation NOx means due to O_2 lvl

This relationship was able to explain 39.9 percent of the data scatter (a rather weak, but still positive correlation) with the balance (60.1 percent) being due to other than the oxygen variation. Normal variations in the coal nitrogen content could also have a significant effect on NO_x emissions. Quantification of this effect would require, at least, an extensive coal sampling and analysis effort. In addition, the "burnability" of the feed (a measure of the clinker forming reactions), as determined from a detailed feed analysis, influences the temperature within the kiln and, therefore, the NO_x

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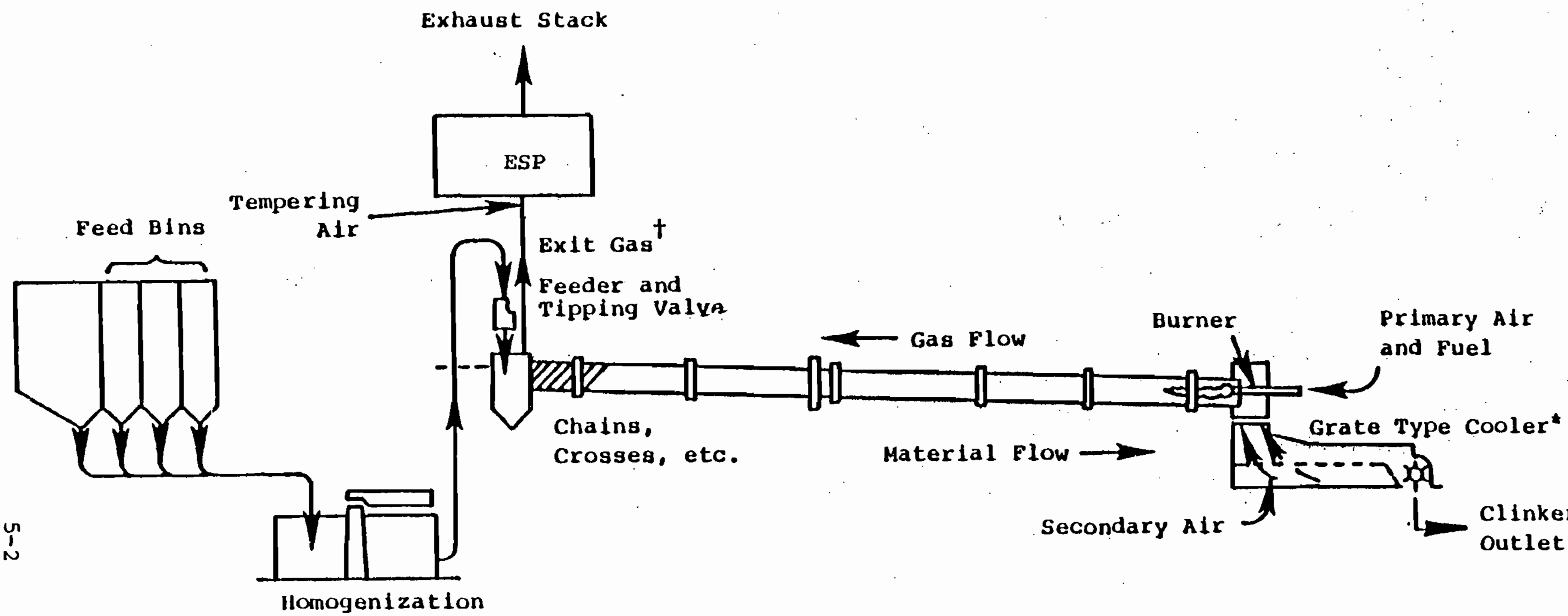
*The column headed "Input MW" represents the fuel thermal energy input to the kiln. The appropriate conversion is: MW = 0.293×10^6 Btu/hr.



*Cooling air not used for secondary air is exhausted through pollution control device to atmosphere.

†Exhaust gases pass through pollution control device to atmosphere.

Figure 5-1. Schematic of a conventional process cement kiln.

TABLE 5-1. SUMMARY OF GASEOUS EMISSIONS FROM A WET PROCESS ROTARY KILN - LOCATION 9

Test No.	Time	Date 1980	Clinker Rate kg/s	Input MW	O_2 (%)	CO_2 (%)	NO_x (ppm)	NO (ppm)	CO (ppm)	SO_2 (ppm)	Comments
9-1	11:30	8-19	7.66	--	2.8	>20	199	195	129	528	As Found
9-2	12:30	8-19	7.66	--	2.5		185	182	126	924	As Found
9-3	15:30	8-19	7.66	--	1.5		179	175	108	1,624	As Found
9-4	16:00	8-19	7.66	--	2.0		155	149	161	1,934	As Found
9-5	16:30	8-19	7.66	--	1.5		183	171	120	1,691	As Found
9-6	10:00	8-20	7.76	60.5	2.8		186	183	168	2,033	As Found
9-7	11:00	8-20	7.76	60.5	2.8		--	173	188	--	As Found
9-8	12:00	8-20	7.76	60.5	3.0		166	165	175	1,207	As Found
9-9	13:00	8-20	7.76	60.5	2.8		190	188	188	1,542	As Found
9-10	14:00	8-20	7.76	60.5	2.6		158	154	166	1,773	As Found
9-11	15:00	8-20	7.76	60.5	3.1		156	151	191	1,652	As Found
9-12	16:00	8-20	7.76	60.5	2.8		157	143	184	1,368	As Found
9-13	17:00	8-20	7.76	60.5	2.9		154	152	143	1,727	As Found
9-14	18:00	8-20	7.76	60.5	3.1		143	140	191	1,288	As Found
9-15	10:30	8-21	7.99	54.4	2.9		192	185	189	1,577	Baseline
9-16	11:00	8-21	7.99	54.4	2.9		180	175	179	1,083	Baseline
9-17	11:30	8-21	7.99	54.4	2.7		179	179	167	1,738	Baseline
9-18	12:00	8-21	7.99	54.4	2.9		198	191	159	1,865	Baseline
9-19	13:30	8-21	7.99	54.4	3.6		200	193	151	754	O_2 Variation
9-20	14:00	8-21	7.99	54.4	4.1		208	199	155	815	O_2 Variation
9-21	14:30	8-21	7.99	54.4	4.0		207	196	169	712	O_2 Variation
9-22	15:00	8-21	7.99	54.4	3.9		223	218	154	467	O_2 Variation
9-23	15:30	8-21	7.99	54.4	3.9		206	195	168	881	O_2 Variation
9-24	16:00	8-21	7.99	54.4	4.6		279	269	159	244	O_2 Variation
9-25	16:30	8-21	7.99	54.4	2.5		136	126	296	788	O_2 Variation
9-26	7:30	8-23	--	--	1.2		224	214	116	1,213	Kiln under start-up
9-27	7:45	8-23	--	--	0.9	>20	201	197	1,791	>2,000	Kiln under start-up
9-28	8:00	8-23	--	--	1.2	19.8	325	318	145	982	Kiln under start-up

NO_x, NO, CO and SO_2 corrected to 3% O_2, dry.

NO_x (ng/J) = NO_x (ppm) · 0.654, includes CO_2 generation in kiln.

NO (ng/J) = NO (ppm) · 0.654.

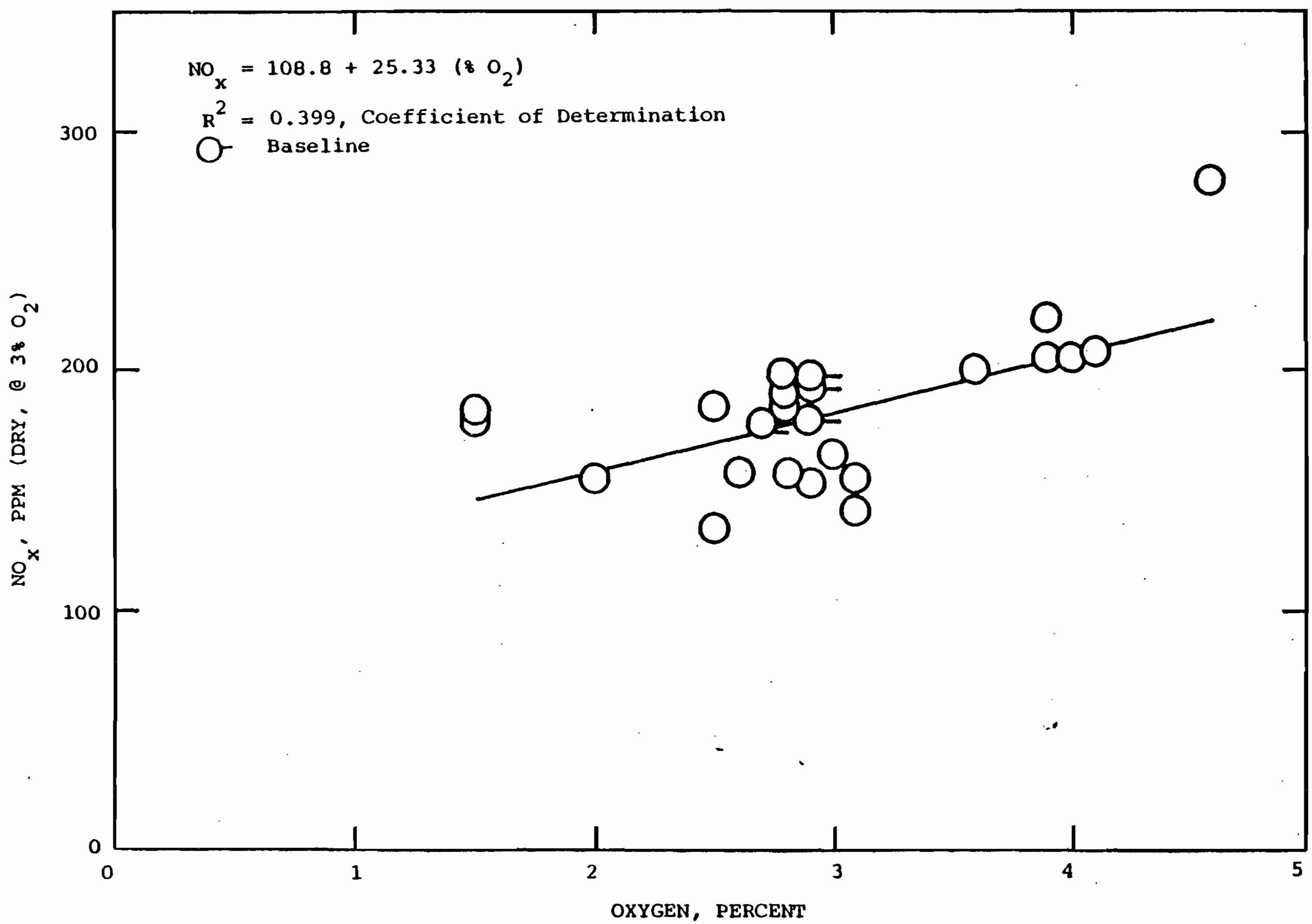


Figure 5-2. Variation of NO_x with Kiln Exit Oxygen, Location 9 Wet Process Cement Kiln

emissions. Based on the linear regression a NO_x reduction of 38 percent is predicted when the oxygen level is lowered from 2.9 percent (baseline average) to 1.5 percent.

Similarly, Figure 5-3 depicts the effect of oxygen on SO_2 emissions. The linear regression between SO_2 and O_2 is also noted and shows a decrease in SO_2 with an increase in O_2. Also, the linear regression shows that the variation in O_2 explains 43.6 percent of the variation in SO_2. This relationship predicts a 46.6 percent increase in SO_2 concentration if the operating O_2 is reduced from 2.85 percent (baseline average) to 1.5 percent.

SO_2 decreases as O_2 increases 44% vari SO_2 explained

Normal variations in coal and feed sulfur contents could have a significant effect on kiln SO_2 emissions. As was discussed for NO_x vs. O_2, quantification of this effect would require an extensive program involving the analysis of many fuel and feed samples and their relationship to the measured SO_2 concentration.

Normal variations in process operation (e.g., burning zone temperature, feed composition and fuel properties) can also affect both the NO_x and SO_2 emissions. Indeed, a linear regression performed on the NO_x and O_2 data measured during a three-hour time period on the same day (Tests 9-19 through 9-25) was able to explain 88.4 percent of the NO_x data scatter. This regression conducted with data obtained over a short period of time, when compared with the regression of all the data, illustrates that normal variations in feed and fuel properties and kiln conditions can affect the long-term relationships between NO_x, SO_2, and oxygen.

The purpose of developing the linear regressions for NO_x and SO_2 was to determine the extent to which they were related to a single independent variable, namely O_2. It was recognized that this procedure would not consider the effects of other potentially significant variables. In combustion devices where there is direct contact between the combustion products and the feed, there is some degree of interaction between the streams such that a regression in terms of multiple independent variables would be necessary to more completely describe the measured pollutant concentrations in terms of operational conditions.

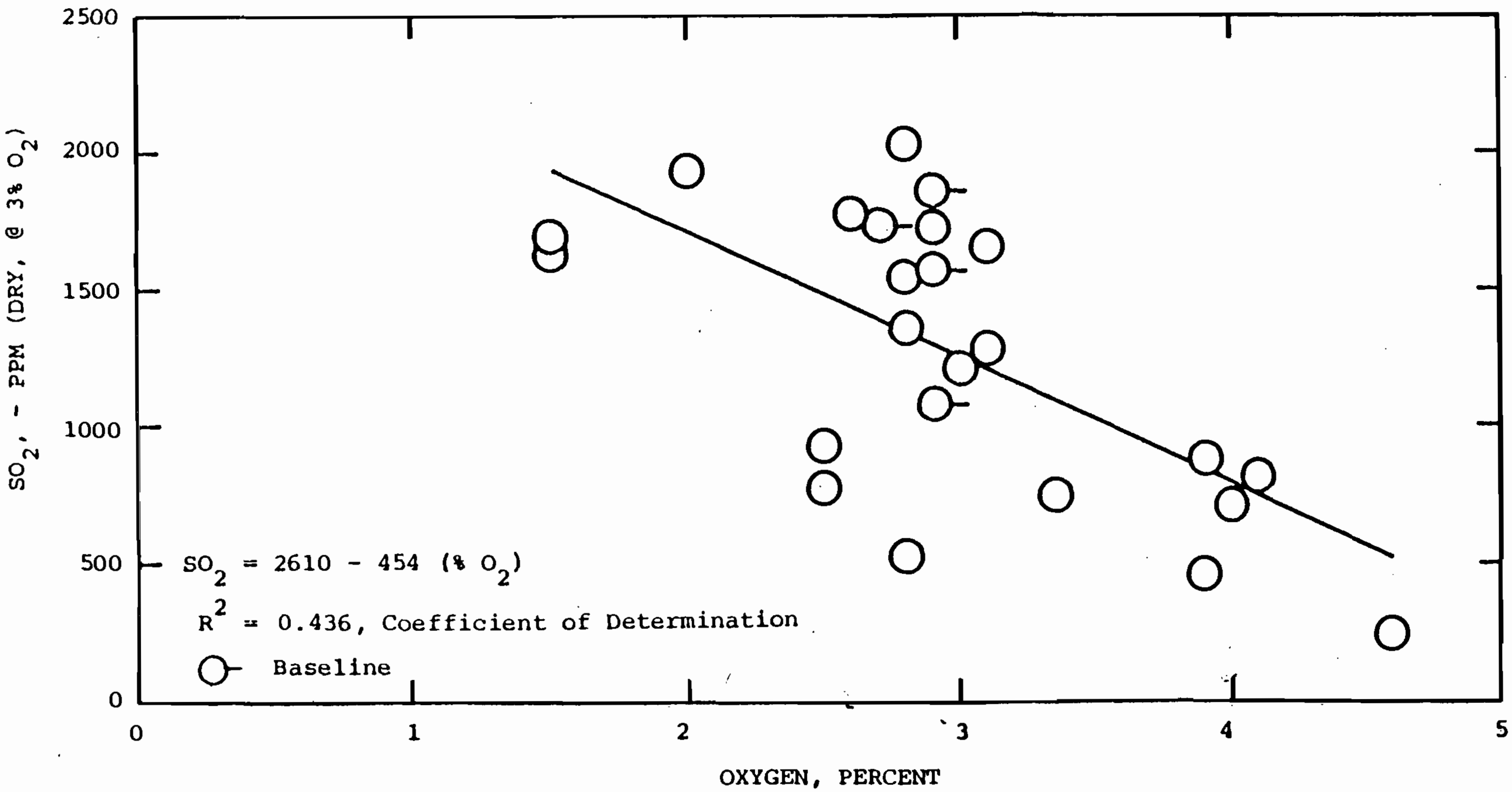


Figure 5-3. Variation of SO_2 with Kiln Exit Oxygen, Location 9 Wet Process Cement Kiln

The SO_2 dependence suggests a reaction between SO_2 and feed alkali components in the presence of oxygen. Laboratory and full-scale tests (Reference 5) have also shown that water vapor speeds up the reaction between SO_2 and alkali. In this respect the feed is performing as a flue gas desulfurization agent (Reference 6), i.e.:

$$SO_2(g) + 0.5\ O_2(g) + CaCO_3(s) + 2\ H_2O(g) \rightarrow CaSO_4 \cdot 2\ H_2O(s) + CO_2(g)$$

where

g = gas

s = solid

The above global reaction indicates that both oxygen and water vapor are required for the reaction between SO_2 and limestone (or lime). H_2O needed in reaction

Triplicate particulate runs were performed upstream of the ESP during tests 9-1, 9-4 and 9-18. The solid particulate results were 10,062, 11,318 and 12,023 ng/J (23.40, 26.32 and 27.96 lb/10^6 Btu). No particulate measurements were made dowhstream of the ESP.

On August 20, 1980, hourly samples were obtained of coal, kiln feed, clinker and precipitator catch for the express purpose of performing constituent mass balances. The sample analysis results are shown in Tables 5-2 and 5-3. (An oxide analysis of the coal ash was not performed.) X-ray fluorescence (XRF) was used by the plant for the elemental analyses. The procedures contained in ASTM C-114 were followed including equipment certification with NBS standards. In addition, a single coal sample was analyzed on both a proximate and ultimate basis (Table 5-4). As noted from Table 5-2 the coal fuel was the only source of sulfur since none was measured in the dry feed.

In addition to the coal consumption rate and clinker production rate, the precipitator catch was also measured. Not measured, however, was the kiln feed rate. This quantity was estimated on the basis that 1.67 kg of dry feed is required to produce 1 kg of clinker. This value was taken from previous tests on a natural gas-fired wet kiln (Reference 1) and includes the evolution of CO_2 gas and entrainment of a portion of the feed by the combustion

TABLE 5-2. KILN MATERIAL ANALYSIS FOR WET PROCESS CEMENT KILN - LOCATION 9

	Weight Percent (Standard Deviation)		
	Dry Feed	Clinker	Precipitator Dust
SiO_2	13.46 (0.12)	20.44 (0.20)	15.27 (0.70)
Al_2O_3	3.45 (0.13)	5.90 (0.14)	4.63 (0.27)
Fe_2O_3	1.89 (0.14)	4.10 (0.17)	1.78 (0.11)
CaO	41.82 (0.28)	64.19 (0.23)	36.06 (1.73)
MgO	2.26 (0.14)	3.65 (0.19)	2.59 (0.19)
SO_3	0	0.23 (0.09)	8.08 (0.31)
K_2O	0.53 (0.01)	0.57 (0.12)	2.81 (0.47)
TiO_2	0	0.27 (0.02)	0
Mn_3O_4	0	0.02 (0.01)	0
P_2O_5	0	0.01 (0.01)	0
Ignition Loss*	36.43 (0.10)	0	21.93 (1.05)
Total	99.84	99.38	93.15

*Weight loss due to carbonate decomposition.

TABLE 5-3. COAL PROXIMATE ANALYSES FOR WET PROCESS CEMENT KILN - LOCATION 9

Average (Standard Deviation)

Volatiles*	37.7 (0.59)
Ash*	16.3 (3.60)
Fixed Carbon*	42.8 (3.74)
Sulfur*	3.27 (0.21)
Btu/lb	11,917 (107)
kJ/kg	27,719 (249)

*Weight percent, dry basis

TABLE 5-4. COAL FUEL ANALYSIS FOR LOCATION 9 WET PROCESS CEMENT KILN

TEST 9-3

Proximate Analysis	As Rec'd.	Dry Basis	Ultimate Analysis	As Rec'd.	Dry Basis
%Moisture	2.38	xxxxx	%Moisture	2.38	xxxxx
%Ash	13.39	13.72	%Carbon	65.88	67.49
%Volatile	36.08	36.96	%Hydrogen	4.61	4.72
%Fixed Carbon	48.15	49.32	%Nitrogen	1.17	1.20
	100.00	100.00	%Chlorine	0.10	0.10
			%Sulfur	3.43	3.51
Btu/lb.	12,004	12,297	%Ash	13.39	13.72
kJ/kg	27,921	28,603	%Oxygen (diff.)	9.04	9.26
%Sulfur	3.43	3.51		100.00	100.00

products. The oxide analysis of a coal with a similar ash content was used as an input stream in the mass balances.

Mass balances were performed for aluminum, silicon, iron, calcium, magnesium, potassium and sulfur using the measured oxide concentrations in the kiln feed, clinker and precipitator catch. As previously mentioned a coal ash analysis was assumed since none was made on the coal actually used. In addition, the average flue gas SO_2 volume concentration measured during the same time period was converted to an equivalent sulfur outlet stream on a weight basis. The overall approach does not account for particulates passing through the ESP and assumes that the gaseous SO_2 is not converted to other sulfur compounds within the ESP. (With respect to ESP collection efficiency, a previous KVB test on a wet kiln (Reference 1) demonstrated an ESP collection efficiency of 99.59 percent.)

The mass balance results are shown in Table 5-5 for each individual constituent and for all the constituents. As noted, the largest difference was for iron oxide where the outlet streams exceeded the inlet streams by 29.5 percent. Part of this difference could be due to kiln metal material loss which would increase the iron content of the outlet streams (clinker and precipitator catch). Based on the sulfur mass balance it is estimated that the coal sulfur is distributed as follows:

	S in Coal
Clinker	10.3%
Precipitator Catch	23.8%
Flue Gas	54.5% — emitted
Unaccounted	11.4%
	100.0%

Thus, for this particular kiln only 54.5 percent of the coal sulfur is emitted as SO_2.

Also noted in Table 5-5 is that the overall mass balance for the seven constituents is within 4 percent.

TABLE 5-5. MASS BALANCES FOR WET PROCESS CEMENT KILN - LOCATION 9

Constituent	In Mg/d	In (tons/day)	Out Mg/d	Out (tons/day)	% Difference*
Al_2O_3	40.1	(44.2)	41.4	(45.6)	3.2
SiO_2	152.1	(167.7)	143.0	(157.6)	-6.0
Fe_2O_3	21.7	(23.9)	28.1	(31.0)	29.5
CaO	468.2	(516.1)	443.9	(489.3)	-5.2
MgO	25.4	(28.0)	25.5	(28.1)	0.4
K_2O	5.96	(6.57)	5.03	(5.55)	-15.6
S	5.98	(6.59)	5.30	(5.84)	-11.4
Total	719.4	(793.1)	692.2	(763.0)	-3.8

$$^{*}\frac{(\text{Out}-\text{In})}{\text{In}} \times 100$$

The kiln heat rate varied from 7897 kJ/kg (6.8×10^6 Btu/ton clinker) to 6812 kJ/kg (5.9×10^6 Btu/ton clinker) during the test program. These values are at or below the average of 7897 kJ/kg (6.8×10^6 Btu/ton clinker) reported for a 1973 survey of wet process kilns (Reference 4).

The stack losses were computed for several of the tests and the results presented below:

Test	O_2, %, dry	Stack Loss, % of Fuel Input
9-18	2.9	11.9
9-19	3.6	12.2
9-20	4.1	12.4
9-24	4.6	12.6
9-25	2.5	11.7

As noted, the stack loss decreases (thermal efficiency increases) as the operating O_2 is reduced.

SECTION 6.0

SUBSCALE CEMENT KILN STUDIES

The objectives of the laboratory program are to identify the mechanisms of NO_x formation in the "near burner" zone within a cement kiln and to determine possible methods for the control of NO_x emissions. The results would provide guidance for the field modification of a pilot-scale unit to demonstrate advanced NO_x control approaches.

6.1 LABORATORY FACILITY

A lab-scale model of a typical cement kiln burner and furnace, capable of firing natural gas or pulverized coal, was constructed in KVB's Combustion Laboratory. The key variables investigated were fuel injection velocity, furnace temperature, preheat temperature, fuel carrier oxygen concentration, and excess air. No product was made by the furnace.

The test furnace is shown in Figure 6-1. By using a different size refractory, the furnace inside diameter can be made either 5 or 8 inches (0.127 or 0.203 m). In addition, refractories of two different thermal conductivities were used to vary the furnace temperature. These insulations were Kaiser Purotab Coarse* (high density, high thermal conductivity, 97 percent alumina) and Kaiser Purolite 30* (low density, low thermal conductivity, 54 percent alumina). At 1500°F (1089 K) the ratio of the thermal conductivities is 2.8. In subsequent discussions these insulations are referred to as "HD" and "LD", respectively. The secondary combustion air is admitted through two concentric annuli. The flow can be biased to one or the other annulus, and it is also possible to preheat one stream and not the other. The fuel carrier can be air or nitrogen, or a combination of the two. Pulverized coal, when fired, is fed to the injection pipe by a Vibra-screw feeder. Figure 6-2 shows the furnace and its ancillary equipment. Flue

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*Mention of trade names or products does not constitute endorsement by EPA.

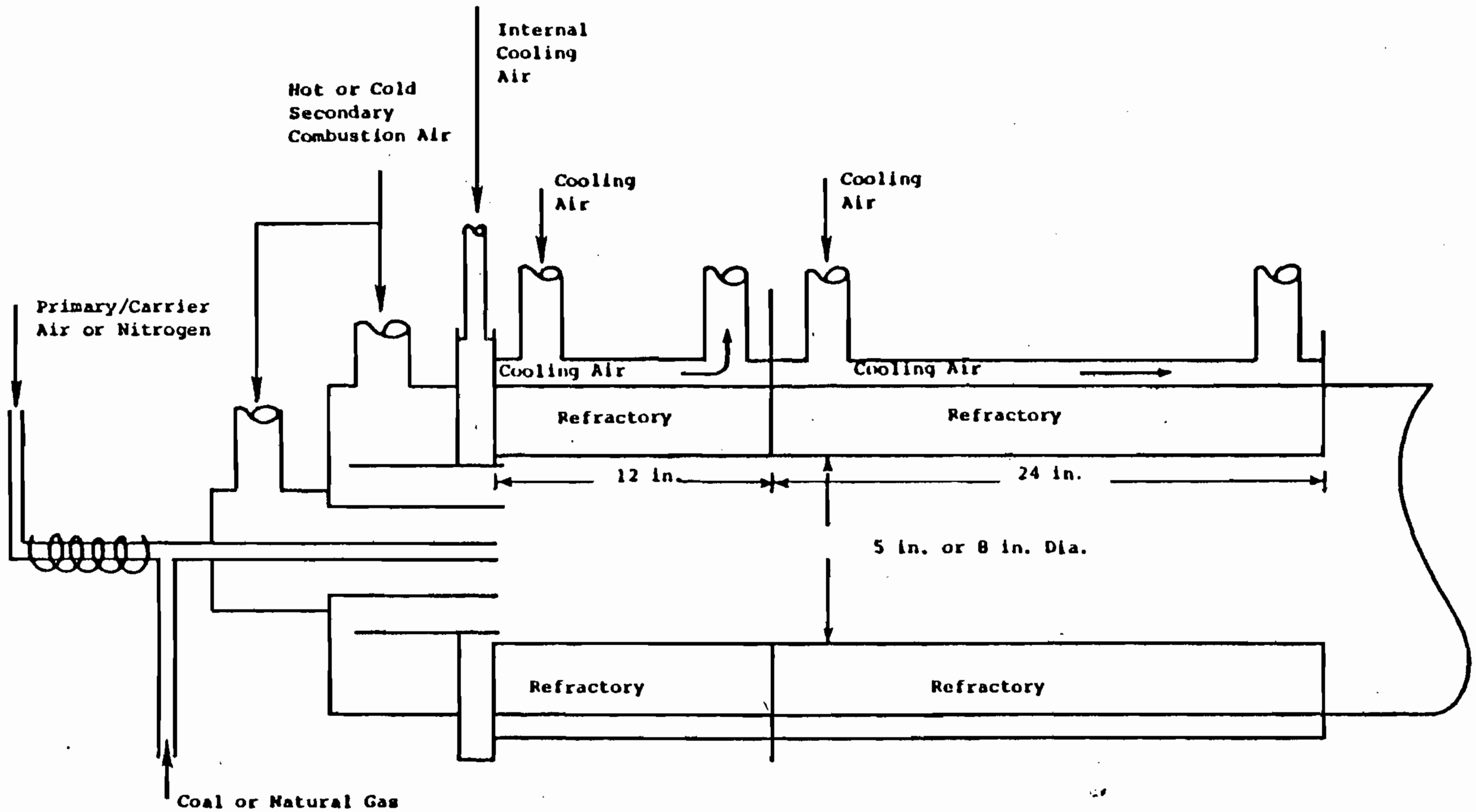


Figure 6-1. Schematic of Subscale Test Furnace

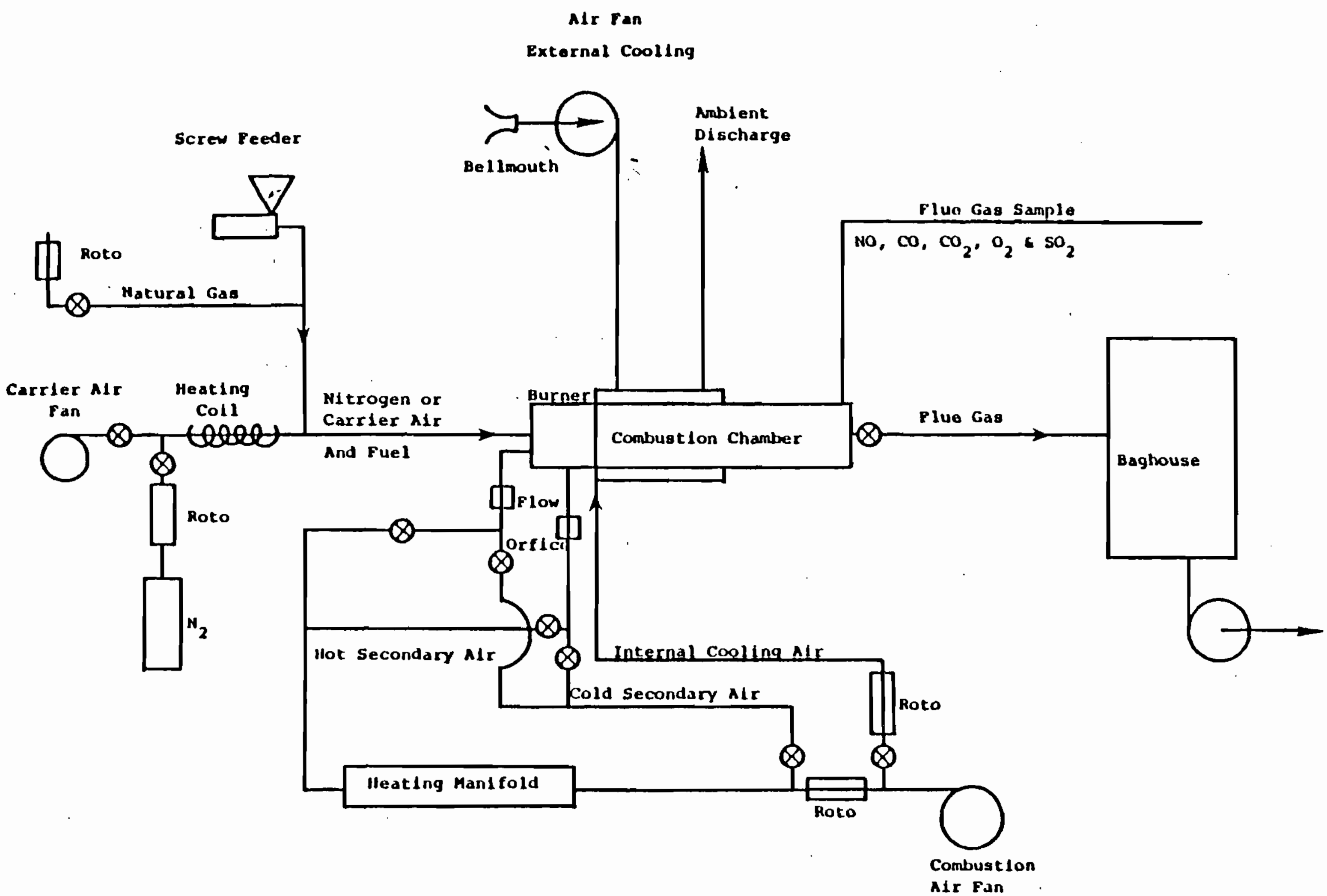


Figure 6-2. Schematic of test facility

gas is drawn from the stack and fed to continuous NO/NO_x, CO, CO_2, and SO_2 analyzers. Table 6-1 is a listing of the measurement equipment. All mass flows supplied to the furnace were monitored.

The burners used in this program for both fuels were straight sections of pipe of differing diameter. The diameters ranged from 3/16" (4.8 mm) to 1" (25.4 mm) and were used to vary the fuel injection velocity at constant heat input rate.

A combustion preheater was added to the existing test facility. This natural gas-fired preheater is supplied with air at about 900°F (756 K) from the electric heating manifold (shown in Figure 6-2) and increases the combustion air temperature to 1600°F (1144 K). Pure oxygen is added at the discharge to bring the oxygen concentration to 21 percent. The testing capabilities of the cement kiln simulation facility are primarily as follows:

- Fuel - pulverized coal, natural gas
- Combustion air preheat - 80-900°F (300-756 K) (electric preheat) - 1600°F (1144 K) (combustion preheat)
- Fuel injection velocity - 10-900 ft/sec. (3.1-274 m/s)
- Heat input - up to 230,000 Btu/hr (0.07 MW_t)
- Burner surface heat release rate - 660,000 - 1,760,000 Btu/ft^2-hr (0.018-0.048 MW_t/m^2)

The natural gas injection velocity and coal carrier gas injection velocity were calculated on the basis of their measured mass flow rate, injector area and the assumption of standard temperature and pressure at the injection plane.

Table 6-2 contains two ultimate analyses of the coal used in the program. This coal is classified as a high volatile "A" bituminous. No analysis was made of the natural gas fuel.

6.2 TEST RESULTS

This section will describe the scope of tests completed, the most significant data, and provide a summary of the key variables identified in the laboratory to affect NO_x formation in cement kilns.

TABLE 6-1. ANALYTICAL INSTRUMENTATION EMPLOYED - LABORATORY TEST FURNACE

Emission Species	Measurement Method	Manufacturer	Model No.
Oxygen	Fuel Cell	Teledyne	720P4
Carbon Dioxide	NDIR	Horiba	PIR2000
Carbon Monoxide	NDIR	Horiba	PIR2000
Nitrogen Oxides	Chemiluminescent	Thermo Electron	10A
Sulfur Dioxide	UV Spectrometer	Du Pont	411

TABLE 6-2. COAL ULTIMATE ANALYSES - LABORATORY TEST FURNACE

As Received

	Sample 1	Sample 2
Moisture	3.85	3.51
Carbon	71.31	73.54
Hydrogen	4.79	4.88
Nitrogen	1.29	1.18
Chlorine	0.04	0.05
Sulfur	1.01	1.05
Ash	8.97	7.63
Oxygen (diff)	8.74	8.16
Btu/lb	12,698	13,019
kJ/kg	29,536	30,282

Test variables examined during this program included:

- Combustion air preheat
- Oxygen concentration in carrier air
- Furnace wall temperature
- Furnace heat release rate
- Fuel injection velocity
- Furnace O_2

A review of the important results obtained during the program is presented below.

Figure 6-3 presents NO_x as a function of injection velocity for natural gas fuel with air carrier and with N_2 carrier. The data show that NO_x emissions are higher with air carrier than with N_2 carrier. The slope of the NO_x vs. fuel injection velocity curve is also greater with air carrier. This apparently results from the improved fuel/oxidant mixing when oxidant is present in both the fuel jet and the secondary air stream. The flame thus burns oxidant rich, and more O_2 is available to form NO. Another possible factor is the quenching effect of the nitrogen resulting in a reduced combustion temperature.

This effect is also noted for coal fuel as shown in Figure 6-4 which demonstrates the NO_x reduction measured when the carrier (primary) stream oxygen content is reduced by the addition of N_2. On a full-scale kiln this effect could be implemented by replacing a portion of the carrier air stream with recirculated flue gas products or other inert gas.

Figure 6-5 illustrates the effect of furnace temperature upon NO_x emissions with a pure gas fuel jet, i.e., without primary air. With high-density (high thermal conductivity) refractory and no preheat, NO_x emissions are low and the NO_x vs. injection velocity slope is very small. Preheated combustion air (800-900°F--700-756 K) in the same furnace increases NO_x emissions and the slope. When low density (low thermal conductivity) refractory was used with air preheat, the NO_x and the slope increased further reflecting a more intense and hot combustion.

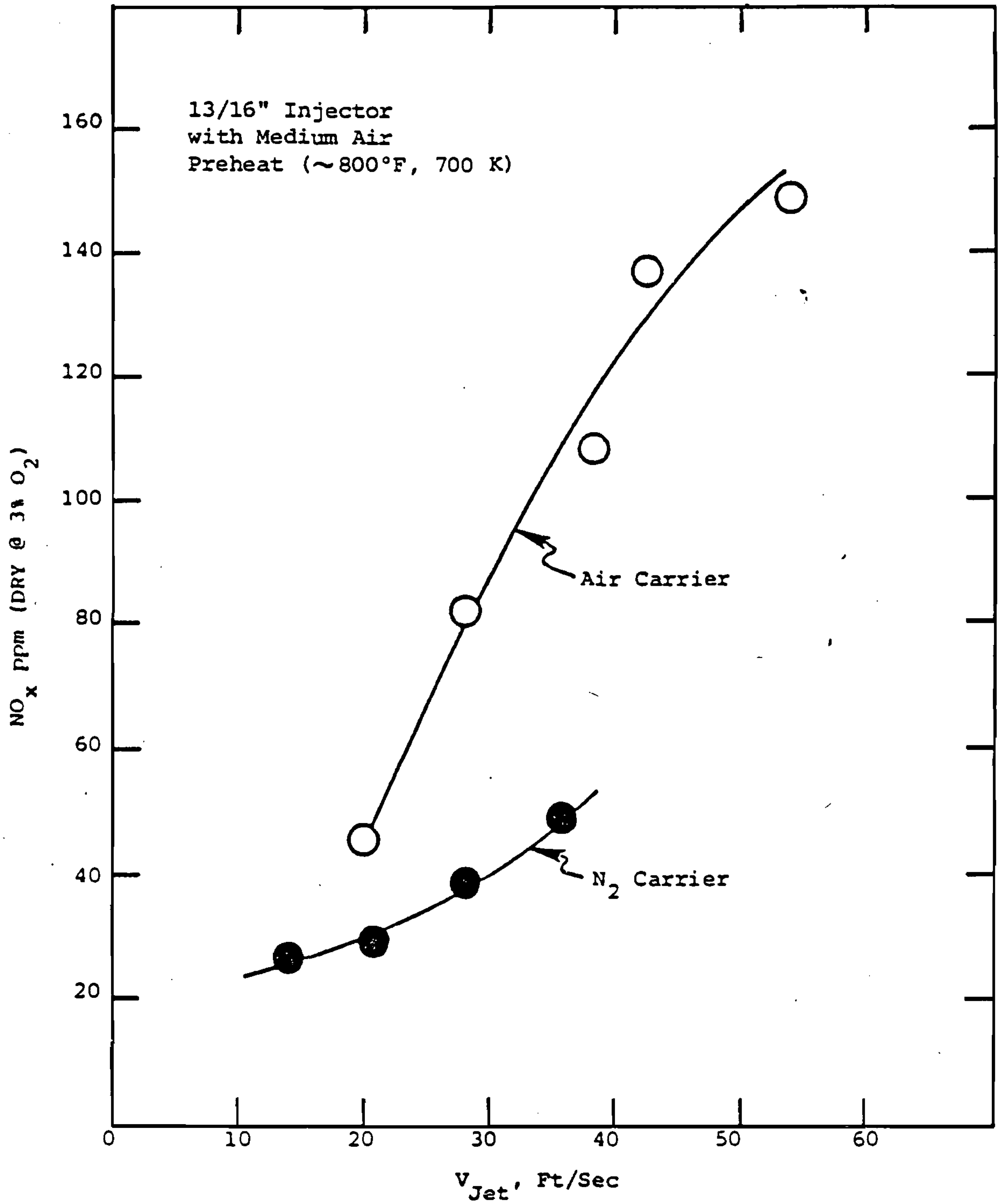


Figure 6-3. NO_x vs. Injection Velocity for Air and N_2 Carriers
Gas Fuel - 8" Furnace - HD Insulation.

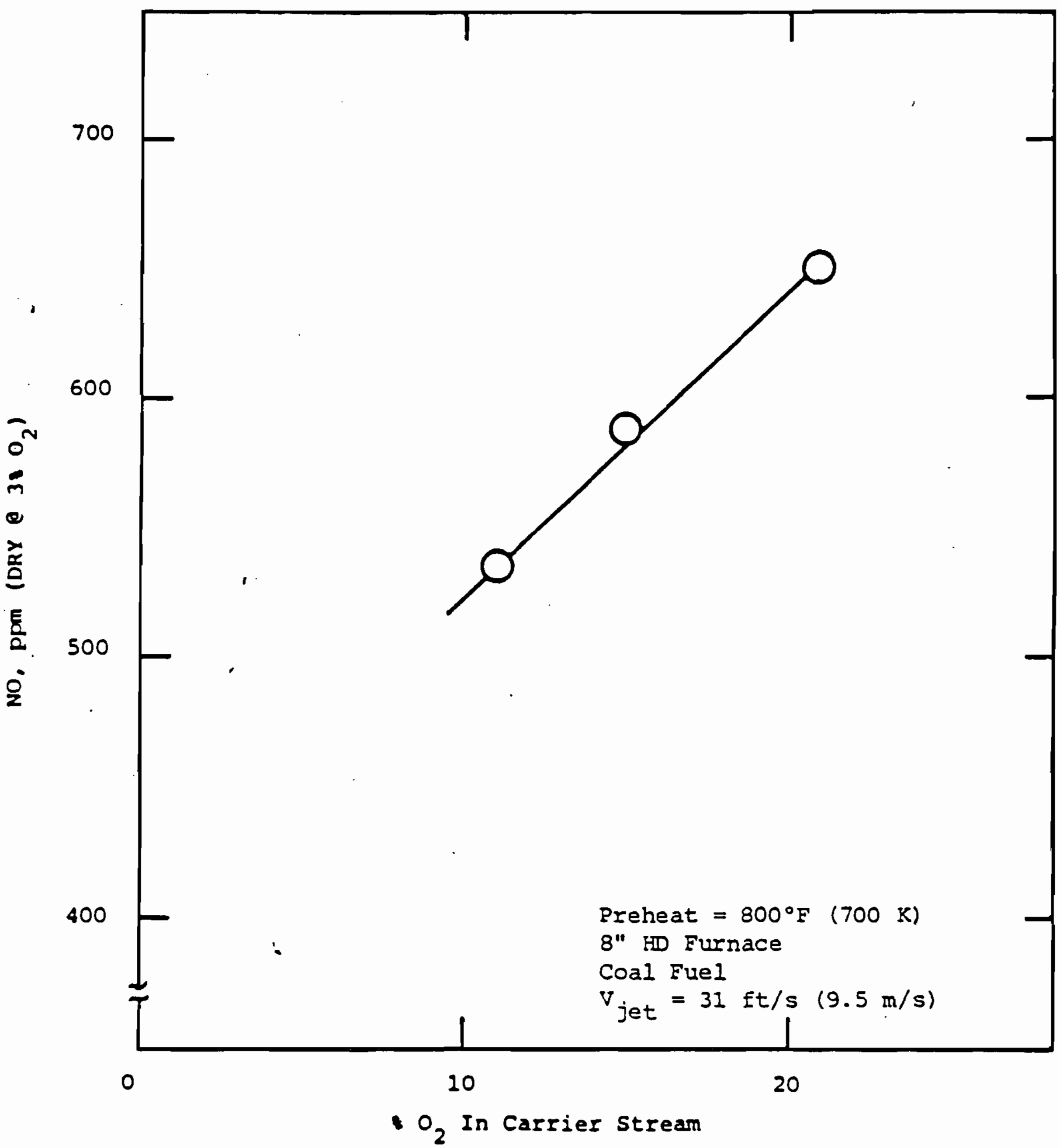


Figure 6-4. Effect of Carrier O_2 on NO_x

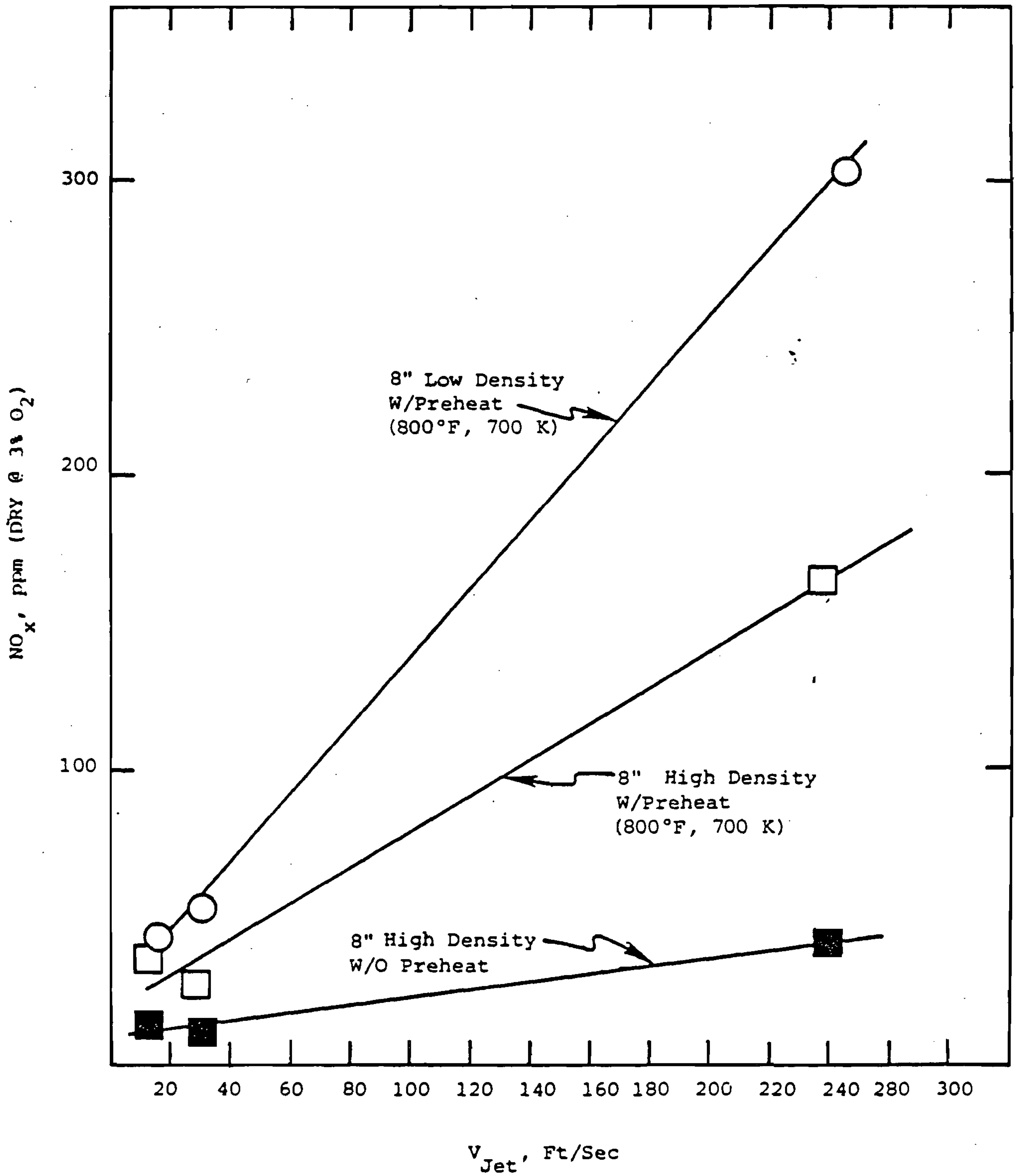


Figure 6-5. NO_x vs. Injection Velocity - Natural Gas Only.

Figure 6-6 shows the effect of preheat on NO_x emissions from coal. At the same heat input (~200,000 Btu/hr--0.06 MW_t) and injection velocity (52-55 ft/sec--15.9-16.7 m/s), a moderate level of preheat increases the NO_x emissions 40 to 60 percent, depending on excess O_2. As with the gas tests, the preheated air temperature was 800-900°F (700-756 K).

Figure 6-7 shows NO_x emissions as a function of injection velocity for gas fuel. The injection velocities were changed by varying the injector diameters. The data are presented for three levels of combustion air preheat - none, ~800°F (700 K), and ~1600°F (1144 K). The figure clearly shows the effect of high preheat upon NO_x formation. The data at high preheat suggests that the NO_x decreases at very high fuel injection velocities. This effect may be due to the decreased gas residence time within the combustor which would inhibit NO_x production. Another possible explanation would be that at very high fuel injection velocities, the mixing is so rapid that the combustion would correspond to a premixed flame for which the maximum NO_x would occur at 0 percent excess air.

The curve shown at high preheat is a quadratic regression of NO_x as a function of fuel injection velocity, i.e.:

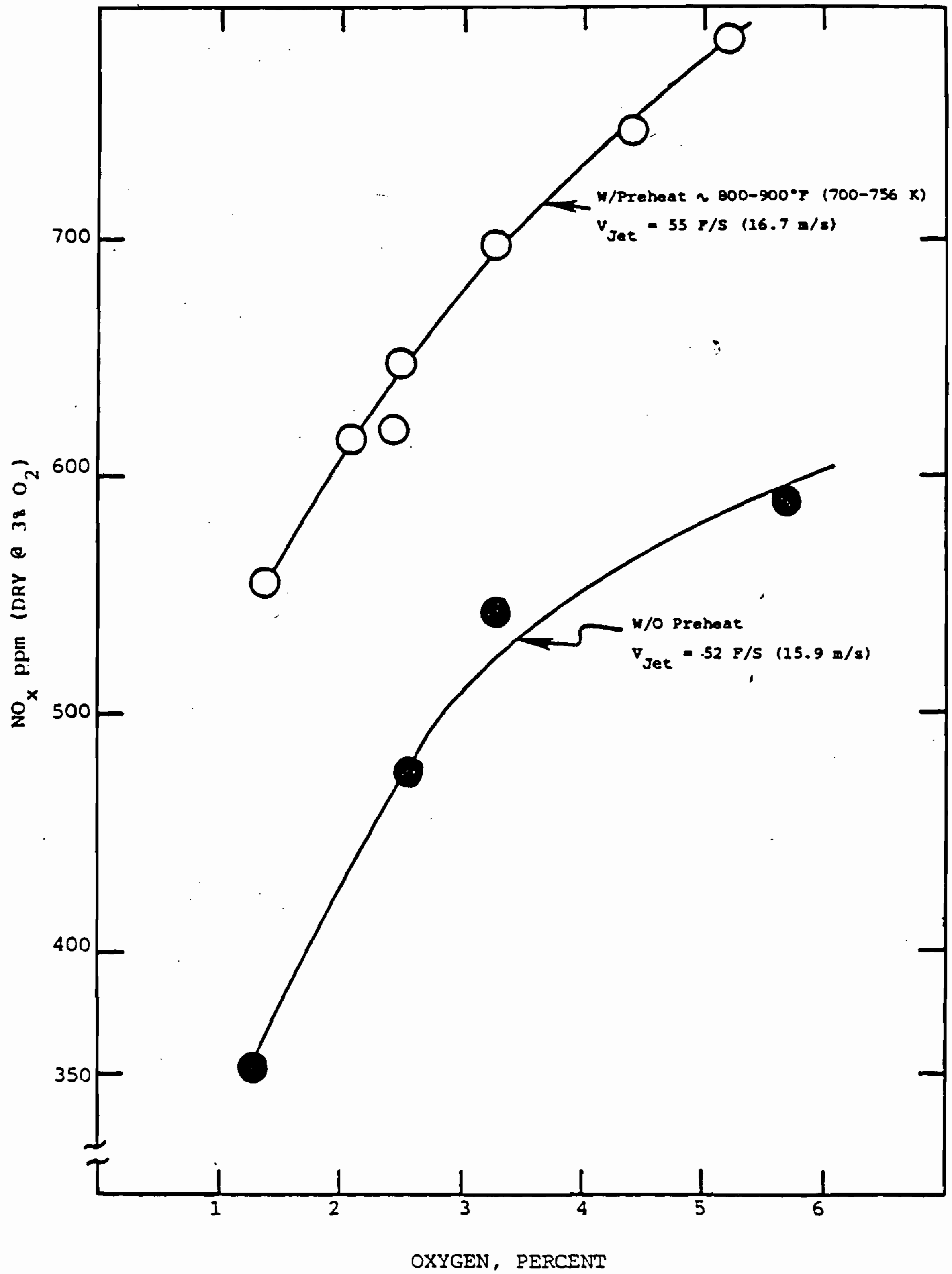
$$NO_x = a + b\,V_{jet} + c\,V_{jet}^2$$

This function is able to account for 87 percent of the data scatter. The effect of high fuel injection velocity on NO_x is less pronounced at the lower combustion air temperatures.

Several significant variables affecting NO_x formation in cement kilns have been identified. These variables are:

- Fuel injection velocity
- Combustion air preheat
- Furnace wall temperature
- Carrier gas composition
- Excess O_2

influence NOx emission



-ˆ 6-6. NO_x vs. O_2 - Coal-Constant V_{Jet} - 8" LD Furnace

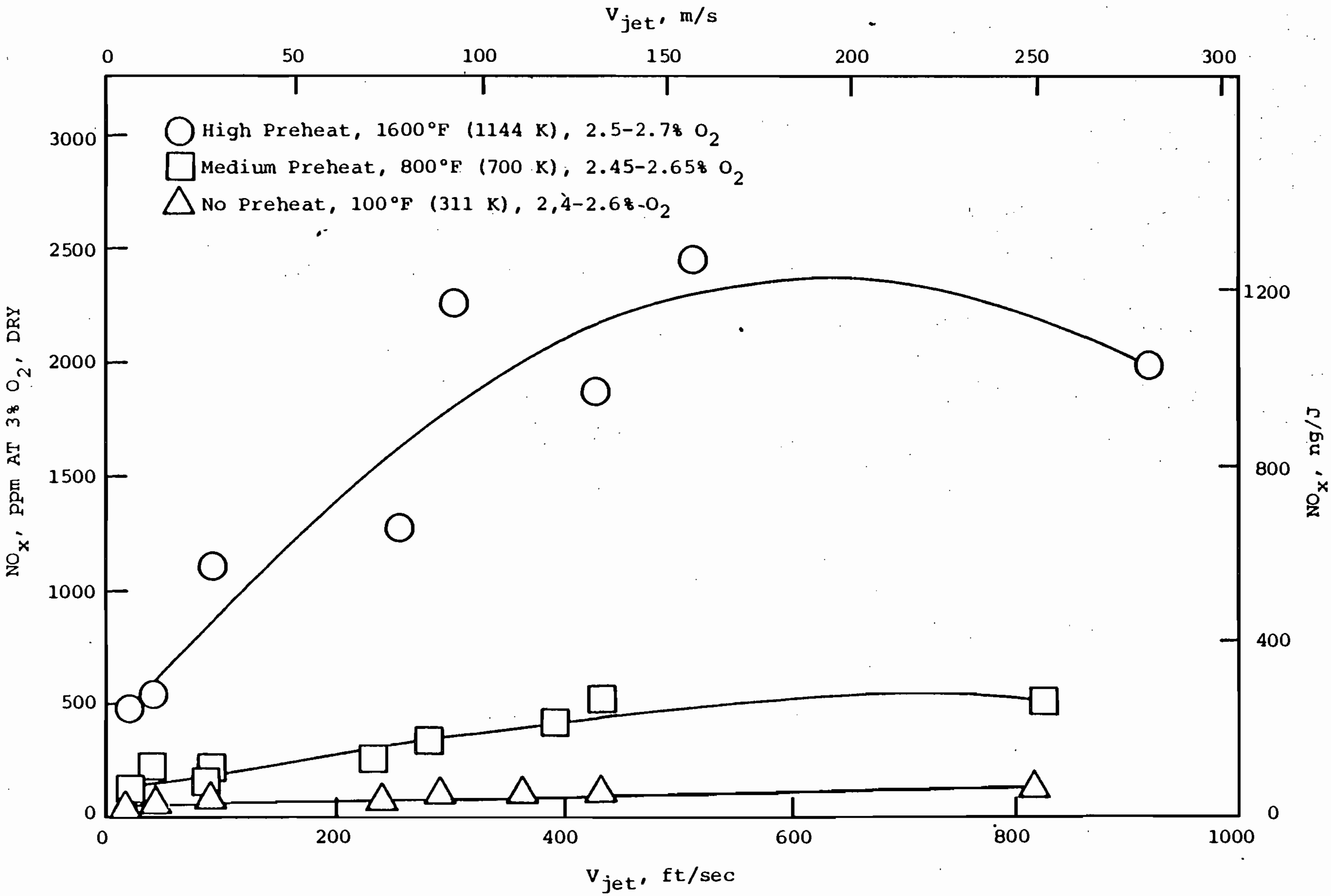


Figure 6-7. NO_x Emissions vs. Injection Velocity - Natural Gas Fuel

KVB72-806023-1305

These results suggest a number of approaches to NO_x reduction:

- Reduce fuel injection velocity. This variable has a strong effect on NO_x emissions, but it can reduce flame geometry often essential for product quality.

- Reduce oxygen content of carrier gas. This approach would substantially lower NO_x emissions while preserving the flame geometry.

- Reduce furnace wall temperature. This can be achieved by enclosing the primary combustion zone of the flame in a water/air cooled shroud to prevent the radiation of the flame to the hot refractory or by the re-injection of cement dust in a shroud surrounding the flame to provide a heat sink for radiation from the flame and hence reduce the flame temperature.

- Distribute cold combustion air to near burner flame zone. The approach involves injecting a layer of cold air in the mixing region between the fuel/carrier jet and the preheated combustion air to act as a shield and minimize NO_x produced with high levels of preheat. Optimizing the amount of cold air would minimize the potential adverse impact on efficiency.

NOx control procedures

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Application of Advanced Combustion Modifications to Industrial Process Equipment: Subscale Test Results

by

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ABSTRACT

Results of subscale tests to evaluate combustion modifications for emission control on petroleum process heaters, cement kilns, and steel furnaces are reported. The objective was to assess applicability, NO_x emissions reductions, and cost effectiveness of several modifications and to select the most promising for pilot scale tests. Subscale process heater baseline NO_x emissions were about 55 ng/J firing natural gas at 2.9 MW heat input. NO_x was reduced by 67 percent with staged combustion and by 63 percent with flue gas recirculation. Firing No. 6 oil, baseline NO_x of 160 ng/J was reduced by 51 percent with staged combustion and by 39 percent with flue gas recirculation. Staged combustion was selected for pilot scale tests. Subscale cement kiln baseline NO_x emissions were 30 to 60 ng/J firing natural gas at about 80 kW heat input. Fly ash, kiln dust, water, and sulfur were injected separately to evaluate the NO_x reduction potential. Fly ash injection reduced NO_x emissions by 28 percent, while the other injectants reduced NO_x by 12 to 20 percent. Further work at a larger scale is planned prior to selecting modifications for pilot scale tests. For the subscale steel furnace, baseline NO_x emissions of 115 ng/J firing natural gas at 0.6 MW heat input were reduced by 88 percent with flue gas recirculation and by 47 percent with water injection. Firing No. 2 oil, baseline NO_x emissions of 160 ng/J were reduced by 77 percent with flue gas recirculation and by 89 percent with steam injection.

SECTION 5.0

SUBSCALE TEST - ROTARY CEMENT KILN

5.1 INTRODUCTION

KVB completed a series of tests on a small pilot cement kiln. The cement kiln, located at a major cement industry association facility, has a 13 cm (5 in.) ID, 30 cm (12 in.) OD, and is 4.6 m (15 ft) in length. The maximum kiln feed rate is 0.0015 kg/s (12 lb/hr), and the unit has no air preheat capability.

All tests were conducted with natural gas fuel. The objectives of the tests were the following: to determine the effects of (1) sulfur addition either with the fuel or with the feed, (2) water injection at the burner, (3) kiln dust injection at the burner, and (4) fly ash injection at the burner on gaseous emissions, kiln operating conditions (temperature), and clinker quality.

Table 5-1 summarizes the effects of sulfur addition, water injection, and fly ash injection on gaseous emissions and kiln operating temperatures. The analysis of the clinker material from the kiln for each set of conditions was carried out by the cement association, and that information was supplied to KVB in a report which has been reproduced in Appendix B. Essentially, the injection of these materials had little effect on clinker quality according to that report. Excess air changes had more significant effects on the clinker.

5.2 EMISSIONS SAMPLING

All emissions measurements were taken from the center of the dustbox (at the back end of the kiln upstream of the cyclone as illustrated in Fig. 5-1). Flame zone temperature readings were taken with an optical pyrometer, and the cyclone inlet temperature was measured with a thermocouple. Dustbox excess oxygen measurements were verified using a portable oxygen analyzer.

TABLE 5-1. SUMMARY OF GASEOUS EMISSION DATA - LOCATION 2, RESEARCH ROTARY CEMENT KILN[1]

Test No.	Date, 1978	Kiln Feed Rate g/s (lb/h)	Heat Input Rate kW(10^6Btu/h)	O_2 %[2]	CO_2 %[2]	NO_x ppm*	NO_x ng/J	NO ppm*	NO ng/J	CO ppm*	SO_2 ppm*	HC ppm*	S Inj. %[2]	H_2O Inj. %[2]	Kiln Dust Inj. %[2]	Fly Ash Inj. %[2]	Flame Zone Temp. K (°F)	Cyclone Inlet Temp. K (°F)	Comments[3]
2/3-1	8-17	1.06 (8.4)	78.5 (0.268)	0.20	13.4	64	33	64	33	407	36	31	0	0	0	0	1839(2850)	849(1068)	Baseline - LSF
2/3-2				0.15	12.4	1.0	0.5	1.0	0.5	>1727	35	22	7.3	0	0	0	1805(2790)	849(1068)	Sulfur Injection-LSF
2/3-3				0.10	12.4	~1.0	~0.5	~1.0	~0.5	>1722	~860	--	25	0	0	0	1789(2760)	849(1068)	
2/3-4		0.78 (6.2)	79.7 (0.272)	0.20	11.9	0	0	0	0	>1731	685	52	14	0	0	0	1797(2775)	839(1050)	
2/3-5			78.5 (0.268)	0.40	11.9	3.1	1.6	2.6	1.3	830	350	--	0	0	0	0	1800(2780)	844(1060)	Sulfur burn-out - LSF
2/3-6	8-18	0.93 (7.4)	75.7 (0.258)	1.8	12.0	66	34	65	33	28	23	77	0	0	0	0	1761(2710)	850(1070)	Baseline - LSF
2/3-7				2.0	11.5	58	30	57	29	19	11	85	8.1	0	0	0	1761(2710)	843(1058)	Sulfur Injection-LSF
2/4-1	8-18	0.45 (3.6)	75.7 (0.258)	2.1	9.9	63	32	44	23	19	0	40	0	0	0	0	1755(2700)	833(1040)	Baseline - HSF
2/4-2				3.75	9.4	--	--	35	18	21	~125	~104	19	0	0	0	1755(2700)	836(1045)	Sulfur Injection-HSF
2/4-3		0.76 (6.0)		3.1	10.2	55	28	47	24	21	17	--	0	0	0	0	1722(2640)	833(1040)	Baseline - HSF
2/4-4				2.4	10.4	52	27	46	24	48	485	134	18	0	0	0	1739(2670)	836(1045)	Sulfur Injection-HSF
2/5-1	8-18	0.76 (6.0)	79.7 (0.272)	2.55	10.2	58	30	45	23	24	66	153	0	0	0	0	1733(2660)	830(1035)	Baseline - HSF
2/5-2				2.05	10.6	51	26	44	23	24	22	104	0	13	0	0	1755(2700)	832(1038)	Water Injection - HSF
2/5-3			79.3 (0.271)	2.2	10.6	58	30	53	27	24	25	88	0	24	0	0	1758(2705)	838(1048)	
2/5-4				2.05	10.6	54	28	45	23	52	27	88	0	59	0	0	1744(2680)	839(1050)	
2/5-5				1.7	12.0	63	32	55	28	23	12	99	0	0	0	0	1766(2720)	836(1045)	Baseline - HSF
2/6-1	8-21	0.44 (3.5)	71.7 (0.245)	1.3	11.4	77	40	73	38	32	0	23	0	0	0	0	1755(2700)	805 (990)	Baseline - LSF
2/6-2		0.61 (4.8)	70.9 (0.242)	1.6	11.2	66	34	65	33	28	0	13	0	0	3.1	0	1733(2660)	803 (985)	Kiln Dust Injection - LSF
2/6-3				1.5	11.6	67	34	66	34	23	0	11	0	0	8.6	0	1694(2590)	805 (990)	
2/6-4				1.55	11.2	78	40	73	38	28	0	9	0	0	9.8	0	1678(2560)	803 (985)	
2/6-5		0.76 (6.0)	73.3 (0.250)	0.25	12.0	36	19	35	18	226	19	8	0	0	0	0	1761(2710)	816(1010)	Baseline - LSF
2/6-6				0.10	12.2	17	8.8	16	8.2	1068	20	26	0	0	3.4	0	1766(2720)	811(1000)	Kiln Dust Injection - LSF
2/6-7				0.15	12.4	44	23	40	21	1470	24	18	0	0	9.3	0	1772(2730)	808 (995)	
2/6-8				0.30	12.8	76	39	72	37	296	0	37	0	0	0	0	1800(2780)	808 (995)	Baseline - LSF
2/7-1	8-21	0.76 (6.0)	73.7 (0.252)	0.4	13.2	103	53	100	51	227	22	21	0	0	0	2.2	1766(2720)	794 (970)	Fly Ash Injection - LSF
2/7-2			74.9 (0.256)	0.3	13.2	91	47	89	46	1077	0	14	0	0	0	6.6	1783(2750)	791 (965)	
2/7-3			73.3 (0.250)	0.3	12.8	119	61	116	60	198	11	12	0	0	0	0	1789(2760)	794 (970)	Baseline - LSF
2/7-4				1.5	11.8	82	42	82	42	28	0	21	0	0	0	0	1789(2760)	794 (970)	Baseline - LSF
2/7-5			73.7 (0:252)	1.5	11.7	73	38	73	38	148	0	13	0	0	0	2.4	1791(2765)	800 (980)	Fly Ash Injection - LSF
2/7-6				1.8	11.7	71	37	71	37	38	0	10	0	0	0	7.3	1755(2700)	794 (970)	
2/7-7			73.3 (0.250)	1.6	11.6	99	51	96	49	202	0	13	0	0	0	0	1778(2740)	794 (970)	Baseline - LSF

[1]Natural gas fuel used for all tests.
[2]Percent by mass of kiln feed rate
[3]LSF = Low-Sulfur Feed; HSF = High-Sulfur Feed
*dry, corrected to 3% O_2

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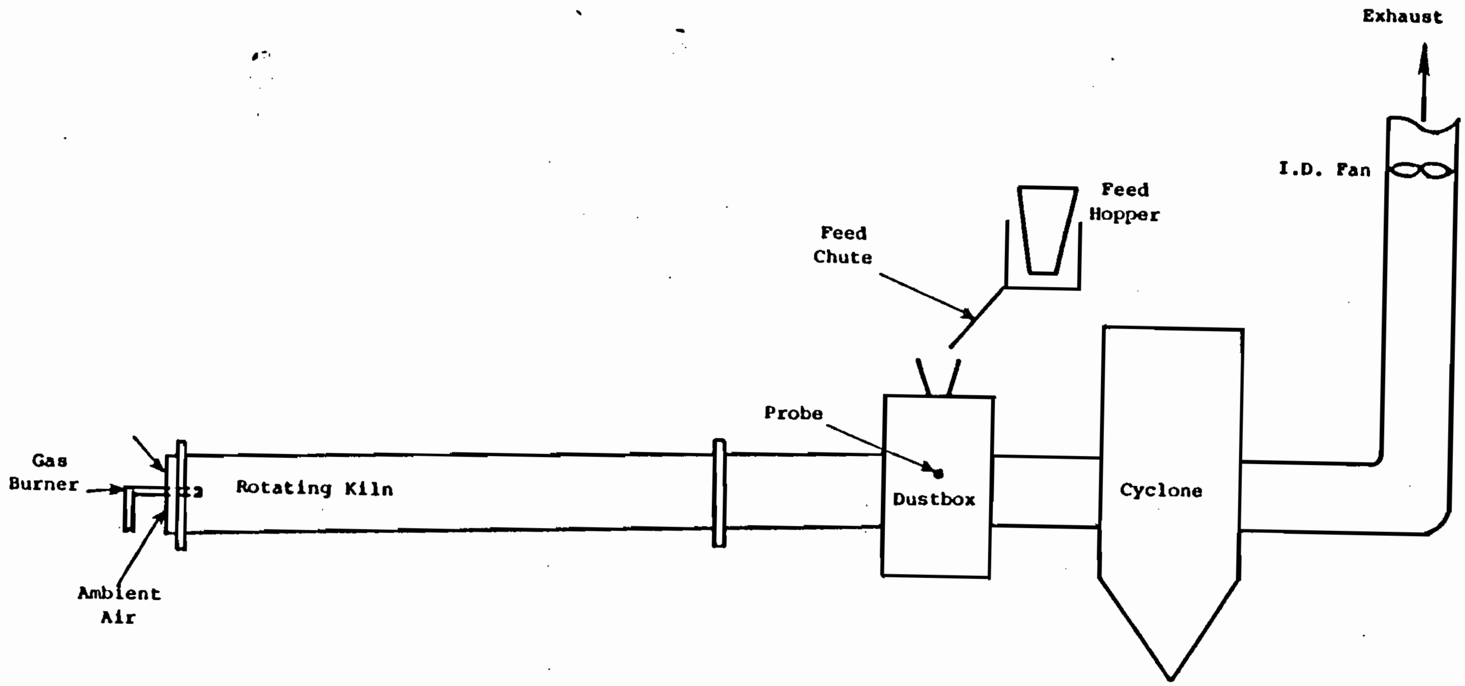

Figure 5-1. Schematic of subscale dry process rotary cement kiln (not equipped with air preheat).

The kiln feed used in the tests was pelletized from a difficult-to-burn mix. This mix was high in limestone content and contained a relatively large amount of binder material to lower the dust loading. The hard-burning mix was selected so that flame zone temperatures would be abnormally high, thus providing a worst-case situation from the standpoint of NO_x emissions.

The fuel analysis for all tests is given in Table 5-2 below.

TABLE 5-2. NATURAL GAS FUEL ANALYSIS (TYPICAL)

Component	Volume %
Nitrogen	1.7
Hydrogen	0.1
Carbon Dioxide	0.5
Methane	95.0
Ethane	2.0
Propane	0.5
Butane	0.2
High Heating value, dry, J/m^3 (Btu/CF)	37.89×10^6 (1017)
Specific gravity	0.5816

The following sections discuss each of the combustion modifications and the results obtained.

5.3 COMBUSTION MODIFICATION

5.3.1 Sulfur Addition

Sulfur was injected with the fuel at different rates for two different feed sulfur contents. The sulfur was injected through a screw feeder and blown in with air. The sulfur injection rate was determined after each test by measuring the total mass of sulfur injected and the time taken to inject it.

S injecting lowers NOx

Under ordinary operating conditions, the dustbox oxygen is maintained at 1.0% to 2.0%. At approximately this oxygen level the maximum NO_x reductions were ~20% below a baseline value of 63 ppm (dry, corrected to 3% O_2) with the higher sulfur feed (0.99% SO_3 by weight) and 12% below a baseline of 66 ppm (dry, corrected to 3% O_2) with the lower sulfur feed (0.53% SO_3). The NO_x levels at this O_2 level did not appear to be affected by the change in feed sulfur content although a greater proportion of the total NOx occurred as NO_2 (∿12%) with the high-sulfur feed. The injection of sulfur produced significant increases in SO_2 emissions when the sulfur injection rate was greater than 10% of the kiln feed rate.

At lower dustbox oxygen (≤ 0.4%) the NO_x dropped sharply on the low-sulfur feed. A full 100% reduction in NO_x concentration was observed at 0.2% O_2 on the low-sulfur feed. At the same time, SO_2 emissions increased from a baseline level of 36 ppm (dry, corrected to 3% O_2) to 685 ppm (dry, corrected to 3% O_2). The large decrease in NO_x emissions may be partially a result of oxygen consumption by sulfur (to form SO_2). However, the decrease in NO_x may also have been caused by a drop in oxygen which occurred during the test. The O_2 values reported in Table 5-1 for Tests 2/3-1 to 2/3-5 are nominal values; the lag time ∿ 60 sec in measuring the oxygen concentration may have resulted in readings which did not match kiln conditions precisely. [In tests subsequent to the sulfur injection tests it was determined that small changes in oxygen concentration at low (< 0.5%) produced significant changes in NO_x emissions. Special effort was made in those latter tests to hold oxygen levels constant.]

N# dropped with O_2 / SO_2 increased

At the low oxygen conditions with the low-sulfur feed, CO concentrations went off scale (> 2000 ppm) during sulfur injection, up from an initial baseline at 0.20% O_2 of 407 ppm (dry, corrected to 3% O_2). At higher oxygen conditions, CO concentrations were generally < 30 ppm.

Figures 5-2 and 5-3 graph the relationship of NO_x emissions to (1) dustbox oxygen, and (2) sulfur injection rate for the two different kiln feed contents. (Low-O_2 conditions were not tested with the high-sulfur feed because of a shortage of feed.) Figure 5-4 shows NO_x emissions versus SO_2 emissions. However, no direct relationship between the two is implied by this graph.

5.3.2 Water Injection

Water was sprayed into the flame zone at three different flow rates for one feed sulfur content and at approximately 2% oxygen. Water was metered through a pipette and entered the kiln through a pipe next to the burner pipe.

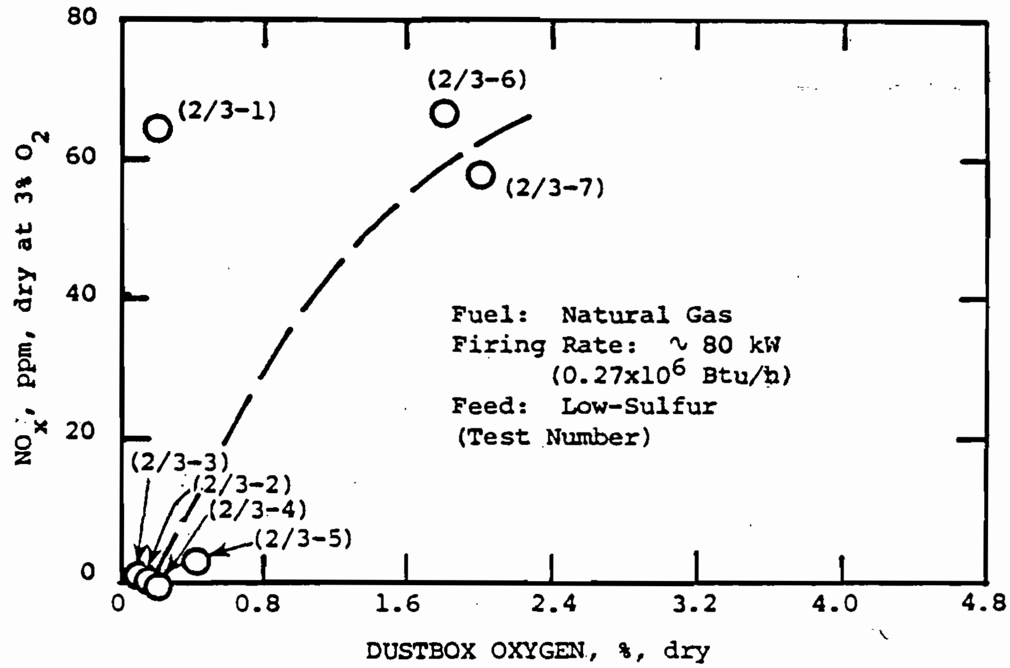

Figure 5-2a. NO_x emissions as a function of dustbox oxygen for a research cement kiln with low-sulfur kiln feed.

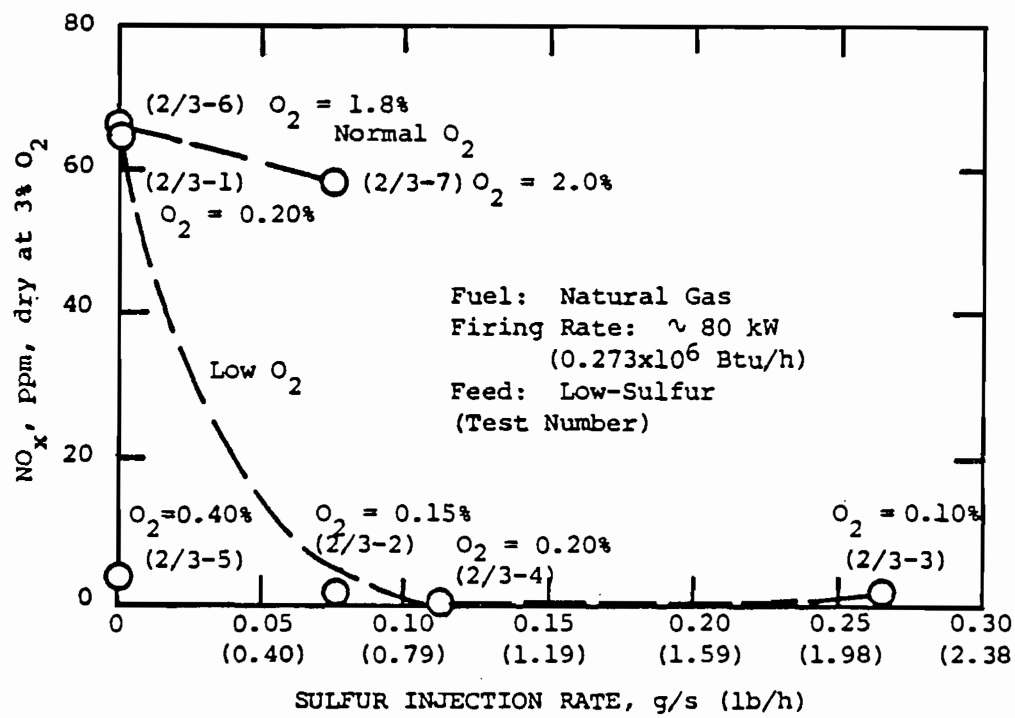

Figure 5-2b. NO_x emissions as a function of sulfur injection rate for a research cement kiln with low-sulfur kiln feed.

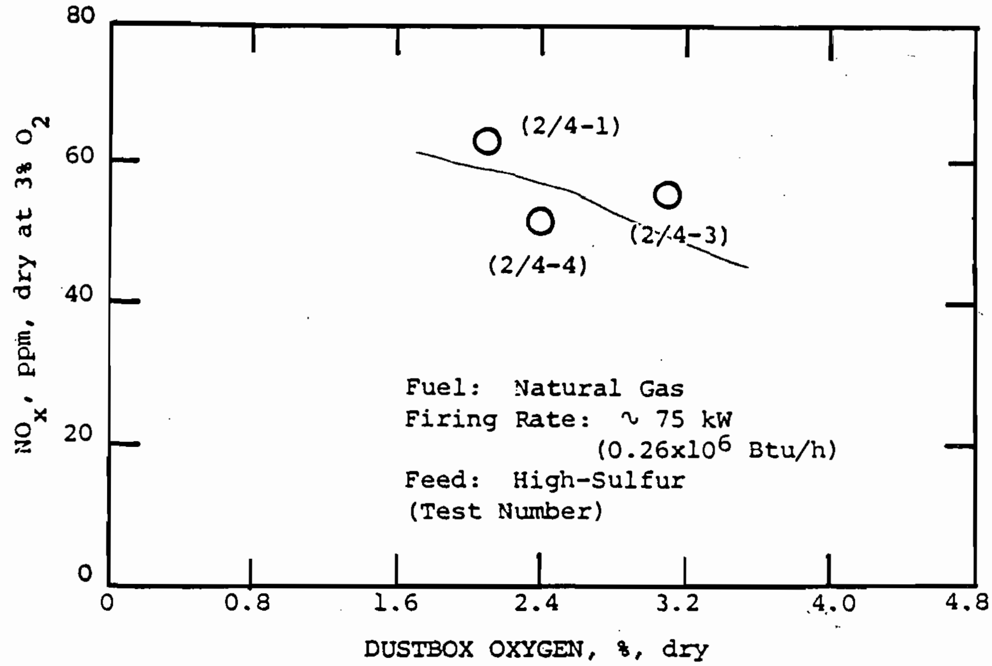

Figure 5-3a. NO_x emissions as a function of dustbox oxygen for a research cement kiln with high-sulfur kiln feed.

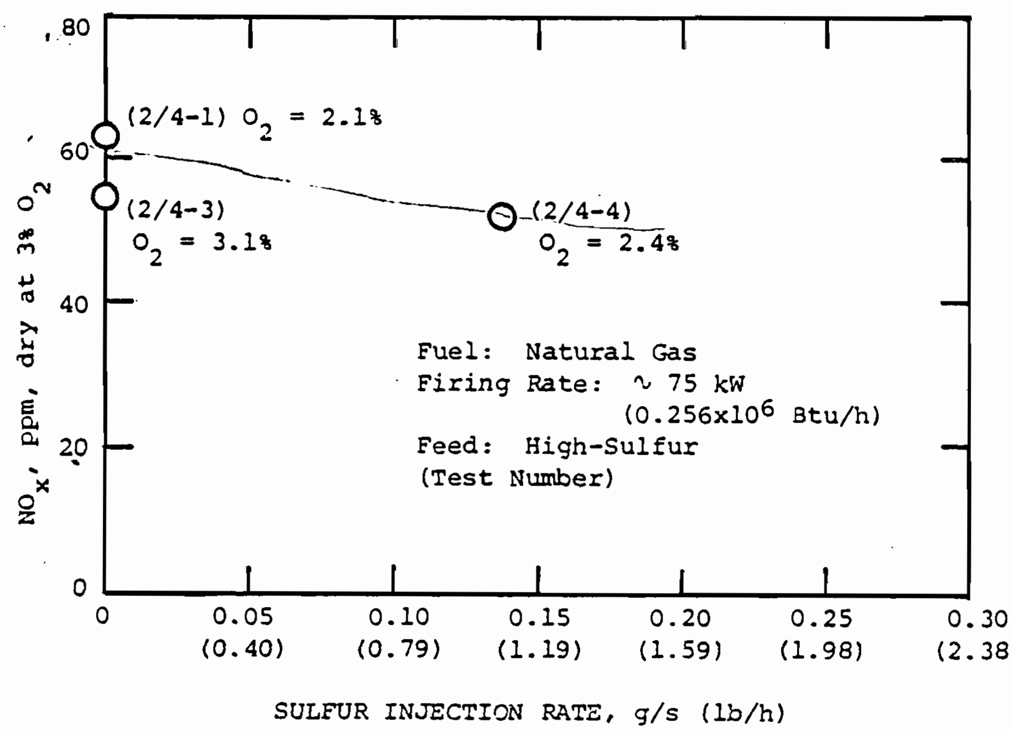

Figure 5-3b. NO_x emissions as a function of sulfur injection rate for a research cement kiln with high-sulfur kiln feed.

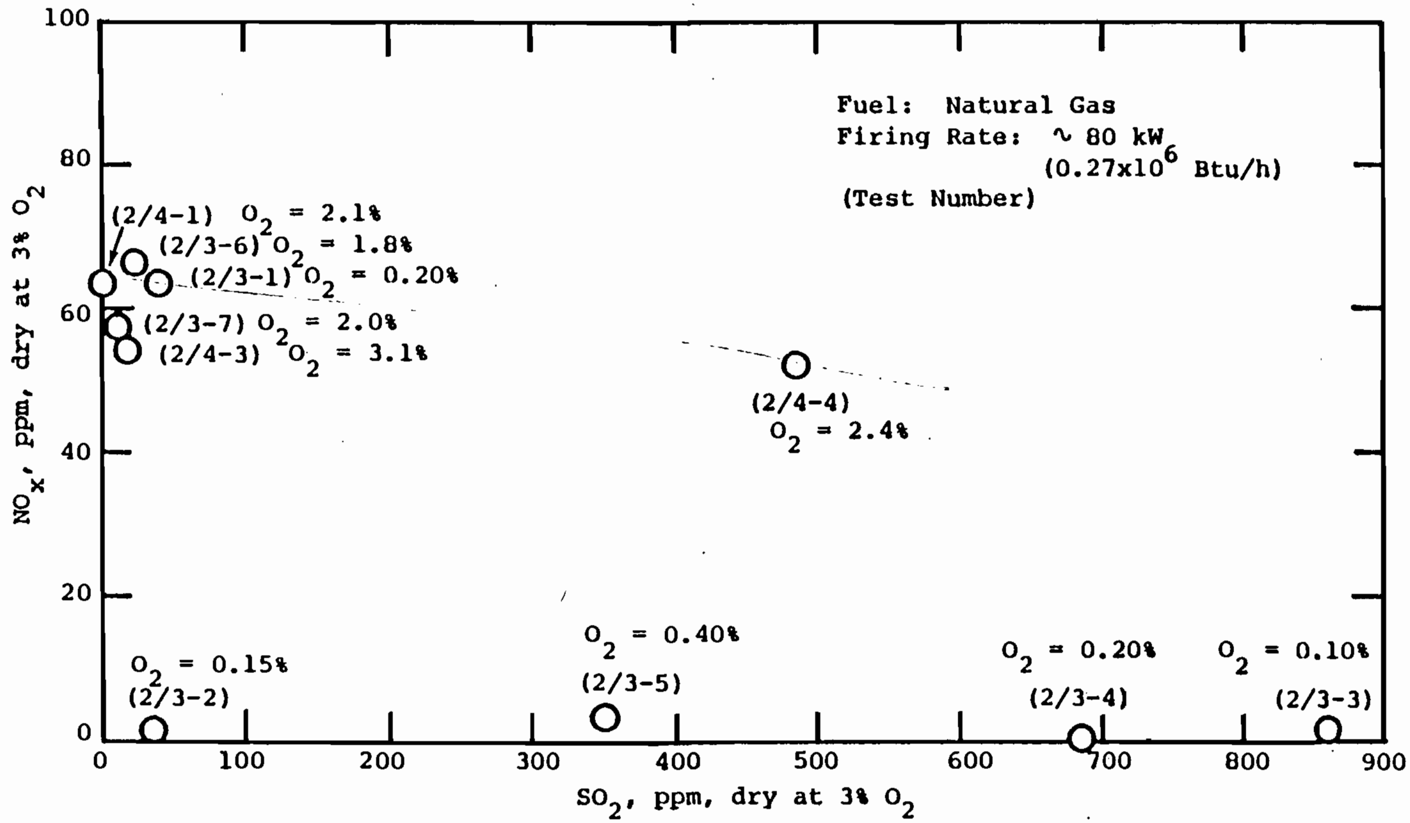

Figure 5-4. NO_x emissions as a function of SO_2 emissions for several sulfur addition rates and dustbox oxygen conditions.

Small reductions in NO_x of 12-14% below baseline levels of 58-63 ppm (dry, corrected to 3% O_2) occurred during the water injection tests. The NO_x concentration did not appear to vary significantly with the water injection rate. At the highest injection rate, however, the CO concentration was twice the baseline value (52 ppm, dry, corrected to 3% O_2 up from 24 ppm, dry, corrected to 3% O_2).

12-14% red. NOx with H_2O injection

Figure 5-5 shows the relationship between NO_x emissions and water injection rate at a nominal O_2 level of 2% for the high-sulfur kiln feed.

5.3.3 Kiln Dust Injection

Kiln dust containing 6.76% sulfur (by weight) was injected at various rates and at two different oxygen conditions while burning the low-sulfur kiln feed. The injection technique was the same as that used for sulfur addition.

At a baseline oxygen level of approximately 1.5%, the maximum NO_x reduction of 14% below the baseline of 77 ppm (dry, corrected to 3% O_2) occurred with the lowest rate of the kiln dust injection (approximately 3% of kiln feed rate). Increases in dust injection rate caused the NO_x to increase rather than decrease. CO, SO_2, and hydrocarbon emissions were all very low at this O_2 level.

normal O_2 increase dust injection – increased NOx

At the low oxygen conditions, the maximum reduction of NO_x again occurred at the smallest kiln dust injection rate (again approximately 3% of kiln feed rate). This reduction, however, was accompanied by a slight drop in oxygen similar to the drop which occurred during the sulfur injection tests. Thus, changes in O_2 may have been responsible, at least in part, for the reduction in NO_x concentration observed at less than 0.3% oxygen.

During the dust addition at the low O_2 levels the CO concentration rose to greater than 1000 ppm. SO_2 and hydrocarbon concentrations were low, however, although they were slightly higher than they had been at the higher O_2 condition.

Figure 5-6 graphs NO_x emissions versus dustbox oxygen and kiln dust injection rate.

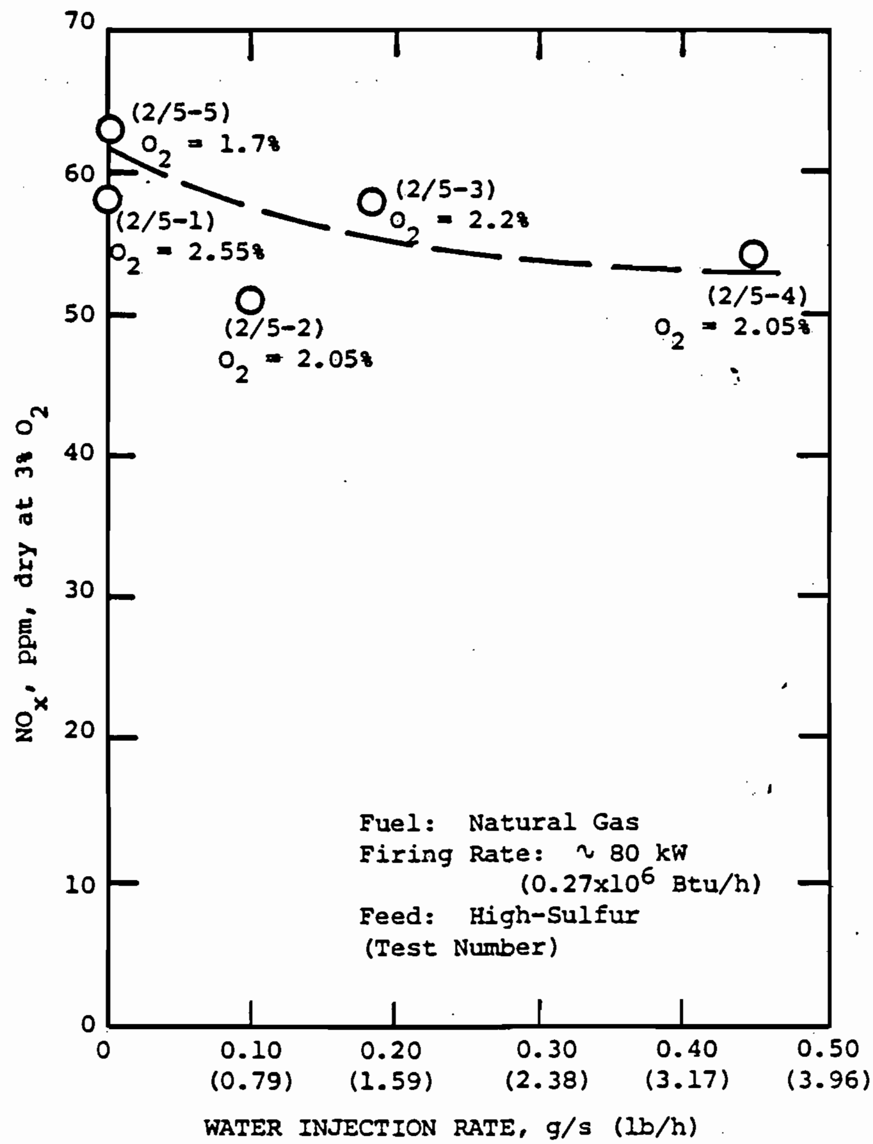

Figure 5-5. NO_x emissions as a function of water injection rate for a research cement kiln.

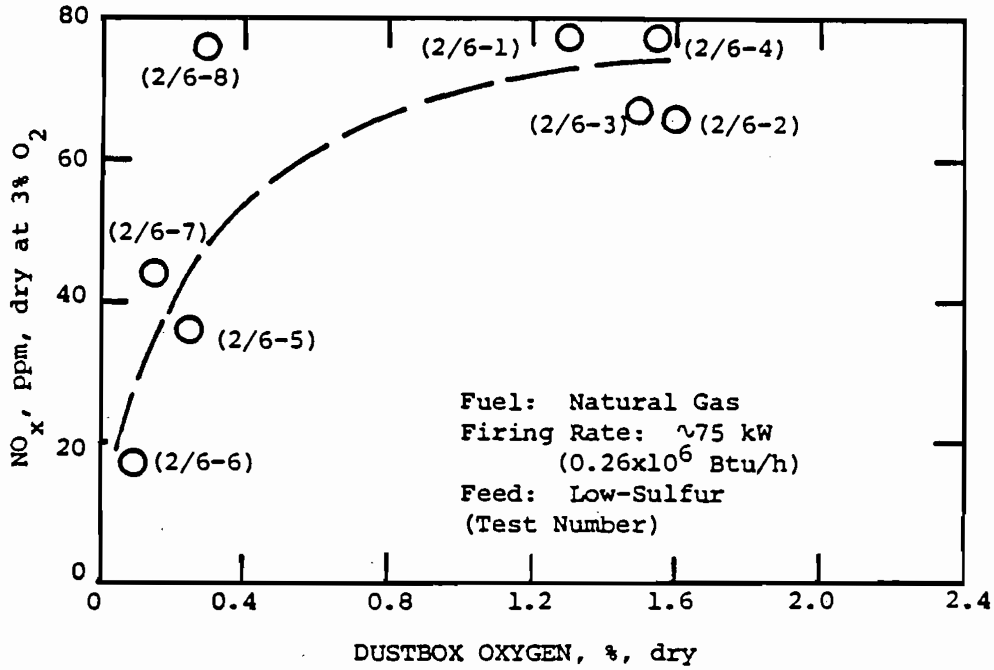

Figure 5-6a. NO_x emissions as a function of dustbox oxygen for a research cement kiln.

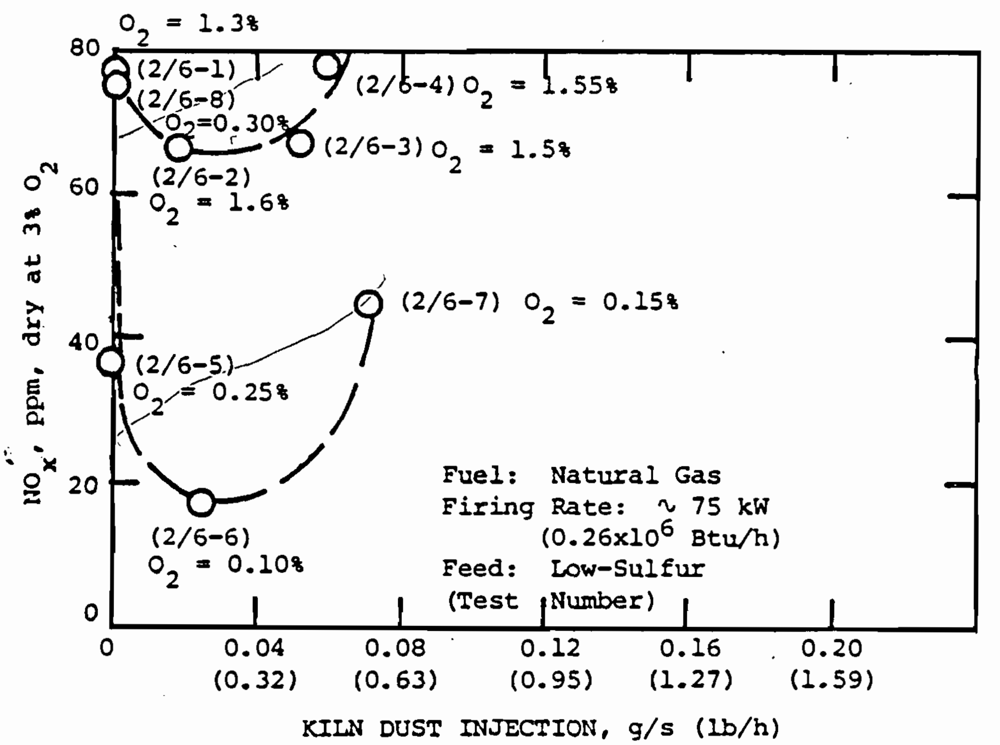

Figure 5-6b. NO_x emissions as a function of kiln dust injection for a research cement kiln.

5.3.4 Fly Ash Injection

Fly ash containing 0.16% sulfur by weight was injected at various rates and at two different oxygen levels while firing the low-sulfur feed. The injection method was that used for sulfur and kiln dust addition. Figure 5-7 shows the effects on NO_x emissions of fly ash injection rate and dustbox oxygen.

At the baseline oxygen level of approximately 1.5%, the maximum NO_x reduction of 28% below a baseline of 99 ppm (dry, corrected to 3% O_2) occurred at the maximum fly ash injection rate (approximately 7% of kiln feed rate). CO concentrations rose somewhat during fly ash injection to 100-200 ppm from a baseline level of 28 ppm (dry, corrected to 3% O_2) . Other emissions were low.

normal O_2 28% NO_x red. w/ max fly ash inj.

At low oxygen conditions (approximately 0.3%) NO_x values dropped a maximum of only 24% from a baseline level of 119 ppm (dry, corrected to 3% O_2). This reduction occurred at the greatest fly ash injection rate (again, approximately 7% of kiln feed rate). The CO concentration rose to 1077 ppm (dry, corrected to 3% O_2) from a baseline value of 198 ppm (dry, corrected to 3% O_2). SO_2 and hydrocarbon emissions were low.

low O_2 NO_x reduced 24% max fly ash inj CO increased

Special effort was made during the fly ash injection tests to maintain constant oxygen levels throughout and, especially, to prevent the oxygen concentration from dropping below 0.3% at the low O_2 condition. The results showed that NO_x reduction potential may not be any greater at very low O_2 than it is at the baseline O_2 level.

5.4 CONCLUSIONS

Operation of the cement kiln at very low oxygen levels (below 0.5%) does not seem to be practical. Very low NO_x levels may be attained, but the accompanying CO concentrations are high. In addition, when special care was taken to hold the oxygen level constant, the results indicated that a modification applied at baseline O_2 (approximately 1.5%) has nearly the same effect on NO_x emissions when applied at low O_2 conditions.

@ low O_2 (0.5%) low NO_x high CO not practical

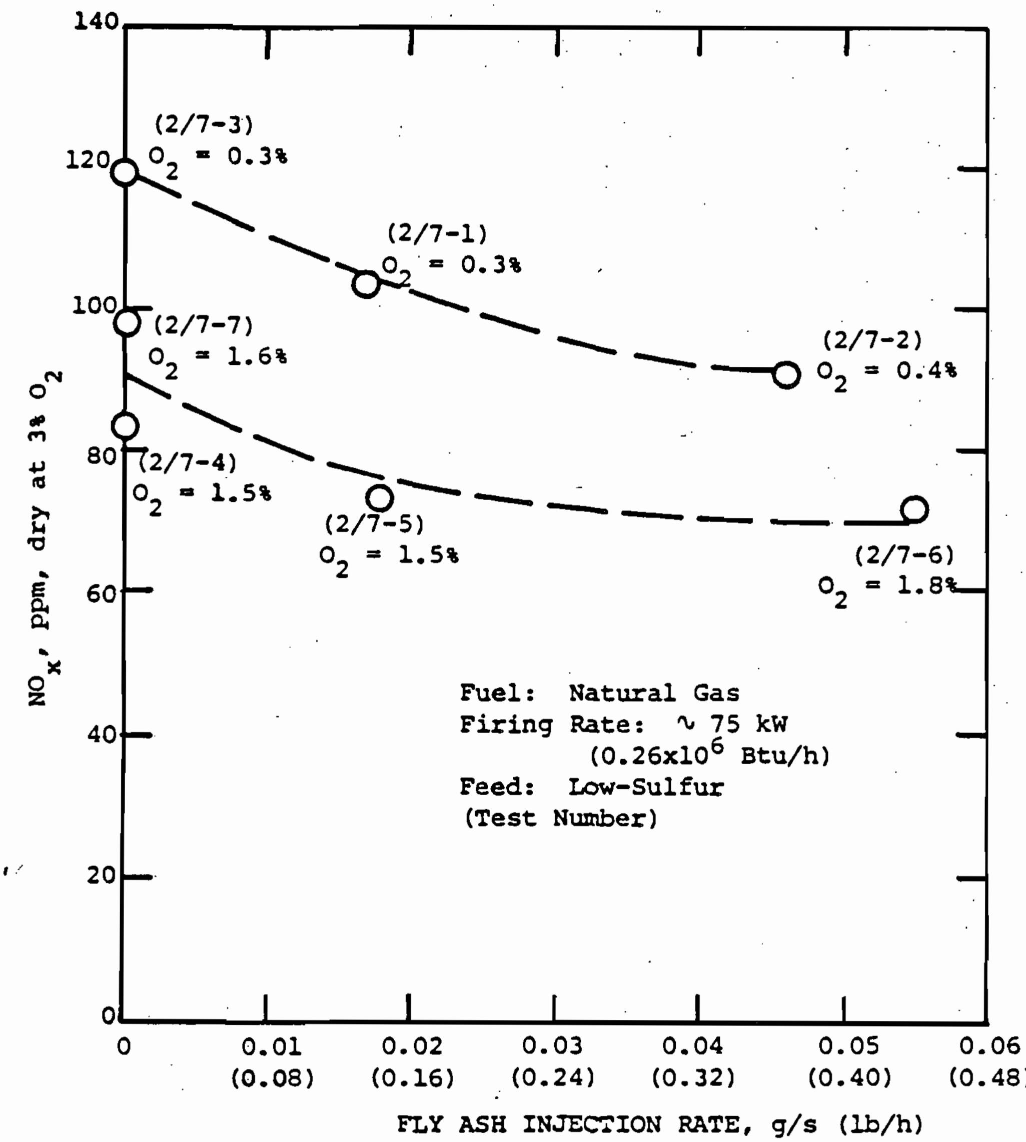

Figure 5-7. NO_x emissions as a function of fly ash injection rate at baseline and low oxygen conditions.

The maximum practical NO_x reductions attained in the research kiln are shown in Table 5-3. These reductions all occurred at baseline oxygen conditions. Sulfur, water, and kiln dust injection seem to produce similar results. Fly ash injection produced the largest practical NO_x reduction.

TABLE 5-3. MAXIMUM PRACTICAL NO_x REDUCTIONS FOR FOUR COMBUSTION MODIFICATIONS TO A RESEARCH CEMENT KILN

Combustion Modification	Maximum NO_x Reduction (%)
Sulfur Injection	12 - 20
Water Injection	14
Kiln Dust Injection	14
Fly Ash Injection	28

It is important to note that the baseline NO_x levels observed for the pilot kiln were far lower than any observed by KVB on full-scale kilns. The most likely explanation for this occurrence is the fact that ambient air was used in all of the subscale tests. In an actual kiln, air preheat temperatures of 1144 K (1600°F) are not uncommon. The report in Appendix B suggests in addition that the high surface-to-volume ratio may have resulted in greater heat losses from the flame zone, thus lowering NO_x production and also that the high gas-to-solids ratio in the subscale kiln limited the effect of kiln feed nitrogen on the NO_x emissions.

File copy

LONESTAR FLORIDA PENNSUCO, INC.

Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

June 13, 1983

Mr. Clair Fancy
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: PSD-FL-050, Request for Emission Limitation Revision

Dear Mr. Fancy,

This is a response to your April 7, 1983 letter where in you requested additional information and clarification regarding our request for revisions to the SO_2 emission limitations in the referenced federal permit. We request that the contents of this letter be kept confidential in accordance with Section 403.111, Florida Statutes because of the proprietary nature of the information provided. For clarification I will answer each item as it was asked in your letter.

o Lonestar Florida (LSF) presently has on file with the Department's West Palm Beach office an application for the extension of construction permit for coal conversion of Kiln Nos. 1,2 & 3 (File No. AC-13-54054). It is being held in abeyance until the SO_2 emission limitation in the PSD permit is resolved.

o Flue gas desulfurization was not considered because to the best of our knowledge there has been no installation of desulfurization equipment in a commercially active wet process cement plant. Control processes and their economics would therefore be highly speculative. Enclosed is an excerpt from a report which discusses the cost and impact of controlling SO_2 emissions in the cement industry (Attachment 1). The report shows that the cost of installing and operating gas desulfurization equipment on three hypothethical cement plants would range from 30-34 cent per pound of SO_2 removed from each kiln. Considering that we are already removing 75 to 80 percent of the potential SO_2, the additional costs projected in the report to remove a purported 90 percent of the remaining SO_2 are not warranted.

PDS-FL-050, Request for Emission Limitation Revision

o Four grades of coal with 0.75 to 2.0 percent sulfur were analyzed from an economic and process standpoint. The coals analyzed were from our two current major suppliers and were of the same specifications with the exception of sulfur. The prices quoted are F.O.B. mine and are as follows:

% Sulfur	Company A	Company B
<2.0 % (Current Contract)	$ 32	$ 28
1.75 %	32	28
1.0 %	36	31
0.75 %	39	35

Annual costs using the above prices averaged together (LSF utilizes both companies equally to assure a non-interrupted supply) show the economic disadvantage of the lower sulfur coal. The costs are F.O.B. mine based on Kilns 1-3 operating at permitted capacities.

% Sulfur	Annual Cost	% Increase above<2% S
<2 % (Current Contract)	$7,560,000	NA
1.75 %	7,560,000	0
1.0 %	8,440,000	12%
0.75 %	9,320,000	23%

It must be noted that our current contract specifies coal with a sulfur content of <2%. During the past six months our weekly as-fired coal averaged 1.67% sulfur. This accounts for the lack of a price difference between <2% and 1.75% sulfur coal in that they are basically the same coal.

As you are probably aware the cement industry is highly competitive. The additional cost of the low sulfur coal would place Lonestar Florida at an un-fair economic position with our local competitors who are not restricted to the use of low sulfur coal. As the above costs clearly show, Lonestar Florida would be required to expend an additional 0.88 to 1.76 million dollars annually if required to burn lower sulfur coal. This is a genuine economic disadvantage especially in view of the fact that Lonestar Florida will be in compliance with Federal, State and County ambient air quality standards and PSD increments using ≤2% coal.

- o Kiln 3 is operated with an excess oxygen level of between 0.5 and 3.0 percent. The overall effect of excess oxygen, as pointed out in the BACT originally submitted, is that lower excess oxygen level will enhance SO_2 formation and resultant emissions where higher excess oxygen levels will enhance the retention of sulfur compounds with the feed material and eventually in the clinker. However, a balance exists between higher excess oxygen levels and such variables as kiln feed rates, dust insulflation rates, slurry moisture content, chemistry of slurry and NO_x formation. Higher excess oxygen levels can also cause unstable kiln conditions, such as too hot of a backened kiln temperature, which must be corrected by adjusting one of the variables listed above; all of which will impact the overall production rate of the kiln.

- o Attachment 2. provides the calculations of Kiln 3 at permit capacity utilizing 2% coal. The sulfur content of the feed material is the average of analyses of slurry from 15 test runs dating from April 1982 to March 1983. The SO_2 absorption into the clinker is 77.7 percent. The SO_2 emissions of 386.9 #/hr. would meet the emission limit of 400 #/hr. selected as BACT. We believe absorption in Kilns 1 and 2 would fall in the range of 75-85 percent and would meet the emission limits of 100 #/hr. selected as BACT for each source.

  now claim up to 0.56%

- o The sulfur content of the raw feed material is relatively constant. Analysis of slurry from 15 test runs mentioned above range from a minimum of 0.040 percent sulfur to a maximum of 0.088 percent sulfur with an average of 0.064 percent.

- o Attachment 3. is an evaluation of predicted violations of the Dade County ambient air quality standards for SO_2 downwind of Alton Box. The summary will show that Lonestar Florida does not contribute significantly (<5.0 ug/m^3) to any predicted violation near Alton Box. Supportive computer model printouts will be forwarded under seperate cover.

I sincerely hope this additional information will answer all concerns regarding our request, and again remind you of its proprietary nature. Should you have any further questions or question regarding the information provided herein, please don't hesitate to call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

SQ/ep

CC: R. DuBose - EPA, Region IV
T. Tittle - DER, West Palm Beach
E. Cahill - DERM

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An Assessment of the Impact of Reducing Emissions in
Five Critical Industries for the
Purpose of Acid Deposition Mitigation

Prepared for the U.S. Office of Technology Assessment

by

Energy and Resource Consultants, Inc.
P.O. Drawer O
Boulder, CO 80306

ATTACHMENT 1.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 6, 1984

AUG 15 Rec'd

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Scott Quaas
Environmental Specialist
Lonestar Florida Pennsuco, Inc.
Post Office Box 122035 - PVS
Hialeah, Florida 33012

Dear Mr. Quaas:

RE: Preliminary Determination - Lonestar Florida Pennsuco, Inc.
PSD-FL-050, Request for Revision

The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, Region IV, has reviewed your application to modify the referenced source under the provisions of the Prevention of Significant Deterioration Regulations (40 CFR 52.21) and has made a preliminary determination of approval with conditions. Please find enclosed one copy of the Preliminary Determination and proposed federal permit.

You are requested to publish (at your own expense) the attached Public Notice. The notice must appear, one time only, in the legal advertising section of a newspaper of general circulation in Dade County. A copy of the Preliminary Determination and your application will be open to public review and comment for a period of 30 days. The public can also request a public hearing to review and discuss specific issues. At the end of this period, the Department will evaluate the comments received and make a final determination and recommendation to EPA regarding the proposed modification.

I. Applicant

Lonestar Florida Pennsuco, Inc.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012

II. Location

The sources affected by the proposed revision are located at the applicant's existing Portland cement plant at 11000 Northwest 121 Street, Hialeah, Dade County, Florida. The UTM coordinates are Zone 17, 562.75 km E and 2861.65 km N.

III. Background

The applicant received federal permit No. PSD-FL-050 in 1980 which authorized the fuel conversion of existing kilns Nos. 1, 2, and 3 from gas or oil to coal containing up to two percent sulfur. Burning coal instead of oil or gas in the kilns will increase the sulfur dioxide emissions from the kilns. The Best Available Control Technology (BACT) determination on which the emission standards were based limited the sulfur dioxide (SO_2) emissions from the existing electrostatic precipitators serving the three kilns to the quantities listed below.

Kiln No.	Maximum Sulfur Dioxide Emission Standards
1	1.42 lb/ton dry feed or 56.7 lbs/hr, 248.4 TPY
2	1.42 lb/ton dry feed or 56.7 lbs/hr, 248.4 TPY
3	0.19 lb/ton dry feed or 26.3 lbs/hr, 115.1 TPY

These standards were the emission limits requested by the applicant. The applicant had estimated a SO_2 removal efficiency of over 90 percent for the system. This removal efficiency was based on test data collected on the systems by a limited number of flue gas tests while the kilns were burning high sulfur fuel oil.

Kiln No. 3 has been converted to coal and actual stack test data shows that SO_2 removal is less than 90 percent. The applicant has studied the latest test data and now believes the systems will obtain only 75 to 85 percent SO_2 removal.

The Company is now requesting a revised BACT determination which would set SO_2 emission limits for the three kilns, while they are burning coal containing two percent sulfur, at the values shown below.

Kilns	Sulfur Dioxide Emission Limit
1	125 lb/hr
2	125 lb/hr
3	400 lb/hr

The company also agrees to operate only 2 kilns at any one time with coal as fuel. The third kiln will be fired with natural gas if it is operated while the other two are operating. Thus, the maximum SO_2 emissions from the three kilns will be 525 lb/hr or 2,300 tons per year.

Model results of the proposed SO_2 emissions from the three kilns shows no violation of the SO_2 increments or ambient air quality standards.

Although other criteria pollutants were regulated by the construction permit, SO_2 is the only pollutant that the Company has addressed in its request for a revision to the BACT determination and the permit.

IV. Rule Applicability

The original application for a permit to burn coal in the three kilns was subject to Prevention of Significant Deterioration (PSD) review for sulfur dioxide in accordance with the provisions of Title 40, Code of Federal Regulations, Part 52.21 (40 CFR 52.21) promulgated on June 19, 1978, because the original application proposed an increase in sulfur dioxide emissions of greater than 100 tons per year (562 tons per year). This PSD review required a BACT determination and an air quality review and growth analysis. However, the applicant demonstrated that the predicted air quality impacts upon the annual, 24-hour, and 3-hour National Ambient Air Quality Standards (NAAQS) and the PSD Class II increments were below the significance levels as published in 43 FR 26398, June 19, 1978; therefore, a detailed air quality review and growth analysis was not required for the original application.

The applicant is now requesting a revised BACT determination which would increase the sulfur dioxide emission limits for the three kilns. This change in limits results in predicted air quality impacts upon the NAAQS and PSD Class II increments which are greater than the significance levels mentioned above; thus, a detailed air quality review and growth analysis under the June 19, 1978 PSD regulations is required for this change.

V. Engineering Evaluation

The 77.7 percent SO_2 removal efficiency for this system that the applicant's requested revision of the BACT SO_2 emission limits is based on, is greater than EPA implies can be achieved in the AP-42 Manual, Compilation of Air Pollutant Emission Factors. A cement kiln with a baghouse control device is estimated to remove 75 percent of the SO_2. The baghouse is believed to be more efficient in facilitating SO_2 removal than the electrostatic precipitators used by Lonestar. The Company has submitted a limited number of test results on kiln No. 3 that shows the average SO_2 removal efficiency, when the percent oxygen in the flue gas was above 2.8 percent, is 75 percent. No data has been provided that gives assurance that the existing system can consistently achieve a removal efficiency above this. Based on the data available, the department believes the system should achieve 75 percent SO_2 removal.

Flue gas desulfurization equipment (FGD) may be able to meet the standards set in the original BACT determination. However, the applicant stated that FGD on this type of source is unproven and, if used, would cause a financial hardship. The Department is in agreement that FGD is not feasible for this plant at this time.

Using fuels with a lower sulfur content is the only feasible way of reducing sulfur dioxide emissions from this plant. However, the original SO_2 standards initially selected as BACT cannot be met with low sulfur coal alone. Also, if the removal efficiency of the system is only 75 percent, the proposed SO_2 BACT standards will be exceeded at maximum permitted production when using coal containing two percent sulfur (Company's plan) and raw material containing 0.088 percent sulfur (highest estimated sulfur content of the raw material). Coal with a lower sulfur content is available which will allow the Company to meet their proposed SO_2 standards.

Calculations using the maximum raw material and coal inputs to the kilns listed in the original application for a permit to construct, the maximum sulfur content in the feed from Lonestar's June 13, 1983 letter, and a sulfur removal of 75 percent by the system show the kilns would have to burn coal with one percent sulfur to meet the sulfur dioxide emission standards now being requested (See Table I and Figure 1). This is low sulfur fuel. As these emissions cause no ambient air violations, the Department finds these standards acceptable.

VI. Air Quality Impact Analysis

As noted in Section IV., the revision in SO_2 emission limits will result in air quality impacts greater than significance levels, thus requiring a detailed air quality impact analysis for SO_2.

The air quality impact analyses required for SO_2 includes:

- An analysis of existing air quality;
- A PSD increment analysis;
- An Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, and visibility, and growth-related air quality impacts.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analyses depend on air quality modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the department has reasonable assurance that the proposed revision, as described in this permit and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A discussion of the modeling methodology and required analyses follows:

1. Modeling Methodology

The EPA-approved Industrial Source Complex (ISC) dispersion model was used in the air quality impact analysis. This model was used to predict annual, 24-hour, 4-hour, 3-hour, and 1-hour average concentrations resulting from the Lonestar sources and all other existing sources in the vicinity of Lonestar.

The maximum short-term impacts were refined with a 0.1 kilometer spacing between receptors for only the days on which worst-case meteorological conditions occurred. Emissions from interacting sources were included in these runs.

The surface meteorological data used in the model were National Weather Service data collected at Miami, Florida during the period 1970-1974. Upper air meteorological data used in the model were collected during the same time period at Miami, Florida. Final stack parameters and emission rates used in modeling and analyzing the proposed revision are contained in Tables 2 and 3.

2. Analysis of Existing Air Quality

In order to evaluate existing air quality in the area of a proposed project, the department may require a period of continuous preconstruction monitoring for any pollutant subject to federal PSD review. Since the original PSD permit application for the Lonestar coal conversion project was complete before June 8, 1981, and this application is for a revision to the original permit, the department is not requiring any preconstruction SO_2 monitoring. This is in accordance with the 1978 ambient monitoring guidelines in effect at the time of the original permit application.

Since the Lonestar plant is located in a remote area with respect to SO_2 emissions from non-specified sources, a background of 0 ug/m^3 for SO_2 is assumed. The department also assumed this background since all sources of SO_2 which would interact with emissions from Lonestar are accounted for in the modeling. The department assumed no contribution to the background value from natural and distant non-specified sources because of the prevailing subtropical easterly winds and the lack of space heating requirements in the area. This background was used for all averaging times and is consistent with EPA monitoring guidelines applicable to projects submitting complete applications prior to June 8, 1981.

3. PSD Increment Analysis

The Lonestar plant is located in an area where the Class II PSD increments apply. However, the Everglades National Park is located about 30 kilometers from the plant so an analysis of Class I impacts was also performed.

Lonestar and Dade County Resource Recovery were determined to be the only significant increment consuming sources in the area. Modeling results shown in Table 4 predict that the proposed revision, in combination with Dade County Resource Recovery, will not cause a violation of any Class I or Class II PSD increment. The highest, second highest short-term predicted concentrations are given in the table since five years of meteorological data were used in the modeling.

4. Ambient Air Quality Standards Analysis

As shown in Table 5, modeling results predict that maximum ground-level concentrations of SO_2 as a result of the proposed revision will be below all national (NAAQS), state (FAAQS) and local (Dade County AAQS) ambient air quality standards. The highest, second highest predicted value is given in the table for the three-hour averaging time since five years of meteorological data were used in the modeling and since this value is exclusively compared to NAAQS and FAAQS. However, the highest predicted values are given for the one-hour, four-hour and 24-hour averaging times since these values are compared with the Dade County AAQS, which require the use of the highest predicted value for comparison.

5. Analysis of Impact on Soils, Vegetation and Visibility and Growth-Related Air Quality Impacts

The maximum impact of the proposed increase in SO_2 emissions, as demonstrated through the air quality analysis, will be below the national secondary air quality standards established to protect public welfare related values. Therefore, no adverse effects on soils, vegetation and visibility are expected.

There will be no increase in the number of employees at the site due to the revision. No secondary residential, commercial or industrial growth which will adversely affect air quality in the area is expected.

VII. Conclusion

Based on the data available, the Department has concluded that the original BACT determination for SO_2 was too restrictive. The SO_2 emission standards of 400 lb/hr for kiln 3 and 125 lb/hr each for kilns 1 and 2 are reasonable. These emissions will not cause an ambient air quality violation or exceed any allowable increase of SO_2 in the ambient air if only two kilns are fired with coal at any one time. Higher SO_2 emissions from the existing plant could increase the SO_2 concentration in the ambient air near the plant above that allowed by Dade County regulations.

The proposed SO_2 emission standards can be achieved by controlling the percent sulfur in the coal. The maximum percent sulfur that can be allowed in the coal is a function of the sulfur dioxide removal efficiency of the system. Low sulfur coal, one percent sulfur, may have to be burned to meet these standards. A controlled test series on all three kilns is needed to resolve what is the maximum percent sulfur in the coal that can be used in the kilns without exceeding the emission standards.

new Cond 4 - SO_2 em 1+2 125#/hr, ~~K#3~~

5 - K#3 400#/hr max 187.5 #/hr clinker

6 - Coal used K123 Sulfur content [illegible] monthly average and 3% limit.

VIII. Revised BACT:

Best Available Control Technology (BACT) Determination

Lonestar Florida Pennsuco, Inc.

Dade County

The applicant has requested a revision of a previous BACT determination for sulfur dioxide emission limits for the three cement kilns located at their facility in Hialeah, Florida. Federal permit PSD-FL-050, issued in 1980, specified that SO_2 emissions from kiln No.1 and No.2 shall not exceed 56.7 pounds per hour per kiln and 26.3 pounds per hour from kiln No.3. The SO_2 emission limits were based on tests using 2.38% sulfur content fuel oil.

Kiln No. 3 was converted from oil/gas fired to coal fired and the emissions measured. The No. 3 kiln test results indicate a lower absorption of SO_2 by the products in the kiln, and consequently more SO_2 is being emitted to the atmosphere than originally proposed based on the tests using oil as fuel. Based upon the new data, the applicant has requested a revision of the SO_2 emission limits for the No. 3 kiln and No. 1 and No. 2 kiln, both of which will also be converted to coal-fired units as originally proposed.

The requested change would result in an increase of 68 lb/hr from kilns 1 and 2 and 374 lb/hr from kiln 3 above the original limits determined as BACT.

BACT Determination Requested by the applicant:

The following fuel operating mix for the three kilns would be:

A.	Kiln 1-coal (125)	Kiln 2-gas(9)	Kiln 3-coal(400)
B.	Kiln 1-gas(9)	Kiln 2-coal(125)	Kiln 3-coal(400)
C.	Kiln 1-coal(125)	Kiln 2-coal(125)	Kiln 3-DOWN

* figure in parenthesis is pounds SO_2 emissions per hour.

Kiln operations per any of the three scenarios will not cause violation of the Federal, State, or Dade County ambient air quality standards.

Date of receipt of a BACT application:

June 4, 1984

Date of Publication in the Florida Administrative Weekly:

June 22, 1984

Review Group Members:

The determination was based upon comments received from the New Source Review Section, Air Modeling Section, the Dade County Department of Environmental Resources Management, and the Southeast District Office.

BACT Determined by DER:

Pollutant	Emission Limit
Kiln No.1	125 lb SO_2/hr
Kiln No.2	125 lb SO_2/hr
Kiln No.3	400 lb SO_2/hr

The SO_2 emission limits determined as BACT do not result in a violation of Federal or State ambient air quality standards, but, do violate the Dade County standards. The department, therefore, has incorporated the proposed three operating scenarios as BACT to prevent violation of the Dade County standards.

Matrix	Matrix	Matrix
Kiln 1 fire coal	Kiln 1 fire gas	Kiln 1 fire coal
Kiln 2 fire gas	Kiln 2 fire coal	Kiln 2 fire coal
Kiln 3 fire coal	Kiln 3 fire coal	Kiln 3 down

Compliance with the SO_2 emission limit will be in accordance with 40 CFR 60, Appendix A; Methods 1, 2, 3, 4 and 6.

Proof of compliance with the operating matrix provision will be the kiln operating log. The day, time and type of fuel fired will be recorded for each kiln. The time period Number 3 kiln is down will also be recorded in the operating log. Each log will be kept a minimum of two years.

BACT Determination Rationale:

The cement kilns were originally fired with natural gas and residual oil. The applicant had submitted test data while firing residual oil containing 2.38 percent sulfur to determine kiln product absorption of SO_2. The data indicated that 91.3% of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2 and 98.7% in kiln 3. A BACT determination was made based upon the applicant's data.

A construction permit was issued that authorized the use of coal in all three kilns. Kiln No. 3 was converted to fire coal and the exhaust gases were tested for SO_2 content. The data indicated the absorption of SO_2 in the kiln product was 75 to 80 percent, not the reduction originally anticipated. The coal fired in the kiln during the test contained two percent sulfur.

AP-42, Section 8.6-1 indicates the overall control inherent in the process is approximately 75 percent or greater of the available sulfur in ore and fuel if a baghouse that allows SO_2 to come in contact with the cement dust used. The existing sources use electrostatic precipitators for the control of particulate emissions; therefore, the department believes the maximum absorption would be 75 percent. The amount of SO_2 emissions will vary according to the alkali and sulfur content of the raw materials and fuel.

The SO_2 emission limits determined as BACT are obtainable by firing low sulfur coal. The economics of firing two percent sulfur coal is evident. The applicant has the option of burning a lower sulfur coal or installing additional SO_2 controls to meet the SO_2 limits determined as BACT.

low S coal or control

The three operating scenarios proposed by the applicant to protect the Dade County AAQS are acceptable. The application of production process techniques is a recognized method to achieve the required level of emission control.

<u>Details of the Analysis May be Obtained by Contacting:</u>

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 9, 1984

Mr. James T. Wilburn, Chief
Air Management Branch
Environmental Protection Agency-Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: Request for Revision of PSD-FL-050

Dear Mr. Wilburn:

Enclosed is the department's recommendations on revision of the sulfur dioxide emission standards in federal permit PSD-FL-050 for Lonestar Florida Pennsuco, Inc.'s three Portland cement kilns.

Public notice of the proposed revisions was published in the Miami Herald on August 28, 1984. Comments on the proposal were received from the department's Southeast District office and the National Park Service. These comments and the department's response, which resulted in several changes to the proposed permit specific conditons, are discussed in the final determination.

The department recommends that federal permit PSD-FL-050 be revised as shown in the final determination. If the Environmental Protection Agency approves the department's recommendations, then the state construction permits issued for the three kilns will be revised by the department's Southeast District office to be consistent with the federal permit.

Sincerely,

for Clair Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/WH/agh
cc: Roy Duke, Southeast District

Final Determination

Revision of Best Available Control Technology Determination
and
Permit to Construct

Lonestar Pennsuco, Inc.
Dade County

Federal Permit Number
PSD-FL-050

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

November 9, 1984

Final Determination

The Florida Department of Environmental Regulation has completed its review of the Lonestar Florida Pennsuco, Inc.'s February 23, 1983, request for revisions to the sulfur dioxide emission standards listed in federal permit number PSD-FL-050 for the three Portland cement kilns at its plant in Hialeah, Dade County, Florida. Public notice of the department's intent to revise the Best Available Control Technology (BACT) determination and the permit to construct was published in the Miami Herald on August 28, 1984.

Comments on the department's intent were received from the Southeast District office and the National Park Service. The district requested the sulfur dioxide emission limits for kiln No. 3 be reduced from 4.6 to 4.57 lb SO_2/ton clinker produced, that the stack test program to be used to determine the maximum sulfur content that can be in the coal be described, and that the Company be required to maintain an operating log on the three kilns. The National Park Service asked for an explanation of the discrepancy in the test data that showed sulfur dioxide removals of 75 and 98.7 percent, commented on the background sulfur dioxide levels in the park, and asked that the impact analysis be included in the application.

In response to the district's comments, the difference between emission factors for kiln No. 3 of 4.6 and 4.57 lb. SO_2 per ton clinker is less than one percent. The actual factor (400 lb. SO_2 per hour emission/87.5 tons per hour clinker production) rounded off to one decimal place is adequate for this permit. The procedures used to measure the sulfur dioxide emissions are not accurate enough to justify a more precise emission factor. Proposed specific condition No. 5 was not changed in the final determination.

The test program to establish the highest sulfur content of the coal that can be burned in the kilns is as follows. The program will consist of at least three separate EPA Method 6 compliance tests on each kiln. Each test will be no less than 168 hours apart to account for unknown variations in the feed and operation of the kilns. Should any test fail, the subsequent tests will be run with the kilns fired on coal containing a sulfur content 0.25 percent less than the preceeding test. This program is for the initial compliance test only. Any operating permits issued for the kilns will require only one test, as described in 40 CFR 60, Appendix A, per year. Specific condition No. 6 is revised to include this requirement.

The National Park Service requested an explanation for the discrepancy in the sulfur dioxide removal reported by the Company. The initial applications for permits to burn coal in the kilns were based on a sulfur dioxide absorption rate measured while burning No. 6 fuel oil in the kilns. The Company assumed a similar sulfur dioxide removal efficiency when the kilns were fired with coal. Tests on the one kiln converted to coal showed much lower sulfur dioxide absorption rates. The conclusion is that coal-fired cement kilns do not retain as much of the potential sulfur dioxide emissions as oil-fired ones.

In answer to the National Park Service's comments on the background SO_2 level in the Everglades National Park, we acknowledge that the SO_2 level in the park is greater than zero ug/m^3. According to 1983 SO_2 monitoring data from the park, an annual average concentration of 7 ug/m^3 was measured. If Lonestar's predicted impact of 0.4 ug/m^3, which is much less than the Class I increment, is added to this concentration, the resulting impact is predicted to be 7.4 ug/m^3. As stated in the preliminary determination, this impact is not expected to have an adverse impact on park resources.

In response to the Park Service's comment on the impact analysis, there were no additional increment consuming sources besides Dade County Resource Recovery which would have an impact on the receptors used in the modeling to evaluate the impact of Lonestar's modification on the Class I area. All other increment consuming sources were located at least 50 kilometers away from those receptors. Therefore, no impact area was defined.

The revised specific conditions, with the changes discussed above, are as follows:

Revised Specific Conditions:

4. Emissions of sulfur dioxide from Nos. 1 and 2 kilns shall not exceed 125.0 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 5.0 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from No. 3 kiln shall not exceed 400 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 4.6 pounds per ton of clinker produced.

6. The coal used to fuel kilns Nos. 1, 2, and 3 shall have a sulfur content of less than 1.75 percent (monthly average) and 2.0 percent maximum; or the sulfur content, determined once by the stack test program described below, that consistently meets the revised sulfur dioxide emission standards, whichever sulfur content is most restrictive.

TEST PROGRAM

In establishing the maximum sulfur content of the coal that can be used in each kiln, the Company shall conduct a test series on the kilns while they are operating near maximum production.

The test series shall consist of a minimum of three separate compliance tests, each test at least 168 hours after the preceeding test, and using fuel with a constant (± 0.25 percent) sulfur content. All test results for coal of this sulfur content must be below the BACT standards.

If test results show the SO_2 emissions from a kiln do not meet the BACT standard, then the Company shall reduce the sulfur content of the coal burned in this kiln by at least 0.25 percent (average) and repeat the test series until the emissions consistently comply with the revised BACT standards. For each test the Company shall provide a test report giving, as a minimum, the data listed in Chapter 17-2.700(7), FAC.

In addition, for each test sample the Company shall measure or estimate and report:

- feed rate (TPH)
- sulfur content of feed
- coal rate (TPH)
- sulfur content of coal
- oxygen content of flue gas

New Condition:

13. Only two kilns will be operated with coal as fuel at the same time. The Company shall maintain a log or logs that shows, as a minimum: the operational status of all three kilns at any time; when each kiln is placed in service; the clinker, feed, and fuel feed rates to each kiln; and when the kiln is taken out of service.

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

October 24, 1984

Mr. C. H. Fancy
Deputy Bureau Chief
Bureau of Air Quality Management
2600 Blair Stone Rd.
Tallahassee, Florida 32301

Re: PSD-FL-050, Request for Revision.

Dear Mr. Fancy:

This letter is in response to telephone conversations with Mr. Willard Hanks of your office regarding public comment received concerning the above referenced permit. Four (4) items needing further clarification were raised from the comments received.

1. STACK TEST PROGRAM - The preliminary determination references a stack test program without further clarification. It is my understanding that this program is detailed in DER internal files and it amounts to a series of three (3) SO_2 emission tests. Each consecutive test would be no less than 168 hours apart. Additionally, should any test fail, the subsequent test would be run with the kiln fired on coal with a sulfur content 0.25% less than the preceeding test. This stack test program is acceptable provided that it is for initial compliance purposes only. All subsequent annual compliance tests will consist of one (1) stack test in accordance with 40 CFR 60, Appendix A.

2. VERIFICATION OF BACT OPERATING RATES - Operating logs are kept for each kiln of the day, time, type and amount of fuel fired.

3. CHANGES IN PROJECTED SO_2 ABSORPTION - This has been the basis of the entire SO_2 emission limitation revision request and was documented in many previous correspondence. To briefly summarize, the initial 1979 coal conversion permit SO_2 emission limits were based on sulfur absorption rates derived from stack tests performed on the kilns while burning No. 6 fuel oil.

Mr. C. H. Fancy
PSD-FL-050, Request for Revision
Page Two

Those tests showed sulfur absorption at ± 98%. Little information was available at that time of similar kiln systems converting to coal so the assumption that absorption rates would be similar was accepted. When the coal conversion was completed on the Kiln No. 3 system a compliance test was conducted which demonstrated that much lower absorption rates could be expected utilizing coal. A series of stack test after that initial test were utilized to arrive at the absorption rate of 77.7% in our permit revision request.

4. STACK TESTS ON COAL REPRESENTATIVE OF OPERATION - All stack tests were conducted during normal kiln operations while burning coal averaging 1.7% S.

I hope this answers the questions raised, but should you need anything further please call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

cc: C. D. Coppinger
A. Townsend

United States Department of the Interior
NATIONAL PARK SERVICE
SCIENCE PUBLICATIONS OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:
N3615(475)

SEP 25 1984

Mr. C. H. Fancy, P.E.
Deputy Bureau Chief
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy:

Thank you for sending us information regarding your preliminary approval of Lonestar Florida Pennsuco's (Lonestar) permit modification request. As we understand it, Lonestar was granted a permit in 1980 for the fuel conversion of three existing kilns from gas/oil firing to coal firing, but is now requesting an increase in the allowable sulfur dioxide (SO_2) limit. The Lonestar facilities, which are located in Hialeah, Florida, are 30 kilometers northeast of Everglades National Park, a mandatory class I area.

You indicate that original stack tests performed, while the kilns were firing oil, show that 91.3 percent of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2, and 98.7 percent in kiln 3. The emission limitations for the fuel conversion permit were based on these data. Actual stack test data for coal firing indicate that the observed SO_2 removal is only approximately 75 percent. Consequently, Lonestar is requesting the SO_2 allowable limit in their permit be increased by 1,688 tons per year.

In the information you provided, there was little discussion regarding the large discrepancy in the test data (75 percent versus 98.7 percent). We would like to know if the difference is attributable entirely to the fuel change, if the coal-fired tests were properly conducted and were representative of normal operation, and if the kilns were being operated in the same manner as when the oil-fired tests were performed.

We note that the predicted SO_2 concentrations in Everglades National Park were made assuming a zero micrograms per cubic meter (ug/m^3) background concentration. Using this assumption, Lonestar predicts an annual SO_2 concentration of 0.4 ug/m^3 in the park. Although we do not expect this concentration to have an adverse impact on park resources, please note for future permits that SO_2 monitoring has been done in the park, and these data indicate that background levels, although low, are not zero ug/m^3. Future permits should include the background concentrations in any impact discussion.

The applicant asserts that "Lonestar and Dade County Resource Recovery were determined to be the only significant increment consuming sources in the area." This implies that an analysis was performed to define some impact area. This analysis should be included in the application.

If you have any questions regarding this matter, please contact Mark Scruggs of our Air and Water Quality Division at (303) 234-6620.

Sincerely,

C. W. Ogle

Acting Regional Director
Southeast Region

Best Available Control Technology (BACT) Determination

Lonestar Florida Pennsuco, Inc.

Dade County

The applicant has requested a revision of a previous BACT determination for sulfur dioxide emission limits for the three cement kilns located at their facility in Hialeah, Florida. Federal permit PSD-FL-050, issued in 1980, specified that SO_2 emissions from kiln No.1 and No.2 shall not exceed 56.7 pounds per hour per kiln and 26.3 pounds per hour from kiln No.3. The SO_2 emission limits were based on tests using 2.38% sulfur content fuel oil.

Kiln No. 3 was converted from oil/gas fired to coal fired and the emissions measured. The No. 3 kiln test results indicate a lower absorption of SO_2 by the products in the kiln, and consequently more SO_2 is being emitted to the atmosphere than originally proposed based on the tests using oil as fuel. Based upon the new data, the applicant has requested a revision of the SO_2 emission limits for the No. 3 kiln and No. 1 and No. 2 kiln both of which will also be converted to coal-fired units as originally proposed.

The requested change would result in an increase of 68 lb/hr from kilns 1 and 2 and 374 lb/hr from klin 3 above the original limits determined as BACT.

BACT Determination Requested by the applicant:

The following fuel operating mix for the three kilns would be:

A.	Kiln 1-coal(125)[#]	Kiln 2-gas(9)	Kiln 3-coal(400)
B.	Kiln 1-gas(9)	Kiln 2-coal(125)	Kiln 3-coal(400)
C.	Kiln 1-coal(125)	Kiln 2-coal(125)	Kiln 3-DOWN

* figure in parenthesis is pounds SO_2 emissions per hour.

Kiln operations per any of the three scenarios will not cause violation of the Federal, State or Dade County ambient air quality standards.

Date of receipt of a BACT application:

June 4, 1984

Date of Publication in the Florida Administrative Weekly:

June 22, 1984

Review Group Members:

The determination was based upon comments received from the New Source Review Section, Air Modeling Section, the Dade County

Department of Environmental Resources Management and the Southeast District Office.

BACT Determined by DER:

Pollutant	Emission Limit
Kiln No.1	125 lb SO_2/hr
Kiln No.2	125 lb SO_2/hr
Kiln No.3	400 lb SO_2/hr

The SO_2 emission limits determined as BACT do not result in a violation of Federal or State ambient air quality standards, but, do violate the Dade County standards. The department, therefore, has incorporated the proposed three operating scenarios as BACT to prevent violation of the Dade County standards.

Matrix	Matrix	Matrix
Kiln 1 fire coal	Kiln 1 fire gas	Kiln 1 fire coal
Kiln 2 fire gas	Kiln 2 fire coal	Kiln 2 fire coal
Kiln 3 fire coal	Kiln 3 fire coal	Kiln 3 down

Compliance with the SO_2 emission limit will be in accordance with 40 CFR 60, Appendix A; Methods 1, 2, 3, 4 and 6.

Compliance with the operating matrix provision will be the kiln operating log. The day, time and type of fuel fired will be recored for each kiln. The time period Number 3 kiln is down

will also be recorded in the operating log. Each log will be kept a minimum of two years.

BACT Determination Rationale:

The cement kilns were originally fired with natural gas and residual oil. The fuel was switched to coal in 1980 as per the conditions of permit number PSD-FL-050. The applicant submitted test data while firing residual oil containing 2.38 percent sulfur to determine kiln product absorption of SO_2. The data indicated that 91.3% of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2 and 98.7% in kiln 3. A BACT determination was made based upon the applicants data.

After one of the the kilns had been converted to fire coal, the exhaust gases were tested for SO_2 content. The data indicated the absorption of SO_2 in the kiln product was 75 to 80 percent, not the reduction originally anticipated. The coal fired in the kiln during the test contained two percent sulfur.

AP-42, Section 8.6-1 indicates the overall control inherent in the process is approximately 75 percent or greater of the available sulfur in ore and fuel if a baghouse that allows SO_2 to come in contact with the cement dust is used. These existing sources use electrostatic precipitators for the control of particulate emissions, therefore, the department believes the maximum absorption would be 75 percent.

The amount of SO_2 emissions, of course, will vary according to the alkali and sulfur content of the raw materials and fuel.

The SO_2 emission limits determined as BACT are obtainable by firing low sulfur coal. The economics of firing two percent sulfur coal is evident. The applicant has the option of burning a lower sulfur coal or installing additional SO_2 controls to meet the SO_2 limits determined as BACT.

The three operating scenarios proposed by the applicant, to protect the Dade County AAQS, are acceptable. The application of production process techniques are a recognized method to achieve the required level of emission control.

Details of the Analysis May be Obtained by Contacting:

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended by:

C.H. Fancy Deputy Bureau Chief

Date:

Approved:

Victoria J. Tschinkel, Secretary

Date:

ED/agh

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To:	Loctn.:	
To:	Loctn.:	
To:	Loctn.:	
From:	Date:	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due:	Date Due:	

TO: Tom Tittle, Southeast District

FROM: Bill Thomas, BAQM (work for)

DATE: May 15, 1985

SUBJ: Lonestar RDF Fuel

We have examined the proposal and concluded that the request will not be likely to result in any increased emissions or emissions of any new pollutants. The kiln is capable of accommodating RDF and, therefore, the use of RDF would not be a modification requiring any change to the federal or state construction permits.

Lower sulfur content and lower BTU value with higher moisture content results in a decrease, or at least no increase, in SO_2 and NO_x. High temperatures necessary for production of clinkers with relatively long residence times should effectively remove any toxic concerns, and any metals not removed during delivery processing should be controlled by the ESP.

Lonestar has addressed the equipment for handling the RDF. If you and DERM are satisfied that a construction permit is not required, we feel that the appropriate vehicle for documenting this would be an operating permit amendment with a Method 5 and 6 at maximum RDF consumption for verification of no increased emissions.

BT/ks

cc: Art Bolivar, DERM

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

February 12, 1985

Mr. A. L. Chiles, Jr.
Manager - Engineering & Projects
Lonestar Florida Pennsuco, Inc.
P. O. Box 122035-PVS
Hialeah, Florida 33012

Dear Mr. Chiles:

Re: Kiln No. 3 Fuel Modification

Before the Department can process your January 8, 1985, request to burn refuse derived fuel (RDF) in kiln No. 3, we will need the following information:

1. Analysis of the RDF produced in the South Dade Facility, including its Btu content.

2. The calculated emissions of regulated pollutants from burning this RDF, and emission test data on this or a similar RDF.

3. The estimated changed in emissions of all air pollutants that will occur when the maximum proposed quantity of RDF is burned in kiln No. 3.

4. A description of the RDF storage and feed system that includes the precaution to prevent fugitive dust and objectionable odors emissions.

5. What is the minimum residence time and temperature the RDF will be subject to in kiln No. 3?

6. What safeguards and monitoring procedures are proposed to reasonably assure the destruction of all hazardous compounds while burning RDF?

After the Department reviews your reply to this letter, we will be able to advise you on how to proceed with your request. If the emissions of any pollutant increases above the de minimus levels, Lonestar will need ~~be~~ to submit an application for permit to construct. If there are no increases or new pollutants emitted, the Department and the Environmental Protection Agency may be able to modify your existing permits to construct kiln No. 3 and allow the use of RDF.

If you have any questions on this matter, please contact Willard Hanks at (904)488-1344 or write me at the above address.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/WH/s

cc: James Wilburn
Isidore Goldman
Raymond Moreau

1-25-85
Jan 21, 1985

Best Available Control Technology (BACT) Determination Lonestar
(Amendment)
Lonestar Florida Pennsuco, Inc.
Dade County

The applicant has requested a revision of a previous BACT determination for sulfur dioxide emission limits for the three cement kilns located at their facility in Hialeah, Florida. Federal permit PSD-FL-050, issued in 1980, specified that SO_2 emissions from kiln No. 1 and No. 2 shall not exceed 56.7 pounds per hour per kiln and 26.3 pounds per hour from kiln No.3. The SO_2 emission limits were based on tests using 2.38% sulfur content fuel oil.

Kiln No. 3 was converted from oil/gas fired to coal fired and the emissions measured. The No. 3 kiln test results indicate a lower absorption of SO_2 by the products in the kiln, and consequently more SO_2 is being emitted to the atmosphere than originally proposed based on the tests using oil as fuel. Based upon the new data, the applicant has requested a revision of the SO_2 emission limits for the No. 3 kiln and No. 1 and No. 2 kiln both of which will also be converted to coal-fired units as originally proposed.

higher SO_2 generation

The requested change would result in an increase of 68 lb/hr from kilns 1 and 2 and 374 lb/hr from kiln 3 above the original limits determined as BACT.

BACT Determination Requested by the applicant:

The following fuel operating mix for the three kilns would be:

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* figure in parenthesis is pounds SO_2 emissions per hour.

Kiln operations per any of the three scenarios will not cause violation of the Federal, State, or Dade County ambient air quality standards.

Date of receipt of a BACT application:

June 4, 1984

Date of Publication in the Florida Administrative Weekly:

June 22, 1984

AP-42, Section 8.6-1 indicates the overall control inherent in the process is approximately 75 percent or greater of the available sulfur in ore and fuel if a baghouse that allows SO_2 to come in contact with the cement dust used. The existing sources use electrostatic precipitators for the control of particulate emissions; therefore, the department believes the maximum absorption would be 75 percent. The amount of SO_2 emissions will vary according to the alkali and sulfur content of the raw materials and fuel.

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The three operating scenarios proposed by the applicant to protect the Dade County AAQS are acceptable. The application of production process techniques is a recognized method to achieve the required level of emission control.

Details of the Analysis May be Obtained by Contacting:

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended By: C H Fancy

C. H. Fancy, Deputy Chief

Date: 1/21/85

Approved By:

for Victoria J. Tschinkel, Secretary

Date: 21 Jan 1985

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 9, 1984

Mr. James T. Wilburn, Chief
Air Management Branch
Environmental Protection Agency-Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: Request for Revision of PSD-FL-050

Dear Mr. Wilburn:

Enclosed is the department's recommendations on revision of the sulfur dioxide emission standards in federal permit PSD-FL-050 for Lonestar Florida Pennsuco, Inc.'s three Portland cement kilns.

Public notice of the proposed revisions was published in the Miami Herald on August 28, 1984. Comments on the proposal were received from the department's Southeast District office and the National Park Service. These comments and the department's response, which resulted in several changes to the proposed permit specific conditons, are discussed in the final determination.

The department recommends that federal permit PSD-FL-050 be revised as shown in the final determination. If the Environmental Protection Agency approves the department's recommendations, then the state construction permits issued for the three kilns will be revised by the department's Southeast District office to be consistent with the federal permit.

Sincerely,

Lamwell L George

for Clair Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/WH/agh
cc: Roy Duke, Southeast District

Final Determination

Revision of Best Available Control Technology Determination
and
Permit to Construct

Lonestar Pennsuco, Inc.
Dade County

Federal Permit Number
PSD-FL-050

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

November 9, 1984

Final Determination

The Florida Department of Environmental Regulation has completed its review of the Lonestar Florida Pennsuco, Inc.'s February 23, 1983, request for revisions to the sulfur dioxide emission standards listed in federal permit number PSD-FL-050 for the three Portland cement kilns at its plant in Hialeah, Dade County, Florida. Public notice of the department's intent to revise the Best Available Control Technology (BACT) determination and the permit to construct was published in the Miami Herald on August 28, 1984.

Comments on the department's intent were received from the Southeast District office and the National Park Service. The district requested the sulfur dioxide emission limits for kiln No. 3 be reduced from 4.6 to 4.57 lb SO_2/ton clinker produced, that the stack test program to be used to determine the maximum sulfur content that can be in the coal be described, and that the Company be required to maintain an operating log on the three kilns. The National Park Service asked for an explanation of the discrepancy in the test data that showed sulfur dioxide removals of 75 and 98.7 percent, commented on the background sulfur dioxide levels in the park, and asked that the impact analysis be included in the application.

In response to the district's comments, the difference between emission factors for kiln No. 3 of 4.6 and 4.57 lb. SO_2 per ton clinker is less than one percent. The actual factor (400 lb. SO_2 per hour emission/87.5 tons per hour clinker production) rounded off to one decimal place is adequate for this permit. The procedures used to measure the sulfur dioxide emissions are not accurate enough to justify a more precise emission factor. Proposed specific condition No. 5 was not changed in the final determination.

The test program to establish the highest sulfur content of the coal that can be burned in the kilns is as follows. The program will consist of at least three separate EPA Method 6 compliance tests on each kiln. Each test will be no less than 168 hours apart to account for unknown variations in the feed and operation of the kilns. Should any test fail, the subsequent tests will be run with the kilns fired on coal containing a sulfur content 0.25 percent less than the preceeding test. This program is for the initial compliance test only. Any operating permits issued for the kilns will require only one test, as described in 40 CFR 60, Appendix A, per year. Specific condition No. 6 is revised to include this requirement.

The National Park Service requested an explanation for the discrepancy in the sulfur dioxide removal reported by the Company. The initial applications for permits to burn coal in the kilns were based on a sulfur dioxide absorption rate measured while burning No. 6 fuel oil in the kilns. The Company assumed a similar sulfur dioxide removal efficiency when the kilns were fired with coal. Tests on the one kiln converted to coal showed much lower sulfur dioxide absorption rates. The conclusion is that coal-fired cement kilns do not retain as much of the potential sulfur dioxide emissions as oil-fired ones.

In answer to the National Park Service's comments on the background SO_2 level in the Everglades National Park, we acknowledge that the SO_2 level in the park is greater than zero ug/m^3. According to 1983 SO_2 monitoring data from the park, an annual average concentration of 7 ug/m^3 was measured. If Lonestar's predicted impact of 0.4 ug/m^3, which is much less than the Class I increment, is added to this concentration, the resulting impact is predicted to be 7.4 ug/m^3. As stated in the preliminary determination, this impact is not expected to have an adverse impact on park resources.

In response to the Park Service's comment on the impact analysis, there were no additional increment consuming sources besides Dade County Resource Recovery which would have an impact on the receptors used in the modeling to evaluate the impact of Lonestar's modification on the Class I area. All other increment consuming sources were located at least 50 kilometers away from those receptors. Therefore, no impact area was defined.

The revised specific conditions, with the changes discussed above, are as follows:

Revised Specific Conditions:

4. Emissions of sulfur dioxide from Nos. 1 and 2 kilns shall not exceed 125.0 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 5.0 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from No. 3 kiln shall not exceed 400 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 4.6 pounds per ton of clinker produced.

6. The coal used to fuel kilns Nos. 1, 2, and 3 shall have a sulfur content of less than 1.75 percent (monthly average) and 2.0 percent maximum; or the sulfur content, determined once by the stack test program described below, that consistently meets the revised sulfur dioxide emission standards, whichever sulfur content is most restrictive.

TEST PROGRAM

In establishing the maximum sulfur content of the coal that can be used in each kiln, the Company shall conduct a test series on the kilns while they are operating near maximum production.

The test series shall consist of a minimum of three separate compliance tests, each test at least 168 hours after the preceeding test, and using fuel with a constant ($\pm$ 0.25 percent) sulfur content. All test results for coal of this sulfur content must be below the BACT standards.

If test results show the SO_2 emissions from a kiln do not meet the BACT standard, then the Company shall reduce the sulfur content of the coal burned in this kiln by at least 0.25 percent (average) and repeat the test series until the emissions consistently comply with the revised BACT standards. For each test the Company shall provide a test report giving, as a minimum, the data listed in Chapter 17-2.700(7), FAC.

In addition, for each test sample the Company shall measure or estimate and report: feed rate (TPH)
sulfur content of feed
coal rate (TPH)
sulfur content of coal
oxygen content of flue gas

New Condition:

13. Only two kilns will be operated with coal as fuel at the same time. The Company shall maintain a log or logs that shows, as a minimum: the operational status of all three kilns at any time; when each kiln is placed in service; the clinker, feed, and fuel feed rates to each kiln; and when the kiln is taken out of service.

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

October 24, 1984

Mr. C. H. Fancy
Deputy Bureau Chief
Bureau of Air Quality Management
2600 Blair Stone Rd.
Tallahassee, Florida 32301

Re: PSD-FL-050, Request for Revision.

Dear Mr. Fancy:

This letter is in response to telephone conversations with Mr. Willard Hanks of your office regarding public comment received concerning the above referenced permit. Four (4) items needing further clarification were raised from the comments received.

1. STACK TEST PROGRAM - The preliminary determination references a stack test program without further clarification. It is my understanding that this program is detailed in DER internal files and it amounts to a series of three (3) SO_2 emission tests. Each consecutive test would be no less than 168 hours apart. Additionally, should any test fail, the subsequent test would be run with the kiln fired on coal with a sulfur content 0.25% less than the preceeding test. This stack test program is acceptable provided that it is for initial compliance purposes only. All subsequent annual compliance tests will consist of one (1) stack test in accordance with 40 CFR 60, Appendix A.

2. VERIFICATION OF BACT OPERATING RATES - Operating logs are kept for each kiln of the day, time, type and amount of fuel fired.

3. CHANGES IN PROJECTED SO_2 ABSORPTION - This has been the basis of the entire SO_2 emission limitation revision request and was documented in many previous correspondence. To briefly summarize, the initial 1979 coal conversion permit SO_2 emission limits were based on sulfur absorption rates derived from stack tests performed on the kilns while burning No. 6 fuel oil.

Those tests showed sulfur absorption at ± 98%. Little information was available at that time of similar kiln systems converting to coal so the assumption that absorption rates would be similar was accepted. When the coal conversion was completed on the Kiln No. 3 system a compliance test was conducted which demonstrated that much lower absorption rates could be expected utilizing coal. A series of stack test after that initial test were utilized to arrive at the absorption rate of 77.7% in our permit revision request.

4. STACK TESTS ON COAL REPRESENTATIVE OF OPERATION - All stack tests were conducted during normal kiln operations while burning coal averaging 1.7% S.

I hope this answers the questions raised, but should you need anything further please call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

cc: C. D. Coppinger
A. Townsend

United States Department of the Interior

NATIONAL PARK SERVICE
SCIENCE PUBLICATIONS OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:
N3615(475)

SEP 25 1984

Mr. C. H. Fancy, P.E.
Deputy Bureau Chief
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy:

Thank you for sending us information regarding your preliminary approval of Lonestar Florida Pennsuco's (Lonestar) permit modification request. As we understand it, Lonestar was granted a permit in 1980 for the fuel conversion of three existing kilns from gas/oil firing to coal firing, but is now requesting an increase in the allowable sulfur dioxide (SO_2) limit. The Lonestar facilities, which are located in Hialeah, Florida, are 30 kilometers northeast of Everglades National Park, a mandatory class I area.

You indicate that original stack tests performed, while the kilns were firing oil, show that 91.3 percent of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2, and 98.7 percent in kiln 3. The emission limitations for the fuel conversion permit were based on these data. Actual stack test data for coal firing indicate that the observed SO_2 removal is only approximately 75 percent. Consequently, Lonestar is requesting the SO_2 allowable limit in their permit be increased by 1,688 tons per year.

In the information you provided, there was little discussion regarding the large discrepancy in the test data (75 percent versus 98.7 percent). We would like to know if the difference is attributable entirely to the fuel change, if the coal-fired tests were properly conducted and were representative of normal operation, and if the kilns were being operated in the same manner as when the oil-fired tests were performed.

We note that the predicted SO_2 concentrations in Everglades National Park were made assuming a zero micrograms per cubic meter (ug/m^3) background concentration. Using this assumption, Lonestar predicts an annual SO_2 concentration of 0.4 ug/m^3 in the park. Although we do not expect this concentration to have an adverse impact on park resources, please note for future permits that SO_2 monitoring has been done in the park, and these data indicate that background levels, although low, are not zero ug/m^3. Future permits should include the background concentrations in any impact discussion.

The applicant asserts that "Lonestar and Dade County Resource Recovery were determined to be the only significant increment consuming sources in the area." This implies that an analysis was performed to define some impact area. This analysis should be included in the application.

If you have any questions regarding this matter, please contact Mark Scruggs of our Air and Water Quality Division at (303) 234-6620.

Sincerely,

C. W. Ogle

Acting Regional Director
Southeast Region

Best Available Control Technology (BACT) Determination

Lonestar Florida Pennsuco, Inc.

Dade County

The applicant has requested a revision of a previous BACT determination for sulfur dioxide emission limits for the three cement kilns located at their facility in Hialeah, Florida. Federal permit PSD-FL-050, issued in 1980, specified that SO_2 emissions from kiln No.1 and No.2 shall not exceed 56.7 pounds per hour per kiln and 26.3 pounds per hour from kiln No.3. The SO_2 emission limits were based on tests using 2.38% sulfur content fuel oil.

Kiln No. 3 was converted from oil/gas fired to coal fired and the emissions measured. The No. 3 kiln test results indicate a lower absorption of SO_2 by the products in the kiln, and consequently more SO_2 is being emitted to the atmosphere than originally proposed based on the tests using oil as fuel. Based upon the new data, the applicant has requested a revision of the SO_2 emission limits for the No. 3 kiln and No. 1 and No. 2 kiln both of which will also be converted to coal-fired units as originally proposed.

The requested change would result in an increase of 68 lb/hr from kilns 1 and 2 and 374 lb/hr from klin 3 above the original limits determined as BACT.

BACT Determination Requested by the applicant:

The following fuel operating mix for the three kilns would be:

A.	Kiln 1-coal(125)#	Kiln 2-gas(9)	Kiln 3-coal(400)
B.	Kiln 1-gas(9)	Kiln 2-coal(125)	Kiln 3-coal(400)
C.	Kiln 1-coal(125)	Kiln 2-coal(125)	Kiln 3-DOWN

* figure in parenthesis is pounds SO_2 emissions per hour.

Kiln operations per any of the three scenarios will not cause violation of the Federal, State or Dade County ambient air quality standards.

Date of receipt of a BACT application:

June 4, 1984

Date of Publication in the Florida Administrative Weekly:

June 22, 1984

Review Group Members:

The determination was based upon comments received from the New Source Review Section, Air Modeling Section, the Dade County

Department of Environmental Resources Management and the Southeast District Office.

BACT Determined by DER:

Pollutant	Emission Limit
Kiln No.1	125 lb SO_2/hr
Kiln No.2	125 lb SO_2/hr
Kiln No.3	400 lb SO_2/hr

The SO_2 emission limits determined as BACT do not result in a violation of Federal or State ambient air quality standards, but, do violate the Dade County standards. The department, therefore, has incorporated the proposed three operating scenarios as BACT to prevent violation of the Dade County standards.

Matrix	Matrix	Matrix
Kiln 1 fire coal	Kiln 1 fire gas	Kiln 1 fire coal
Kiln 2 fire gas	Kiln 2 fire coal	Kiln 2 fire coal
Kiln 3 fire coal	Kiln 3 fire coal	Kiln 3 down

Compliance with the SO_2 emission limit will be in accordance with 40 CFR 60, Appendix A; Methods 1, 2, 3, 4 and 6.

Compliance with the operating matrix provision will be the kiln operating log. The day, time and type of fuel fired will be recored for each kiln. The time period Number 3 kiln is down

will also be recorded in the operating log. Each log will be kept a minimum of two years.

BACT Determination Rationale:

The cement kilns were originally fired with natural gas and residual oil. The fuel was switched to coal in 1980 as per the conditions of permit number PSD-FL-050. The applicant submitted test data while firing residual oil containing 2.38 percent sulfur to determine kiln product absorption of SO_2. The data indicated that 91.3% of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2 and 98.7% in kiln 3. A BACT determination was made based upon the applicants data.

After one of the the kilns had been converted to fire coal, the exhaust gases were tested for SO_2 content. The data indicated the absorption of SO_2 in the kiln product was 75 to 80 percent, not the reduction originally anticipated. The coal fired in the kiln during the test contained two percent sulfur.

AP-42, Section 8.6-1 indicates the overall control inherent in the process is approximately 75 percent or greater of the available sulfur in ore and fuel if a baghouse that allows SO_2 to come in contact with the cement dust is used. These existing sources use electrostatic precipitators for the control of particulate emissions, therefore, the department believes the maximum absorption would be 75 percent.

The amount of SO_2 emissions, of course, will vary according to the alkali and sulfur content of the raw materials and fuel.

The SO_2 emission limits determined as BACT are obtainable by firing low sulfur coal. The economics of firing two percent sulfur coal is evident. The applicant has the option of burning a lower sulfur coal or installing additional SO_2 controls to meet the SO_2 limits determined as BACT.

The three operating scenarios proposed by the applicant, to protect the Dade County AAQS, are acceptable. The application of production process techniques are a recognized method to achieve the required level of emission control.

<u>Details of the Analysis May be Obtained by Contacting:</u>

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended by:

____

C.H. Fancy Deputy Bureau Chief

Date: ____________________________________

Approved: ____________________________________

Victoria J. Tschinkel, Secretary

Date: ____________________________________

ED/agh

LONESTAR FLORIDA PENNSUCO, INC.

Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

October 24, 1984

Mr. C. H. Fancy
Deputy Bureau Chief
Bureau of Air Quality Management
2600 Blair Stone Rd.
Tallahassee, Florida 32301

Re: PSD-FL-050, Request for Revision.

Dear Mr. Fancy:

This letter is in response to telephone conversations with Mr. Willard Hanks of your office regarding public comment received concerning the above referenced permit. Four (4) items needing further clarification were raised from the comments received.

1. STACK TEST PROGRAM - The preliminary determination references a stack test program without further clarification. It is my understanding that this program is detailed in DER internal files and it amounts to a series of three (3) SO_2 emission tests. Each consecutive test would be no less than 168 hours apart. Additionally, should any test fail, the subsequent test would be run with the kiln fired on coal with a sulfur content 0.25% less than the preceeding test. This stack test program is acceptable provided that it is for initial compliance purposes only. All subsequent annual compliance tests will consist of one (1) stack test in accordance with 40 CFR 60, Appendix A.

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Those tests showed sulfur absorption at ± 98%. Little information was available at that time of similar kiln systems converting to coal so the assumption that absorption rates would be similar was accepted. When the coal conversion was completed on the Kiln No. 3 system a compliance test was conducted which demonstrated that much lower absorption rates could be expected utilizing coal. A series of stack test after that initial test were utilized to arrive at the absorption rate of 77.7% in our permit revision request.

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I hope this answers the questions raised, but should you need anything further please call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

cc: C. D. Coppinger
A. Townsend

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 29, 1984

Mr. Barry Peterson
South Florida Regional Planning Council
1515 N.W. 167th Street
Suite 429
Miami, Florida 33169

Dear Mr. Peterson:

RE: Preliminary Determination - Lonestar Florida Pennsuco, Inc.
Request for Revision, PSD-FL-050

I wish to bring to your attention that Lonestar Florida Pennsuco, Inc. proposes to modify its existing facilities in Dade County, Florida, and that emissions of air pollutants will thereby be increased. The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, has reviewed the proposed construction under Federal Prevention of Significant Deterioration Regulations (40 CFR 52.21) and reached a preliminary determination of approval, with conditions, for this construction.

Please also be aware that the attached Public Notice announcing the preliminary determination, the availability of pertinent information for public scrutiny and the opportunity for public comment will be published in a local newspaper in the near future. This notice has been mailed to you for your information and in accordance with regulatory requirements. You need take no action unless you wish to comment on the proposed construction. If you have any questions, please feel free to call Mr. Bill Thomas or myself at (904)488-1344.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/pa
Enclosure

Public Notice

PSD-FL-050 (Revised)

Federal construction permit No. PSD-FL-050 authorized Lonestar Pennsuco, Inc. of Hialeah, Dade County, Florida to convert three Portland cement kilns to coal fuel. Operational data from the first kiln converted to coal showed the permitted sulfur dioxide limits for the kilns cannot be met. The Company has requested that the allowable sulfur dioxide emissions from the three kilns associated with the conversion to coal be increased to 2,300 tons per year. Emissions of other criteria pollutants will not change significantly.

By authority of the United States Environmental Protection Agency, the Florida Department of Environmental Regulation (FDER) has reviewed the proposed modification to the sulfur dioxide emission standard under federal prevention of significant deterioration (PSD) regulations (40 CFR 52.21). The FDER has made a preliminary determination that the modification can be approved provided certain conditions are met. A summary of the basis for this determination and the data submitted by Lonestar Florida Pennsuco, Inc. to support its request is available for public review at the following regulatory agency offices:

Department of Environmental Regulation
Bureau of Air Quality Management
Koger Properties, Inc.
Montgomery Building
Suite 101
Apalachee Parkway
Tallahassee, Fl. 32301

Department of Environmental Regulation
Southeast Florida District
3301 Gun Club Road
West Palm Beach, Florida 33402

Metropolitan Dade County
Environmental Resources Management
909 Southeast First Avenue
Brickell Plaza Building-Room 402
Miami, Florida 33131

The maximum percentage of allowable PSD sulfur dioxide increment consumed by the proposed modification is as follows:

Percent Class I Increment Consumed

	Annual	24-hour	3-hour
Sulfur Dioxide	20	60	56

Percent Class II Increment Consumed

	Annual	24-hour	3-hour
Sulfur Dioxide	13	15	10

Any person may submit written comments to FDER regarding the proposed modification. All comments postmarked not later than 30 days from the date of this notice will be considered by FDER in making a final determination regarding approval of this modification. These comments will be made available for public review at the above locations. Furthermore, a public hearing can be requested by any person. Such requests should be submitted within 15 days of the date this notice is published. Letters should be addressed to:

Mr. C. H. Fancy P.E.

Deputy Bureau Chief

Bureau of Air Quality Management

2600 Blair Stone Road

Tallahassee, Florida 32301

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

September 12, 1984

Mr. Bill Voshell
Air Compliance Section
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, Georgia 30365

Re: PSD-FL-050

Dear Mr. Voshell:

Please find enclosed a copy of the public notice and proof of publication in regards to the referenced permit revision request. We look forward to the final determination and permit revision subsequent to the thirty-day public comment period.

Sincerely,

SCOTT QUAAS
Environmental Specialist

SQ:lyn
cc: ~~Clair Fancy~~ - DER, Tallahassee
Tom Tittle - DER, W. Palm Beach
Patrick Wong - DERM

DER
SEP 18 1984
BAQM

BEST AVAILABLE COPY

The Miami Herald
A KNIGHT-RIDDER NEWSPAPER

PUBLISHED DAILY
MIAMI — DADE — FLORIDA

STATE OF FLORIDA
COUNTY OF DADE:

Before the undersigned authority personally appeared

Eddie L. Sweet

who on oath says that he/she is

Office Manager

of The Miami Herald, a daily newspaper published at Miami in Dade County, Florida; that the attached copy of advertisement was published in said newspaper in the issues of

August 28, 1984

Affiant further says that the said The Miami Herald is a newspaper published at Miami, in the said Dade County, Florida and that the said newspaper has heretofore been continuously published in said Dade County, Florida, each day and has been entered as second class mail matter at the post office in Miami, in said Dade County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

E. L. Sweet

Sworn to and subscribed before me this 29th

day of August A.D. 19 84

My commission expires

NOTARY PUBLIC STATE OF FLORIDA
MY COMMISSION EXPIRES SEPT 10 1987
BONDED THRU GENERAL INSURANCE UND.

PUBLIC NOTICE
PSD-FL-050 (Revised)

Federal construction permit No. PSD-FL-050 authorized Lonestar Pennsuco, Inc. of Hialeah, Dade County, Florida to convert three Portland cement kilns to coal fuel. Operational data from the first kiln converted to coal showed the permitted sulfur dioxide limits for the kilns cannot be met. The Company has requested that the allowable sulfur dioxide emissions from the three kilns associated with the conversion to coal be increased to 2,300 tons per year. Emissions of other criteria pollutants will not change significantly.

By authority of the United States Environmental Protection Agency, the Florida Department of Environmental Regulation (FDER) has reviewed the proposed modification to the sulfur dioxide emission standard under federal prevention of significant deterioration (PSD) regulations (40 CFR 52.21). The FDER has made a preliminary determination that the modification can be approved provided certain conditions are met. A summary of the basis for this determination and the data submitted by Lonestar Florida Pennsuco, Inc. to support its request is available for public review at the following regulatory agency offices:

Department of Environmental Regulation, Bureau of Air Quality Management, Koger Properties, Inc., Montgomery Building, Suite 101, Apalachee Parkway, Tallahassee, Fl. 32301.

Department of Environmental Regulation, Southeast Florida District, 3301 Gun Club Road, West Palm Beach, Florida 33402.

Metropolitan Dade County, Environmental Resources Management, 909 Southeast First Avenue, Brickell Plaza Building-Room 402, Miami, Florida 33131.

The maximum percentage of allowable PSD sulfur dioxide increment consumed by the proposed modification is as follows:

Percent Class I Increment Consumed

	Annual	24-hour	3-hour
Sulfur Dioxide	20	60	56

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	Annual	24-hour	3-hour
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Mr. C. H. Fancy, P.E., Deputy Bureau Chief, Bureau of Air Quality Management, 2600 Blair Stone Road, Tallahassee, Florida 32301.

August 28, 1984
Ad No 471-456 R

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 6, 1984

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Scott Quaas
Environmental Specialist
Lonestar Florida Pennsuco, Inc.
Post Office Box 122035 - PVS
Hialeah, Florida 33012

Dear Mr. Quaas:

RE: Preliminary Determination - Lonestar Florida Pennsuco, Inc.
PSD-FL-050, Request for Revision

The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, Region IV, has reviewed your application to modify the referenced source under the provisions of the Prevention of Significant Deterioration Regulations (40 CFR 52.21) and has made a preliminary determination of approval with conditions. Please find enclosed one copy of the Preliminary Determination and proposed federal permit.

You are requested to publish (at your own expense) the attached Public Notice. The notice must appear, one time only, in the legal advertising section of a newspaper of general circulation in Dade County. A copy of the Preliminary Determination and your application will be open to public review and comment for a period of 30 days. The public can also request a public hearing to review and discuss specific issues. At the end of this period, the Department will evaluate the comments received and make a final determination and recommendation to EPA regarding the proposed modification.

Mr. Scott Quaas
August 6, 1984
Page two

Should you have questions regarding this information, please contact Mr. Bill Thomas at (904)488-1344.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/pa

Attachments

cc: Mr. Anthony Clemente, Dade County Environmental Resources Management
Mr. Roy Duke, DER Southeast Florida District
Ms. Barbara D. Brown, National Park Service

Technical Evaluation
and
Preliminary
D

Lonestar Pennsuco, Inc.
Dade County

Revision of Best Available Control Technology Determination
and
Permit to Construct

Federal Permit Number
PSD-FL-050

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

August 6, 1984

Table of Contents

Public Notice

PSD-FL-050 (Revised)

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Mr. C. H. Fancy P.E.

Deputy Bureau Chief

Bureau of Air Quality Management

2600 Blair Stone Road

Tallahassee, Florida 32301

I. Applicant

Lonestar Florida Pennsuco, Inc.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012

II. Location

The sources affected by the proposed revision are located at the applicant's existing Portland cement plant at 11000 Northwest 121 Street, Hialeah, Dade County, Florida. The UTM coordinates are Zone 17, 562.75 km E and 2861.65 km N.

III. Background

The applicant received federal permit No. PSD-FL-050 in 1980 which authorized the fuel conversion of existing kilns Nos. 1, 2, and 3 from gas or oil to coal containing up to two percent sulfur. Burning coal instead of oil or gas in the kilns will increase the sulfur dioxide emissions from the kilns. The Best Available Control Technology (BACT) determination on which the emission standards were based limited the sulfur dioxide (SO_2) emissions from the existing electrostatic precipitators serving the three kilns to the quantities listed below.

Kiln No.	Maximum Sulfur Dioxide Emission Standards
1	1.42 lb/ton dry feed or 56.7 lbs/hr, 248.4 TPY
2	1.42 lb/ton dry feed or 56.7 lbs/hr, 248.4 TPY
3	0.19 lb/ton dry feed or 26.3 lbs/hr, 115.1 TPY

These standards were the emission limits requested by the applicant. The applicant had estimated a SO_2 removal efficiency of over 90 percent for the system. This removal efficiency was based on test data collected on the systems by a limited number of flue gas tests while the kilns were burning high sulfur fuel oil.

Kiln No. 3 has been converted to coal and actual stack test data shows that SO_2 removal is less than 90 percent. The applicant has studied the latest test data and now believes the systems will obtain only 75 to 85 percent SO_2 removal.

The Company is now requesting a revised BACT determination which would set SO_2 emission limits for the three kilns, while they are burning coal containing two percent sulfur, at the values shown below.

Kilns	Sulfur Dioxide Emission Limit
1	125 lb/hr
2	125 lb/hr
3	400 lb/hr

The company also agrees to operate only 2 kilns at any one time with coal as fuel. The third kiln will be fired with natural gas if it is operated while the other two are operating. Thus, the maximum SO_2 emissions from the three kilns will be 525 lb/hr or 2,300 tons per year.

Model results of the proposed SO_2 emissions from the three kilns shows no violation of the SO_2 increments or ambient air quality standards.

Although other criteria pollutants were regulated by the construction permit, SO_2 is the only pollutant that the Company has addressed in its request for a revision to the BACT determination and the permit.

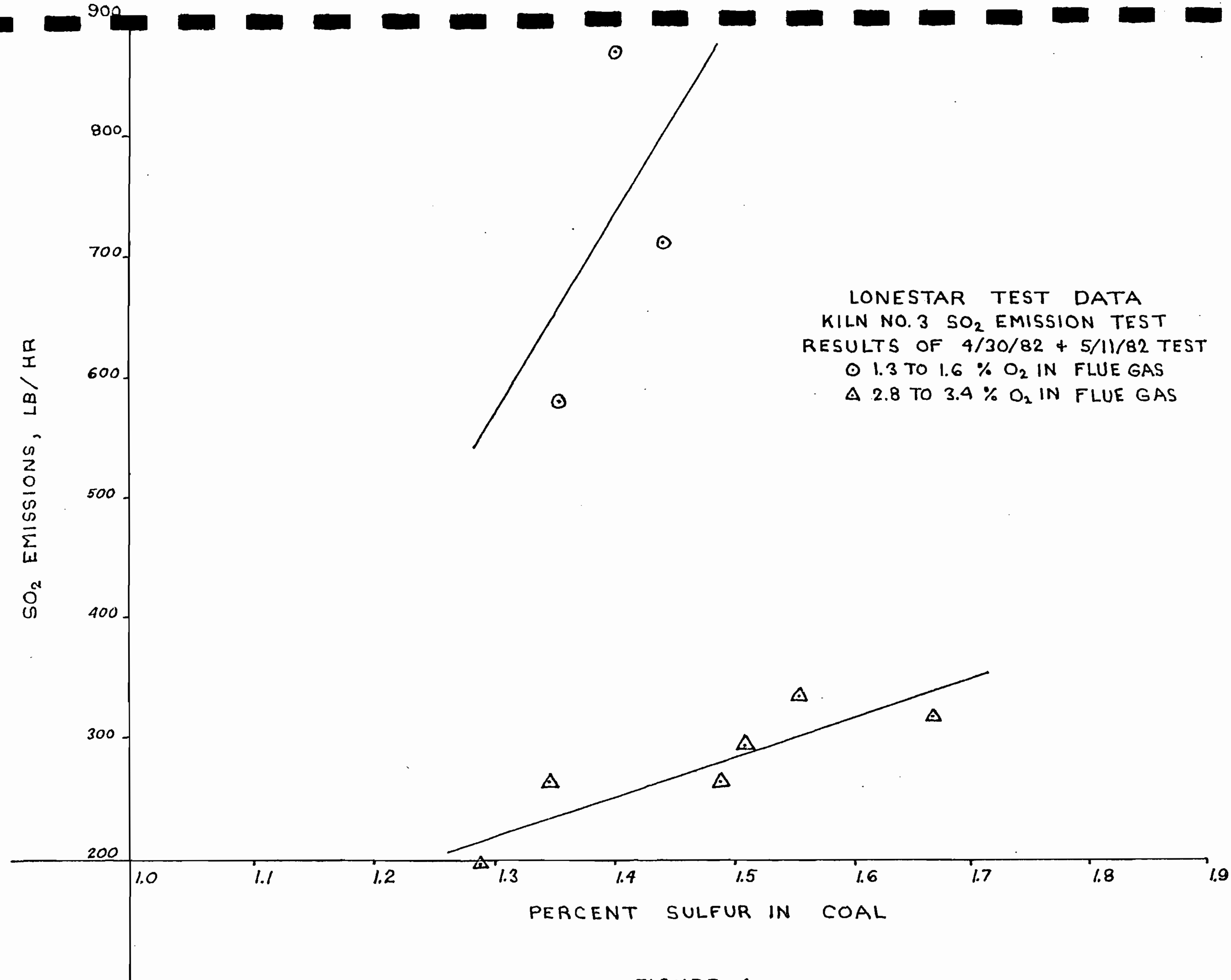
LONESTAR TEST DATA
KILN NO. 3 SO_2 EMISSION TEST
RESULTS OF 4/30/82 + 5/11/82 TEST
⊙ 1.3 TO 1.6 % O_2 IN FLUE GAS
△ 2.8 TO 3.4 % O_2 IN FLUE GAS
SO_2 EMISSIONS, LB/HR
900
800
700
600
500
400
300
200
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
PERCENT SULFUR IN COAL

FIGURE 1

Table 1

Sulfur Dioxide Emissions From Kiln 3

Run	Feed Rate (TPH)	% S in Feed	Coal Rate TPH	% S in Coal	Potential SO_2 Emiss. lb/hr	Measured SO_2 Emiss. lb/hr	Measured SO_2 Removal %
1	138.28	0.068	16.5	1.400	1300	863.60*	33.6
2	138.38	0.068	16.5	1.440	1326	709.10*	46.5
3	138.38	0.088	16.5	1.552	1511	332.30	78.0
1	127.59	0.044	13.9	1.668	1152	318.52	72.4
2	127.59	0.044	13.5	1.508	1039	294.72	71.6
3	127.59	0.044	14.4	1.488	1082	265.46	75.5
4	127.59	0.048	14.4	1.288	987	197.09	80.0
5	127.59	0.040	14.4	1.344	978	264.91	72.9
6	127.59	0.040	15.5	1.356	1045	578.92*	44.6

* O_2 in flue gas=1.6%

IV. Rule Applicability

The original application for a permit to burn coal in the three kilns was subject to Prevention of Significant Deterioration (PSD) review for sulfur dioxide in accordance with the provisions of Title 40, Code of Federal Regulations, Part 52.21 (40 CFR 52.21) promulgated on June 19, 1978, because the original application proposed an increase in sulfur dioxide emissions of greater than 100 tons per year (562 tons per year). This PSD review required a BACT determination and an air quality review and growth analysis. However, the applicant demonstrated that the predicted air quality impacts upon the annual, 24-hour, and 3-hour National Ambient Air Quality Standards (NAAQS) and the PSD Class II increments were below the significance levels as published in 43 FR 26398, June 19, 1978; therefore, a detailed air quality review and growth analysis was not required for the original application.

The applicant is now requesting a revised BACT determination which would increase the sulfur dioxide emission limits for the three kilns. This change in limits results in predicted air quality impacts upon the NAAQS and PSD Class II increments which are greater than the significance levels mentioned above; thus, a detailed air quality review and growth analysis under the June 19, 1978 PSD regulations is required for this change.

V. Engineering Evaluation

The 77.7 percent SO_2 removal efficiency for this system that the applicant's requested revision of the BACT SO_2 emission limits is based on, is greater than EPA implies can be achieved in the AP-42 Manual, Compilation of Air Pollutant Emission Factors. A cement kiln with a baghouse control device is estimated to remove 75 percent of the SO_2. The baghouse is believed to be more efficient in facilitating SO_2 removal than the electrostatic precipitators used by Lonestar. The Company has submitted a limited number of test results on kiln No. 3 that shows the average SO_2 removal efficiency, when the percent oxygen in the flue gas was above 2.8 percent, is 75 percent. No data has been provided that gives assurance that the existing system can consistently achieve a removal efficiency above this. Based on the data available, the department believes the system should achieve 75 percent SO_2 removal.

Flue gas desulfurization equipment (FGD) may be able to meet the standards set in the original BACT determination. However, the applicant stated that FGD on this type of source is unproven and, if used, would cause a financial hardship. The Department is in agreement that FGD is not feasible for this plant at this time.

Using fuels with a lower sulfur content is the only feasible way of reducing sulfur dioxide emissions from this plant. However, the original SO_2 standards initially selected as BACT cannot be met with low sulfur coal alone. Also, if the removal efficiency of the system is only 75 percent, the proposed SO_2 BACT standards will be exceeded at maximum permitted production when using coal containing two percent sulfur (Company's plan) and raw material containing 0.088 percent sulfur (highest estimated sulfur content of the raw material). Coal with a lower sulfur content is available which will allow the Company to meet their proposed SO_2 standards.

Calculations using the maximum raw material and coal inputs to the kilns listed in the original application for a permit to construct, the maximum sulfur content in the feed from Lonestar's June 13, 1983 letter, and a sulfur removal of 75 percent by the system show the kilns would have to burn coal with one percent sulfur to meet the sulfur dioxide emission standards now being requested (See Table I and Figure 1). This is low sulfur fuel. As these emissions cause no ambient air violations, the Department finds these standards acceptable.

VI. Air Quality Impact Analysis

As noted in Section IV., the revision in SO_2 emission limits will result in air quality impacts greater than significance levels, thus requiring a detailed air quality impact analysis for SO_2.

The air quality impact analyses required for SO_2 includes:

- An analysis of existing air quality;
- A PSD increment analysis;
- An Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, and visibility, and growth-related air quality impacts.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analyses depend on air quality modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the department has reasonable assurance that the proposed revision, as described in this permit and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A discussion of the modeling methodology and required analyses follows:

1. Modeling Methodology

The EPA-approved Industrial Source Complex (ISC) dispersion model was used in the air quality impact analysis. This model was used to predict annual, 24-hour, 4-hour, 3-hour, and 1-hour average concentrations resulting from the Lonestar sources and all other existing sources in the vicinity of Lonestar.

The maximum short-term impacts were refined with a 0.1 kilometer spacing between receptors for only the days on which worst-case meteorological conditions occurred. Emissions from interacting sources were included in these runs.

The surface meteorological data used in the model were National Weather Service data collected at Miami, Florida during the period 1970-1974. Upper air meteorological data used in the model were collected during the same time period at Miami, Florida. Final stack parameters and emission rates used in modeling and analyzing the proposed revision are contained in Tables 2 and 3.

2. Analysis of Existing Air Quality

In order to evaluate existing air quality in the area of a proposed project, the department may require a period of continuous preconstruction monitoring for any pollutant subject to federal PSD review. Since the original PSD permit application for the Lonestar coal conversion project was complete before June 8, 1981, and this application is for a revision to the original permit, the department is not requiring any preconstruction SO_2 monitoring. This is in accordance with the 1978 ambient monitoring guidelines in effect at the time of the original permit application.

Since the Lonestar plant is located in a remote area with respect to SO_2 emissions from non-specified sources, a background of 0 ug/m^3 for SO_2 is assumed. The department also assumed this background since all sources of SO_2 which would interact with emissions from Lonestar are accounted for in the modeling. The department assumed no contribution to the background value from natural and distant non-specified sources because of the prevailing subtropical easterly winds and the lack of space heating requirements in the area. This background was used for all averaging times and is consistent with EPA monitoring guidelines applicable to projects submitting complete applications prior to June 8, 1981.

3. PSD Increment Analysis

The Lonestar plant is located in an area where the Class II PSD increments apply. However, the Everglades National Park is located about 30 kilometers from the plant so an analysis of Class I impacts was also performed.

Lonestar and Dade County Resource Recovery were determined to be the only significant increment consuming sources in the area. Modeling results shown in Table 4 predict that the proposed revision, in combination with Dade County Resource Recovery, will not cause a violation of any Class I or Class II PSD increment. The highest, second highest short-term predicted concentrations are given in the table since five years of meteorological data were used in the modeling.

4. Ambient Air Quality Standards Analysis

As shown in Table 5, modeling results predict that maximum ground-level concentrations of SO_2 as a result of the proposed revision will be below all national (NAAQS), state (FAAQS) and local (Dade County AAQS) ambient air quality standards. The highest, second highest predicted value is given in the table for the three-hour averaging time since five years of meteorological data were used in the modeling and since this value is exclusively compared to NAAQS and FAAQS. However, the highest predicted values are given for the one-hour, four-hour and 24-hour averaging times since these values are compared with the Dade County AAQS, which require the use of the highest predicted value for comparison.

5. Analysis of Impact on Soils, Vegetation and Visibility and Growth-Related Air Quality Impacts

The maximum impact of the proposed increase in SO_2 emissions, as demonstrated through the air quality analysis, will be below the national secondary air quality standards established to protect public welfare related values. Therefore, no adverse effects on soils, vegetation and visibility are expected.

There will be no increase in the number of employees at the site due to the revision. No secondary residential, commercial or industrial growth which will adversely affect air quality in the area is expected.

Table 2

Stack Parameters for Lonestar's Original Coal Conversion Project

	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temperature (K)	Emission Rate SO_2 (g/s)
Kiln #1	61.0	2.1	16.9	472	7.14
Kiln #2	61.0	2.1	15.5	455	7.14
Kiln #3	61.0	4.33	10.8	472	3.31

Table 3

Stack Parameters for Lonestar's Proposed Revision to Coal Conversion Project

	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temperature (K)	Emission Rate SO_2 (g/s)
Kiln #1	61.0	2.1	11.86	465	1.13
Kiln #2	61.0	2.1	10.55	447	15.8
Kiln #3	61.0	4.33	9.98	455	50.4

Table 4

Maximum SO_2 Increment Consumption (ug/m^3)

Averaging Time

	3-hours	24-hours	Annual
Maximum Predicted Increment Consumption in Class I area	14*	3*	0.4*
Allowable Class I Increment	25.0	5.0	2.0
Maximum Predicted Increment Consumption in Class II area	53	14	2.5

Table 5

Comparison of Predicted SO_2 Impacts (ug/m^3) with
Ambient Air Quality Standards

<u>Averaging Time</u>

	1-hour	3-hour	4-hour	24-hour	Annual
Maximum Predicted Impact*	128	54	54	16	2.5
NAAQS	—	1300	—	365	80
FAAQS	—	1300	—	260	60
Dade County AAQS	286	—	57.2	28.6	8.6

* Includes 0 ug/m^3 background concentration for all averaging times

VII. Conclusion

Based on the data available, the Department has concluded that the original BACT determination for SO_2 was too restrictive. The SO_2 emission standards of 400 lb/hr for kiln 3 and 125 lb/hr each for kilns 1 and 2 are reasonable. These emissions will not cause an ambient air quality violation or exceed any allowable increase of SO_2 in the ambient air if only two kilns are fired with coal at any one time. Higher SO_2 emissions from the existing plant could increase the SO_2 concentration in the ambient air near the plant above that allowed by Dade County regulations.

The proposed SO_2 emission standards can be achieved by controlling the percent sulfur in the coal. The maximum percent sulfur that can be allowed in the coal is a function of the sulfur dioxide removal efficiency of the system. Low sulfur coal, one percent sulfur, may have to be burned to meet these standards. A controlled test series on all three kilns is needed to resolve what is the maximum percent sulfur in the coal that can be used in the kilns without exceeding the emission standards.

VIII. Revised BACT:

Best Available Control Technology (BACT) Determination

Lonestar Florida Pennsuco, Inc.

Dade County

The applicant has requested a revision of a previous BACT determination for sulfur dioxide emission limits for the three cement kilns located at their facility in Hialeah, Florida. Federal permit PSD-FL-050, issued in 1980, specified that SO_2 emissions from kiln No.1 and No.2 shall not exceed 56.7 pounds per hour per kiln and 26.3 pounds per hour from kiln No.3. The SO_2 emission limits were based on tests using 2.38% sulfur content fuel oil.

Kiln No. 3 was converted from oil/gas fired to coal fired and the emissions measured. The No. 3 kiln test results indicate a lower absorption of SO_2 by the products in the kiln, and consequently more SO_2 is being emitted to the atmosphere than originally proposed based on the tests using oil as fuel. Based upon the new data, the applicant has requested a revision of the SO_2 emission limits for the No. 3 kiln and No. 1 and No. 2 kiln, both of which will also be converted to coal-fired units as originally proposed.

The requested change would result in an increase of 68 lb/hr from kilns 1 and 2 and 374 lb/hr from kiln 3 above the original limits determined as BACT.

BACT Determination Requested by the applicant:

The following fuel operating mix for the three kilns would be:

A.	Kiln 1-coal (125)	Kiln 2-gas(9)	Kiln 3-coal(400)
B.	Kiln 1-gas(9)	Kiln 2-coal(125)	Kiln 3-coal(400)
C.	Kiln 1-coal(125)	Kiln 2-coal(125)	Kiln 3-DOWN

* figure in parenthesis is pounds SO_2 emissions per hour.

Kiln operations per any of the three scenarios will not cause violation of the Federal, State, or Dade County ambient air quality standards.

Date of receipt of a BACT application:

June 4, 1984

Date of Publication in the Florida Administrative Weekly:

June 22, 1984

Review Group Members:

The determination was based upon comments received from the New Source Review Section, Air Modeling Section, the Dade County Department of Environmental Resources Management, and the Southeast District Office.

BACT Determined by DER:

Pollutant	Emission Limit
Kiln No.1	125 lb SO_2/hr
Kiln No.2	125 lb SO_2/hr
Kiln No.3	400 lb SO_2/hr

The SO_2 emission limits determined as BACT do not result in a violation of Federal or State ambient air quality standards, but, do violate the Dade County standards. The department, therefore, has incorporated the proposed three operating scenarios as BACT to prevent violation of the Dade County standards.

Matrix	Matrix	Matrix
Kiln 1 fire coal	Kiln 1 fire gas	Kiln 1 fire coal
Kiln 2 fire gas	Kiln 2 fire coal	Kiln 2 fire coal
Kiln 3 fire coal	Kiln 3 fire coal	Kiln 3 down

Compliance with the SO_2 emission limit will be in accordance with 40 CFR 60, Appendix A; Methods 1, 2, 3, 4 and 6.

Proof of compliance with the operating matrix provision will be the kiln operating log. The day, time and type of fuel fired will be recorded for each kiln. The time period Number 3 kiln is down will also be recorded in the operating log. Each log will be kept a minimum of two years.

BACT Determination Rationale:

The cement kilns were originally fired with natural gas and residual oil. The applicant had submitted test data while firing residual oil containing 2.38 percent sulfur to determine kiln product absorption of SO_2. The data indicated that 91.3% of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2 and 98.7% in kiln 3. A BACT determination was made based upon the applicant's data.

A construction permit was issued that authorized the use of coal in all three kilns. Kiln No. 3 was converted to fire coal and the exhaust gases were tested for SO_2 content. The data indicated the absorption of SO_2 in the kiln product was 75 to 80 percent, not the reduction originally anticipated. The coal fired in the kiln during the test contained two percent sulfur.

AP-42, Section 8.6-1 indicates the overall control inherent in the process is approximately 75 percent or greater of the available sulfur in ore and fuel if a baghouse that allows SO_2 to come in contact with the cement dust used. The existing sources use electrostatic precipitators for the control of particulate emissions; therefore, the department believes the maximum absorption would be 75 percent. The amount of SO_2 emissions will vary according to the alkali and sulfur content of the raw materials and fuel.

The SO_2 emission limits determined as BACT are obtainable by firing low sulfur coal. The economics of firing two percent sulfur coal is evident. The applicant has the option of burning a lower sulfur coal or installing additional SO_2 controls to meet the SO_2 limits determined as BACT.

The three operating scenarios proposed by the applicant to protect the Dade County AAQS are acceptable. The application of production process techniques is a recognized method to achieve the required level of emission control.

<u>Details of the Analysis May be Obtained by Contacting:</u>

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

IX. Permit Condition Revision

Permit Conditions 4, 5, and 6 are revised as follows:

Original Conditions:

4. Emissions of sulfur dioxide from Nos. 1 and 2 kilns shall not exceed 56.7 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 2.27 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from No. 3 kiln shall not exceed 26.3 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 0.30 pounds per ton of clinker produced.

6. The coal used to fuel kilns Nos. 1, 2, and 3 shall have a sulfur content of 2 percent or less.

Revised Conditions:

4. Emissions of sulfur dioxide from Nos. 1 and 2 kilns shall not exceed 125.0 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates, the

emission of sulfur dioxide shall not exceed 5.0 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from No. 3 kiln shall not exceed 400 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 4.6 pounds per ton of clinker produced.

6. The coal used to fuel kilns Nos. 1, 2, and 3 shall have a sulfur contect of less than 1.75 percent (monthly average) and 2.0 percent maximum; or the sulfur content, as determined by the stack test program described in the BACT determination, that consistently meets the revised sulfur dioxide emission standards; whichever sulfur content is most restrictive.

New Condition:

13. Only two kilns will be operated with coal as fuel at the same time.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

June 4, 1984

Mr. Scott Quaas
Lonestar Florida Pennsuco Inc.
P.O. Box 122035-PVS
Hialeah, Florida 33012

RE: Request for Revision of Coal Conversion Permit
PSD-FL-050

Dear Mr. Quaas:

With regard to your letter concerning the status of your April 26, 1984 request for revision of coal conversion permit PSD-FL-050, we are in the process of preparing the preliminary determination which we plan to issue during June, 1984. If we need further clarification of any issues while preparing the preliminary determination, we will call you. If you have any further questions, please contact Cleve Holladay or Willard Hanks at 904-488-1344.

Sincerely,

C.H. Fancy, P.E.
Deputy Bureau Chief
Bureau of Air Quality Management

CHF/cgh/agh
cc: Roy Duke, DER Southeast District
Anthony Clemente, Dade County DERM
Bill Voshell, USEPA

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

DER
MAY 29 1984
BAQM

May 22, 1984

Mr. Clair Fancy, Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: PSD-FL-050

Dear Mr. Fancy:

With regard to my recent SO_2 emission limitation revision request, could you please advise me of the status of your review and/or whether additional information is needed. As this matter has been under review for over one (1) year we are anxious to bring it to a final conclusion.

Please contact me as soon as possible.

Sincerely,

Scott Quaas
Environmental Specialist

LONESTAR FLORIDA PENNSUCO, INC.
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11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
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APR 30 1984
BAQM

April 26, 1984

Mr. C. H. Fancy
Deputy Chief
Bureau of Air Quality Management
Fla. Dept. of Environmental Regulation
2600 Blair Stone Rd.
Tallahassee, Florida 32301-8241

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Dear Mr. Fancy:

The attached letter was sent to EPA requesting our SO_2 emission limiting standards be changed to reflect lower total emissions from our three kilns. These changes were necessitated by your interpretation of the Dade County short-term SO_2 standard and the comparison of modeling concentrations to that standard as outlined in your December 28, 1983 letter.

As your office has been given the responsibility for performing the review and preparing the determination on our PSD revision request, Lonestar also requests that our pending permit extension application for the coal conversion of Kiln Nos. 1, 2, & 3 (File No. AC-13-54054) be issued to reflect that determination.

Should you need any additional information, please do not hesitate to call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

SQ/mp

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
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March 23, 1984

Mr. James Wilburn, Chief
Air Management Branch
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, Georgia 30365

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Dear Mr. Wilburn,

In our revision submittal dated November 19, 1982, Lonestar requested a change to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr
Kiln 2	100 lbs/hr
Kiln 3	400 lbs/hr

You advised me on December 17, 1982 that the Florida Department of Environmental Regulation (FDER) would be responsible for performing the technical review and preparing a determination. Subsequently, Lonestar has submitted additional information to both the state and county regulatory agencies, as requested by those agencies, to clarify remaining issues. Additionally, it was our understanding that the State intended to approve our revision request.

However, in a letter dated December 28, 1983, the FDER advised Lonestar of a change in their interpretation of the Dade County short-term SO_2 standard and the comparison of modeling concentrations to that short-term standard.

The FDER indicated they must compare the predicted highest concentrations at each receptor site to Dade County standards not the second-highest concentrations as used in state and federal regulations. When the modeling submitted by Lonestar was re-evaluated, a violation of the 4-hour Dade County SO_2 standard was predicted.

In view of this recent interpretation, Lonestar has completed a revised air modeling evaluation of three emission scenarios to determine maximum predicted concentrations when the kilns are burning either coal or natural gas. The fuels burned and associated maximum SO_2 emissions for each of the kilns are as follows:

Emission Scenarios	Maximum SO_2 emissions (lbs/hr), and fuel burned		
	Kiln 1	Kiln 2	Kiln 3
1	125 (coal)	9 (natural gas)	400 (coal)
2	9 (natural gas)	125 (coal)	400 (coal)
3	125 (coal)	125 (coal)	off - line

Attached is a summary of maximum SO_2 concentrations predicted for each scenario due to Lonestar and other nearby sources. The supportive computer model printouts will be forwarded under seperate cover. As the air dispersion modeling results depict, Lonestar may operate Kiln 1, Kiln 2 and Kiln 3 under any of the three emission scenarios modeled and will comply, as before, with Federal and State Ambient Air Quality Standards (AAQS), and also comply with the Dade County AAQS as currently interpreted.

Lonestar respectively requests that our emission limiting standards be revised to reflect the emissions outlined in the above three scenarios. As this matter has been under review for one year, we believe an expeditious conclusion of our permit revision request is now warranted.

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Should you need any further information from me, please don't hesitate to call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

SQ:elvy

cc: S. Smallwood - DER, Tallahassee
A. Clemente - Dade County DERM
R. Duke - DER, West Palm Beach
B. Voshell - EPA
C. D. Coppinger
R. F. Scully
A. Townsend

file

Summary of Maximum Sulfur Dioxide Concentrations
Due to Lonestar and Other Nearby Sources

Scenario	SO$_2$ Concentrations (ug/m^3)* for Averaging Periods of: Annual	24-hour Highest	24-hour Highest, Second Highest	4-Hour Highest	3-hour Highest, Second Highest	1-hour Highest
1-Kiln #1 and Kiln #3 on coal, Kiln #2 on gas						
Total-All Sources	2.4	15.7	13.4	52.7	52.3	127.2
Lonestar contribution	---	14.3	13.4	52.4	52.0	127.2
2-Kiln #2 and Kiln #3 on coal, Kiln #1 on gas						
Total-All Sources	2.5	16.2	14.0	54.2	53.5	128.0
Lonestar contribution	---	14.7	14.0	53.9	53.2	128.0
3-Kiln #1 and Kiln #2 on coal, Kiln #3 off-line						
Total-All Sources	2.2	15.4	13.2	50.4	46.2	101.6
Lonestar contribution	---	15.4	12.4	50.4	45.8	100.4
Dade County AAQS	8.6	28.6	NA	57.2	NA	286
Florida AAQS	60	NA	260	NA	1300	NA

Note: NA = Not Applicable

*Highest 1-,-4, and 24-hour concentrations are compared to Dade County AAQS, which are not to be exceeded. Highest, second-highest 3- and 24-hour concentrations are compared to Florida AAQS, which are not to be exceeded more than once per year.

Source: ESE, 1984

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LONESTAR FLORIDA PENNSUCO, INC.

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Atlanta, Georgia 30365

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Dear Mr. Wilburn,

In our revision submittal dated November 19, 1982, Lonestar requested a change to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr
Kiln 2	100 lbs/hr
Kiln 3	400 lbs/hr

You advised me on December 17, 1982 that the Florida Department of Environmental Regulation (FDER) would be responsible for performing the technical review and preparing a determination. Subsequently, Lonestar has submitted additional information to both the state and county regulatory agencies, as requested by those agencies, to clarify remaining issues. Additionally, it was our understanding that the State intended to approve our revision request.

However, in a letter dated December 28, 1983, the FDER advised Lonestar of a change in their interpretation of the Dade County short-term SO_2 standard and the comparison of modeling concentrations to that short-term standard.

The FDER indicated they must compare the predicted highest concentrations at each receptor site to Dade County standards not the second-highest concentrations as used in state and federal regulations. When the modeling submitted by Lonestar was re-evaluated, a violation of the 4-hour Dade County SO_2 standard was predicted.

In view of this recent interpretation, Lonestar has completed a revised air modeling evaluation of three emission scenarios to determine maximum predicted concentrations when the kilns are burning either coal or natural gas. The fuels burned and associated maximum SO_2 emissions for each of the kilns are as follows:

Emission Scenarios	Maximum SO_2 emissions (lbs/hr), and fuel burned Kiln 1	Kiln 2	Kiln 3
1	125 (coal)	9 (natural gas)	400 (coal)
2	9 (natural gas)	125 (coal)	400 (coal)
3	125 (coal)	125 (coal)	off - line

Attached is a summary of maximum SO_2 concentrations predicted for each scenario due to Lonestar and other nearby sources. The supportive computer model printouts will be forwarded under seperate cover. As the air dispersion modeling results depict, Lonestar may operate Kiln 1, Kiln 2 and Kiln 3 under any of the three emission scenarios modeled and will comply, as before, with Federal and State Ambient Air Quality Standards (AAQS), and also comply with the Dade County AAQS as currently interpreted.

Lonestar respectively requests that our emission limiting standards be revised to reflect the emissions outlined in the above three scenarios. As this matter has been under review for one year, we believe an expeditious conclusion of our permit revision request is now warranted.

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Should you need any further information from me, please don't hesitate to call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

SQ:elvy

cc: S. Smallwood - DER, Tallahassee
A. Clemente - Dade County DERM
R. Duke - DER, West Palm Beach
B. Voshell - EPA
C. D. Coppinger
R. F. Scully
A. Townsend

file

Summary of Maximum Sulfur Dioxide Concentrations
Due to Lonestar and Other Nearby Sources

Scenario	SO_2 Concentrations (ug/m^3)* for Averaging Periods of:					
	Annual	24-hour Highest	24-hour Highest, Second Highest	4-Hour Highest	3-hour Highest, Second Highest	1-hour Highest
1-Kiln #1 and Kiln #3 on coal, Kiln #2 on gas						
Total-All Sources	2.4	15.7	13.4	52.7	52.3	127.2
Lonestar contribution	---	14.3	13.4	52.4	52.0	127.2
2-Kiln #2 and Kiln #3 on coal, Kiln #1 on gas						
Total-All Sources	2.5	16.2	14.0	54.2	53.5	128.0
Lonestar contribution	---	14.7	14.0	53.9	53.2	128.0
3-Kiln #1 and Kiln #2 on coal, Kiln #3 off-line						
Total-All Sources	2.2	15.4	13.2	50.4	46.2	101.6
Lonestar contribution	---	15.4	12.4	50.4	45.8	100.4
Dade County AAQS	8.6	28.6	NA	57.2	NA	286
Florida AAQS	60	NA	260	NA	1300	NA

Note: NA = Not Applicable

*Highest 1-,-4, and 24-hour concentrations are compared to Dade County AAQS, which are not to be exceeded. Highest, second-highest 3- and 24-hour concentrations are compared to Florida AAQS, which are not to be exceeded more than once per year.

Source: ESE, 1984

C H

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

December 28, 1983

Mr. Scott Quaas
Environmental Specialist
Lonestar Florida Pennsuco, Inc.
Post Office Box 122035 - PVS
Hialeah, Florida 33012

Re: Request for Revision of Coal Conversion Permit # AC 13-27742 and PSD-FL-050

Dear Mr. Quaas:

We stated our intention to revise both the federal and state permits on your coal conversion project in a letter to EPA concerning our Air Enforcement Action Plans. However, we have recently discovered a problem which may preclude the Department from issuing the state permit. This problem is based on our understanding that DERM considers the first annual exceedance of a Dade County short-term SO_2 standard to be a violation.

If our understanding of the DERM rules is correct, we have to compare modeled SO_2 concentrations to Dade County short-term standards differently than we compare them to state and national standards. In other words, we must compare the predicted highest concentrations at each receptor site to Dade County standards, not the predicted second-highest concentrations as used in state and federal regulations. When we reevaluated Lonestar's modeling using this method, we found that the revised SO_2 emissions from Lonestar alone, exclusive of emissions from other sources or of any background SO_2 level, are predicted to violate the 4-hour Dade County SO_2 standard (a value of 64.8 ug/m^3 compared to the Dade County standard of 57.2 ug/m^3). Since the Department must enforce the Dade County standards when issuing a state permit, we now believe the Department can't issue a state permit for the requested emission limits. However, since the Dade County ambient standards are not part of the approved SIP, EPA does not recognize them as enforceable, and consequently they are not to be considered in whether we approve or disapprove Lonestar's request for a modification to their federal permit. Therefore, we will, if all federal requirements are complied with, recommend to EPA that the federal permit be modified.

Mr. Scott Quaas
Page Two
December 28, 1983

In view of this problem, we responded to the comments contained in DERM's October 20, 1983, letter to Steve Smallwood as follows:

1. Comment #1 on ambient monitoring: Since the requested emission limits result in predicted violations of the 4-hour Dade County standard and since any change in emission limits Lonestar subsequently proposes because of this problem will still likely approach the 4-hour standard, we are prepared to require Lonestar to locate an SO_2 monitor near the plant.
2. Comments #2 and #3 on explaining and documenting the SO_2 emissions in the kilns: We have discussed these comments with you and understand that you have discussed them with DERM and that they have agreed to your answers. Please provide us with any answers to these comments you have provided to DERM, as we would like to resolve these comments with them before taking any final action on your permits.

If you have any questions concerning this matter please feel free to call Cleve Holladay at 904/488-1344.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management

CHF/CH/s
cc: Anthony Clemente
Dade County DERM
Roy Duke, DER
Bill Voshell, USEPA

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

December 23, 1983

Mr. Anthony J. Clemente, Director
Department of Environmental Resources Management
909 Southeast 1st Avenue
Brickell Plaza Building - Room 402
Miami, Florida 33131

Re: Lonestar Florida Pennsuco, Inc., Request for Revision of Coal Conversion Permit # AC 13-27742 and PSD-FL-050

Dear Mr. Clemente:

This is in response to your October 20, 1983, letter to me which stated your reasons for disagreeing with our intention to approve the relaxation of Lonestar's sulfur dioxide emission limits on its coal conversion permits.

When I stated our intention to revise both the federal and state permits in my August 30, 1983, letter to EPA concerning our Air Enforcement Action Plans, I was unaware of a problem we have recently discovered which may preclude the Department from issuing the state permit. This problem is based on our understanding that DERM considers the first annual exceedance of a Dade County short-term SO_2 standard to be a violation.

If our understanding of the DERM rules is correct, we have to compare modeled SO_2 concentrations to Dade County short-term standards differently than we compare them to state and national standards. In other words, we must compare the predicted highest concentrations at each receptor site to Dade County standards, not the predicted second-highest concentrations as used in state and federal regulations. When we reevaluated Lonestar's modeling using this method, we found that the revised SO_2 emissions from Lonestar alone, exlcusive of emissions from other sources or of any background SO_2 level, are predicted to violate the 4-hour Dade County SO_2 standard (a value of 64.8 ug/m^3 compared to the Dade County standard of 57.2 ug/m^3). Since the Department must enforce the Dade County standards when issuing a state permit, we now believe the Department can't issue a state permit for the requested emission limits. However, since the Dade County ambient standards are not part of the approved SIP, EPA does not recognize them as enforceable, and consequently they are not to be considered in whether we approve or disapprove Lonestar's request for a modification to their federal permit. Therefore, we will, if all federal requirements are complied with, recommend to EPA that the federal permit be modified.

In view of this problem, our response to the comments in your October 20, 1983, letter are as follows:

1. Comment #1 on ambient monitoring: Since the requested emission limits result in predicted violations of the 4-hour Dade County standard and since any change in emission limits Lonestar subsequently proposes because of this problem will still likely approach the 4-hour standard, we are prepared to require Lonestar to locate an SO_2 monitor near the plant.

2. Comments #2 and #3 on documenting the SO_2 emissions in the kilns: we have discussed these comments with Lonestar staff and understand that they have discussed them with DERM and that you have agreed to their answers. However, if this is not the case, we will require these comments be satisfactorily resolved before further permitting of Lonestar's kilns is considered.

We will wait for your response to this letter before taking any further action on these permits.

Sincerely,

Steve Smallwood, P.E.
Chief
Bureau of Air Quality Management

SS/LG/s

cc: Scott Quaas
Bill Voshell
Roy Duke

bc: N. Wright
B. Blommel
C. Fancy

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 17, 1983

Mr. Anthony J. Clemente, Director
Environmental Resources Management
909 Southeast, 1st Avenue
Brickell Plaza Building - Room 402
Miami, Florida 33131

Re: Lonestar Florida Pennsuco, Inc., Request for Revision of Coal Conversion Permit # AC 13-27742 and PSD-Fl-050

Dear Mr. Clemente:

The Bureau is preparing a response to your October 20, 1983, letter to me which stated your reasons for disagreeing with our intention to approve the relaxation of Lonestar's sulfur dioxide emission limits on their coal conversion permits. I expect to send the Bureau's response within the next week to ten days. We will not take final action on the permit until we have resolved the questions you raised.

Sincerely,

Steve Smallwood, P.E.
Bureau Chief
Bureau of Air Quality Management

SS/CH/s

METROPOLITAN **DADE** COUNTY, FLORIDA

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING—RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

October 20, 1983

Steve Smallwood, P.E., Chief
Bureau of Air Quality Management
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

RE: Lonestar Florida Pennsuco, Inc.
Request for Revision of Coal
Conversion Permit #AC 13-27742
(File #AC 13-54054)

Dear Mr. Smallwood:

This letter is in response to your memorandum of September 8, 1983, which indicates that you intend to approve the referenced request by Lonestar for relaxation of the sulfur dioxide emission limits contained in their coal conversion permit. As indicated to you and Lonestar in previous correspondence, we are not satisfied with the information presented in the request and therefore disagree with your intent to approve same for the following reasons:

A. DERM does not feel that certain important questions raised by us in three (3) separate letters to your Department, to date, have been adequately addressed in your review of Lonestar's request.

B. We do not consider your Bureau's interpretation of the Dade County Pollution Control Ordinance, in this instance, that a source is not subject to any further requirements of that ordinance if it only "contributes to" but does not, by itself, "cause" a violation of the standards contained therein, as being reasonable or compatible with the intent of the Ordinance or any similar regulation. Under your interpretation, just about any source proposed in Dade County would only "contribute to" and, therefore, be approvable with few if any controls. We have consulted with our County Attorney's Office and they supported our view in this matter.

In view of the above, we hereby request that your agency reconsider said approval until Lonestar satisfactorily responds to the following:

1. Commit to carrying out an extensive ambient monitoring program to verify the actual levels of sulfur dioxide in the area, and also to determine the direct impact of the higher levels of sulfur dioxide from kiln 3.

2. Explain the drastic turnaround in the projected levels of sulfur dioxide from kiln 3 as compared with kilns 1 and 2. Lonestar had previously maintained that sulfur dioxide emissions from kilns 1

and 2 would be more than twice that from kiln 3. Now, Lonestar claims that kiln 3 will emit four (4) times more sulfur dioxide than the emissions from each of the smaller kilns.

3. Provide documented evidence to support the increase in sulfur dioxide absorption rates from 55 percent in July, 1981 to between 75 percent and 80 percent as is currently being claimed.

This Department does not think it is unreasonable to ask that these issues relating to the use of coal fuel be satisfactorily resolved before further permitting of Lonestar's kilns can be considered. Instead, DERM feels that it is essential to ensure that these new and substantially higher emissions of sulfur dioxide will not adversely affect the air quality in the surrounding areas, nor exacerbate any existing violations that might be caused by other sources. We therefore urge you to reconsider your current position, and look forward to your cooperation in this matter.

Copies of our earlier correspondence are attached for your information.

Sincerely,

for

Anthony J. Clemente
Director
Environmental Resources Management

AJC/RR/HPW/ag

Attachments

CC: Bill Voshell
Roy Duke
Al Townsend
Scott Quaas

METROPOLITAN DADE COUNTY, FLORIDA

METRO-DADE

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING — RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

July 22, 1983

Steve Smallwood
Chief, Bureau of Air Quality Management
Florida Department of Environmental
Regulation
Twin Towers Building
2600 Blairstone Road
Tallahassee, Florida 32301

RE: Request by Lonestar Florida
Pennsuco, Inc. for revision
of SO_2 standards contained
in EPA permit #PSD 050 and
FDER Permit #AC 13-27742
(File No.AC 13-54054)

Dear Mr. Smallwood:

The Department of Environmental Resources Management has reviewed the response by Lonestar dated 6/13/83 to FDER's request for additional information regarding the referenced revision of their coal conversion permit, and offers the following comments for your consideration:

1. DERM feels that an ambient monitoring program for SO_2 in the predicted high impact areas is necessary to ensure that the Dade County AAQS is not exceeded, and also to protect nearby Class I areas.

2. Lonestar contends in their letter that the current sulfur absorption rate in kiln #3 is 75-80 percent, whereas the compliance stack test of July 15, 1981 showed an absorption rate of only 55%. Documentation of how this higher figure was calculated must be provided along with the results of the 15 test runs Lonestar says were performed between April, 1982 and March, 1983, including the excess oxygen level during each run.

3. The requested SO_2 emission level of 100#/hr. for kilns 1 and 2 still has not been justified by Lonestar. A detailed analysis of how this requested emission level was arrived at is necessary to alleviate those concerns contained in our letter of January 31, 1983 to Clair Fancy of your office.

4. In Attachment 3 of their June 13 letter to your Department, Lonestar erringly stated that Dade County's short term AAQS for SO_2 can be

exceeded once annually at each receptor site. However, the first exceedance of the Dade County 24-hour AAQS, as contained in Sec. 24-17(1)(b) of the Dade County Code, is considered a violation and must be addressed.

DERM hereby requests that review of Lonestar's request for revision of the above mentioned SO_2 emission standards be completed as expeditiously as possible, as kiln #3 has been operated without a valid operating permit since May 31, 1982 with SO_2 emissions far in excess of previously permitted levels. This Department has to date deferred enforcement action against Lonestar in consideration of their revision request, and in fact has had to refund the local annual operating permit fee for 1982-1983 as no operating permit was issued due to their non-compliance status.

We trust that the above concerns will be adequately addressed by Lonestar prior to any decision by you regarding the SO_2 emission standards revision request. If you have any questions pertaining to the above, please do not hesitate to call.

Yours sincerely,

Rafael Rodon, P.E.. Chief
Environmental Planning Division

RR/HPW/ag

CC: Bill Voshell, E.P.A.
Roy Duke, D.E.R.
A. Townsend, Lonestar
Scott Quaas, Lonestar

METROPOLITAN **DADE** COUNTY, FLORIDA

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
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MIAMI, FLORIDA 33131
(305) 579-2760

April 23, 1982

Roy M. Duke, P.E.
Subdistrict Manager
Florida Department of Environmental Regulation
Post Office Box 3858
West Palm Beach, Florida 33402

RE: LONESTAR FLORIDA PENNSUCO INC., REQUEST FOR EXTENSION OF DER CONSTRUCTION PERMIT # AC13-27742

Dear Mr. Duke:

This Department has reviewed the referenced request by Lonestar for a three year extension of their coal conversion construction permit and recommends that said request be denied for kilns #1 and #2, and that a conditional permit extension be granted for kiln #3.

As you are aware, Lonestar kiln #3 is the only kiln at the subject facility that has been converted to coal fuel thus far, with a subsequent stack test on July 15, 1981 showing the sulfur dioxide emissions from that kiln to be 505.79 lbs/hr. DERM believes that this violation of the 26.3 lbs/hr permitted level for sulfur dioxide for kiln #3 as contained in EPA Permit #PSD-FL-050 and DERM Permit #AC13-27742 can result in violation of the Dade County Ambient Standards for that pollutant. DERM is therefore requiring that Lonestar conduct an ambient monitoring program to determine actual levels of sulfur dioxide, and Lonestar's contribution in the areas of greater impact.

Furthermore, the high level of sulfur dioxide emissions from kiln #3 indicates that assumptions regarding sulfur absorption rates in the kilns on which the original coal conversion applications were based are erroneous. Consequently, this Department feels that Lonestar must provide revised projections of pollutant emissions, especially for sulfur dioxide, that would result from conversion of kilns 1 and 2 to coal fuel, before any further permitting actions can be considered for these kilns to convert to coal.

DERM hereby proposes that extension of the above-mentioned permit be granted for kiln #3 only, with the attached condition that the existing violation be resolved with all the regulatory agencies concerned within eighteen months of the granting of such extension.

Your cooperation in protecting Dade County's ambient air quality is greatly appreciated. If you have any questions on any of the above, please do not hesitate to call.

Yours sincerely,

Rafael Rodon

Rafael Rodon, P.E.
Acting Chief
Environmental Planning Division
Environmental Resources Management

RR:HPW:toc

cc: Ed Cahill
Bill Brant
Joe Stilwell
Al Townsend, Lonestar
Tommie Gibbs, EPA

BEST AVAILABLE COPY

METROPOLITAN DADE COUNTY, FLORIDA

METRO·DADE

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING — RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

January 31, 1983

Mr. Clair Fancy, P.E.
Deputy Chief, B.A.Q.M.
Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Re: Lonestar Florida Pennsuco Inc.;
Request for revision of SO_2 Standards
contained in EPA Permit # PSD 050 and
FDER Permit # AC13 - 54054

Dear Mr. Fancy:

The Department of Environmental Resources Management has completed review of the referenced request by Lonestar to the Environmental Protection Agency and the Florida Department of Environmental Regulation for revision of the sulfur dioxide emission limits contained in the abovementioned permits, and we have several concerns for your consideration during the review of the proposed revision.

As indicated previously in our letter dated April 23, 1982 to Mr. Roy Duke at your District office in West Palm Beach, DERM proposes that Lonestar be directed to conduct a thorough ambient monitoring program to determine the actual levels of SO_2 in predicted high impact areas, before kilns #1 and #2 are allowed to be converted to coal fuel. It is our position that such a measure is required due to inconsistencies in previous models, and also because the Dade County AAQS might be exceeded if new emission limits are granted to Lonestar. Furthermore, ambient monitoring would serve to ensure that the Class 1 increment is not exceeded in the Everglades National Park.

With regards to Lonestar's current request for revision of the SO_2 emission limits, please be advised of the following concerns by DERM:

1. The original application by Lonestar for the coal conversion of their kilns projected SO_2 emissions of 56.7 lbs/hr. each from kilns 1 and 2, and 26.3 lbs/hr/ from kiln #3. As you can see, this is greater than twice the amount of SO_2 from each of kilns 1 and 2 than from kiln 3. Yet the current request by Lonestar is for 100 lbs/hr. from each of kilns 1 and 2, and 400 lbs/hr. from kiln 3. Lonestar should justify such a significant change in the projected emission limitations.

2. The BACT analysis, attached to the current request, includes a section describing operating variables that affect SO_2 emissions (page 2, 2nd paragraph). It is stated in this section that the use of excess oxygen greater than 1.5 percent can cause operational problems. Then, in the separate attachment 'STACK TEST RESULTS - SO_2', it is documented that for all the stack tests where SO_2 emissions were lower than the requested limit of 400 lbs/hr. for kiln #3, the percent oxygen ranged from 2.9% to 3.4%. Other results, with the percent oxygen between 1.3% and 1.6%, all showed SO_2 emissions well in excess of 400 lbs/hr. Based on the above, it is reasonable to assume that the requested emission limit for SO_2 of 400 lbs/hr. from kiln 3 is unrealistic.

Finally, this Department does not feel that the possibility of alternate or add on controls for sulfur dioxide has been adequately addressed, in that no direct controls for SO_2 emissions have been assessed.

We trust that the above comments will assist you in your review. If you should have any questions, please do not hesitate to call at (305) 579-2760 or (Suncom 448-2760).

Sincerely,

Rafael Rodon

Rafael Rodon, P.E.
Chief
Environmental Planning Division

RR:HPW:vpc

cc: Bill Voshell
Roy Duke
Al Townsend
Scott Quaas

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

August 30, 1983

DER
SEP 02 1983
BAQM

Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-3841

Re: PSD-FL-050; Request for SO_2 Emission Limitation Revision

Dear Mr. Smallwood:

Lonestar is in receipt of a July 22, 1983 letter addressed to you from the Metro-Dade County Department of Environmental Resources Management (DERM). This is to respond to those comments and to clarify the issues raised in their letter.

1. The ambient modeling evaluations submitted with Lonestar's revision request utilized EPA and DER approved Industrial Source Complex Short-Term (ISCST) model. It analyzed annual, 24-hour, 4-hour, 3-hour, and 1-hour impacts due to Lonestar and nearby significant sources on PSD increments, and Florida and Dade County AAQS. The dispersion modeling evaluation showed the operation of Kiln 1, 2, and 3 utilizing coal, and emitting 100, 100, & 400 lbs/hr. SO_2 respectively, will not exceed Federal, State and Dade County ambient air quality standards, will not impact significantly predicted violations in the vicinity of Alton Box, nor will the operations impact on the nearby Class I area exceed the allowable PSD increments. In a May 13, 1980 letter from DERM to the Florida Department of Environmental Regulation regarding this project, it was stated, "Since Alton Box Board is depicted to exceed the four-hour standard individually and Lonestar's emissions are apparently insignificant ($< 5ug/m^3$) at the interaction receptor location, it is felt the applicant's proposed modification should not be denied on the basis of sulfur dioxide

emissions. It is recommended that Alton Box Board demonstrate SO_2 emissions reduction prior to the renewal of its permit." Those comments by DERM are directly applicable to this revision request as shown by the modeling evaluations submitted with our request.

2. Stack test results for Kiln 3 and SO_2 absorption calculations using those results were submitted in our original request for revision dated November 19, 1982. The calculations show 77.7 percent absorption with 372 lbs/hr. SO_2 emitted. Excess oxygen levels during the test runs are indicated in the results. Our June 13, 1983 supplemental information letter further describes the relationship between oxygen levels and other kiln variables on SO_2 emissions. The results of all but six of the fifteen test runs, referred to in DERM's letter were submitted in our original request. The additional test runs were performed in-house and while these tests do support Lonestar's conclusions, the only information used from the tests in any calculations submitted was the sulfur contents of the raw feed material.

3. The estimates of SO_2 emission levels for Kilns 1 and 2 at 100 lbs/hr. were based upon the best available data as there are no existing equivalent facilities to make precise assumptions. Calculations using 2 percent S coal, 0.15 percent SO_3 in the feed material and absorption of 80 percent show emissions would be 98.6 lbs/hr.

4. In attachment 3 of our June 13, 1982 supplemental information letter to your office, we quoted from the Dade County 1981 Ambient Air Quality Data Report regarding exceedences and violations which DERM now points out in their July 22nd letter as being in error. In any case, whether the highest or second highest 24-hour concentration at each receptor is considered, the ambient dispersion model evaluation submitted in Lonestar's original revision request and the supplemental evaluation of predicated violations in the vicinity of Alton Box show that Lonestar does not exceed any Federal, State, or Dade County AAQS. Again DERM's earlier comments referred to in No. 1 above would apply.

I am hopeful this resolves those concerns raised in DERM's July 22nd letter and agree that the review of our revision request be completed as expeditiously as possible. We stand ready to meet with you and your staff to resolve any questions you may have on this important project, and look forward to continuing to work closely with the Department.

Sincerely,

Scott Quaas
Environmental Specialist

SQ:lyn
cc: Rafael Rodon - DERM
Tom Tittle - DER, W. Palm Beach
Richard DuBose - EPA

307,2

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 30, 1983

Mr. James T. Wilburn, Chief
Air Management Branch
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, Northeast
Atlanta, Georgia 30365

Dear Mr. Wilburn:

Your letter of July 8, 1983, which we received July 14 requested additional information on our Air Enforcement Action Plans. On August 3, I sent you information on the 24 cases discussed in your letter. The following is a more detailed response to each case:

1. Orlando Utilities Commission (OUC) Indian River - Unit 2

There are several issues related to the Indian River Power Plant. They include: the acceptablity of the current test port location; the acceptability of the previously used test methodology; the status of the company's request for department approval of an alternate standard and procedure for demonstrating compliance with the applicable emission standards for this plant; and, the compliance status of the unit with respect to tests conducted during this calendar year.

The current port location at Unit 2 is upstream of the air preheater. There is essentially no ductwork between the air preheater and the stack, which Unit 2 shares with Unit 1. The existing Unit 2 port locations meet the upstream downstream flow disturbance criteria but the stack temperature at that location is in the range of 650° - 800°F.

Historically, OUC has used a particulate emission testing methodology similar to EPA Method 17. DER rules allow the use of EPA Method 5, or EPA Method 17 provided particulate is collected at a temperature of 375°F or less. The unit is an older oil-fired unit that is not subject to NSPS.

11. Visual Graphics

This facility was inspected by Bill Voshell of EPA on July 19, 1983. He informed Rick Vail, of BAQM, that the facility had eliminated the source of VOCs and planned to cease all operation by the end of the year. The facility is now in compliance; DER does not plan to take enforcement action.

12. General Motors

Data was submitted on July 7, 1983 to EPA verifying that the source was no longer under RACT regulations. The plant modified both of their paint spray booths to reduce emissions to lower than 3 lbs/hr and 15 lbs/day. They are now in compliance. Any efforts to increase emissions will require modification of GM's operating permit. EPA has also discussed with DER the eventual submittal of a SIP revision to include the permit condition.

13. Lonestar Pennsuco

Lonestar Pennsuco submitted its request for a revision to it's federal PSD permit, PSD-FL-050, on February 28, 1983. This revision would increase SO_2 emissions from each of their three kilns. Lonestar submitted air quality dispersion modeling in February 1983 and in June 1983. This modeling shows that no state or federal ambient air quality standards are predicted to be violated, but it does show predicted violations of the 24-hour (28.6 ug/m^3) and 4-hour (57.2 ug/m^3) Dade County SO_2 standards in the vicinity of Alton Box Board Company. Alton Box Board is located about seven kilometers to the southeast of Lonestar. Alton Box Board is predicted to violate these standards several times a year, operating alone. The Dade County ordinance treats even one exceedance of the standards as a violation (Dade County Code 24-17). Lonestar's proposed modification will increase the impacts of some of the violations and will contribute to several additional violations which are predicted to occur downwind of Alton Box Board in the direction of interaction with Lonestar. However, Lonestar's contributions to these predicted violations are small compared to impacts from Alton Box Board.

Since the Department has determined that it must enforce the Dade County pollution standards when issuing a state permit, [Section 403.182(6), Florida Statutes], the Bureau orginally believed that Lonestar's predicted contributions to predicted violations would prevent the Department from being able to issue a state permit with the SO_2 emission limits being requested by Lonestar. However, the Dade County pollution

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Mr. James T. Wilburn, Chief
August 30, 1983
Page eight

ordinance states that no source may "cause" an emission of SO_2 which would exceed their standards. There is no mention of the word "contribute" in their ordinance. Lonestar's modeling clearly shows that Lonestar does not cause any violations, when operating alone. Therefore, the Bureau, after consulting with the Department's Office of General Counsel, believes that the Department now may issue both the federal and state permits with the SO_2 emission limits requested by Lonestar. The Bureau will be issuing a preliminary determination for the federal permit modification around September 15, 1983.

The Action Plans for the following sources were identified as acceptable upon submittal of stack test certifying compliance. A copy of stack test reports will be submitted to you as soon as they are submitted to us.

1) Yorke Doliner

2) Marion Paving

3) Sloan Construction

4) V.E. Whitehurst - A stack test showing compliance was submitted to you on 7-7-83. The plant is now in compliance.

5) Alad Construction is now in compliance. The stack test report showing compliance is enclosed (see attachment III).

I believe this provides the information you requested. If you need additional information, let me know. If you think we should pursue a different course of action on any of these, let's discuss it.

Sincerely,

Steve Smallwood, P.E.
Chief
Bureau of Air Quality Management

SS/dt

Attachments

Enclosure

BEST AVAILABLE COPY

cc: Jesse Baskerville, EPA
Bill Blommel
Bill Buzick
Tom Devine
Clair Fancy
Marti Hall
Andrew Hodges, EPA
Marshall Mott-Smith
Howard Rhodes
Winston Smith, EPA
Walt Starnes
Dan Thompson
Bill Voshell, EPA
Nancy Wright
District Managers
Local Program Directors

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LONESTAR FLORIDA PENNSUCO, INC.

Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

June 14, 1983

DER
JUN 16 1983
BAQM

Mr. Clair Fancy
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: PSD-FL-050, Request for Emission Limitation Revision

Dear Mr. Fancy,

Please find enclosed the supportive computer model printouts referenced in our June 13th letter regarding the above federal permit.

Sincerely,

Scott Quaas
Environmental Specialist

SQ/ep

CC: R. DuBose - EPA, Region (with enclosure)

EVALUATION OF PREDICTED VIOLATIONS OF THE DADE COUNTY AAQS
DOWNWIND OF ALTON BOX

In response to the Florida Department of Environmental Regulation (DER) letter of April 7, 1983, an investigation of predicted violations of the Dade County Ambient Air Quality Standard (AAQS) for sulfur dioxide (SO_2) in the vicinity of Alton Box has been completed. Based upon a conversation with Mr. Larry George of the DER on June 3, 1983, only the 24-hour averaging time was evaluated. The 4-hour Dade County AAQS was also predicted to be violated in the vicinity of Alton Box, but since Lonestar maximum 4-hour impacts near Alton Box are low (less than 17 ug/m^3 based upon previous modeling), and no air quality impact significance level has been established for the 4-hour average, no further analysis was required.

The analysis consisted of executing the Industrial Source Complex Short-Term (ISCST) model for five years of Miami Airport meteorological data (1970-1974), with Lonestar SO_2 emissions at 100 pounds per hour (lb/hr) for Kilns #1 and #2, and 400 lb/hr for Kiln #3. Stack parameters for Lonestar and other sources, and SO_2 emissions for other sources were the same as contained in the November 19, 1982 submittal to the U.S. EPA. The receptor grid used in the vicinity of Alton Box for the evaluation differed somewhat from the previous modeling. Based upon the relative location of Alton Box and Lonestar, a radial direction of 120.5° from north aligns the two plants. As a result, radial directions in the model were set at 117.5°, 119.0°, 120.5°, 122.0° and 123.5°. The 1.5° angular spacing results in a receptor spacing of about 200 m at a downwind distance of 7.4 km. The two plants are located 7.267 km apart, and therefore downwind distances (from Lonestar) of 7.4, 7.6, 7.8, 8.0 and 8.2 km were input to the model. All other model inputs were the same as for the modeling in your November 19 submittal.

[redacted]

ATTACHMENT 3.

From the ISCST model output, all 24-hour periods (days) on which the Dade County 24-hour SO_2 AAQS of 28.6 ug/m^3 was exceeded were identified. These days and associated predicted concentrations due to all sources are shown in Table 1. Dade County's short-term AAQS can be exceeded once per year at each receptor location (Dade County, Florida, 1981 Ambient Air Quality Data Report, pg. 7). Thus, the highest 24-hour concentration at each receptor is not considered in determining if a violation of the standard has occurred. Therefore, Lonestar's contribution to total concentrations are not shown in Table 1 for the highest predicted concentration at each receptor. Lonestar's contribution is shown for all other values exceeding the AAQS.

Review of Table 1 shows that Lonestar's maximum contribution to any predicted violation of the 24-hour Dade County AAQS near Alton Box is 2.0 ug/m^3. This value is well below the 24-hour SO_2 significance level of 5.0 ug/m^3, and therefore Lonestar does not contribute significantly to any of these predicted violations. Supportive computer model printouts are included with this submittal.

Table 1. Concentrations (ug/m^3) Predicted to Exceed the 24-Hour Dade County Standard in the Vicinity of Alton Box

		Receptor Location [Distance (km), Range (Deg)]																	
		7.4, 119		7.4, 122		7.4, 123.5		7.6, 119		7.6, 120.5		7.6, 122		7.6, 123.5		7.8, 120.5		7.8, 122	
Year	Day	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC
1970	4			33.8	*														
	51			31.6	0.3														
	37			31.3	0.2									40.2	0.3				
	320			29.6	0.0														
	36											29.3	0.0	43.3	*				
	35											32.6	*						
	328											31.9	0.2						
	9											31.5	2.0						
1971	317													31.4	*				
	40											38.7	*						
	79											29.1	1.4						
	269					28.8	*												
	16			41.9	*														
	15									36.0	*					33.6	*		
1972	174	54.5	*																
	173	54.3	0.0																
	144	32.7	0.0																
	176	28.8	0.0																
	352											33.3	*						
	77									29.4	*								
	327																	29.2	*
1973	298			35.7	*														
	297			31.5	1.0														
	50					41.2	*												
	41							31.7	*										
	355									28.9	*								
1974	89	39.2	*																
	279			37.4	*														
	313			32.9	0.0														
	317			29.3	0.0														
	330			28.9	0.0														
	344			28.9	0.0														
	40											36.3	*						
	57											32.9	0.9						

Source: Environmental Science and Engineering, Inc., 1983.

AS = Total concentration due to all sources.
LC = Lonestar's contribution to total concentration.
[redacted] * = No contri[redacted]tion [redacted]n fo[redacted]hest[redacted]ict[redacted]ncen[redacted]on a[redacted]h re[redacted]r. [redacted]

LONESTAR FLORIDA PENNSUCO, INC.
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(305) 823-8800

DER
FEB 28 1983
BAQM

February 23, 1983

Mr. Clair Fancy
Env Pmt - Bur AQM
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: PSD-FL-050 ; Request for Revision

Dear Mr. Fancy:

Pursuant to our telephone conversation today, please find enclosed a copy of our request for revision of our PSD permit limitations. The original was received by Mr. Smallood's office on November 22, 1982. It is my understanding in accordance with a December 17, 1982 letter from EPA (copy enclosed), that your office will perform the technical review and prepare a preliminary determination regarding our revision.

Please don't hesitate to call should you need anything further.

Sincerely,

Scott Quaas
Scott Quaas
Environmental Specialist

SC/ep

LONESTAR FLORIDA/PENNSUCO, INC.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

November 19, 1982

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

RE: PSD-FL-050; Lonestar Florida/Pennsuco, Inc.; Kilns 1, 2 and 3; Request for Revision of Sulfur Dioxide Emission Limitations

Dear Mr. Devine:

In accordance with my letter to you dated November 2, 1982, the following items are enclosed to assist your office in revising the above referenced permit:

1) A revised air quality modeling analysis addressing significant changes which would influence the model predictions and which shows compliance with applicable ambient air quality standards.

2) A revised BACT analysis showing that alternate controls for SO_2 emissions are unwarranted. Retrofitting the three existing kilns with additional or alternative control devices would have only minimal effect on emissions, would have an insignificant effect on reducing ambient air impacts, and would prohibit the company from implementing the complete conversion of its kilns to coal. The analysis also contains an explanation of operating variables in a Portland cement kiln and the resulting effect on SO_2 emissions.

3) A summary of recent stack tests including SO_2 absorption calculations with resulting emission estimates for kiln 3.

Based upon these materials Lonestar respectfully requests a revision to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr.
Kiln 2	100 lbs/hr.
Kiln 3	400 lbs/hr.

We look forward to answering any questions you may have and meeting with you at an early date to discuss this request.

Sincerely,

Scott Quaas

SCOTT QUAAS
Environmental/Specialist

cc: S. Smallwood-DER

LONESTAR FLORIDA PENNSUCO, INC.
BEST AVAILABLE CONTROL TECHNOLOGY

Operating Variables that Affect SO_2 Emissions

During the operation of a wet process cement kiln there are several process variables that will affect the emission of SO_2 from the kiln's stack.

The major variable is the oxygen content of the kiln and its possible reduction/oxidation zones. The sulfur that has the potential to form SO_2 comes from the kiln feed, fuel and insulflated dust. Depending on the oxygen content in the kiln, the sulfur from the kiln feed will either stay as an oxidized sulfur compound or will be reduced to SO_2. Oxygen contents below about 0.5 percent will tend to generate SO_2 while higher oxygen contents will retain the sulfur with the feed and eventually in the clinker. This is basically a surface reaction of sulfur oxides on MgO and CaO particles and proceeds until $MgSO_4$ or $CaSO_4$ have encapsulated the particle and it has diffused to its interior.

As the fuel burns, sulfur oxides are formed in the oxidizing area of the flame. With sufficient oxygen and contact in the kiln with the feed material, compounds such as calcium sulfate are formed and retained in this material.

As the feed material is calcinated and reaches the point of insipient fusion (clinker formation), potassium and sodium oxides are volatized and combined with available sulfur oxides to form alkaline salts in a gas reaction. These salts are very fine particles that are caught in the pollution control equipment downstream of the kiln. The return of all the dust to the kiln (insulflation) is performed as Lonestar's kiln #3. The insulflated sulfates are eventually retained with the clinker as were the sulfates in the feed material and sulfur oxides from the fuel.

The overall effect of excess oxygen in the kiln is that less than 0.5 percent will enhance SO_2 emissions and excess oxygen in the range of 0.5-1.5 percent will significantly reduce emissions. The use of excess oxygen greater than 1.5 percent can cause operational problems (too hot of a backend kiln temperature, improper clinker burning zone, kiln dusting) as well as wasting fuel by heating the excess air. The use of too little excess oxygen causes incomplete combustion and very unstable operating conditions. When an electrostatic precipitator (ESP) is used, the carbon monoxide generated can cause explosive conditions in the ESP.

Other variables for the emission of SO_2 are sulfur content of fuel, chemistry of kiln feed and kiln dust, NO_x formation and unstable kiln conditions. These factors can be significant as to

SO_2 generation, but for the specific long term operating conditions at Lonestar's kilns they are not considered as important for this analysis as is excess oxygen content.

Control Technology Available

The two types of particulate control equipment typically used to meet New Source Performance Standards (NSPS) and Best Available Control Technology (BACT) review criteria are electrostatic precipitators (ESP) and baghouses. Historically, there has been very little success in using baghouses on wet process kilns due to condensation, temperature and maintenance problems. Baghouses are usually multicompartmental with thousands of fiberglass bags for filtering the dust from the kiln gases. The collection is done on the dust cake which forms on the dirty side of the bags. When a kiln is started or stopped, there is potential for the filter cake temperature to fall below the dew point unless heated by a separate heat source. If condensation does occur (the usual moisture content of the exhaust gases is 30 percent) this cake will harden and permanently blind the bag. Another major problem with baghouses has been the inability to sustain the high operational temperatures without gas conditioning equipment (dilution air). During unstable kiln conditions this can become a problem to adequately cool or heat the bags to prevent excursions of their temperature limits or cooling below the dew point.

Another operational problem with baghouses has been maintaining the thousands of bags. The fiberglass fibers will fatigue with time or fail due to condensation or temperature and can develop pin hole leaks that will necessitate patching or bag replacement. Therefore, a routine maintenance program is a necessity to monitor the conditions of the bags and maintain the reliability of the system.

ESP's, such as those presently installed at Lonestar's kilns, do not have condensation, temperature, or maintenance problems. They do not require any auxiliary heating and can take relatively large fluctuations in gas temperatures without problem. An ESP is designed to have extensive internal maintenance during annual kiln shutdowns and not on a daily basis. It has multi-stages that the gases must travel through (not just a thin filter cake) for collection of the kiln dust. These stages are individually controlled as to voltage, amperage and cleaning cycle. Operational problems in one stage can be compensated for by externally adjusting the other stages. ESP's do not have the daily maintenance problems associated with baghouses.

With regard to SO_2 emissions, approximately 75 percent of the SO_2 is absorbed by the proper burning of the kiln and is incorporated in the clinker. EPA has stated that due to the gases having to pass through the filter cake an additional 50 percent removal of the remaining 25 percent (that is,

approximately 12 percent) of the SO_2 may be achieved. This was developed through review of limited testing data on several kilns in the early 1970's; however, no actual tests comparing both control devices under the same operating kiln conditions have been performed.

Furthermore, the reasonableness of that 50 percent additional removal is questionable. In a baghouse system, the gases quickly move from the inlet manifold to a compartment and through a filter cake (approximately 1/4 inch thick) and back to the clean air plenum. The residence time in the collector is much less than in a precipitator. The additional residence time in an electrostatic precipitator (ESP) allows for longer reaction time with the dust particles for good absorption.

Environmental Impacts

The ambient air quality impacts due to conversion of Lonestar's kilns are addressed in the accompanying dispersion modeling evaluation. The predicated impacts reflect SO_2 emissions using ESP's. Lonestar's maximum annual and highest, second-highest short-term predicted SO_2 impacts with ESP control are shown below in terms of percentages of the AAQS and PSD increments consumed:

Percentage of Air Quality Standards

Consumed by Lonestar Kilns 1, 2 and 3

Averaging Time	Class I Increments	Class II Increments	Florida AAQS	Dade County AAQS
Annual	15%	11%	5%	N/A
24-Hour	58%	18%	6%	59%
4-Hour	N/A	N/A	N/A	97%
3-Hour	56%	12%	5%	N/A
1-Hour	N/A	N/A	N/A	37%

N/A - Not applicable

Retrofitting all three kilns with baghouses, and adopting the undocumented assumption of 50% additional removal of the SO_2, would reduce the percentages by one half. With existing ESP control, however, Lonestar's impacts are predicted to be less than 20 percent of Class II increments and Florida AAQS. Therefore, reducing these impacts by 50 percent would not produce significant air quality benefits. In the case of Class I PSD increments and Dade County AAQS (the most stringent standards), Lonestar's impacts do not exceed 60 percent of those standards, except for the 4-hour Dade County AAQS. Therefore, even if a 50% reduction is assumed to be achievable, the ultimate benefit to the environment of such a reduction is not significant.

The impacts presented in this analysis represent the combination of maximum Lonestar production capacity and worst case meteorological conditions. For the majority of time, actual impacts due to Lonestar are expected to be far below these predicted levels.

ECONOMIC ANALYSIS

An economic analysis was performed for retrofitting baghouses on kilns 1, 2 and 3. The analysis was performed using procedures described in the August 1978 through November 1978 issues of the Journal of the Air Pollution Control Association (Volume 28, Nos. 8-11) in a series of articles entitled "Capital and Operating Costs of Selected Air Pollution Control System."

Purchased Equipment Costs:

	K 1	K 2	K 3
Flow rate, ACFM	82,000*	82,000*	311,400
Air/Cloth Ratio	2:1	2:1	2:1
Total Net Cloth Area (ft^2)	41,000	41,000	156,000
Total Gross Cloth Area (ft^2)	46,000	46,000	164,000
Insulated, suction baghouse	243,000	243,000	815,500
Bag Filters $	96,000	96,000	342,000
Fans & Motors $	13,000	13,000	41,000
1977 $	352,000	352,000	1,198,500
X 1.6 = 1981 $	563,200	563,200	1,917,500
Gas Conditioner	25,000	25,000	50,000
Total 1981 $	588,200	588,200	1,967,500

* Average of Kilns 1 and 2

Installation Costs:

Item	Cost Factor
Foundations & Supports	0.04
Erection & Handling 0.50 x 2	1.0 (retrofit)
Electrical	0.08
Piping	0.01
Insulation	0.07
Painting	0.02
Engineering/Supervision	0.10
Construction & Field Expense	0.20
Construction Fee	0.10
Start-up	0.01
Performance Test	0.01
Contingencies	0.03
Total	1.67

Total Installation Costs:

K1-	588,200
K2-	588,200
K3-	1,967,500

$ 3,143,900 x 1.67 = $5,250,313

Total Costs:

Total equipment and installation costs are estimated at:

$3,143,900 + $5,250,313 = $8,394,213

This does not include operating or maintenance costs.

Cost Benefit Analysis.

Although no test data is presented to support the claim of an additional 50 percent SO_2 removal through the baghouse, for purposes of this analysis the 50 percent removal was assumed. Kilns 1, 2 and 3 are proposed to emit a total of 600 lb/hr of SO_2. Based upon maximum capacity and year-round operation, a reduction of 50 percent in emissions would equal 1,314 tons per year of SO_2. The total cost of installing baghouses on kilns 1, 2 and 3 is estimated above at $8,400,000. This cost is extremely high and does not include the substantially higher maintenance/operation costs of a baghouse. Considering that the existing ESP system is already removing up to 80 percent of the potential SO_2 emissions from the kiln system, the additional costs a baghouse system would impose upon Lonestar are not warranted.

Summary

The question of SO_2 emission control in a wet process cement kiln is not one of control equipment (which one has better control) but concerns the maintaining of sufficient excess oxygen to drive the SO_2 into the clinker material. At Lonestar's facilities the oxygen is maintained in this range (above 0.5 percent) not only for SO_2 control but to provide for complete combustion of the

coal and economic benefits. Additionally, SO_2 emissions will be controlled by utilizing coal having a sulfur content of 2 percent or less.

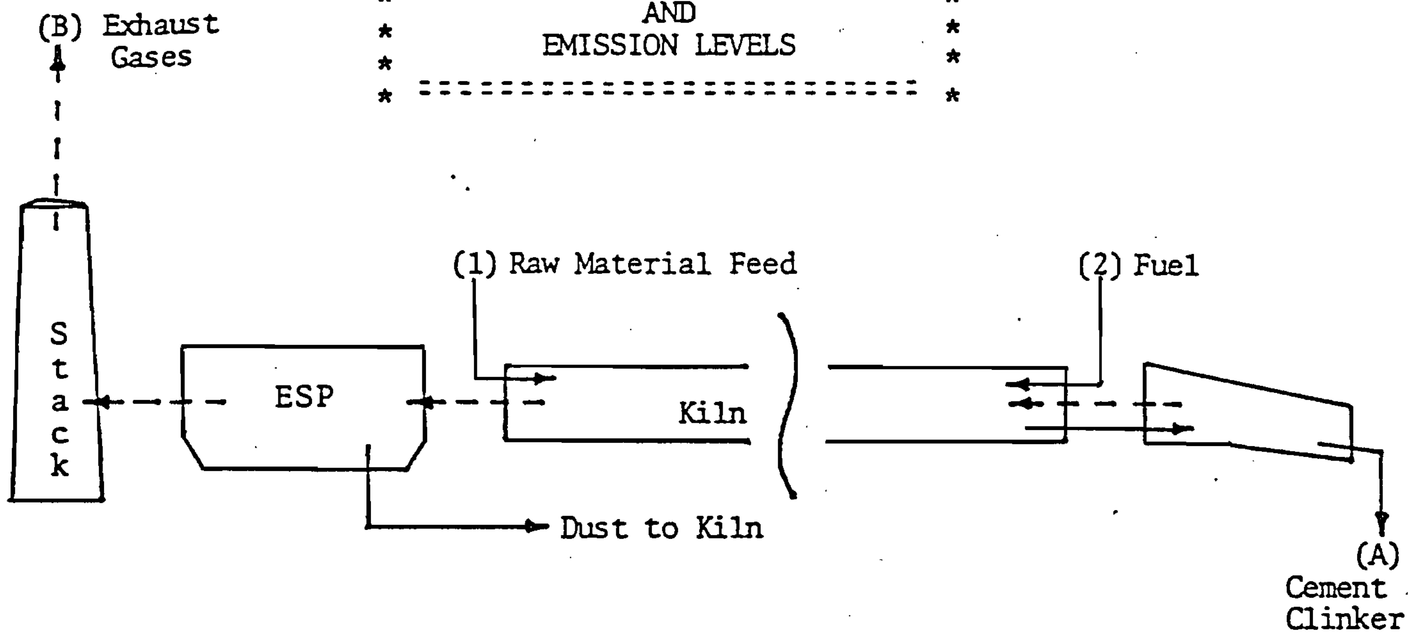
Alternative controls for SO_2 emissions were rejected since retrofitting the three existing kilns with additional or alternative control devices would have only a minimal effect on emissions and would have an insignificant effect on reducing ambient air impacts. The costs of retrofitting would prohibit the company from implementing the complete conversion of its kilns to coal.

LONESTAR FLORIDA/PENNSUCO

CALCULATED SULFUR BALANCE

AND

EMISSION LEVELS



Kiln #3

Sulfur Input Into System - Calculated as Equivalent SO_2

(1) Raw Materials Feed: 141.75 TPH (283,500#/hr.) @ 0.13% SO_3

#/hr. SO_2 = (141.75)(2000#/ton)(.0013# SO_3/#feed)(64# SO_2/80# SO_3)

#/hr. SO_2 = 294.8

(2) Fuel: 17.18 TPH (34,360 #/hr.) coal @ 2% S

#/hr. SO_2 = (17.18)(2000#/ton)(.02#S/#fuel)(64# SO_2/32#S)

#/hr. SO_2 = 1374.4

Total SO_2 Input = 1669.2#/hr.

Sulfur Out - Calculated as Equivalent SO_2

(A) Cement Clinker: 87.8 TPH @ 0.92% SO_3

#/hr. SO_2 = (87.8)(2000#/ton)(.0092# SO_3/#clinker)(64# SO_2/80# SO_3)

#/hr. SO_2 = 1297.1

(B) Gaseous Emissions should be equivalent to difference between Sulfur Input & Cement Clinker Sulfur Out

#/hr. SO_2 = 372.1#

Percent Sulfur Absorbed in Kiln System

1669.2 - 372.1/1669.2 = 77.7%

Potential Emissions = 372.2 #/hr. x 8760 ÷ 2000 = 1630.4 TPY

STACK TEST RESULTS - SO_2

Date: 4/30/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. ^0F
1	138.28	.17	16.5	3.5	.19	4.93	863.6	1.4	153911	356.8
2	138.28	.17	16.5	3.6	.19	5.40	709.1	1.3	147463	364.6
3	138.28	.22	16.5	3.88	.19	4.97	332.3	2.9	145883	362.8

Date: 5/11/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. ^0F
1	127.59	.11	13.9	4.17	.82	4.79	318.52	3.4	155886	343.1
2	127.59	.11	13.5	3.77	1.27	4.55	294.72	2.9	149023	343.9
3	127.59	.11	14.4	3.72	.84	4.35	265.46	2.8	149124	346.2
4	127.59	.12	14.4	3.22	.86	4.35	197.09	3.1	153814	343.3
5	127.59	.10	14.4	3.36	1.03	4.52	264.91	2.9	151523	344.3
6	127.59	.10	15.5	3.39	.72	4.33	578.92	1.6	148903	352.3

DISPERSION MODELING EVALUATION

Introduction

ESE has completed a dispersion modeling evaluation of Lonestar's sulfur dioxide (SO2) impacts with Kilns 1, 2 and 3 all burning coal. K1 and K2 were modeled emitting a maximum of 100 lbs/hr each when burning coal, and K3 was modeled emitting a maximum of 400 lbs/hr. The purpose of this evaluation was to determine compliance with PSD Class I and Class II allowable increments, and with Federal, State and Dade County Ambient Air Quality Standards (AAQS) when all three kilns are fired with coal. Presented below is a summary of the methodology and results of the modeling evaluation.

Methodology

The methodology used in the evaluation was the same as that presented in the December 17, 1981 modeling evaluation performed for K3 only on coal, except that default values for the wind profile exponents were used. The U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Regulation (DER) approved Industrial Source Complex Short-Term (ISCST) model was used to estimate annual, 24-hour and 3-hour SO2 impacts due to Lonestar and nearby significant sources. To evaluate compliance with Dade County AAQS, 4-hour and 1-hour concentrations were also examined. A 5-year meteorological data base (1970-1974) from Miami International Airport was used in conjunction with the ISCST.

For Class I Prevention of Significant Deterioration (PSD) impacts, 33 discrete receptors were placed on the boundary of the Class I area (Everglades National Park). For short term averaging times, highest, second-highest concentrations at each receptor were utilized.

Class II PSD increment consumption and maximum impact concentrations were determined by executing the ISCST with a radial receptor grid placed around the Lonestar plant. Receptors ranged from 0.4 km to 2.8 km with a 0.4 km radial grid spacing. Lonestar and Resource Recovery were determined to be the only significant increment consuming sources in the area, as presented in previous Lonestar modeling reports. Highest, second-highest concentrations were utilized for short-term averaging times.

Lonestar's interaction with other sources were also examined in three additional 5-year ISCST model executions, i.e., receptors were placed downwind of Alton Box, Resource Recovery, and South Florida Materials (formerly Houdaille) in the directions aligning Lonestar with these sources. Since the modeling for receptors around Lonestar showed that Lonestar by itself will comply with all ambient air quality standards, the purpose of this modeling was to determine if Lonestar would cause or contribute to non-compliance of AAQS in the vicinity of these other sources. A 0.2 km receptor spacing was utilized in these model runs.

Highest, second-highest predicted short-term concentrations were refined with the ISCST for cases where standards were predicted to be approached or exceeded. Based on the modeling results, refinements were performed for only the 4-hour averaging time since the Dade County 4-hour AAQS was being approached. A 0.1 km receptor spacing was utilized to refine the concentrations.

Stack parameters used in the modeling are shown in Table 1. The changes since the December 17, 1981 modeling are shown in parentheses, and consist of the SO2 emission rates for Kilns 1, 2 and 3, and stack parameters for South Florida Materials. Updated parameters for South Florida Materials were provided by Scott Quass of your staff, who researched the permit file of the DER's West Palm Beach office.

Results

Table 2 presents the maximum air quality impacts on PSD Class I and Class II increments, and Florida and Dade County AAQS. The dispersion modeling analysis predicted that Class I and Class II area impacts will not exceed the allowable PSD increments, and no Florida AAQS will be exceeded due to Kilns 1, 2 and 3 burning coal. The increment consumption values shown in Table 2 are conservative since they reflect Lonestar's entire emissions as being increment consuming; only emissions above those due to natural gas firing in K1, K2 and K3 are increment consuming.

Lonestar also complies with all Dade County AAQS. There is a predicted violation of Dade County AAQS which occurs downwind of Alton Box in the direction of interaction with Lonestar. As shown by the "Lonestar only" impacts, Lonestar's potential maximum individual impact is relatively small and well below the Dade County AAQS. Upon further investigation, it was shown that Lonestar does not contribute significantly to the predicted Alton Box violations. These results are based upon Alton Box emitting 14.4 lbs/hr for each hour of the day (346 lbs/day). Updated information provided by Alton Box showed they burned up to 40 gal/hr of up to 3.0% sulfur fuel oil for 16 hrs/day. This fuel usage would result in only 307 lbs/day being emitted; therefore, Alton Box's maximum impacts may be overestimated by about 10 percent.

Conclusion

In conclusion, the dispersion modeling evaluation shows that the operation of Kilns 1, 2 and 3 at Lonestar on coal, emitting 100, 100 and 400 lbs/hr SO_2, respectively, is in compliance with Federal, State and Dade County ambient air quality standards and PSD increments. Lonestar's contributions to predicted violations in the vicinity of Alton Box are shown to be insignificant.

Table 1. Stack Parameters Used in Lonestar Modeling Evaluation

Source	SO2 Emission Rate (g/sec)	Stack Height (m)	Stack Diameter (m)	Stack Gas Velocity (m/sec)	Stack Temp. (°K)
Kiln #1	12.60(2.26)	61.0	2.1	11.86	465.0
Kiln #2	12.60(1.03)	61.0	2.1	10.55	447.0
Kiln #3	50.40(63.70)	61.0	4.33	9.98	454.8
Alton Box	1.81	9.1	0.50	10.00	491.0
South Fla. Mat. (Houdaille)	2.38	11.60 (12.2)	1.08 (1.07)	21.30 (30.10)	363.0 (397.0)
Resource Recovery	14.00	45.7	2.70	14.00	489.0

Note: Numbers in parentheses indicate value used in previous modeling, if different from that used in present study.

Table 2. Summary of Lonestar Modeling Results, K3 Burning Coal

Scenario	Maximum Concentrations (ug/m^3) Annual	24-hour	4-hour	3-hour	1-hour
Class I Increment Consumption*					
Lonestar Only	0.3	2.9	NA	13.9	NA
Lonestar & Resource Recovery	0.4	3.0	NA	13.9	NA
Allowable Class I Increments	2.0	5.0	NA	25.0	NA
Class II Increment Consumption*					
Lonestar Only	2.2	16.8	NA	63.3	NA
Lonestar & Resource Recovery	2.4	16.8	NA	63.3	NA
Allowable Class II Increments	20	91	NA	512	NA
Total Air Quality Impacts					
Receptors in Vicinity of Lonestar	3.0	16.8	56.3	63.6	107.2
Receptors in Vicinity of South Florida Materials (Houdaille)**	2.1	19.5	53.3	58.6	95.5
Receptors in Vicinity of Resource Recovery**	1.2	11.2	29.2	34.5	56.9
Receptors in Vicinity of Alton Box**					
All Sources	6.8	32.9	99.8	108.2	155.1
Lonestar Only	0.4	5.7	16.6	20.7	34.0
Dade County AAQS	NA	28.6	57.2	NA	286.0
Florida AAQS	60	260	NA	1300	NA

Note: NA = Not Applicable
*Values shown assume that all Lonestar emissions consume increments, therefore, numbers are conservative.
**Receptors were placed downwind of indicated source in direction which aligned Lonestar with the respective source.

Scott Quaas

LONESTAR FLORIDA PENNSUCO, INC.

6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

November 19, 1982

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Devine:

Re: PSD-FL-050; Lonestar Florida Pennsuco, Inc.;
Kilns 1, 2 and 3; Request for Revision of Sulfur
Dioxide Emission Limitations

Please find enclosed the support documentation for the modeling analysis which accompanied our November 19, 1982 letter on the referenced subject.

Sincerely yours,

Albert W. Townsend

Albert W. Townsend
Manager
Real Estate & Environmental Affairs

Encl.
AWT/jh
cc: S. Smallwood-DER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4AW-AM

DEC 17 1982

Mr. Scott Quaas, Environmental/Specialist
Lonestar Florida/Pennsuco, Inc.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012

Dear Mr. Quaas:

This is in response to your November 19, 1982, submittal to Mr. Thomas W. Devine concerning the sulfur dioxide (SO_2) emission limitations on Lonestar's Kilns 1,2, and 3 and a request for revising these limitations from those appearing in your present PSD permit (PSD-FL-050).

Since the State of Florida has been granted partial delegation of authority regarding PSD reviews, we have forwarded a copy of this submittal to them. Florida will be responsible for performing the technical review and preparing a preliminary determination. Following this determination, Florida will initiate a public notice and 30-day comment period. EPA will also be afforded an opportunity to review and comment on this determination. A final determination on your permit revision request will be made after the conclusion of the public comment period.

If you have any questions or comments concerning this matter, please contact Mr. Richard S. DuBose, Chief, Air Engineering Section at (404) 881-7654.

Sincerely yours,

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

cc: Mr. Clair Fancy, Deputy Bureau Chief
FL Dept. of Environmental Regulation

Mr. Anthony J. Clemente, P.E., Acting Director
Metropolitan Dade County Dept. of Environmental Resources

Mr. Warren G. Strahm, Subdistrict Manager
FL Dept. of Environmental Regulation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

MAY 30 1980

REF: 4AH-AF

Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Division of Environmental Programs
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Smallwood:

Enclosed for your review and comment are the Public Notice and Preliminary PSD Determination for the Lonestar Florida/Pennsuco proposed kiln fuel conversion and addition of coal handling system in Dade County, Florida. The public notice will appear in a local newspaper, the Miami Herald, in the near future.

Please let my office know if you have comments or questions regarding this determination. You may contact Mr. Kent Williams of my staff at 404/881-4552 or Mr. Jeffrey L. Shumaker of TRW Inc. at 919/541-9100. TRW Inc. is under contract to EPA, and TRW personnel are acting as authorized representatives of the Agency in providing aid to the Region IV PSD review program.

Sincerely yours,

Tommie A. Gibbs

Tommie A. Gibbs, Chief
Air Facilities Branch

TAG:JLS:jbt

Enclosure

PUBLIC NOTICE
PSD-FL-050

A modification to an existing air pollution source is proposed for construction by Lonestar Florida/Pennsuco near the city of Hialeah in Dade County, Florida. Three existing oil or gas fired Portland Cement kilns will be converted to coal firing. In addition, a coal handling facility will be constructed.

The proposed construction has been reviewed by the U.S. Environmental Protection Agency (EPA) under Federal Prevention of Significant Deterioration (PSD) Regulations (40 CFR 52.21), and EPA has made a Preliminary Determination that the construction can be approved provided certain conditions are met. A summary of the basis for this determination and the application for a permit submitted by Lonestar are available for public review in the Dade County Environmental Resources Management Office in the Brickwell Plaza Building, Suite 402, 909 Southeast 1st Avenue, Miami, Florida.

The maximum allowable emissions increase of the various pollutants emitted by this kiln are as follows (in tons per year).

TSP	NO_x	SO_2	CO	HC
33.3	0	562	Negl.	Negl.

Consistent with the exemptions stated in paragraph (k) of 40 CFR 52.21, the TSP increment consumed by the source was not determined. In addition, the SO_2 increment consumption was not calculated because the net impact resulting from the net emissions increase of ambient air quality was shown to be insignificant. Due to the small expected impact on Class I area, which is less than the significance levels defined by EPA (1 ug/m^3 annual and 5 ug/m^3 24-hour), a detailed Class I area impact analysis is not required.

Finally, any person may submit written comments to EPA regarding the proposed modification. All comments, postmarked not later than 30 days from the date of this notice, will be considered by EPA in making a Final Determination regarding approval for construction of this source. These comments will be made available for public review at the above location. Furthermore, a public hearing can be requested by any person. Such requests should be submitted within 15 days of the date of this notice. Letters should be addressed to:

Mr. Tommie A. Gibbs, Chief
Air Facilities Branch
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30308

PSD-FL-050

Preliminary Determination Summary

I. Applicant

Lonestar Florida/Pennsuco, Inc.
Cement and Aggregate Division
P. O. Box 122035
Palm Village Station
Hialeah, Florida 33012

II. Location

The proposed modification is located at the applicant's existing Portland Cement Plant at 11000 N.W. 121 Street, Hialeah (Dade County), Florida. The UTM coordinates are: Zone 17-562.75 km East and 2861.65 km North.

III. Project Description

The applicant proposes to convert fuel used in kilns #1, #2, and #3 from the permitted gas or oil firing to coal firing. Each kiln has one emission point. The coal to be fired will have a maximum sulfur content of 2 percent.

Further, the applicant proposes to construct a coal handling system with four (4) emission points. Each of these points are to be controlled by baghouse dust collectors.

A summary of new and modified facilities is shown in Table 1.

IV. Source Impact Analysis

Table 2 summarizes the total potential to emit (uncontrolled) from the proposed modification. The proposed modification has the potential to emit greater than 100 tons per year of particulates (TSP) and sulfur dioxide (SO_2). Therefore, in accordance with the provisions of Title 40, Code of Federal Regulations, Part 52.21 (40 CFR 52.21) promulgated June 19, 1978, a Prevention of Significant Deterioration (PSD) review is required for each of these pollutants.

TABLE 1

SUMMARY OF PROJECT

Facilities	Operating Capacity, Tons/Hour Input	Fuel	Process Weight Tons/Hour	Product Cement Clinker Tons/Hour
New Coal Handling				
Mill A	23	N/A	N/A	N/A
Mill B	15	N/A	N/A	N/A
Feedbin & Elevator	150[a]	N/A	N/A	N/A
Hopper & Weight Feeder	150[a]	N/A	N/A	N/A
Modified (After)	Feed	Coal (T/hr)		
#1 Kiln	40.5	7.5	48[c]	25
#2 Kiln	40.5	7.5	48[c]	25
#3 Kiln	141.75[b]	23		87.5
		38		137.5
Modified (Before)		Gas (MMCF/hr)		
#1 Kiln	40.5	.18	40.5[c]	25
#2 Kiln	40.5	.18	40.5[c]	25
#3 Kiln	141.75[b]	.54		87.5
		.90		137.5

[a] Intermittent capacity since average capacity equals the sum of the two mills (38 tons/hr).

[b] Basis of particulate emission standard - standards of Performance for New Stationary Sources (NSPS); 40 CFR 60 Subpart F.

[c] Basis of particulate emission standard - Florida State Implementation Plan (SIP); 17-2.05 (2) FAC.

The change in potential nitrogen oxide emissions due to the modification are not quantified. Without data to the contrary, the applicant has assumed the modification is subject to PSD review for nitrogen oxides. All other regulated pollutants are not subject to PSD review because potential emissions increase by less than 100 tons per year.

Full PSD review consists of:

1. Control Technology Review
2. Air Quality Review
   a. Impact upon Ambient Air Quality
   b. Impact upon Increment
   c. Impact upon Soils, Visibility and Vegetation
   d. Impact upon Class I Areas
3. Growth Analysis

Table 3 summarizes allowable emissions and the various categories of changes that determine the level of PSD review required under the regulations. Each type of facility and each pollutant is classified.

Line E of Table 3 shows that TSP has increased allowable emissions of less than 50 tons per year. With no limits placed upon operating time, 50 tons per year is more restrictive than the additional 100 pounds per hour or 1000 pounds per day criteria. Therefore, consistent with the provisions of 40 CFR 52.21(j) and (k), PSD review for particulates is limited to:

1. Ensuring compliance with State Implementation Plans (SIP) and Federal Regulations (40 CFR Parts 60 and 61), and
2. Impacts upon Class I areas and upon areas of known increment violation.

Table 3 shows that SO_2 increased allowable emissions of 562 tons per year requires full PSD review.

TABLE 2

APPLICABILITY SUMMARY

Facilities	Potential to Emit (Uncontrolled), Tons/Year				
	TSP	SO_2	NO_x	CO	HC
A. New	25100[a]	0	0	0	0
B. Modified (After)	137313[b]	612[c]	(d)	Negl.	Negl.
C. Modified (Before)	137313[b]	50[e]	(d)	Negl.	Negl.
Net Increase from Modification[f]	25100	562	(d)	Negl.	Negl.
Accumulated from Previous Modification[g]	N/A	97	N/A	6.6	38
Total Increase	25100	659	(d)	6.6	38

[a] Calculated from vender guaranteed controlled emissions (5.7 lb/hr) and assumed 99.9% efficiency.

[b] Based on AP-42 Table 8.6-1 uncontrolled emissions 228 pounds of particulate per ton on cement ash in coal is absorbed in the cement product. Substantially less kiln feed ash in required for coal burning.

[c] Potential emissions is based on the proposed allowable emission rate which is based on absorption of SO_2 in the clinker of 91.3 percent in kilns #1 and #2 and 98.7 percent in kiln #3.

[d] The change in nitrogen oxides emissions are not quantified. Without data to the contrary, the applicant assumed PSD review applies. (See discussion in Section IV, A.4).

[e] Based upon test results on existing facilities.

[f] Source is subject to PSD review for specific pollutant if potential increased by 100 tons/year or more.

[g] PSD-FL-028 was not major for SO_2, HC, and CO, thus potential increases are accumulated.

TABLE 3

ALLOWABLE EMISSIONS, TONS PER YEAR

(No Limits Upon Hours Per Year)

Facilities	TSP	SO_2	NO_x
A. New or Reconstructed	25.4		
B. Modified (After)	468.2	612	<2624[a]
C. Modified (Before)	460.3	50	2624
D. Increases from Modified	7.9	562	NONE
E. Increase New and Modified (A&D)	33.3	562	NONE

[a] The applicant will determine minimum NO_x emission rates with performance tests following start-up. The proposed allowable represent the maximum allowable rate.

It should be noted that the application was reviewed under the Partial Stay of PSD Regulations, published February 5, 1980 and the proposed revisions to the PSD regulations referenced in that partial stay. It was determined that the exemption outlined in the partial stay does not apply and that the proposed modification is subject to review under existing PSD regulations (promulgated 6/19/78) because:

1. The existing source is a major source of particulates as defined in the September 5, 1979 proposed revised regulations (greater than 100 tons of allowable emissions), and the proposed modification would significantly (greater than 10 tons per year) increase allowable emissions of particulates. And further,

2. The proposed modification alone is making the source a major modification because sulfur dioxide emissions increase by greater than 100 tons per year, irrespective of the sulfur dioxide emissions from the existing source.

A. <u>Control Technology Review</u>

Although these facilities are exempt from a Best Available Control Technology (BACT) review for the specific pollutants (TSP) and NO_x, they are required to meet all applicable emission limits and standards of performance under the Florida State Implementation Plan (SIP) and Federal Regulations (40 CFR Parts 60 and 61). In addition, and as discussed later in this section, the modification is subject to BACT review for SO_2. Several of the facilities proposed for construction are subject to Federal New Source Performance Standards (NSPS) and/or requirements under the Florida SIP. These requirements are referenced in Table 4 which summarizes the allowable emission limits for the proposed emission limits for the proposed new and modified facilities. Only the most stringent requirement of (1) NSPS, (2) Florida SIP, (3) Florida permit, or (4) allowable limit proposed by the applicant is listed.

The limitations upon emissions of nitrogen oxides from the three kilns were proposed by the applicant and are conditions of this permit to ensure the

TABLE 4

SUMMARY OF ALLOWABLE EMISSIONS LIMITS

Facility/Pollutant	Basis for Requirement	Emissions Limits Standard	lbs/hr
23 Ton Mill			
TSP	Proposed by Applicant, Florida BACT	<.01 grains/ACF	$\leq$ 3.1
Opacity	NSPS Subpart Y (40 CFR 60.252)	<20%	-
15 Ton Mill			
TSP	Same	$\leq$.01 grains/ACF	$\leq$2.1
Opacity	Same	<20%	-
Feedbin & Elevator			
TSP	Same	<.01 grains/ACF	$\leq$0.3
Opacity	Same	<20%	-
Hopper & Weight Feeder			
TSP	Same	$\leq$.01 grains/ACF	$\leq$0.3
Opacity	Same	<20%	-
#1 Kiln			
TSP	Florida SIP, Operating Permit	Florida Process Weight Equation	$\leq$32.2
SO_2	Proposed by Applicant as BACT	$\leq$2% S in Coal, 2.27 lbs/ton[a]	$\leq$56.7
NO_x	Proposed by Applicant	<4.73 lbs/Ton[a]	<118

TABLE 4

SUMMARY OF ALLOWABLE EMISSIONS LIMITS

(Continued)

Facility/Pollutant	Basis for Requirement	Emissions Limits Standard	lbs/hr
#2 Kiln			
TSP	Florida Permit	Florida Process Weight Equation	≤32.2
SO_2	Proposed by Applicant as BACT	≤2% S in Coal, 2.27 lbs/Ton[a]	≤56.7
NO_x	Proposed by Applicant	<4.79 lbs/Ton[a]	<118
#3 Kiln			
TSP	Florida SIP & Federal NSPS Subpart F (40 CFR 60.62)	≤0.30 lb/Ton feed[b]	≤42.5
SO_2	Proposed by Applicant as BACT	≤2% S in Coal, 0.30 lbs/Ton[a]	≤26.3
NO_x	Proposed by Applicant	<6.77 lbs/Ton[a]	≤592
Opacity	Federal NSPS Subpart F (40 CFR 60.62)	≤20%	-

[a] Pounds of pollutant per ton of clinker produced.

[b] Pounds of TSP per ton of feed (except fuel).

validity of the exemption from further PSD review (no net increase in emissions).

The three kilns emitting increased sulfur dioxide are reviewed for a determination of Best Available Control Technology (BACT). To achieve the limited emissions of Table 4 the following control technologies will be utilized:

1. Coal Handling System - Particulates

   All potential particulate emissions points are controlled by baghouse type dust collectors. These are to control 99.9 percent of the particles above 0.5 microns. The exhaust gases will have a maximum concentration of 0.01 grains per actual cubic foot.

   These have been proposed to the State of Florida to meet the SIP BACT requirements.

   These facilities must not emit gases which exhibit 20 percent opacity or greater. These baghouses and properly ducted dust collection system should comply with this requirement.

2. Kilns - Particulates

   The existing kilns will continue to utilize their existing electrostatic precipitators to maintain compliance with the emission standards specified in their operating permits in accordance with the Florida SIP. Number 3 kiln will continue to operate in compliance with the NSPS standards under which it has been certified with continued compliance verified by the State of Florida.

   A small increase in allowable TSP emissions is due to the addition of the solid coal to the process weight. The allowable emissions are calculated according to the Florida SIP process weight rule. The actual emissions will probably not increase because the ash introduced with the coal (compared with gas as a fuel) is compensated by a decrease in fly ash in the cement feed materials.

3. Kilns - Sulfur Dioxide (BACT)

The three kilns are subject to a BACT review for the control of sulfur dioxide.

Sulfur dioxide potentially is derived from sulfur in the process feed materials and from sulfur in the fuel.

The majority of this potential sulfur dioxide combines with the process products (limestone). The efficiency of this absorption is a function of the size and design (mixing of gas and solids) of the kilns and also of the type of particulate control (baghouse is better than electrostatic precipitator - due to intimate contact of gas with fine particles). Since the three kilns and their particulate controls are existing these parameters will not change. The applicant presents test results using oil (2.38% sulfur) as fuel. These results show that 91.3 percent of the potential sulfur dioxide was absorbed by the products in the smaller kilns (#1 and #2), and that 98.7 percent of the potential sulfur dioxide was absorbed in the larger kiln (#3). The applicant proposes BACT be the use of low sulfur coal (maximum 2% sulfur) and a maximum of 2.27 pounds of SO_2 per ton of clinker produced from kiln #1 and #2, and 0.30 pounds of SO_2 per ton of clinker produced from kiln #3.

EPA concurs with the applicant that for the cases of existing kilns with existing particulate control technology these do constitute BACT. Further the applicant used these emission rates at full design operating rates in its air quality presentation.

4. Kilns - Nitrogen Oxides

The applicant has proposed to run tests to optimize operating conditions. The criteria to judge such optimization would be:

a. satisfactory product,
b. energy economy,
c. minimum NO_x emissions, and
d. continued negligible emissions of carbon monoxide and hydrocarbons.

The applicant further stipulates that the NO_x emissions shall be less than those from the existing gas fueled operation. These current NO_x emissions have been established by tests to be 6.77 pounds of NO_x per ton of clinker produced from Kiln #3 and 4.7 pounds per ton from Kilns #1 and #2.

The applicant has presented published[1] test data which reports emissions of nitrogen oxides are less using coal than when using gas or oil as a fuel for cement kilns. This report attributes this reduction to the characteristics of the flame. It has been described as a longer, "lazier" flame (with lower temperature in the center of the flame). The conclusion that reduced emissions of nitrogen oxides are experienced when cement kilns are converted from gas to coal fuel has also been reported in reference 2.

The coal to be used in this proposed modification will contain ~1.7 percent nitrogen (compared with ~0 percent for gas or <.5 percent for oil). Therefore, the potential for fuel derived NO_x is greater. The literature[2] confirms that less than 20 percent of the fuel nitrogen will be converted to nitrogen oxides and that the amount of conversion is a function of the same flame characteristic variables (maximum temperature, and time at high temperature) that control thermally derived NO_x (oxidation of atmospheric nitrogen). AP-42 emission factors and NSPS for large utility boilers seem to indicate the potential for increased NO_x emissions of coal firing over gas firing. Regardless of these factors that indicate nitrogen oxide emissions could increase, the EPA concurs with the applicant that operating conditions can be found which will result in reduced emissions, or at least no net increased emissions. Therefore, with testing to find allowable operating conditions required as a permit condition. No net increase in NO_x emissions will occur and no air quality impact analysis is required for NO_x consistent with paragraph (k) of 40 CFR 52.21.

B. Air Quality Review - 40 CFR 52.21 (ℓ)

The applicant has demonstrated with the modeling results summarized in Table 5 that the impact upon the annual, 24-hour and 3-hour National Ambient Air Quality Standards for SO_2 and upon the annual and 24-hour Class II increment are below the significance levels as published 43 FR 26398, June 19, 1978.

The modeling was conservatively run upon the total SO_2 emissions from the three kilns rather than only the increase (coal less gas).

The CRSTER model was used to determine maximum predicted annual concentrations and to identify worst-case 24-hour and 3-hour meteorological conditions. The CRSTER was run using five years (1970-1974) of meteorological data. The maximum short term 24-hour and 3-hour predictions were made using the PTMTP-W model.

The lack of significant impact indicated by this modeling eliminates requirements for monitoring detailed NAAQS and increment impact analyses, growth impacts and additional impact analyses upon visibility, soils, and vegetation.

C. Class I Area Impact

The proposed modification is located about 30 km from the Everglades National Park. As discussed previously maximum impacts which occur in the vicinity of the plant are insignificant. On the basis that further dilution will occur over the 30 kilometers, the impact on this Class I area is considered insignificant and detailed assessment of Class I area impacts is not required.

V. Conclusions

EPA Region IV proposes a preliminary determination of approval for construction of the new coal handling facilities and the conversion to coal as a fuel for kilns #1, #2, and #3 by Lonestar Florida/Pennsuco, Inc. as proposed in its application dated February 11, 1980 as amended by letter dated April 25, 1980.

The conditions set forth in the permit are as follows:

TABLE 5

AIR QUALITY IMPACT ANALYSIS

	SO_2, micrograms/meter^3		
	Annual	24-hour average[a]	3-hour average[a]
NAAQS	80	365	1300
Class II Increments	20	91	512
Maximum Predicted Concentration	0.63	4.90	18
Significance Level	1	5	25

[a] Not to be exceeded more than once per year.

1. The modifications and the facilities constructed shall be in accordance with the capacities and specifications stated in the application. Specifically included are the operating capacities listed in Table 1 for new and modified facilities.

2. Particulate emissions from each of the four new emitting points of the coal handling system shall not exceed 0.01 grains per actual cubic foot or the emission limits listed in Table 4.

3. Visible emissions from four emission points of the coal handling system shall be less than 20 percent opacity. Visible emissions from any fugitive sources associated with the coal handling system shall be less than 20 percent opacity. Opacity shall be measured by EPA standard method 9.

4. Emissions of sulfur dioxide from #1 and #2 kilns shall not exceed 56.7 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 2.27 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from #3 kiln shall not exceed 26.3 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 0.30 pounds per ton of clinker produced.

6. The coal used to fuel kilns #1, #2 and #3 shall have a sulfur content of 2 percent or less.

7. Tests shall be run to optimize the operating conditions toward a minimum emissions of nitrogen oxides. The results of the test shall be analyzed and the resulting optimum operating conditions shall be described to EPA Region IV with a plan describing how continuing compliance will be maintained.

8. Emissions of nitrogen oxides from #1 and #2 kilns shall be less than 118 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of nitrogen oxides shall not exceed 4.73 pounds per ton of clinker produced.

9. Emissions of nitrogen oxides from #3 kiln shall be less than 592 pounds per hour from each kiln at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of nitrogen oxides shall not exceed 6.77 pounds per ton of clinker produced.

10. Visible emissions from #3 kiln shall be less than 20 percent opacity as measured by EPA standard method 9.

11. Compliance with all emissions limits shall be determined by performance tests. Performance tests shall be conducted in accordance with the provisions of 40 CFR 60.8 and as such shall use appropriate EPA standard methods outlined in 40 CFR 60 Appendix A. The processes shall operate within 10 percent of maximum capacity during sampling.

12. The source will comply with the requirements of the attached General Conditions.

REFERENCES

1. Hilovsky, Robert J., PE; NO_x Reductions in the Portland Cement Industry with Conversion to Coal-Firing, Presented at the 1977 EPA Emission Inventory/Factor Workshop, Raleigh, North Carolina. September 13-15, 1977.

2. EPA-450/1-78-001, January 1978, Control Techniques for Nitrogen Oxide Emissions from Stationary Sources.

Best Available Control Technology (BACT) Determination

Lonestar Florida Pennsuco, Inc.

Dade County

The applicant has requested a change in the permitted sulfur dioxide emission limits for the three coal fired cement kilns located at their facility in Hialeah, Florida. Federal permit PSD-FL-050, issued in 1984, specified that SO_2 emissions from kiln No.1 and No.2 shall not exceed 56.7 pounds per hour per kiln and 26.3 pounds per hour from kiln No.3. The SO_2 emission limits were based on tests using 2.38% sulfur content fuel oil.

The kilns were converted from oil/gas fired to coal fired and the emissions analyzed. The test results indicate a lower absorption of SO_2 by the products in the kiln, and consequently more SO_2 is being emitted to the atmosphere then originally proposed based on the tests using oil as fuel.

The amount of SO_2 emissions increase requested by the applicant exceeds the significant emission rate - Table 500-2. A BACT determination, therefore, is required for SO_2, Rule 17-2.500(5)(c).

BACT Determination Requested by the applicant:

The following fuel operating mix for the three kilns would be:

A.	Kiln 1-coal(125)#	Kiln 2-gas(9)	Kiln 3-coal(400)
B.	Kiln 1-gas(9)	Kiln 2-coal(125)	Kiln 3-coal(400)
C.	Kiln 1-coal(125)	Kiln 2-coal(125)	Kiln 3-DOWN

* figure in parenthesis is pounds SO_2 emissions per hour.

Kiln operations per any of the three scenarios will not cause violation of the Federal, State or Dade County ambient air quality standards.

Date of receipt of a BACT application:

June 4, 1984

Date of Publication in the Florida Administrative Weekly:

June 22, 1984

Review Group Members:

The determination was based upon comments received from the New Source Review Section, Air Modeling Section, the Dade County

Department of Environmental Resources Management and the Southeast District Office.

BACT Determined by DER:

Pollutants-SO_2	Emission Limit
Kiln NO.1	125 lb/hr
Kiln NO.2	125 lb/hr
Kiln NO.3	400 lb/hr

The SO_2 emission limits determined as BACT do not result in a violation of Fderal or State ambient air quality standards, but, do violate the Dade County standards. The department, therefore, has incorporated the proposed three operating scenarios as BACT.

Matrix	Matrix	Matrix
Kiln 1 fire coal	Kiln 1 fire gas	Kiln 1 fire coal
Kiln 2 fire gas	Kiln 2 fire coal	Kiln 2 fire coal
Kiln 3 fire coal	Kiln 3 fire coal	Kiln 3 down

Compliance with the SO_2 emission limit will be in accordance with 40 CFR 60, Appendix A; Methods 1, 2, 3 and 6.

Compliance with the operating matrix provision will be the kiln operating log. The day, time and type of fuel fired will be recored for each kiln. The time period Number 3 kiln is down

will also be recorded in the operating log. Each log will be kept for two years.

BACT Determination Rationale:

The kilns were originally fired with natural gas and residual oil. The fuel was switched to coal in 1980 as per the conditions of permit number PSD-FL-050. The applicant submitted test data while firing residual oil containing 2.38 percent sulfur to determine kiln product absorption of SO_2. The data indicated that 91.3% of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2 and 98.7% in kiln 3.

After the kilns had been converted to fire coal, the exhaust gases were tested for SO_2 content. The data indicated the absorption of SO_2 in the kiln product was 75 to 80 percent, not the reduction originally anticipated. The kilns fire coal with a sulfur content of 2.0 percent.

AP-42, Section 8.6-1 indicates the overall control inherent in the process is approximately 75 percent or greater of the available sulfur in ore and fuel if a baghouse that allows SO_2 to come in contact with the cement dust is used. These existing sources use electrostatic precipitators for the control of particulate emissions, therefore, the department believes the maximum absorption would be 75 percent. The applicant's test data indicates a higher percent absorption will be obtained.

The amount of SO_2 emissions control, of course, will vary according to the alkali and sulfur content of the raw materials and fuel.

The SO_2 emissions limits determined as BACT are obtainable when firing low sulfur coal. The economics of firing two percent sulfur coal is evident. The department, therefor, has not set a limit for the sulfur content of the coal to be fired. The applicant has the option of burning a lower sulfur coal or installing additional SO_2 controls to meet the SO_2 limits determined as BACT.

The three operating scenarios proposed by the applicant, to protect the Dade County AAQS, is acceptable. The application of production process techniques are a recognized method to achieve the required level of emission control.

<u>Details of the Analysis May be Obtained by Contacting:</u>

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DEC 28 1984

REC'D
DER
JAN 7 1985
BAQM

REF: 4AW-AM

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Albert W. Townsend, Manager
Real Estate and Environmental Affairs
Lonestar Florida Pennsuco Inc.
P. O. Box 122035 - PVS
Hialeah, Florida 33012

RE: PSD-FL-050, Lonestar Florida/Pennsuco, Inc.

Dear Mr. Townsend:

This office has reviewed your March 23, 1984, request for a revision of the above referenced PSD permit for cement kiln Nos. 1, 2, and 3, at your Hialeah, Florida, facility. In accordance with the Florida Department of Environmental Regulation final determination dated November 9, 1984, we hereby revise your federal PSD permit (PSD-FL-050) issued on July 8, 1980, as outlined below.

I. Specific Conditions 4, 5, and 6 are changed as follows:

4. Emissions of sulfur dioxide from Nos. 1 and 2 kilns shall not exceed 125.0 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates, the emissions of sulfur dioxide shall not exceed 5.0 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from No. 3 kiln shall not exceed 400 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates, the emissions of sulfur dioxide shall not exceed 4.6 pounds per ton of clinker produced.

6. The coal used to fuel kilns Nos. 1, 2, and 3 shall have a sulfur content of less than 1.75 percent (monthly average) and a 2.0 percent maximum; or the sulfur content, determined once by the stack test program described below, that consistently meets the revised sulfur dioxide emission standards, whichever sulfur content is most restrictive.

II. TEST PROGRAM

In establishing the maximum sulfur content of the coal that can be used in each kiln, the Company shall conduct a test series on the kilns while they are operating near maximum production.

The test series shall consist of a minimum of three separate compliance tests, each test at least 168 hours after the preceeding test, and using fuel with a constant ($\pm$ 0.25 percent) sulfur content. All test results for coal of this sulfur content must be below the BACT standards.

If test results show the SO_2 emissions from a kiln do not meet the BACT standard, then the Company shall reduce the sulfur content of the coal burned in this kiln by at least 0.25 percent (average) and repeat the test series until the emissions consistently comply with the revised BACT standards.

The Company shall maintain a record of these test results for review during subsequent inspections.

In addition, for each test sample, the Company shall measure or estimate and record the following parameters:

a. feed rate (TPH);
b. sulfur content of feed;
c. coal rate (TPH);
d. sulfur content of coal; and
e. oxygen content of flue gas

III. Specific Conditions 13 and 14 are hereby added as follows:

13. Only two kilns will be operated with coal as fuel at the same time. The Company shall maintain a log or logs that show(s), as a minimum: the operational status of all three kilns at any time; when each kiln is placed in service; the clinker, feed, and fuel feed rates to each kiln; and when the kiln is taken out of service.

extra condition

14. Continuous oxygen monitors shall be properly installed, operated and maintained on kilns 1 and 2 after their conversion to coal firing and on kiln 3. The monitors shall be certified and calibrated in accordance with 40 CFR §60, Appendix B, Performance Specification 3. A record of excess oxygen for each of the coal-fired kilns and fuel/raw feed sulfur input shall be maintained on the premises for viewing during subsequent compliance inspections.

The PSD permit revisions contained herein are effective as of the date of issuance of this letter and become a binding part of Federal PSD permit PSD-FL-050 issued on July 8 1980, unless a written objection is received at the above address within ten (10) days after receipt of this letter. Please be advised that the terms and conditions specified in the original July 8, 1980, federal PSD permit are still in force and effect, except as outlined above. Notice of this revised permit will be published in the Federal Register in the near future. In addition, please be advised that this revised permit does not preclude obtaining valid state and local permits for this coal conversion project.

If you have any questions regarding this matter, please feel free to contact Mr. James T. Wilburn, Chief, Air Management Branch, at 404/881-3043.

Sincerely yours,

for

Charles R. Jeter
Regional Administrator

cc: Mr. C. H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental
Regulation

BEST AVAILABLE COPY

DEC 17 1982

4AW-AM

Mr. Scott Quaas, Environmental/Specialist
Lonestar Florida/Pennsuco, Inc.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012

Dear Mr. Quaas:

This is in response to your November 19, 1982, submittal to Mr. Thomas W. Devine concerning the sulfur dioxide (SO_2) emission limitations on Lonestar's Kilns 1,2, and 3 and a request for revising these limitations from those appearing in your present PSD permit (PSD-FL-050).

Since the State of Florida has been granted partial delegation of authority regarding PSD reviews, we have forwarded a copy of this submittal to them. Florida will be responsible for performing the technical review and preparing a preliminary determination. Following this determination, Florida will initiate a public notice and 30-day comment period. EPA will also be afforded an opportunity to review and comment on this determination. A final determination on your permit revision request will be made after the conclusion of the public comment period.

If you have any questions or comments concerning this matter, please contact Mr. Richard S. DuBose, Chief, Air Engineering Section at (404) 881-7654.

Sincerely yours,

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

cc: Mr. Clair Fancy, Deputy Bureau Chief
FL Dept. of Environmental Regulation

Mr. Anthony J. Clemente, P.E., Acting Director
Metropolitan Dade County Dept. of Environmental Resources

Mr. Warren G. Strahm, Subdistrict Manager
FL Dept. of Environmental Regulation

United States Department of the Interior

NATIONAL PARK SERVICE
SCIENCE PUBLICATIONS OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:
N3615(475)

SEP 25 1984

DER
SEP 28 1984
BAQM

Mr. C. H. Fancy, P.E.
Deputy Bureau Chief
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy:

Thank you for sending us information regarding your preliminary approval of Lonestar Florida Pennsuco's (Lonestar) permit modification request. As we understand it, Lonestar was granted a permit in 1980 for the fuel conversion of three existing kilns from gas/oil firing to coal firing, but is now requesting an increase in the allowable sulfur dioxide (SO_2) limit. The Lonestar facilities, which are located in Hialeah, Florida, are 30 kilometers northeast of Everglades National Park, a mandatory class I area.

You indicate that original stack tests performed, while the kilns were firing oil, show that 91.3 percent of the potential SO_2 was absorbed by the aggregate processed in kilns 1 and 2, and 98.7 percent in kiln 3. The emission limitations for the fuel conversion permit were based on these data. Actual stack test data for coal firing indicate that the observed SO_2 removal is only approximately 75 percent. Consequently, Lonestar is requesting the SO_2 allowable limit in their permit be increased by 1,688 tons per year.

In the information you provided, there was little discussion regarding the large discrepancy in the test data (75 percent versus 98.7 percent). We would like to know if the difference is attributable entirely to the fuel change, if the coal-fired tests were properly conducted and were representative of normal operation, and if the kilns were being operated in the same manner as when the oil-fired tests were performed.

We note that the predicted SO_2 concentrations in Everglades National Park were made assuming a zero micrograms per cubic meter (ug/m^3) background concentration. Using this assumption, Lonestar predicts an annual SO_2 concentration of 0.4 ug/m^3 in the park. Although we do not expect this concentration to have an adverse impact on park resources, please note for future permits that SO_2 monitoring has been done in the park, and these data indicate that background levels, although low, are not zero ug/m^3. Future permits should include the background concentrations in any impact discussion.

ann mean was 7ug/m

We acknowledge [illegible]
According to 1983 [illegible] data [illegible]
of [illegible]

The applicant asserts that "Lonestar and Dade County Resource Recovery were determined to be the only significant increment consuming sources in the area." This implies that an analysis was performed to define some impact area. This analysis should be included in the application.

If you have any questions regarding this matter, please contact Mark Scruggs of our Air and Water Quality Division at (303) 234-6620.

Sincerely,

C. W. Ogle

Acting Regional Director
Southeast Region

10-2-84

Clara,
I went over Park letter
and Tom Towles comments
with Scott Quass of Co.
He is going to respond
to 3rd ¶ of Park Service
letter and, also, propose a
stack ~~test~~ program. We need
to wait for his reply. WMA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUG 29 1984

DER

SEP 4 1984

BAQM

REF: 4AW-AM

Mr. C. H. Fancy, P.E.,
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

RE: PSD-FL-050, Lonestar Florida Pennsuco, Inc.

Dear Mr. Fancy:

This is to acknowledge receipt of your letter of transmittal dated August 6, 1984, regarding the preliminary determination for the sulfur dioxide BACT and PSD permit revisions for the above company's cement kilns.

We have reviewed the proposal and concur with your determination on the revised BACT for sulfur dioxide and the modification of permit conditions for sulfur dioxide. Please advise us and submit a copy of the final determination when it is issued.

It is our understanding that once the final determination is issued by your agency, EPA will issue a permit modification for the above referenced facility and incorporate it as part of the original PSD permit issued on July 8, 1980. If this procedure deviates from your understanding, please let us know.

Sincerely yours,

Winston A. Smith

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

Wacke from Fan lady

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

July 30, 1984

Mr. Scott Quaas
Environmental Specialist
Lonestar Florida Pennsuco, Inc.
P. O. Box 122035 - PVS
Hialeah, Florida 33012

Dear Mr. Quaas:

The department acknowledges receipt of your July 3, 1984, request for an alternate particulate emission test procedure for the No. 3 kiln. In order to give consideration to all factors that may influence our decision on this matter, we request you furnish the following additional information.

1. What are the physical constraints that prevent your Company from relocating the stack gas monitor that was installed in the NW sampling port?

2. What would it cost to install another test port in the stack? Please document this cost if you believe it is prohibitive.

3. Please provide sketches (elevation and plan) of the stack that includes the test ports and shows the restriction caused by the stack gas monitor that was installed in one of the test ports.

4. Please provide copies of stack test data field sheets that show the pitot tube readings at each test point before and after the kiln was converted to coal fuel.

5. If the data is available, please provide the particle size distribution of the particulate matter in the emissions for kiln 3 when it is firing coal.

Mr. Scott Quaas
Page Two
July 30, 1984

We will resume processing your request for an alternate test procedure as soon as we receive the information requested above. If you have any questions on this matter, please write to me or call Willard Hanks at (904)488-1344.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/WH/s

cc: T. Tittle

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To:	Loctn.:	
To:	Loctn.:	
To:	Loctn.:	
From:	Date:	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due:	Date Due:	

TO: Tom Tittle SE District
Patrick Wong DERM

FROM: Ed Palagyi EP

DATE: JUNE 18, 1984

SUBJ: BACT DRAFT- Lonestar Fl Pennsuco

Enclosed is a prelimmary BACT for Lonestar. Please review upon receipt if all possible. If you have any comments, changes, or revisions please call me at Sun Com 278-1344.

The goal is to get the finished document to EPA before July 1. A quick reply would be greatly appreciated:

attachment:

cc: Cleve Holladay
Willard Hanks

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

DER
MAY 29 1984
BAQM

May 22, 1984

Mr. Clair Fancy, Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: PSD-FL-050

Dear Mr. Fancy:

With regard to my recent SO_2 emission limitation revision request, could you please advise me of the status of your review and/or whether additional information is needed. As this matter has been under review for over one (1) year we are anxious to bring it to a final conclusion.

Please contact me as soon as possible.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

We will draft a
BACT in order to trigger
the

We will continue
processing your
a request to revise
the federal PSD
permit and plan
to have a draft
preliminary determination
by June, 1984.
Until ~~the~~ your most recent
revision we have
been unable to issue
the permit

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

APR 11 1984

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

REF: 4AW-AM

DER
APR 16 1984
BAQM

Mr. Scott Quaas
Lonestar Florida Pennsuco, Inc.
P. O. Box 122035 - PVS
Hialeah, Florida 33012

RE: PSD-FL-050 Lonestar Florida Pennsuco, Inc.

Dear Mr. Quaas:

This is to acknowledge receipt of your March 23, 1984, letter concerning revisions to the SO_2 emission limitations for kilns 1, 2, and 3 as contained in the above referenced PSD permit. This request supersedes your November 19, 1982, request for revisions to the SO_2 emission limitations for the kilns and will be considered in lieu of the previous submittal.

In our letter to you dated December 17, 1982, you were informed that the Florida Department of Environmental Regulation (DER) would be responsible for performing the technical review of that request for revising the SO_2 emission limitations for the kilns. We will, therefore, proceed in the same manner with this request as we have in the past. The Florida DER will prepare a preliminary determination. Following this determination, Florida will initiate a public notice and 30-day comment period. EPA will also be afforded an opportunity to review and comment on this determination. A final determination on your permit revision request will be made after the conclusion of the public comment period.

If you have any questions or comments concerning this matter, please contact Mr. Wayne J. Aronson, Team Leader, New Source Review Team at (404) 881-7654.

Sincerely yours,

Winston A. Smith

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

cc: Mr. Clair Fancy, Deputy Bureau Chief
FL Dept. of Environmental Regulation

Mr. Anthony J. Clemente, P.E., Director
Metropolitan Dade County Dept. of Environmental Resources

Mr. Roy Duke, District Manager
FL Dept. of Environmental Regulation

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

March 23, 1984

DER
MAR 27 1984
BAQM

Mr. James Wilburn, Chief
Air Management Branch
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, Georgia 30365

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Dear Mr. Wilburn,

In our revision submittal dated November 19, 1982, Lonestar requested a change to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr
Kiln 2	100 lbs/hr
Kiln 3	400 lbs/hr

You advised me on December 17, 1982 that the Florida Department of Environmental Regulation (FDER) would be responsible for performing the technical review and preparing a determination. Subsequently, Lonestar has submitted additional information to both the state and county regulatory agencies, as requested by those agencies, to clarify remaining issues. Additionally, it was our understanding that the State intended to approve our revision request.

However, in a letter dated December 28, 1983, the FDER advised Lonestar of a change in their interpretation of the Dade County short-term SO_2 standard and the comparison of modeling concentrations to that short-term standard.

Same modeling as before only w/ different scenarios

The FDER indicated they must compare the predicted highest concentrations at each receptor site to Dade County standards not the second-highest concentrations as used in state and federal regulations. When the modeling submitted by Lonestar was re-evaluated, a violation of the 4-hour Dade County SO_2 standard was predicted.

In view of this recent interpretation, Lonestar has completed a revised air modeling evaluation of three emission scenarios to determine maximum predicted concentrations when the kilns are burning either coal or natural gas. The fuels burned and associated maximum SO_2 emissions for each of the kilns are as follows:

	Maximum SO_2 emissions (lbs/hr), and fuel burned			
Emission Scenarios	Kiln 1	Kiln 2	Kiln 3	TOTAL
1	125 (coal)	9 (natural gas)	400 (coal)	525
2	9 (natural gas)	125 (coal)	400 (coal)	525
3	125 (coal)	125 (coal)	off - line	300

Only 2 kilns can burn coal at the same time

Attached is a summary of maximum SO_2 concentrations predicted for each scenario due to Lonestar and other nearby sources. The supportive computer model printouts will be forwarded under seperate cover. As the air dispersion modeling results depict, Lonestar may operate Kiln 1, Kiln 2 and Kiln 3 under any of the three emission scenarios modeled and will comply, as before, with Federal and State Ambient Air Quality Standards (AAQS), and also comply with the Dade County AAQS as currently interpreted.

Lonestar respectively requests that our emission limiting standards be revised to reflect the emissions outlined in the above three scenarios. As this matter has been under review for one year, we believe an expeditious conclusion of our permit revision request is now warranted.

Max increase $SO_2 = \frac{525\ lb}{hr} \cdot \frac{8760\ hr}{yr} \cdot \frac{Ton}{2000\ lb} = 2300$ TPY

Re: Request for Revision of Coal Conversion Permit #PSD-FL-050

Should you need any further information from me, please don't hesitate to call.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

SQ:elvy

cc: S. Smallwood - DER, Tallahassee
A. Clemente - Dade County DERM
R. Duke - DER, West Palm Beach
B. Voshell - EPA
C. D. Coppinger
R. F. Scully
A. Townsend

file

Summary of Maximum Sulfur Dioxide Concentrations
Due to Lonestar and Other Nearby Sources

Scenario	SO_2 Concentrations (ug/m^3)* for Averaging Periods of:					
		24-hour			3-hour	
	Annual	Highest	Highest, Second Highest	4-Hour Highest	Highest, Second Highest	1-hour Highest
1-Kiln #1 and Kiln #3 on coal, Kiln #2 on gas						
Total-All Sources	2.4	15.7	13.4	52.7	52.3	127.2
Lonestar contribution	---	14.3	13.4	52.4	52.0	127.2
2-Kiln #2 and Kiln #3 on coal, Kiln #1 on gas						
Total-All Sources	2.5	16.2	14.0	54.2	53.5	128.0
Lonestar contribution	---	14.7	14.0	53.9	53.2	128.0
3-Kiln #1 and Kiln #2 on coal, Kiln #3 off-line						
Total-All Sources	2.2	15.4	13.2	50.4	46.2	101.6
Lonestar contribution	---	15.4	12.4	50.4	45.8	100.4
Dade County AAQS	8.6	28.6	NA	57.2	NA	286
Florida AAQS	60	NA	260	NA	1300	NA

Note: NA = Not Applicable

*Highest 1-,-4, and 24-hour concentrations are compared to Dade County AAQS, which are not to be exceeded. Highest, second-highest 3- and 24-hour concentrations are compared to Florida AAQS, which are not to be exceeded more than once per year.

Source: ESE, 1984

Wayne Arenson Called 1/18/84
404-881-7654

BEST AVAILABLE COPY

C.H. Fancy
F4T

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

Patrick Wong
5C 448-276

Blommel is lead

4AW-AM

FEB 17 1984

DER
FEB 21 1984
BAQM

Mr. Steve Smallwood, P.E., Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Smallwood:

The purpose of this letter is to provide you with the Environmental Protection Agency's (EPA) comments on the present sources in violation of the air pollution requirements in the State of Florida. In your letter to me dated August 30, 1983, you indicated that acceptable Delayed Compliance Orders (DCO) would be issued to Boise Cascade and Arnold Cellophane within two (2) or three (3) months, respectively, of the date of the aforementioned letter.

We understand that your agency has had problems resolving the legal and technical issues involved in issuing their DCO's. However, since the meeting between the Florida Department of Environmental Regulation (FDER) and EPA staffs on January 19, 1984, we feel that FDER has sufficient information to issue an acceptable DCO. To date, FDER has not submitted an acceptable DCO on the aforementioned sources or Continental Can. Therefore, if an acceptable DCO is not issued by March 16, 1984, to Boise Cascade, Arnold Cellophane, and Continental Can, EPA will initiate independent federal enforcement action. Please submit to EPA copies of all the DCO's and keep EPA informed of any subsequent actions resulting from the issuance of the DCO's.

In your August 30, 1983, letter you indicated that a preliminary determination for the federal PSD permit modification would be issued to Lonestar Pennsuco around September 15, 1983. To date it has not been submitted. It is our understanding that the difference in interpretation of the ambient standards between Dade County and the State of Florida has now been resolved and that a new permit can be issued within the next 30 days. Therefore, if the federal permit modification has not been issued by March 16, 1984, EPA will initiate independent federal enforcement action. Please submit the technical information necessary to support the issuance of the PSD Permit modification.

8/23 See me on this - Clair

Need one paragraph input for Bill B. on this. Need to ck out where this statement came from.

one of small units on natural gas

It is our understanding, based upon a telephone conversation on February 6, 1984, between Mr. Bill Voshell of my staff and Mrs. Cynthia Christen, Assistant General Counsel for the State of Florida, that a Consent Order in reference to Ciba-Geigy was signed on January 23, 1984, and that subsequently a permit was issued. Please submit to EPA a copy of the Consent Order and a copy of the permit for our records.

Since receipt of your letter dated August 30, 1983, EPA has not received any further information regarding the Orlando Utilities Commission (OUC) Indian River - Unit No. 2. Please provide EPA with any agreements, commitments, requirements, or mechanisms by which FDER is to bring OUC into compliance. If EPA is not informed by March 16, 1984, EPA will issue a Section 114 letter requesting OUC to test for particulate emissions.

It has come to my attention that an Administrative Order was issued to Yorke-Doliner on November 16, 1983, by FDER. Please submit to EPA a copy of the Administrative Order by March 1, 1984, and keep EPA informed of any subsequent action resulting from issuance of the order. In addition, please provide copies of any future Administrative Orders that are issued by FDER.

Should you have any questions regarding this letter, please feel free to contact me at (404) 881-3043 or Mr. Bert Cole, Acting Chief, Southern Compliance Unit at (404) 881-4298.

Sincerely yours,

Winston A. Smith

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

Bill Voshell - the one to talk to

Both permits same - state & federal

Southern Compliance Unit

cc: William Blommel
Environmental Administrator
Florida Department of Environmental Regulation

Within 60 days

Significant violators list

Send information on ~~federal per~~ technical justification of federal permit.
The federal permit

Then meant in that if issued now federal permit would be ~~less~~ greater ~~than~~ than state.

If wait can be same in next two months

Make SCU make choice

Do they want us to ~~sen~~ issue federal permit

10/14/83
draft

09/ L STAR

Preliminary Evaluation

Revision of Best Available Control Technology Determination
and
Permit to Construct

Lonestar Pennsuco, Inc.
Dade County

Federal Permit Number
PSD-FL-050

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

October -- 1983

Table of Contents

NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to recommend the permit set to construct that was issued to Lonestar Florida Pennsuco, Inc. of Hialeah, Dade County, Florida be revised. The revisions involve changes to the Best Available Control Technology determination and the permit to construct kilns 1, 2, and 3. These revisions will allow sulfur dioxide emissions from the three kilns to increase by 2,016 tons per year. Emissions of other criteria pollutants will not change.

The increased sulfur dioxide emissions from the kilns will not cause an ambient air violation or exceed the allowable sulfur dioxide increment consumption or violate any federal, state or county regulation. The impact of the revised sulfur dioxide emissions, in ug/m^3/percent of allowable increase, is listed below
annual -0.63/3.2; 24 hour - 4.90/5.4; 3 hour-18.0/5.5

A person who is substantially affected by the Department's proposed permitting decision may request a hearing in accordance with Section 120.57, Florida Statutes, and Rules 17-1 and 28-5, Florida Administrative Code. The request for hearing must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within 14 days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.57, Florida Statutes.

The Technical Evaluation and Preliminary Determination for the proposed project is available for public inspection during normal business hours at the following locations:

Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Department of Environmental Regulation
Southeast Florida District
3301 Gun Club Road
West Palm Beach, Florida 33402

Metropolitan Dade County
Environmental Resources Management
909 Southeast First Avenue
Brickell Plaza Building-Room 402
Miami, Florida 33131

Any person may send written comments on the proposed action to Mr. Clair Fancy at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final evaluation of this revision.

I. Applicant

Lonestar Florida Pennsuco, Inc.

Cement and Aggregate Division

Post Office Box 122035

Palm Village Station

Hialeah, Florida 33012

II. Location

The sources affected by the proposed revision are located in the applicant's existing Portland cement plant at 11000 Northwest 121 Street, Hialeah (Dade County), Florida. The UTM coordinates are zone 17-562.75 km E and 2861.65 km N.

III. Background

The applicant received federal permit No. PSD-FL-050 in 1980 which authorized the conversion of existing kilns No.'s 1, 2, and 3 from gas or oil to coal fuel containing up to two percent sulfur. Burning coal instead of oil or gas in the kilns will increase the sulfur dioxide emissions from the kilns. The Best Available Control Technology determination (BACT) on which the emission standards were based limited the sulfur dioxide emissions from the existing electrostatic precipitators serving the three kilns to the quantities listed below.

Kiln No.	Maximum Sulfur Dioxide Emission Standards
1	1.42 lb/ton dry feed or 56.7 lbs/hr, 248.4 TPY
2	1.42 lb/ton dry fed or 56.7 lbs/hr, 248.4 TPY
3	0.19 lb/ton dry feed or 26.3 lbs/hr, 115.1, TPY

These standards were the emission limits requested by the applicant. The applicant estimates a sulfur dioxide removal efficiency of over 90 percent for the system. This removal efficiency was based on test data collected on the systems by a limited number of flue gas tests while the kilns were burning high sulfur fuel oil.

Kiln No. 3 has been converted to coal fuel and actual test data shows the sulfur dioxide removal is less than 90 percent. The applicant has studied the latest test data and now believe the systems will obtain only 75 to 85 percent sulfur dioxide removal.

The Company is now requesting that the sulfur dioxide emission limits for the three kilns, while they are burning coal containing two percent sulfur, be set at the values shown below.

Kilns	Sulfur Dioxide Emission Limit
1	100 lbs/hr
2	100 lbs/hr
3	400 lbs/hr

Model results of the proposed SO_2 emissions from the three kilns shows no violation of the SO_2 increment or ambient air quaility standards.

Although other criteria pollutants were regulated by the construction permit and the BACT determination, sulfur dioxide is the only pollutant that the Company has addressed in their request for a revision to the BACT determination and permit.

IV. Rule Applicability

Although the plant is a major source, the original application for permit to burn coal in the three kilns was not subject to PSD review for sulfur dioxide because the change in sulfur dioxide emissions were estimated to be less than the significant level defined in 40 CFR 52.21(b)(23)(i). The emission standards now being requested will result in a significant net emission increase of sulfur dioxide emissions from the three kilns.

The applicant has requested that the permitted emissions for sulfur dioxide be increased. No change to the permitted emissions of the other criteria pollutants was requested or is being considered by this agency. The regulations applica~~nt~~ble to an increase in sulfur dioxide emissions are discussed below.

This change is subject to preconstruction review under federal prevention of significant deterioration (PSD) regulations, Section 52.21 of Title 40 of the Code of Federal regulations (40 CFR 52.21) as amended in the Federal Register of August 7, 1980 (45 FR 52676). Specifically, the cement kilns constitutes major stationary sources (40 CFR 52.21(b)(1)) located in an area designated in 40 CFR 81.310 as attainment for sulfur dioxide. Use of coal as fuel causes a significant net emission increase in sulfur dioxide, thereby rendering the change a major modification (40 CFR 52.21(b)(2)) subject to PSD review (40 CFRE 52.21(i)).

Full PSD review is required for increase in sulfur dioxide emissions. The review consist of revising the original best available control technology (BACT) determination, It also requires an analysis of the air quality impact of the increased emissions. The review also includes an analysis of the impact of the proposed project on soils, vegetation, visibility and the air quality impacts resulting from associated commerical, residential and industrial growth.

The sulfur dioxide standard in federal permit PSD-FL-050 will be revised if the technical review gives assurance that the air pollution regulations will not be violated at the higher emission rates requested by the source.

V. Engineering Evaluation

The 77.7 percent SO_2 removal efficiency for this system that the applicant's requested revision of the BACT SO_2 emission limits is based on is greater than EPA implies can be achieved in the AP-42 manual, Compilation of Air Pollutant Emission Factors. A cement kiln with a baghouse control device is estimated to remove 75 percent of the SO_2. The baghouse is believed to be more efficient in removing SO_2 than the electrostatic precipitators used by Lonestar. The Company has submitted a limited number of test results on kiln 3 that show the average SO_2 removal efficiency, when the percent oxygen in the flue gas was above 2.8 percent, is 75 percent. No data has been provided that gives assurance that the existing system can consistantly achieve a removal efficiency above this. Based on the data available, the Department believes the system should achieve 75 percent SO_2 removal.

Flue gas desulfurization equipment (FGD) may be able to meet the standards set in the original BACT determination. However, the applicant stated that FGD on this type of source is unproven and, if used, would add approximately $0.30 per pound to the cost of their product. The Bureau is in agreement that FGD is not feasible for this plant at this time.

Using fuel with a lower sulfur content is the only feasible way of reducing sulfur dioxide emissions from this plant. However, the original SO_2 standards initially selected as BACT cannot be met with low sulfur coal alone. Also, if the removal efficiency of the system is only 75 percent, the proposed SO_2 BACT standards will be exceeded at maximum permitted, production when using coal containing two percent sulfur (Company plan) and feed containing 0.088 percent sulfur (highest estimated sulfur content of feed). Coal with a lower sulfur content is available which will allow the Company to meet their proposed SO_2 standards.

Calculations using the maximum feed and coal inputs to the kiln listed in the original application for permit to construct, the maximum sulfur content in the feed from Lonestar's June 13, 1983 letter, and a sulfur removal of 75 percent by the system shows the kilns would have to burn coal with no more than 0.75 percent sulfur for kilns 1 and 2 and 1.0 percent for kiln 3 to meet the sulfur dioxide emission standards now being requested. (See Table I and Figure 1) This is low sulfur fuel. As these emissions cause no ambient air violations, the Department would have approved the sulfur dioxide emission limits for the kilns now being requested by the Company if they has requested those limits in the application for permit to construct.

V. Ambient Air Quality Emission

Cleve Holladay

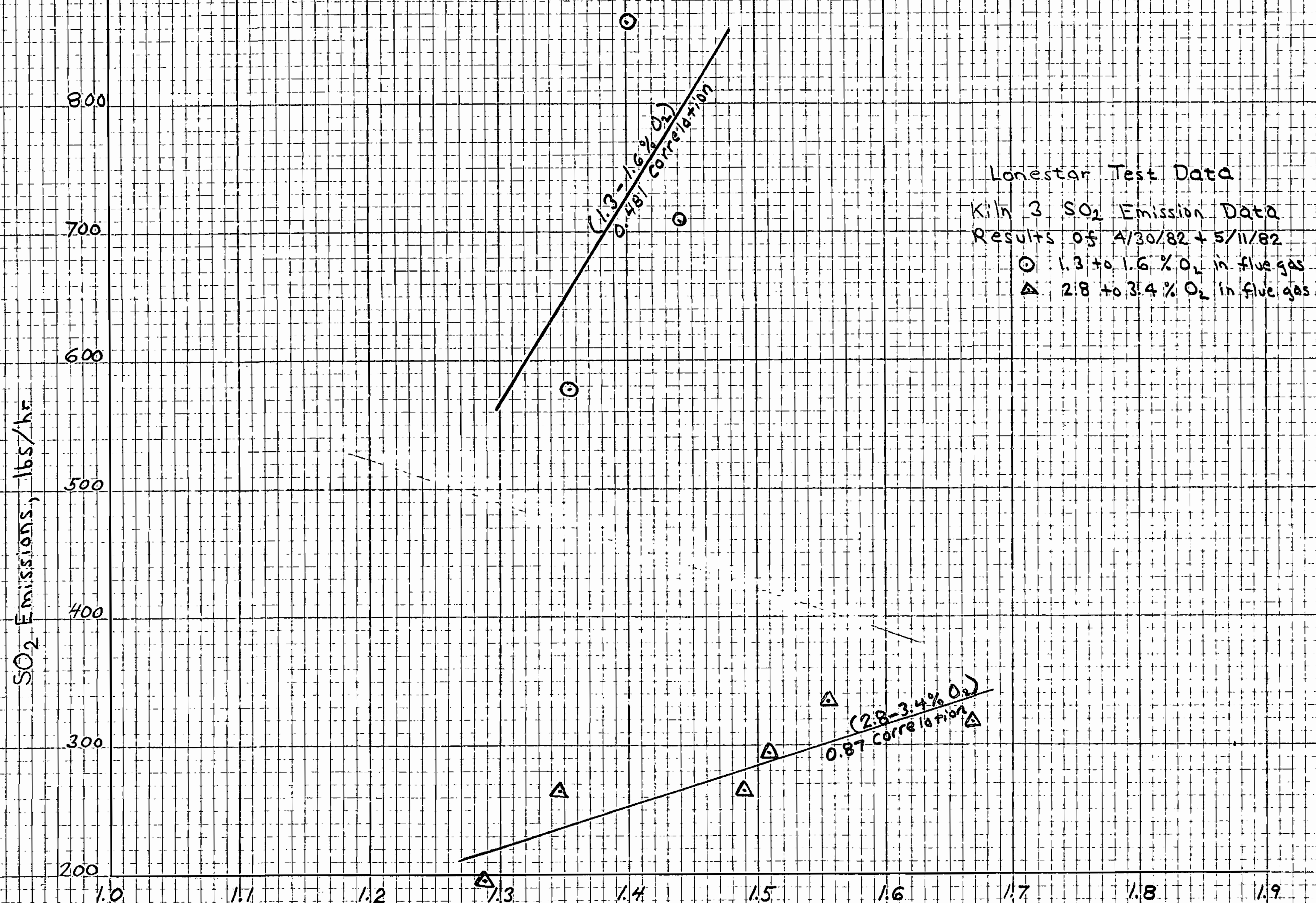

Lonestar Test Data
Kiln 3 SO_2 Emission Data
Results of 4/30/82 + 5/11/82
⊙ 1.3 to 1.6 % O_2 in flue gas
△ 2.8 to 3.4 % O_2 in flue gas
SO_2 Emissions, lbs/hr
800
700
600
500
400
300
200
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
(1.3-1.6% O_2)
0.481 correlation
(2.8-3.4% O_2)
0.87 correlation

Figure I

Sulfur Dioxide Emissions From Kiln 3

Run	Feed Rate (TPH)	% S in Feed	Coal Rate TPH	% S in Coal	Potential SO_2 Emiss. lbs/hr	Measured SO_2 Emiss. lbs/hr	Measured SO_2 Removal %
1	138.28	0.068	16.5	1.400	1300	863.60*	33.6
2	138.28	0.068	16.5	1.440	1326	709.10*	46.5
3	138.28	0.088	16.5	1.552	1511	332.03	78.0
1	127.59	0.044	13.9	1.668	1152	318.52	72.4
2	127.59	0.044	13.5	1.508	1039	294.72	71.6
3	127.59	0.044	14.4	1.488	1082	265.46	75.5
4	127.59	0.048	14.4	1.288	987	197.09	80.0
5	127.59	0.040	14.4	1.344	978	264.91	72.9
6	127.59	0.040	15.5	1.356	1045	578.92*	44.6

* O_2 in Flue gas <1.6%

Table 1

Sulfur Dioxide Emissions From Kiln 3

Run	Feed Rate (TPH)	% S in Feed	Coal Rate TPH	% S in Coal	Potential SO_2 Emiss. lbs/hr	Measured SO_2 Emiss. lbs/hr	Measured SO_2 Remova[l] %
1	138.28	0.068	16.5	1.400	1300	863.60*	33.6
2	138.28	0.068	16.5	1.400	1326	709.10*	46.5
3	138.28	0.088	16.5	1.552	1511	332.03	78.0

VII. Conclusion

Based on the data available, the Department has concluded that the original BACT for SO_2 was too restrictive. The SO_2 emission standards of 400 lbs/hr for kiln 3 and 100 lbs/hr each for kilns 1 and 2 are reasonable. These emissions will not cause an ambient air quality violation or exceed any allowable increase of SO_2 in the ambient air concentration. Higher SO_2 emissions from the existing plant could increase the SO_2 concentration in the ambient air near the plant above that allowed by Dade County regulations.

The proposed SO_2 emission standards can be achieved by controlling the percent sulfur in the coal. The maximum percent sulfur that can be allowed in the coal is a function of sulfur dioxide removal efficiency of the system. Low sulfur coal, 0.75 percent sulfur, may have to be burned to meet these standards. A controlled test series on all three kilns is needed resolve what maximum (and average) percent sulfur in the coal ~~that~~ can be used in the kilns without exceeding the emission standards.

VIII. Revised BACT

Maximum Allowable Sulfur Dioxide Emissions

Kilns	Max.lbs/ton clinker	Max.lbs/hr	Max. TPY
1	4.0	100	438
2	4.0	100	438
3	4.6	400	1752

Maximum sulfur content of the coal shall not exceed the percentages determined by actual tests on each kiln necessary to consistantly meet, at maximum permitted producton, the sulfur dioxide emission standards listed above, or 1.75 percent monthly average/2.0 percent any one sample, whichever limit is most restrictive.

Compliance test for sulfur dioxide shall be by method 6 as described in 40 CFR 60, Appendix A.

In establishing the maximum sulfur content of the coal that can be used in each kiln, the Company shall conduct a test series on the kilns, while they are opeating near maximum production, consisting of:
A minimum of three separate compliance tests, each test at least 168 hours after the proceeding test, and using fuel with a constant ($\pm$ 0.25 percent) sulfur content. All test results for coal of this sulfur content must be below the BACT standards.

If test results show the SO_2 emissions from a kiln do not meet the BACT standard, then the Company shall reduce the sulfur content of the coal burned in this kiln by at least 0.25 percent (average) and repeat the test series until the emission consistantly comply with the revised BACT standards. For each test the Company shall provide: a test report giving, as a minimum, the data listed in Chapter 17-2.700(7), FAC.

In addition, for each test sample the Company shall measure or estimate and report: feed rate (TPH)
sulfur content of feed
coal rate (TPH)
sulfur content of coal
oxygen content of flue gas

IX. Permit Condition Revision

Permit conditions 4, 5, and 6 are revised as follows:

Original Conditions

4. Emissions of sulfur dioxide from #1 and #2 kilns shall not exceed 56.7 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 2.27 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from #3 kiln shall not exceed 26.3 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 0.30 pounds per ton of clinker produced.

6. The coal used to fuel kilns #1, #2, and #3 shall have a sulfur content of 2 percent or less.

Revised Conditions

4. Emissions of sulfur dioxide from #1 and #2 kilns shall not exceed 100.0 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates, the emissions of sulfur dioxide shall not exceed 4.0 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from #3 kiln shall not exceed 400.0 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 4.6 pounds per ton of clinker produced.

6. The coal used to fuel kilns #1, #2, and #3 shall have a sulfur content of less than 1.75 percent (average), and 2.0 percent maximum or the sulfur content, determined by the stack test program described in the revised BACT, that consistently meets the revised sulfur dioxide emission standards, which ever sulfur content is most restrictive.

METROPOLITAN **DADE** COUNTY, FLORIDA

METRO-DADE

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING—RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

October 20, 1983

Steve Smallwood, P.E., Chief
Bureau of Air Quality Management
Florida Department of
  Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

RE: Lonestar Florida Pennsuco, Inc.
Request for Revision of Coal
Conversion Permit #AC 13-27742
(File #AC 13-54054)

Dear Mr. Smallwood:

This letter is in response to your memorandum of September 8, 1983, which indicates that you intend to approve the referenced request by Lonestar for relaxation of the sulfur dioxide emission limits contained in their coal conversion permit. As indicated to you and Lonestar in previous correspondence, we are not satisfied with the information presented in the request and therefore disagree with your intent to approve same for the following reasons:

A. DERM does not feel that certain important questions raised by us in three (3) separate letters to your Department, to date, have been adequately addressed in your review of Lonestar's request.

B. We do not consider your Bureau's interpretation of the Dade County Pollution Control Ordinance, in this instance, that a source is not subject to any further requirements of that ordinance if it only "contributes to" but does not, by itself, "cause" a violation of the standards contained therein, as being reasonable or compatible with the intent of the Ordinance or any similar regulation. Under your interpretation, just about any source proposed in Dade County would only "contribute to" and, therefore, be approvable with few if any controls. We have consulted with our County Attorney's Office and they supported our view in this matter.

In view of the above, we hereby request that your agency reconsider said approval until Lonestar satisfactorily responds to the following:

1. Commit to carrying out an extensive ambient monitoring program to verify the actual levels of sulfur dioxide in the area, and also to determine the direct impact of the higher levels of sulfur dioxide from kiln 3.

2. Explain the drastic turnaround in the projected levels of sulfur dioxide from kiln 3 as compared with kilns 1 and 2. Lonestar had previously maintained that sulfur dioxide emissions from kilns 1

and 2 would be more than twice that from kiln 3. Now, Lonestar claims that kiln 3 will emit four (4) times more sulfur dioxide than the emissions from each of the smaller kilns.

3. Provide documented evidence to support the increase in sulfur dioxide absorption rates from 55 percent in July, 1981 to between 75 percent and 80 percent as is currently being claimed.

This Department does not think it is unreasonable to ask that these issues relating to the use of coal fuel be satisfactorily resolved before further permitting of Lonestar's kilns can be considered. Instead, DERM feels that it is essential to ensure that these new and substantially higher emissions of sulfur dioxide will not adversely affect the air quality in the surrounding areas, nor exacerbate any existing violations that might be caused by other sources. We therefore urge you to reconsider your current position, and look forward to your cooperation in this matter.

Copies of our earlier correspondence are attached for your information.

Sincerely,

Anthony J. Clemente
Director
Environmental Resources Management

AJC/RR/HPW/ag

Attachments

CC: Bill Voshell
Roy Duke
Al Townsend
Scott Quaas

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

December 23, 1983

Mr. Anthony J. Clemente, Director
Department of Environmental Resources Management
909 Southeast 1st Avenue
Brickell Plaza Building - Room 402
Miami, Florida 33131

Re: Lonestar Florida Pennsuco, Inc., Request for Revision of Coal Conversion Permit # AC 13-27742 and PSD-FL-050

Dear Mr. Clemente:

This is in response to your October 20, 1983, letter to me which stated your reasons for disagreeing with our intention to approve the relaxation of Lonestar's sulfur dioxide emission limits on its coal conversion permits.

When I stated our intention to revise both the federal and state permits in my August 30, 1983, letter to EPA concerning our Air Enforcement Action Plans, I was unaware of a problem we have recently discovered which may preclude the Department from issuing the state permit. This problem is based on our understanding that DERM considers the first annual exceedance of a Dade County short-term SO_2 standard to be a violation.

If our understanding of the DERM rules is correct, we have to compare modeled SO_2 concentrations to Dade County short-term standards differently than we compare them to state and national standards. In other words, we must compare the predicted highest concentrations at each receptor site to Dade County standards, not the predicted second-highest concentrations as used in state and federal regulations. When we reevaluated Lonestar's modeling using this method, we found that the revised SO_2 emissions from Lonestar alone, exlcusive of emissions from other sources or of any background SO_2 level, are predicted to violate the 4-hour Dade County SO_2 standard (a value of 64.8 ug/m^3 compared to the Dade County standard of 57.2 ug/m^3). Since the Department must enforce the Dade County standards when issuing a state permit, we now believe the Department can't issue a state permit for the requested emission limits. However, since the Dade County ambient standards are not part of the approved SIP, EPA does not recognize them as enforceable, and consequently they are not to be considered in whether we approve or disapprove Lonestar's request for a modification to their federal permit. Therefore, we will, if all federal requirements are complied with, recommend to EPA that the federal permit be modified.

In view of this problem, our response to the comments in your October 20, 1983, letter are as follows:

1. Comment #1 on ambient monitoring: Since the requested emission limits result in predicted violations of the 4-hour Dade County standard and since any change in emission limits Lonestar subsequently proposes because of this problem will still likely approach the 4-hour standard, we are prepared to require Lonestar to locate an SO_2 monitor near the plant.

2. Comments #2 and #3 on documenting the SO_2 emissions in the kilns: we have discussed these comments with Lonestar staff and understand that they have discussed them with DERM and that you have agreed to their answers. However, if this is not the case, we will require these comments be satisfactorily resolved before further permitting of Lonestar's kilns is considered.

We will wait for your response to this letter before taking any further action on these permits.

Sincerely,

Steve Smallwood, P.E.
Chief
Bureau of Air Quality Management

SS/LG/s

cc: Scott Quaas
Bill Voshell
Roy Duke

bc: N. Wright
B. Blommel
C. Fancy

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 17, 1983

Mr. Anthony J. Clemente, Director
Environmental Resources Management
909 Southeast, 1st Avenue
Brickell Plaza Building - Room 402
Miami, Florida 33131

Re: Lonestar Florida Pennsuco, Inc., Request for Revision of Coal Conversion Permit # AC 13-27742 and PSD-Fl-050

Dear Mr. Clemente:

The Bureau is preparing a response to your October 20, 1983, letter to me which stated your reasons for disagreeing with our intention to approve the relaxation of Lonestar's sulfur dioxide emission limits on their coal conversion permits. I expect to send the Bureau's response within the next week to ten days. We will not take final action on the permit until we have resolved the questions you raised.

Sincerely,

Steve Smallwood

Steve Smallwood, P.E.
Bureau Chief
Bureau of Air Quality
Management

SS/CH/s

Lonestar
Scott Quaas
305/823-8800

Lonestar

Sept. 8 memo →
Prot, 55 letter to
Wilburn, 9/8 may
be date received or
re-sent by EPA —
Ck with Blommel

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 17, 1983

Mr. Anthony J. Clemente, Director
Environmental Resources Management
909 Southeast, 1st Avenue
Brickell Plaza Building - Room 402
Miami, Florida 33131

Re: Lonestar Florida Pennsuco, Inc., Request for Revision of Coal Conversion Permit # AC 13-27742 and PSD-Fl-050

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The Bureau is preparing a response to your October 20, 1983, letter to me which stated your reasons for disagreeing with our intention to approve the relaxation of Lonestar's sulfur dioxide emission limits on their coal conversion permits. I expect to send the Bureau's response within the next week to ten days. We will not take final action on the permit until we have resolved the questions you raised.

Sincerely,

Steve Smallwood, P.E.
Bureau Chief
Bureau of Air Quality
Management

SS/CH/s

Lonestar
Scott Quass
305/823-8800

METROPOLITAN **DADE** COUNTY, FLORIDA

METRO-DADE

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING—RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

July 22, 1983

DER

JUL 28 1983

BAQM

Steve Smallwood
Chief, Bureau of Air Quality Management
Florida Department of Environmental
Regulation
Twin Towers Building
2600 Blairstone Road
Tallahassee, Florida 32301

RE: Request by Lonestar Florida Pennsuco, Inc. for revision of SO_2 standards contained in EPA permit #PSD 050 and FDER Permit #AC 13-17742 (File No.AC 13-54054)

Dear Mr. Smallwood:

The Department of Environmental Resources Management has reviewed the response by Lonestar dated 6/13/83 to FDER's request for additional information regarding the referenced revision of their coal conversion permit, and offers the following comments for your consideration:

1. DERM feels that an ambient monitoring program for SO_2 in the predicted high impact areas is necessary to ensure that the Dade County AAQS is not exceeded, and also to protect nearby Class I areas.

2. Lonestar contends in their letter that the current sulfur absorption rate in kiln #3 is 75-80 percent, whereas the compliance stack test of July 15, 1981 showed an absorption rate of only 55%. Documentation of how this higher figure was calculated must be provided along with the results of the 15 test runs Lonestar says were performed between April, 1982 and March, 1983, including the excess oxygen level during each run.

3. The requested SO_2 emission level of 100#/hr. for kilns 1 and 2 still has not been justified by Lonestar. A detailed analysis of how this requested emission level was arrived at is necessary to alleviate those concerns contained in our letter of January 31, 1983 to Clair Fancy of your office.

4. In Attachment 3 of their June 13 letter to your Department, Lonestar erringly stated that Dade County's short term AAQS for SO_2 can be

exceeded once annually at each receptor site. However, the first exceedance of the Dade County 24-hour AAQS, as contained in Sec. 24-17(1)(b) of the Dade County Code, is considered a violation and must be addressed.

DERM hereby requests that review of Lonestar's request for revision of the above mentioned SO_2 emission standards be completed as expeditiously as possible, as kiln #3 has been operated without a valid operating permit since May 31, 1982 with SO_2 emissions far in excess of previously permitted levels. This Department has to date deferred enforcement action against Lonestar in consideration of their revision request, and in fact has had to refund the local annual operating permit fee for 1982-1983 as no operating permit was issued due to their non-compliance status.

We trust that the above concerns will be adequately addressed by Lonestar prior to any decision by you regarding the SO_2 emission standards revision request. If you have any questions pertaining to the above, please do not hesitate to call.

Yours sincerely,

Rafael Rodon

Rafael Rodon, P.E., Chief
Environmental Planning Division

RR/HPW/ag

CC: Bill Voshell, E.P.A.
Roy Duke, D.E.R.
A. Townsend, Lonestar
Scott Quaas, Lonestar

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHEAST FLORIDA DISTRICT

P.O. BOX 3858
3301 GUN CLUB ROAD
WEST PALM BEACH, FLORIDA 33402-3858

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

ROY M. DUKE
DISTRICT MANAGER

DER
JUN 23 1983
BAQM

TO: Clair Fancy

FROM: Tom Tittle

DATE: June 17, 1983

SUBJECT: Lonestar Florida Pennsuco, Inc. Request for B.A.C.T. Revision

---

As discussed June 16, 1983, we feel that the data presented on page two of Scott Quaas' letter supports requiring an average annual maximum of 1.75% sulfur coal be fired with sulfur content of the coal fired not to equal or exceed 2.0% at any time.

If such a restriction were applied we request that the logs showing the analyses of coal received (and as fired where applicable) be maintained on site for inspection for a period of at least two years. We also suggest that the Annual Operation Report be required to indicate the maximum as well as the annual average sulfur content of the coal fired.

TT:cj/a

LONESTAR

EVALUATION OF PREDICTED VIOLATIONS OF THE DADE COUNTY AAQS
DOWNWIND OF ALTON BOX

In response to the Florida Department of Environmental Regulation (DER) letter of April 7, 1983, an investigation of predicted violations of the Dade County Ambient Air Quality Standard (AAQS) for sulfur dioxide (SO_2) in the vicinity of Alton Box has been completed. Based upon a conversation with Mr. Larry George of the DER on June 3, 1983, only the 24-hour averaging time was evaluated. The 4-hour Dade County AAQS was also predicted to be violated in the vicinity of Alton Box, but since Lonestar maximum 4-hour impacts near Alton Box are low (less than 17 ug/m^3 based upon previous modeling), and no air quality impact significance level has been established for the 4-hour average, no further analysis was required.

The analysis consisted of executing the Industrial Source Complex Short-Term (ISCST) model for five years of Miami Airport meteorological data (1970-1974), with Lonestar SO_2 emissions at 100 pounds per hour (lb/hr) for Kilns #1 and #2, and 400 lb/hr for Kiln #3. Stack parameters for Lonestar and other sources, and SO_2 emissions for other sources were the same as contained in the November 19, 1982 submittal to the U.S. EPA. The receptor grid used in the vicinity of Alton Box for the evaluation differed somewhat from the previous modeling. Based upon the relative location of Alton Box and Lonestar, a radial direction of 120.5° from north aligns the two plants. As a result, radial directions in the model were set at 117.5°, 119.0°, 120.5°, 122.0° and 123.5°. The 1.5° angular spacing results in a receptor spacing of about 200 m at a downwind distance of 7.4 km. The two plants are located 7.267 km apart, and therefore downwind distances (from Lonestar) of 7.4, 7.6, 7.8, 8.0 and 8.2 km were input to the model. All other model inputs were the same as for the modeling in your November 19 submittal.

ATTACHMENT 3.

From the ISCST model output, all 24-hour periods (days) on which the Dade County 24-hour SO_2 AAQS of 28.6 ug/m^3 was exceeded were identified. These days and associated predicted concentrations due to all sources are shown in Table 1. Dade County's short-term AAQS can be exceeded once per year at each receptor location (Dade County, Florida, 1981 Ambient Air Quality Data Report, pg. 7). Thus, the highest 24-hour concentration at each receptor is not considered in determining if a violation of the standard has occurred. Therefore, Lonestar's contribution to total concentrations are not shown in Table 1 for the highest predicted concentration at each receptor. Lonestar's contribution is shown for all other values exceeding the AAQS.

Review of Table 1 shows that Lonestar's maximum contribution to any predicted violation of the 24-hour Dade County AAQS near Alton Box is 2.0 ug/m^3. This value is well below the 24-hour SO_2 significance level of 5.0 ug/m^3, and therefore Lonestar does not contribute significantly to any of these predicted violations. Supportive computer model printouts are included with this submittal.

Table 1. Concentrations (ug/m^3) Predicted to Exceed the 24-Hour Dade County Standard in the Vicinity of Alton Box

		Receptor Location [Distance (km), Range (Deg)]																	
		7.4, 119		7.4, 122		7.4, 123.5		7.6, 119		7.6, 120.5		7.6, 122		7.6, 123.5		7.8, 120.5		7.8, 122	
Year	Day	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC	AS	LC
1970	4			33.8	*														
	51			31.6	0.3														
	37			31.3	0.2									40.2	0.3				
	320			29.6	0.0														
	36											29.3	0.0	43.3	*				
	35											32.6	*						
	328											31.9	0.2						
	9											31.5	2.0						
1971	317													31.4	*				
	40											38.7	*						
	79											29.1	1.4						
	269					28.8	*												
	16			41.9	*														
	15									36.0	*					33.6	*		
1972	174	54.5	*																
	173	54.3	0.0																
	144	32.7	0.0																
	176	28.8	0.0																
	352											33.3	*						
	77									29.4	*								
	327																	29.2	*
1973	298			35.7	*														
	297			31.5	1.0														
	50					41.2	*												
	41							31.7	*										
	355									28.9	*								
1974	89	39.2	*																
	279			37.4	*														
	313			32.9	0.0														
	317			29.3	0.0														
	330			28.9	0.0														
	344			28.9	0.0														
	40											36.3	*						
	57											32.9	0.9						

Source: Environmental Science and Engineering, Inc., 1983.

AS = Total concentration due to all sources.
LC = Lonestar's contribution to total concentration.
* = No contribution shown for highest predicted concentration at each receptor.

In process of modifying the permit a

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

April 7, 1983

Mr. Scott Quaas
Environmental Specialist
Lonestar Florida Pennsuco, Inc.
P. O. Box 122035-PVS
Hialeah, FL 33012

Dear Mr. Quaas:

The Bureau has started reviewing your February 23, 1983, request for revisions to the sulfur dioxide emissions allowed under federal permit number PSD-FL-050 for the three kilns at your portland cement plant in Hialeah, Florida. Your company should also officially request that the sulfur dioxide emissions allowed by state permits AC 13-27739, AC 13-27740 and AC 13-27741 for these kilns also be revised. The Bureau will then be able to process these state permit revisions concurrently with the federal permit revisions.

Part of our review of your request will be a reevaluation of the Best Available Control Technology (BACT) determination. The original determination needs to be expanded to include an analysis of flue gas desulfurization equipment and the use of coal containing less than two percent sulfur. Please amend your BACT recommendation to include an analysis of the use of desulfurization equipment and low sulfur coal. We suggest that three or more grades of coal with 0.75 to 2.0 percent sulfur be studied from an economic and process standpoint.

What percent oxygen are the kilns operated at? Test data for kiln 3 shows high sulfur dioxide emissions at low oxygen concentrations. Your test data indicated the sulfur dioxide emissions would exceed the requested standards when burning coal with less than 1.44 percent sulfur if the oxygen in the kiln was below 1.6 percent. Please provide engineering data to show if the sulfur dioxide emission limits selected as BACT for the three kilns can be met.

What is the sulfur content in your feed raw material to the kiln (average, maximum, minimum)? As the sulfur dioxide removal by the clinker is reported as 77.7 percent, this will limit the amount of sulfur in the feed and fuel that can be processed by the kiln while complying with the emission standard.

Mr. Scott Quaas
Page Two
April 7, 1983

Additionally, the air quality modeling which accompanied your February 23 request predicts violations of the Dade County ambient air quality standards (AAQS) for SO_2 downwind of Alton Box. Before we can issue a revision to your state permits, we must have assurance that emissions from Lonestar will not be predicted to have a significant impact (greater than 5.0 ug/m^3, 24-hour averaging time) at any point downwind of Alton Box on any day in which a violation of the Dade County AAQS is predicted to occur.

If you have any questions on this request, please contact Willard Hanks, review engineer, or Cleve Holladay, meteorologist, at (904) 488-1344.

Sincerely,

Lawrence A. George

for Clair Fancy, P. E.
Deputy Chief
Bureau of Air Quality
Management

CHF/WH/ks

cc: T. Tittle
E. Cahill
R. DuBose

LONESTAR FLORIDA PENNSUCO, INC.
Cement & Aggregate Plant
11000 N. W. 121 Way
Medley, Florida 33178
P. O. Box 122035 - PVS
Hialeah, Florida 33012
(305) 823-8800

DER
FEB 28 1983
BAQM

February 23, 1983

Mr. Clair Fancy
Env Pmt - Bur AQM
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: PSD-FL-050 ; Request for Revision

Dear Mr. Fancy:

Pursuant to our telephone conversation today, please find enclosed a copy of our request for revision of our PSD permit limitations. The original was received by Mr. Smallood's office on November 22, 1982. It is my understanding in accordance with a December 17, 1982 letter from EPA (copy enclosed), that your office will perform the technical review and prepare a preliminary determination regarding our revision.

Please don't hesitate to call should you need anything further.

Sincerely,

Scott Quaas
Scott Quaas
Environmental Specialist

SC/ep

METROPOLITAN DADE COUNTY, FLORIDA

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING — RM 402
MIAMI, FLORIDA 33131
(305) 579-2760

METRO-DADE

January 31, 1983

Mr. Clair Fancy, P.E.
Deputy Chief, B.A.Q.M.
Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Re: Lonestar Florida Pennsuco Inc.;
Request for revision of SO_2 Standards
contained in EPA Permit # PSD 050 and
FDER Permit # AC13 - 54054

Dear Mr. Fancy:

The Department of Environmental Resources Management has completed review of the referenced request by Lonestar to the Environmental Protection Agency and the Florida Department of Environmental Regulation for revision of the sulfur dioxide emission limits contained in the abovementioned permits, and we have several concerns for your consideration during the review of the proposed revision.

As indicated previously in our letter dated April 23, 1982 to Mr. Roy Duke at your District office in West Palm Beach, DERM proposes that Lonestar be directed to conduct a thorough ambient monitoring program to determine the actual levels of SO_2 in predicted high impact areas, before kilns #1 and #2 are allowed to be converted to coal fuel. It is our position that such a measure is required due to inconsistencies in previous models, and also because the Dade County AAQS might be exceeded if new emission limits are granted to Lonestar. Furthermore, ambient monitoring would serve to ensure that the Class 1 increment is not exceeded in the Everglades National Park.

With regards to Lonestar's current request for revision of the SO_2 emission limits, please be advised of the following concerns by DERM:

1. The original application by Lonestar for the coal conversion of their kilns projected SO_2 emissions of 56.7 lbs/hr. each from kilns 1 and 2, and 26.3 lbs/hr/ from kiln #3. As you can see, this is greater than twice the amount of SO_2 from each of kilns 1 and 2 than from kiln 3. Yet the current request by Lonestar is for 100 lbs/hr. from each of kilns 1 and 2, and 400 lbs/hr. from kiln 3. Lonestar should justify such a significant change in the projected emission limitations.

2. The BACT analysis, attached to the current request, includes a section describing operating variables that affect SO_2 emissions (page 2, 2nd paragraph). It is stated in this section that the use of excess oxygen greater than 1.5 percent can cause operational problems. Then, in the separate attachment 'STACK TEST RESULTS - SO_2', it is documented that for all the stack tests where SO_2 emissions were lower than the requested limit of 400 lbs/hr. for kiln #3, the percent oxygen ranged from 2.9% to 3.4%. Other results, with the percent oxygen between 1.3% and 1.6%, all showed SO_2 emissions well in excess of 400 lbs/hr. Based on the above, it is reasonable to assume that the requested emission limit for SO_2 of 400 lbs/hr. from kiln 3 is unrealistic.

Finally, this Department does not feel that the possibility of alternate or add on controls for sulfur dioxide has been adequately addressed, in that no direct controls for SO_2 emissions have been assessed.

We trust that the above comments will assist you in your review. If you should have any questions, please do not hesitate to call at (305) 579-2760 or (Suncom 448-2760).

Sincerely,

Rafael Rodon, P.E.
Chief
Environmental Planning Division

RR:HPW:vpc

cc: Bill Voshell
Roy Duke
Al Townsend
Scott Quaas

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4AW-AM

DEC 17 1982

Mr. Scott Quaas, Environmental/Specialist
Lonestar Florida/Pennsuco, Inc.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012

Is new applic. needed? (I THINK so)

Dear Mr. Quaas:

This is in response to your November 19, 1982, submittal to Mr. Thomas W. Devine concerning the sulfur dioxide (SO_2) emission limitations on Lonestar's Kilns 1,2, and 3 and a request for revising these limitations from those appearing in your present PSD permit (PSD-FL-050).

Since the State of Florida has been granted partial delegation of authority regarding PSD reviews, we have forwarded a copy of this submittal to them. Florida will be responsible for performing the technical review and preparing a preliminary determination. Following this determination, Florida will initiate a public notice and 30-day comment period. EPA will also be afforded an opportunity to review and comment on this determination. A final determination on your permit revision request will be made after the conclusion of the public comment period.

If you have any questions or comments concerning this matter, please contact Mr. Richard S. DuBose, Chief, Air Engineering Section at (404) 881-7654.

Sincerely yours,

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

cc: Mr. Clair Fancy, Deputy Bureau Chief
FL Dept. of Environmental Regulation

Mr. Anthony J. Clemente, P.E., Acting Director
Metropolitan Dade County Dept. of Environmental Resources

Mr. Warren G. Strahm, Subdistrict Manager
FL Dept. of Environmental Regulation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4AW-AM

DEC 17 1982

Mr. Clair Fancy, P.E.
Deputy Bureau Chief
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

DER
DEC 27 1982
BAQM

Dear Mr. Fancy:

On February 11, 1980, Lonestar Florida/Pennsuco, Inc. (Lonestar) applied for a Prevention of Significant Deterioration (PSD) of Air Quality permit to convert three existing kilns to coal firing near Hialeah, Florida. On July 8, 1980, EPA issued a PSD permit (PSD-FL-050) to Lonestar and granted the company authority to construct subject to 40 CFR 52.21.

On July 15, 1981, Lonestar's consultant performed a stack test to demonstrate compliance with the sulfur dioxide (SO_2) emission limitations as contained in the July 8, 1980, PSD permit. The results of the July 15, 1981, and subsequent April 30, 1982, compliance tests showed actual SO_2 emissions to be in excess of the PSD permitted allowable limits.

SO_2 EXCEEDS EMISSIONS IN PERMIT

On October 22, 1982, EPA issued a Notice of Violation pursuant to §113 of the Clean Air Act to the company for operating in violation of the SO_2 emission limits as contained in the PSD permit. The Notice indicated that Lonestar may question the appropriateness of the sulfur dioxide emission limitation contained in the original PSD permit. Subsequently, on November 19, 1982, a formal request to modify their July 8, 1980, PSD permit to reflect their actual emission rates was submitted to this office (copy enclosed).

ENFORCEMENT ACTION

Co. ASKED SO_2 STD BE REVISED

On December 13, 1982, Mr. Bill Wagner of my staff contacted you to discuss the most appropriate way of reviewing and processing Lonestar's request for a permit modification. As a result of that conversation, it was decided that the Florida Department of Environmental Regulation would be the lead agency in processing Lonestar's request for a permit modification. Therefore, EPA is forwarding to you a copy of the information submitted along with Lonestar's request and will await your preliminary determination. Any preliminary determination regarding Lonestar's submittal should be followed by an appropriate public notice and comment period.

Public notice req'd.

If you have any questions concerning this matter, please contact Mr. Richard S. DuBose of my staff at (404) 881-7654.

Sincerely yours,

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

Enclosures

cc: Mr. Anthony J. Clemente, P.E., Acting Director
Metropolitan Dade County Dept. of Environmental Resources

Mr. Warren G. Strahm, Subdistrict Manager
FL Dept. of Environmental Regulation

Scott Quaas

LONESTAR FLORIDA PENNSUCO, INC.

6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

November 19, 1982

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Devine:

Re: PSD-FL-050; Lonestar Florida Pennsuco, Inc.; Kilns 1, 2 and 3; Request for Revision of Sulfur Dioxide Emission Limitations

Please find enclosed the support documentation for the modeling analysis which accompanied our November 19, 1982 letter on the referenced subject.

Sincerely yours,

Albert W. Townsend

Albert W. Townsend
Manager
Real Estate & Environmental Affairs

Encl.
AWT/jh
cc: S. Smallwood-DER

LONESTAR FLORIDA/PENNSUCO, INC.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

November 19, 1982

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

RE: PSD-FL-050; Lonestar Florida/Pennsuco, Inc.; Kilns 1, 2 and 3; Request for Revision of Sulfur Dioxide Emission Limitations

Dear Mr. Devine:

In accordance with my letter to you dated November 2, 1982, the following items are enclosed to assist your office in revising the above referenced permit:

1) A revised air quality modeling analysis addressing significant changes which would influence the model predictions and which shows compliance with applicable ambient air quality standards.

2) A revised BACT analysis showing that alternate controls for SO_2 emissions are unwarranted. Retrofitting the three existing kilns with additional or alternative control devices would have only minimal effect on emissions, would have an insignificant effect on reducing ambient air impacts, and would prohibit the company from implementing the complete conversion of its kilns to coal. The analysis also contains an explanation of operating variables in a Portland cement kiln and the resulting effect on SO_2 emissions.

3) A summary of recent stack tests including SO_2 absorption calculations with resulting emission estimates for kiln 3.

Mr. Thomas W. Devine, Director
November 19, 1982
Page 2

Based upon these materials Lonestar respectfully requests a revision to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr.
Kiln 2	100 lbs/hr.
Kiln 3	400 lbs/hr.

We look forward to answering any questions you may have and meeting with you at an early date to discuss this request.

Sincerely,

Scott Quaas

SCOTT QUAAS
Environmental/Specialist

cc: S. Smallwood-DER

LONESTAR FLORIDA PENNSUCO, INC.
BEST AVAILABLE CONTROL TECHNOLOGY

Operating Variables that Affect SO_2 Emissions

During the operation of a wet process cement kiln there are several process variables that will affect the emission of SO_2 from the kiln's stack.

The major variable is the oxygen content of the kiln and its possible reduction/oxidation zones. The sulfur that has the potential to form SO_2 comes from the kiln feed, fuel and insulflated dust. Depending on the oxygen content in the kiln, the sulfur from the kiln feed will either stay as an oxidized sulfur compound or will be reduced to SO_2. Oxygen contents below about 0.5 percent will tend to generate SO_2 for SO_4 while higher oxygen contents will retain the sulfur with the feed and eventually in the clinker. This is basically a surface reaction of sulfur oxides on MgO and CaO particles and proceeds until $MgSO_4$ or $CaSO_4$ have encapsulated the particle and it has diffused to its interior. ?

As the fuel burns, sulfur oxides are formed in the oxidizing area of the flame. With sufficient oxygen and contact in the kiln with the feed material, compounds such as calcium sulfate are formed and retained in this material.

As the feed material is calcinated and reaches the point of insipient fusion (clinker formation), potassium and sodium oxides are volatized and combined with available sulfur oxides to form alkaline salts in a gas reaction. These salts are very fine particles that are caught in the pollution control equipment downstream of the kiln. The return of all the dust to the kiln (insulflation) is performed in as Lonestar's kiln #3. The insulflated sulfates are eventually retained with the clinker as were the sulfates in the feed material and sulfur oxides from the fuel. ?

The overall effect of excess oxygen in the kiln is that less than 0.5 percent will enhance SO_2 emissions and excess oxygen in the range of 0.5-1.5 percent will significantly reduce emissions. ? The use of excess oxygen greater than 1.5 percent can cause operational problems (too hot of a backend kiln temperature, improper clinker burning zone, kiln dusting) as well as (wasting fuel by heating the excess air) LOWER TEMP (MAX) The use of too little excess oxygen causes incomplete combustion and very unstable operating conditions. When an electrostatic precipitator (ESP) is used, the carbon monoxide generated can cause explosive conditions in the ESP.

Other variables for the emission of SO_2 are sulfur content of fuel, chemistry of kiln feed and kiln dust, NO_x formation and ? unstable kiln conditions. These factors can be significant as to

SO_2 generation, but for the specific long term operating conditions at Lonestar's kilns they are not considered as important for this analysis as is excess oxygen content. –(%S in fuel?)

Control Technology Available

The two types of particulate control equipment typically used to meet New Source Performance Standards (NSPS) and Best Available Control Technology (BACT) review criteria are electrostatic precipitators (ESP) and baghouses. Historically, there has been very little success in using baghouses on wet process kilns due to condensation, temperature and maintenance problems. Baghouses are usually multicompartmental with thousands of fiberglass bags for filtering the dust from the kiln gases. The collection is done on the dust cake which forms on the dirty side of the bags. When a kiln is started or stopped, there is potential for the filter cake temperature to fall below the dew point unless heated by a separate heat source. If condensation does occur (the usual moisture content of the exhaust gases is 30 percent) this cake will harden and permanently blind the bag. Another major problem with baghouses has been the inability to sustain the high operational temperatures without gas conditioning equipment (dilution air). During unstable kiln conditions this can become a problem to adequately cool or heat the bags to prevent excursions of their temperature limits or cooling below the dew point.

Another operational problem with baghouses has been maintaining the thousands of bags. The fiberglass fibers will fatigue with time or fail due to condensation or temperature and can develop pin hole leaks that will necessitate patching or bag replacement. Therefore, a routine maintenance program is a necessity to monitor the conditions of the bags and maintain the reliability of the system.

ESP's, such as those presently installed at Lonestar's kilns, do not have condensation, temperature, or maintenance problems. only relatively They do not require any auxiliary heating and can take relatively large fluctuations in gas temperatures without problem. An ESP is designed to have extensive internal maintenance during annual kiln shutdowns and not on a daily basis. It has multi-stages that the gases must travel through (not just a thin filter cake) for collection of the kiln dust. These stages are individually controlled as to voltage, amperage and cleaning cycle. Operational problems in one stage can be compensated for by externally adjusting the other stages. ESP's do not have the daily maintenance problems associated with baghouses.

Co. prefers ESP over baghouse

With regard to SO_2 emissions, approximately 75 percent of the SO_2 is absorbed by the proper burning of the kiln and is incorporated in the clinker. EPA has stated that due to the gases having to pass through the filter cake an additional 50 percent removal of the remaining 25 percent (that is,

approximately 12 percent) of the SO_2 may be achieved. This was developed through review of limited testing data on several kilns in the early 1970's; however, no actual tests comparing both control devices under the same operating kiln conditions have been performed.

Furthermore, the reasonableness of that 50 percent additional removal is questionable. In a baghouse system, the gases quickly move from the inlet manifold to a compartment and through a filter cake (approximately 1/4 inch thick) and back to the clean air plenum. The residence time in the collector is much less than in a precipitator. The additional residence time in an electrostatic precipitator (ESP) allows for longer reaction time with the dust particles for good absorption. 50%?

Environmental Impacts

The ambient air quality impacts due to conversion of Lonestar's kilns are addressed in the accompanying dispersion modeling evaluation. The predicated impacts reflect SO_2 emissions using ESP's. Lonestar's maximum annual and highest, second-highest short-term predicted SO_2 impacts with ESP control are shown below in terms of percentages of the AAQS and PSD increments consumed:

approximately 12 percent) of the SO_2 may be achieved. This was developed through review of limited testing data on several kilns in the early 1970's; however, no actual tests comparing both control devices under the same operating kiln conditions have been performed.

Furthermore, the reasonableness of that 50 percent additional removal is questionable. In a baghouse system, the gases quickly move from the inlet manifold to a compartment and through a filter cake (approximately 1/4 inch thick) and back to the clean air plenum. The residence time in the collector is much less than in a precipitator. The additional residence time in an electrostatic precipitator (ESP) allows for longer reaction time with the dust particles for good absorption.

GAS DOES NOT FLOW THRU CAKE IN ESP

Environmental Impacts

The ambient air quality impacts due to conversion of Lonestar's kilns are addressed in the accompanying dispersion modeling evaluation. The predicated impacts reflect SO_2 emissions using ESP's. Lonestar's maximum annual and highest, second-highest short-term predicted SO_2 impacts with ESP control are shown below in terms of percentages of the AAQS and PSD increments consumed:

Percentage of Air Quality Standards

Consumed by Lonestar Kilns 1, 2 and 3

Averaging Time	Class I Increments	Class II Increments	Florida AAQS	Dade County AAQS
Annual	15%	11%	5%	N/A
24-Hour	58%	18%	6%	59%
4-Hour	N/A	N/A	N/A	97%
3-Hour	56%	12%	5%	N/A
1-Hour	N/A	N/A	N/A	37%

Enforceable?

N/A - Not applicable

Retrofitting all three kilns with baghouses, and adopting the undocumented assumption of 50% additional removal of the SO_2, would reduce the percentages by one half. With existing ESP control, however, Lonestar's impacts are predicted to be less than 20 percent of Class II increments and Florida AAQS. Therefore, reducing these impacts by 50 percent would not produce significant air quality benefits. In the case of Class I PSD increments and Dade County AAQS (the most stringent standards), Lonestar's impacts do not exceed 60 percent of those standards, except for the 4-hour Dade County AAQS. Therefore, even if a 50% reduction is assumed to be achievable, the ultimate benefit to the environment of such a reduction is not significant.

Bag house may reduce impact by 50% FOR SO_2

The impacts presented in this analysis represent the combination of maximum Lonestar production capacity and worst case meteorological conditions. For the majority of time, actual impacts due to Lonestar are expected to be far below these predicted levels.

MODELING STUDY Based on WORST case

ECONOMIC ANALYSIS

An economic analysis was performed for retrofitting baghouses on kilns 1, 2 and 3. The analysis was performed using procedures described in the August 1978 through November 1978 issues of the Journal of the Air Pollution Control Association (Volume 28, Nos. 8-11) in a series of articles entitled "Capital and Operating Costs of Selected Air Pollution Control System."

Purchased Equipment Costs:

		KILNS	
	K 1	K 2	K 3
Flow rate, ACFM	82,000*	82,000*	311,400
Air/Cloth Ratio	2:1	2:1	2:1
Total Net Cloth Area (ft^2)	41,000	41,000	156,000
Total Gross Cloth Area (ft^2)	46,000	46,000	164,000
Insulated, suction baghouse	243,000	243,000	815,500
Bag Filters $	96,000	96,000	342,000
Fans & Motors $	13,000	13,000	41,000
1977 $	352,000	352,000	1,198,500
X 1.6 = 1981 $	563,200	563,200	1,917,500
Gas Conditioner	25,000	25,000	50,000
Total 1981 $	588,200	588,200	1,967,500

* Average of Kilns 1 and 2

Installation Costs:

Item	Cost Factor
Foundations & Supports	0.04
Erection & Handling 0.50 x 2	1.0 (retrofit)
Electrical	0.08
Piping	0.01
Insulation	0.07
Painting	0.02
Engineering/Supervision	0.10
Construction & Field Expense	0.20
Construction Fee	0.10
Start-up	0.01
Performance Test	0.01
Contingencies	0.03
Total	1.67

Total Installation Costs:

K1-	588,200
K2-	588,200
K3-	1,967,500

$ 3,143,900 x 1.67 = $5,250,313

Total Costs:

Total equipment and installation costs are estimated at:

$3,143,900 + $5,250,313 = $8,394,213
3 Baghouses installation

This does not include operating or maintenance costs.

Cost Benefit Analysis

Although no test data is presented to support the claim of an additional 50 percent SO_2 removal through the baghouse, for purposes of this analysis the 50 percent removal was assumed. Kilns 1, 2 and 3 are proposed to emit a total of 600 (2628 TPY) lb/hr of SO_2. Based upon maximum capacity and year-round operation, a reduction of 50 percent in emissions would equal 50% of potential 1,314 tons per year of SO_2. The total cost of installing baghouses on kilns 1, 2 and 3 is estimated above at $8,400,000. This cost is extremely high and does not include the substantially higher maintenance/operation costs of a baghouse. Considering that the existing ESP system is already removing up to 80 percent of the potential SO_2 emissions from the kiln system, the additional costs a baghouse system would impose upon Lonestar are not warranted.

? CLAIM 80% SO_2 removal by KILN

Summary

The question of SO_2 emission control in a wet process cement kiln is not one of control equipment (which one has better control) but concerns the maintaining of sufficient excess ? oxygen to drive the SO_2 into the clinker material. At Lonestar's facilities the oxygen is maintained in this range (above 0.5 percent) not only for SO_2 control but to provide for complete combustion of the

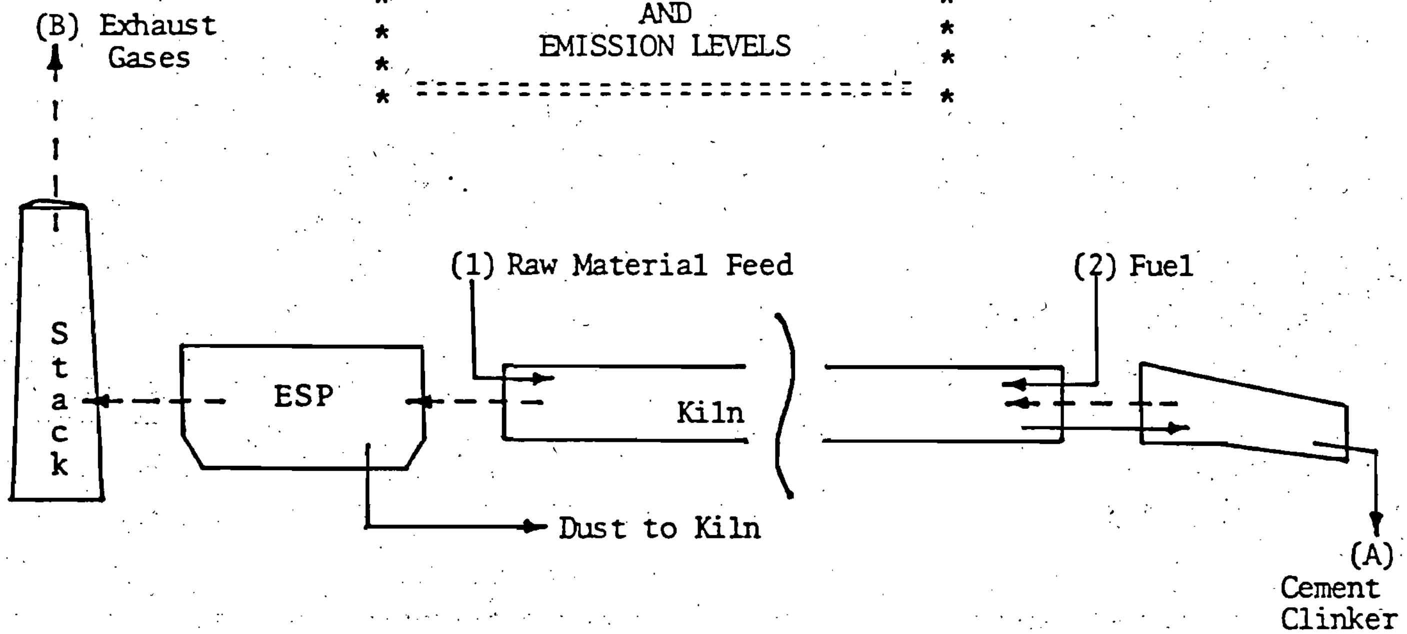
coal and economic benefits. Additionally, SO_2 emissions will be controlled by utilizing coal having a sulfur content of 2 percent or less.

2% coal

Alternative controls for SO_2 emissions were rejected since retrofitting the three existing kilns with additional or alternative control devices would have only a minimal effect on emissions and would have an insignificant effect on reducing ambient air impacts. The costs of retrofitting would prohibit the company from implementing the complete conversion of its kilns to coal.

DIDN'T CONSIDER OTHER CONTROLS

CALCULATED SULFUR BALANCE
AND
EMISSION LEVELS



Kiln #3

Sulfur Input Into System - Calculated as Equivalent SO_2

(1) Raw Materials Feed: 141.75 TPH (283,500#/hr.) @ 0.13% SO_3

#/hr. SO_2 = (141.75)(2000#/ton)(.0013# SO_3/#feed)(64# SO_2/80#SO_3)

#/hr. SO_2 = 294.8 (POTENTIAL)

(2) Fuel: 17.18 TPH (34,360 #/hr.) coal @ 2% S

#/hr. SO_2 = (17.18)(2000#/ton)(.02#S/#fuel)(64# SO_2/32#S)

#/hr. SO_2 = 1374.4 (POTENTIAL)

Total SO_2 Input = 1669.2#/hr. = 294.8(RAW MAT'L) + 1374.4 (FUEL)

Sulfur Out - Calculated as Equivalent SO_2

(A) Cement Clinker: 87.8 TPH @ 0.92% SO_3

#/hr. SO_2 = (87.8)(2000#/ton)(.0092#SO_3/#clinker)(64#SO_2/80#SO_3)

#/hr. SO_2 = 1297.1 SO_2 IN CLINKER

(B) Gaseous Emissions should be equivalent to difference between Sulfur Input & Cement Clinker Sulfur Out

#/hr. SO_2 = 372.1# = (1374.4(fuel)+294.8(feed) − 1297.1(prod))

Percent Sulfur Absorbed in Kiln System

$(\overset{IN}{1669.2} - \overset{OUT}{372.1})/\overset{IN}{1669.2}$ = 77.7%

1630.24

Potential Emissions = 372.2 #/hr. x 8760 ÷ 2000 = 1630.4 TPY

KILN NO. 3

4/30/82
Above
Requested
STD. ... % O_2 ...
?

STACK TEST RESULTS - SO_2

% S in coal (less 2%)

Lbs/hr

Date: 4/30/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	% S	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. °F
1	138.28	.17	16.5	1.4	3.5	.19	4.93	863.6	1.4 <2%	153911	356.8
2	138.28	.17	16.5	1.49	3.6	.19	5.40	709.1	1.3 <2%	147463	364.6
3	138.28	.22	16.5	1.552	3.88	.19	4.97	332.3	2.9	145883	362.8

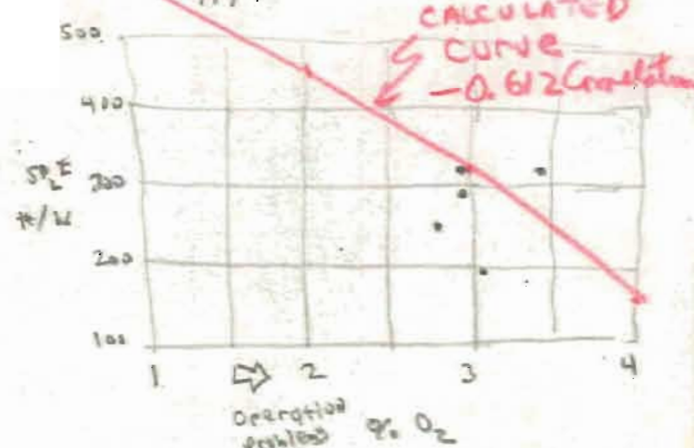
635 Above STD

Date: 5/11/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	% S	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. °F
1	127.59	.11	13.9	1.668	4.17	.82	4.79	318.52	3.4	155886	343.1
2	127.59	.11	13.5	1.508	3.77	1.27	4.55	294.72	2.9	149023	343.9
3	127.59	.11	14.4	1.488	3.72	.84	4.35	265.46	2.8	149124	346.2
4	127.59	.12	14.4	1.288	3.22	.86	4.35	197.09	3.1	153814	343.3
5	127.59	.10	14.4	1.344	3.36	1.03	4.52	264.91	2.9	151523	344.3
6	127.59	.10	15.5	1.356	3.39	.72	4.33	578.92	1.6 <2%	148903	352.3

319.9 Below STD

ORIGINALLY CLAIMED BETTER ABSORPTION ON KILN 3 THAN OTHER 2 KILNS.



Appears less SO_2 emission @ 3% O_2 (low %, 1.5, high ...)

STACK TEST RESULTS - SO_2

Date: 4/30/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. °F
1	138.28	.17	16.5	3.5	.19	4.93	863.6 .43	1.4	153911	356.8
2	138.28	.17	16.5	3.6	.19	5.40	709.1 .35	1.3	147463	364.6
3	138.28	.22	16.5	3.88	.19	4.97	~~332.3~~ .17	2.9	145883	362.8

te: 5/11/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. °F
1	127.59	.11	13.9	4.17	.82	4.79	318.52 .16	3.4	155886	343.1
2	127.59	.11	13.5	3.77	1.27	4.55	294.72 .15	2.9	149023	343.9
3	127.59	.11	14.4	3.72	.84	4.35	265.46 .13	2.8	149124	346.2
4	127.59	.12	14.4	3.22	.86	4.35	197.09 .10	3.1	153814	343.3
5	127.59	.10	14.4	3.36	1.03	4.52	264.91 .13	2.9	151523	344.3
6	127.59	.10	15.5	3.39	.72	4.33	578.92 .29	1.6	148903	352.3

DISPERSION MODELING EVALUATION

Introduction

ESE has completed a dispersion modeling evaluation of Lonestar's sulfur dioxide (SO2) impacts with Kilns 1, 2 and 3 all burning coal. K1 and K2 were modeled emitting a maximum of 100 lbs/hr each when burning coal, and K3 was modeled emitting a maximum of 400 lbs/hr. The purpose of this evaluation was to determine compliance with PSD Class I and Class II allowable increments, and with Federal, State and Dade County Ambient Air Quality Standards (AAQS) when all three kilns are fired with coal. Presented below is a summary of the methodology and results of the modeling evaluation.

Methodology

The methodology used in the evaluation was the same as that presented in the December 17, 1981 modeling evaluation performed for K3 only on coal, except that default values for the wind profile exponents were used. The U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Regulation (DER) approved Industrial Source Complex Short-Term (ISCST) model was used to estimate annual, 24-hour and 3-hour SO2 impacts due to Lonestar and nearby significant sources. To evaluate compliance with Dade County AAQS, 4-hour and 1-hour concentrations were also examined. A 5-year meteorological data base (1970-1974) from Miami International Airport was used in conjunction with the ISCST.

For Class I Prevention of Significant Deterioration (PSD) impacts, 33 discrete receptors were placed on the boundary of the Class I area (Everglades National Park). For short term averaging times, highest, second-highest concentrations at each receptor were utilized.

Class II PSD increment consumption and maximum impact concentrations were determined by executing the ISCST with a radial receptor grid placed around the Lonestar plant. Receptors ranged from 0.4 km to 2.8 km with a 0.4 km radial grid spacing. Lonestar and Resource Recovery were determined to be the only significant increment consuming sources in the area, as presented in previous Lonestar modeling reports. Highest, second-highest concentrations were utilized for short-term averaging times.

Lonestar's interaction with other sources were also examined in three additional 5-year ISCST model executions, i.e., receptors were placed downwind of Alton Box, Resource Recovery, and South Florida Materials (formerly Houdaille) in the directions aligning Lonestar with these sources. Since the modeling for receptors around Lonestar showed that Lonestar by itself will comply with all ambient air quality standards, the purpose of this modeling was to determine if Lonestar would cause or contribute to non-compliance of AAQS in the vicinity of these other sources. A 0.2 km receptor spacing was utilized in these model runs.

Highest, second-highest predicted short-term concentrations were refined with the ISCST for cases where standards were predicted to be approached or exceeded. Based on the modeling results, refinements were performed for only the 4-hour averaging time since the Dade County 4-hour AAQS was being approached. A 0.1 km receptor spacing was utilized to refine the concentrations.

Stack parameters used in the modeling are shown in Table 1. The changes since the December 17, 1981 modeling are shown in parentheses, and consist of the SO_2 emission rates for Kilns 1, 2 and 3, and stack parameters for South Florida Materials. Updated parameters for South Florida Materials were provided by Scott Quass of your staff, who researched the permit file of the DER's West Palm Beach office.

Results

Table 2 presents the maximum air quality impacts on PSD Class I and Class II increments, and Florida and Dade County AAQS. The dispersion modeling analysis predicted that Class I and Class II area impacts will not exceed the allowable PSD increments, and no Florida AAQS will be exceeded due to Kilns 1, 2 and 3 burning coal. The increment consumption values shown in Table 2 are conservative since they reflect Lonestar's entire emissions as being increment consuming; only emissions above those due to natural gas firing in K1, K2 and K3 are increment consuming.

Lonestar also complies with all Dade County AAQS. There is a predicted violation of Dade County AAQS which occurs downwind of Alton Box in the direction of interaction with Lonestar. As shown by the "Lonestar only" impacts, Lonestar's potential maximum individual impact is relatively small and well below the Dade County AAQS. Upon further investigation, it was shown that Lonestar does not contribute significantly to the predicted Alton Box violations. These results are based upon Alton Box emitting 14.4 lbs/hr for each hour of the day (346 lbs/day). Updated information provided by Alton Box showed they burned up to 40 gal/hr of up to 3.0% sulfur fuel oil for 16 hrs/day. This fuel usage would result in only 307 lbs/day being emitted; therefore, Alton Box's maximum impacts may be overestimated by about 10 percent.

violation of Dade Co. AAQS

Conclusion

In conclusion, the dispersion modeling evaluation shows that the operation of Kilns 1, 2 and 3 at Lonestar on coal, emitting 100, 100 and 400 lbs/hr SO_2, respectively, is in compliance with Federal, State and Dade County ambient air quality standards and PSD increments. Lonestar's contributions to predicted violations in the vicinity of Alton Box are shown to be insignificant.

Table 1. Stack Parameters Used in Lonestar Modeling Evaluation

Source	SO2 Emission Rate (g/sec)	Stack Height (m)	Stack Diameter (m)	Stack Gas Velocity (m/sec)	Stack Temp. (°K)
Kiln #1	12.60(2.26)	61.0	2.1	11.86	465.0
Kiln #2	12.60(1.03)	61.0	2.1	10.55	447.0
Kiln #3	50.40(63.70)	61.0	4.33	9.98	454.8
Alton Box	1.81	9.1	0.50	10.00	491.0
South Fla. Mat.	2.38	11.60	1.08	21.30	363.0
(Houdaille)		(12.2)	(1.07)	(30.10)	(397.0)
Resource Recovery	14.00	45.7	2.70	14.00	489.0

Note: Numbers in parentheses indicate value used in previous modeling, if different from that used in present study.

Table 2. Summary of Lonestar Modeling Results, K3 Burning Coal

Scenario	Maximum Concentrations (ug/m^3) Annual	24-hour	4-hour	3-hour	1-hour
Class I Increment Consumption*					
Lonestar Only	0.3	2.9	NA	13.9	NA
Lonestar & Resource Recovery	0.4	3.0	NA	13.9	NA
Allowable Class I Increments	2.0	5.0	NA	25.0	NA
Class II Increment Consumption*					
Lonestar Only	2.2	16.8	NA	63.3	NA
Lonestar & Resource Recovery	2.4	16.8	NA	63.3	NA
Allowable Class II Increments	20	91	NA	512	NA
Total Air Quality Impacts					
Receptors in Vicinity of Lonestar	3.0	16.8 +20 36.8	Refined 56.3 Refined	63.6	107.2
Receptors in Vicinity of South Florida Materials (Houdaille)**	2.1	19.5	53.3	58.6	95.5
Receptors in Vicinity of Resource Recovery**	1.2	11.2	29.2	34.5	56.9
Receptors in Vicinity of Alton Box**					
All Sources	6.8	32.9	99.8	108.2	155.1
Lonestar Only	0.4	5.7	16.6	20.7	34.0
Dade County AAQS	NA	28.6	57.2	NA	286.0
Florida AAQS	60	260	NA	1300	NA

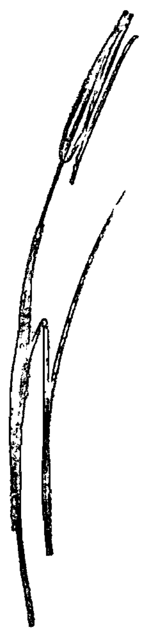
Note: NA = Not Applicable
*Values shown assume that all Lonestar emissions consume increments, therefore, numbers are conservative.
**Receptors were placed downwind of indicated source in direction which aligned Lonestar with the respective source.

4hour – Vcnty AB
1970 98.4
1971 92.1

Highest Lonestar Vcnty

	1970	1970	1972	1973	1974	Refined
~~4hr~~	64.8	61.8	60.8	63.5	~~58.5~~	$\boxed{56.3}$
2-~~4~~hr	55.1	54.2	54.9	53.3	53.2	
24hr	16.7	18.9	17.2	20.1	19.0	
2-24hr	15.0	$\boxed{16.8}$	16.5	15.3	15.0	

4hr Unstable cond.



104191

Clarify - do we use high or 2nd high
Cause or contribute

METROPOLITAN **DADE** COUNTY, FLORIDA

METRO-DADE

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING—RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

January 31, 1983

DER
FEB 11 1983
BAQM

Mr. Clair Fancy, P.E.
Deputy Chief, B.A.Q.M.
Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Re: Lonestar Florida Pennsuco Inc.;
Request for revision of SO_2 Standards
contained in EPA Permit # PSD 050 and
FDER Permit # AC13 - 54054

Dear Mr. Fancy:

The Department of Environmental Resources Management has completed review of the referenced request by Lonestar to the Environmental Protection Agency and the Florida Department of Environmental Regulation for revision of the sulfur dioxide emission limits contained in the abovementioned permits, and we have several concerns for your consideration during the review of the proposed revision.

As indicated previously in our letter dated April 23, 1982 to Mr. Roy Duke at your District office in West Palm Beach, DERM proposes that Lonestar be directed to conduct a thorough ambient monitoring program to determine the actual levels of SO_2 in predicted high impact areas, before kilns #1 and #2 are allowed to be converted to coal fuel. It is our position that such a measure is required due to inconsistencies in previous models, and also because the Dade County AAQS might be exceeded if new emission limits are granted to Lonestar. Furthermore, ambient monitoring would serve to ensure that the Class 1 increment is not exceeded in the Everglades National Park.

With regards to Lonestar's current request for revision of the SO_2 emission limits, please be advised of the following concerns by DERM:

1. The original application by Lonestar for the coal conversion of their kilns projected SO_2 emissions of 56.7 lbs/hr. each from kilns 1 and 2, and 26.3 lbs/hr/ from kiln #3. As you can see, this is greater than twice the amount of SO_2 from each of kilns 1 and 2 than from kiln 3. Yet the current request by Lonestar is for 100 lbs/hr. from each of kilns 1 and 2, and 400 lbs/hr. from kiln 3. Lonestar should justify such a significant change in the projected emission limitations.

2. The BACT analysis, attached to the current request, includes a section describing operating variables that affect SO_2 emissions (page 2, 2nd paragraph). It is stated in this section that the use of excess oxygen greater than 1.5 percent can cause operational problems. Then, in the separate attachment 'STACK TEST RESULTS - SO_2', it is documented that for all the stack tests where SO_2 emissions were lower than the requested limit of 400 lbs/hr. for kiln #3, the percent oxygen ranged from 2.9% to 3.4%. Other results, with the percent oxygen between 1.3% and 1.6%, all showed SO_2 emissions well in excess of 400 lbs/hr. Based on the above, it is reasonable to assume that the requested emission limit for SO_2 of 400 lbs/hr. from kiln 3 is unrealistic.

Finally, this Department does not feel that the possibility of alternate or add on controls for sulfur dioxide has been adequately addressed, in that no direct controls for SO_2 emissions have been assessed.

We trust that the above comments will assist you in your review. If you should have any questions, please do not hesitate to call at (305) 579-2760 or (Suncom 448-2760).

Sincerely,

Rafael Rodon

Rafael Rodon, P.E.
Chief
Environmental Planning Division

RR:HPW:vpc

cc: Bill Voshell
Roy Duke
Al Townsend
Scott Quaas

2/15

~~Larry~~, Clive

Please keep for review of Lonestar when we get it.

CHF

Chapter 25

RESERVED*

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*Editor's note—Prior to the enactment of Ord. No. 73-8, adopted Feb. 6, 1973, Ch. 25 of this Code contained rules and regulations of the Dade County Port Authority. Section 2 of said Ord. No. 73-8 provided:

"Section 2. With the exception of resolutions of the board of county commissioners, acting as Dade County Port Authority, creating or relating to bonded indebtedness or other contractual obligations of the Dade County Port Authority, all county ordinances and resolutions, including those of the board of county commissioners acting as Dade County Port Authority, municipal ordinances, resolutions and charters, special laws applying to this county and general laws applying only to this county or any general law which this commission is specifically authorized by the constitution to supersede, nullify or amend, or any part of any such ordinance, resolution, charter or law, in conflict with any provision contained herein is hereby repealed."

Former Ch. 25 was derived from Ord. No. 59-24, adopted July 14, 1959; Ord. No. 59-30, adopted Aug. 18, 1959; Ord. No. 63-19, adopted May 21, 1963; and Ord. No. 67-8, adopted Feb. 7, 1967.

[The next page is 603]

LONESTAR FLORIDA/PENNSUCO, INC.
Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

November 19, 1982

DER
FEB 02 1983
SAQM

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

RE: PSD-FL-050; Lonestar Florida/Pennsuco, Inc.; Kilns 1, 2 and 3; Request for Revision of Sulfur Dioxide Emission Limitations

Dear Mr. Devine:

In accordance with my letter to you dated November 2, 1982, the following items are enclosed to assist your office in revising the above referenced permit:

1) A revised air quality modeling analysis addressing significant changes which would influence the model predictions and which shows compliance with applicable ambient air quality standards.

2) A revised BACT analysis showing that alternate controls for SO_2 emissions are unwarranted. Retrofitting the three existing kilns with additional or alternative control devices would have only minimal effect on emissions, would have an insignificant effect on reducing ambient air impacts, and would prohibit the company from implementing the complete conversion of its kilns to coal. The analysis also contains an explanation of operating variables in a Portland cement kiln and the resulting effect on SO_2 emissions.

3) A summary of recent stack tests including SO_2 absorption calculations with resulting emission estimates for kiln 3.

Mr. Thomas W. Devine, Director
November 19, 1982
Page 2

Based upon these materials Lonestar respectfully requests a revision to the SO_2 emission limiting standards in the above PSD permit as follows:

Kiln 1	100 lbs/hr.
Kiln 2	100 lbs/hr.
Kiln 3	400 lbs/hr.

We look forward to answering any questions you may have and meeting with you at an early date to discuss this request.

Sincerely,

Scott Quaas

SCOTT QUAAS
Environmental/Specialist

cc: S. Smallwood-DER

LONESTAR FLORIDA PENNSUCO, INC.
BEST AVAILABLE CONTROL TECHNOLOGY

Operating Variables that Affect SO_2 Emissions

During the operation of a wet process cement kiln there are several process variables that will affect the emission of SO_2 from the kiln's stack.

The major variable is the oxygen content of the kiln and its possible reduction/oxidation zones. The sulfur that has the potential to form SO_2 comes from the kiln feed, fuel and insulflated dust. Depending on the oxygen content in the kiln, the sulfur from the kiln feed will either stay as an oxidized sulfur compound or will be reduced to SO_2. Oxygen contents below about 0.5 percent will tend to generate SO_2 while higher oxygen contents will retain the sulfur with the feed and eventually in the clinker. This is basically a surface reaction of sulfur oxides on MgO and CaO particles and proceeds until $MgSO_4$ or $CaSO_4$ have encapsulated the particle and it has diffused to its interior.

As the fuel burns, sulfur oxides are formed in the oxidizing area of the flame. With sufficient oxygen and contact in the kiln with the feed material, compounds such as calcium sulfate are formed and retained in this material.

As the feed material is calcinated and reaches the point of insipient fusion (clinker formation), potassium and sodium oxides are volatized and combined with available sulfur oxides to form alkaline salts in a gas reaction. These salts are very fine particles that are caught in the pollution control equipment downstream of the kiln. The return of all the dust to the kiln (insulflation) is performed as Lonestar's kiln #3. The insulflated sulfates are eventually retained with the clinker as were the sulfates in the feed material and sulfur oxides from the fuel.

The overall effect of excess oxygen in the kiln is that less than 0.5 percent will enhance SO_2 emissions and excess oxygen in the range of 0.5-1.5 percent will significantly reduce emissions. The use of excess oxygen greater than 1.5 percent can cause operational problems (too hot of a backend kiln temperature, improper clinker burning zone, kiln dusting) as well as wasting fuel by heating the excess air. The use of too little excess oxygen causes incomplete combustion and very unstable operating conditions. When an electrostatic precipitator (ESP) is used, the carbon monoxide generated can cause explosive conditions in the ESP.

Other variables for the emission of SO_2 are sulfur content of fuel, chemistry of kiln feed and kiln dust, NO_x formation and unstable kiln conditions. These factors can be significant as to

SO_2 generation, but for the specific long term operating conditions at Lonestar's kilns they are not considered as important for this analysis as is excess oxygen content.

Control Technology Available

The two types of particulate control equipment typically used to meet New Source Performance Standards (NSPS) and Best Available Control Technology (BACT) review criteria are electrostatic precipitators (ESP) and baghouses. Historically, there has been very little success in using baghouses on wet process kilns due to condensation, temperature and maintenance problems. Baghouses are usually multicompartmental with thousands of fiberglass bags for filtering the dust from the kiln gases. The collection is done on the dust cake which forms on the dirty side of the bags. When a kiln is started or stopped, there is potential for the filter cake temperature to fall below the dew point unless heated by a separate heat source. If condensation does occur (the usual moisture content of the exhaust gases is 30 percent) this cake will harden and permanently blind the bag. Another major problem with baghouses has been the inability to sustain the high operational temperatures without gas conditioning equipment (dilution air). During unstable kiln conditions this can become a problem to adequately cool or heat the bags to prevent excursions of their temperature limits or cooling below the dew point.

Another operational problem with baghouses has been maintaining the thousands of bags. The fiberglass fibers will fatigue with time or fail due to condensation or temperature and can develop pin hole leaks that will necessitate patching or bag replacement. Therefore, a routine maintenance program is a necessity to monitor the conditions of the bags and maintain the reliability of the system.

ESP's, such as those presently installed at Lonestar's kilns, do not have condensation, temperature, or maintenance problems. They do not require any auxiliary heating and can take relatively large fluctuations in gas temperatures without problem. An ESP is designed to have extensive internal maintenance during annual kiln shutdowns and not on a daily basis. It has multi-stages that the gases must travel through (not just a thin filter cake) for collection of the kiln dust. These stages are individually controlled as to voltage, amperage and cleaning cycle. Operational problems in one stage can be compensated for by externally adjusting the other stages. ESP's do not have the daily maintenance problems associated with baghouses.

With regard to SO_2 emissions, approximately 75 percent of the SO_2 is absorbed by the proper burning of the kiln and is incorporated in the clinker. EPA has stated that due to the gases having to pass through the filter cake an additional 50 percent removal of the remaining 25 percent (that is,

approximately 12 percent) of the SO_2 may be achieved. This was developed through review of limited testing data on several kilns in the early 1970's; however, no actual tests comparing both control devices under the same operating kiln conditions have been performed.

Furthermore, the reasonableness of that 50 percent additional removal is questionable. In a baghouse system, the gases quickly move from the inlet manifold to a compartment and through a filter cake (approximately 1/4 inch thick) and back to the clean air plenum. The residence time in the collector is much less than in a precipitator. The additional residence time in an electrostatic precipitator (ESP) allows for longer reaction time with the dust particles for good absorption.

50?

<u>Environmental Impacts</u>

The ambient air quality impacts due to conversion of Lonestar's kilns are addressed in the accompanying dispersion modeling evaluation. The predicated impacts reflect SO_2 emissions using ESP's. Lonestar's maximum annual and highest, second-highest short-term predicted SO_2 impacts with ESP control are shown below in terms of percentages of the AAQS and PSD increments consumed:

Percentage of Air Quality Standards

Consumed by Lonestar Kilns 1, 2 and 3

Averaging Time	Class I Increments	Class II Increments	Florida AAQS	Dade County AAQS
Annual	15%	11%	5%	N/A
24-Hour	58%	18%	6%	59%
4-Hour	N/A	N/A	N/A	97%
3-Hour	56%	12%	5%	N/A
1-Hour	N/A	N/A	N/A	37%

N/A - Not applicable

Retrofitting all three kilns with baghouses, and adopting the undocumented assumption of 50% additional removal of the SO_2, would reduce the percentages by one half. With existing ESP control, however, Lonestar's impacts are predicted to be less than 20 percent of Class II increments and Florida AAQS. Therefore, reducing these impacts by 50 percent would not produce significant air quality benefits. In the case of Class I PSD increments and Dade County AAQS (the most stringent standards), Lonestar's impacts do not exceed 60 percent of those standards, except for the 4-hour Dade County AAQS. Therefore, even if a 50% reduction is assumed to be achievable, the ultimate benefit to the environment of such a reduction is not significant.

The impacts presented in this analysis represent the combination of maximum Lonestar production capacity and worst case meteorological conditions. For the majority of time, actual impacts due to Lonestar are expected to be far below these predicted levels.

ECONOMIC ANALYSIS

An economic analysis was performed for retrofitting baghouses on kilns 1, 2 and 3. The analysis was performed using procedures described in the August 1978 through November 1978 issues of the Journal of the Air Pollution Control Association (Volume 28, Nos. 8-11) in a series of articles entitled "Capital and Operating Costs of Selected Air Pollution Control System."

Purchased Equipment Costs:

	K 1	K 2	K 3
Flow rate, ACFM	82,000*	82,000*	311,400
Air/Cloth Ratio	2:1	2:1	2:1
Total Net Cloth Area (ft^2)	41,000	41,000	156,000
Total Gross Cloth Area (ft^2)	46,000	46,000	164,000
Insulated, suction baghouse	243,000	243,000	815,500
Bag Filters $	96,000	96,000	342,000
Fans & Motors $	13,000	13,000	41,000
1977 $	352,000	352,000	1,198,500
X 1.6 = 1981 $	563,200	563,200	1,917,500
Gas Conditioner	25,000	25,000	50,000
Total 1981 $	588,200	588,200	1,967,500

* Average of Kilns 1 and 2

Installation Costs:

Item	Cost Factor
Foundations & Supports	0.04
Erection & Handling 0.50 x 2	1.0 (retrofit)
Electrical	0.08
Piping	0.01
Insulation	0.07
Painting	0.02
Engineering/Supervision	0.10
Construction & Field Expense	0.20
Construction Fee	0.10
Start-up	0.01
Performance Test	0.01
Contingencies	0.03
Total	1.67

Total Installation Costs:

K1-	588,200
K2-	588,200
K3-	1,967,500

$ 3,143,900 x 1.67 = $5,250,313

Total Costs:

Total equipment and installation costs are estimated at:

$3,143,900 + $5,250,313 = $8,394,213

This does not include operating or maintenance costs.

Cost Benefit Analysis

Although no test data is presented to support the claim of an additional 50 percent SO_2 removal through the baghouse, for purposes of this analysis the 50 percent removal was assumed. Kilns 1, 2 and 3 are proposed to emit a total of 600 lb/hr of SO_2. Based upon maximum capacity and year-round operation, a reduction of 50 percent in emissions would equal 1,314 tons per year of SO_2. The total cost of installing baghouses on kilns 1, 2 and 3 is estimated above at $8,400,000. This cost is extremely high and does not include the substantially higher maintenance/operation costs of a baghouse. Considering that the existing ESP system is already removing up to 80 percent of the potential SO_2 emissions from the kiln system, the additional costs a baghouse system would impose upon Lonestar are not warranted.

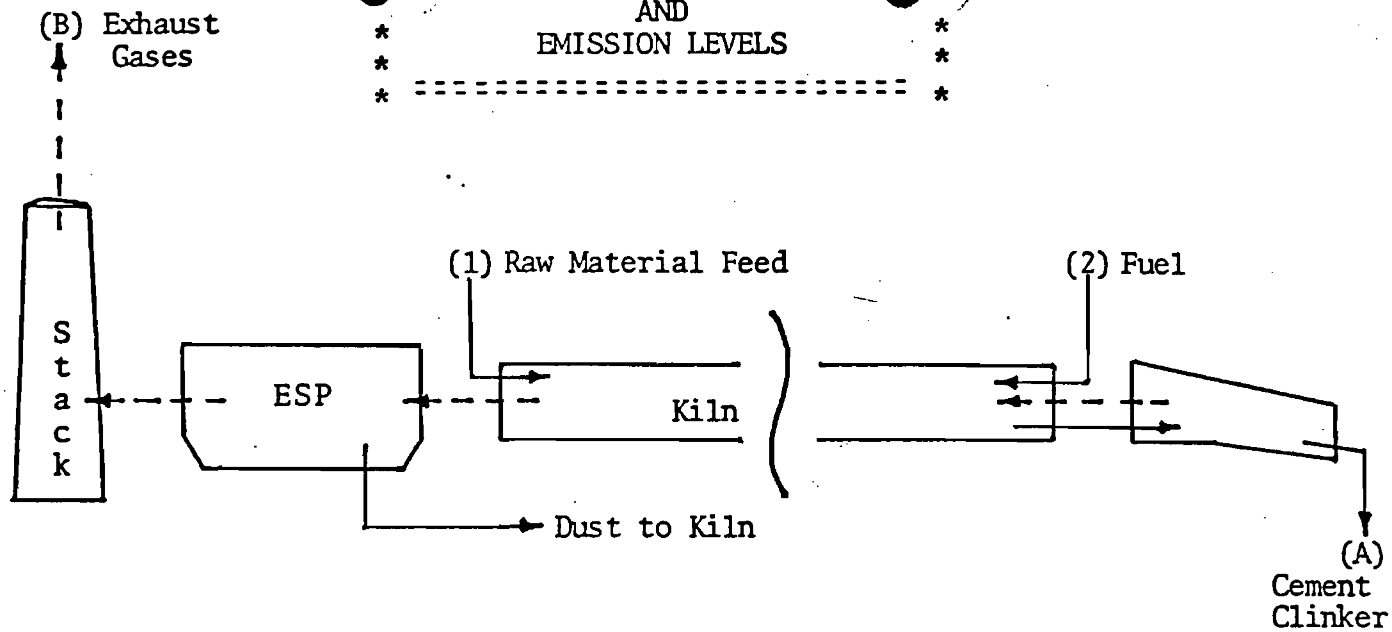
Summary

The question of SO_2 emission control in a wet process cement kiln is not one of control equipment (which one has better control) but concerns the maintaining of sufficient excess oxygen to drive the SO_2 into the clinker material. At Lonestar's facilities the oxygen is maintained in this range (above 0.5 percent) not only for SO_2 control but to provide for complete combustion of the

coal and economic benefits. Additionally, SO_2 emissions will be controlled by utilizing coal having a sulfur content of 2 percent or less.

Alternative controls for SO_2 emissions were rejected since retrofitting the three existing kilns with additional or alternative control devices would have only a minimal effect on emissions and would have an insignificant effect on reducing ambient air impacts. The costs of retrofitting would prohibit the company from implementing the complete conversion of its kilns to coal.

LONESTAR FLORIDA/PENNSUCO CALCULATED SULFUR BALANCE AND EMISSION LEVELS



Kiln #3

Sulfur Input Into System - Calculated as Equivalent SO_2

(1) Raw Materials Feed: 141.75 TPH (283,500#/hr.) @ 0.13% SO_3

#/hr. SO_2 = (141.75)(2000#/ton)(.0013# SO_3/#feed)(64# SO_2/80#SO_3)

#/hr. SO_2 = 294.8

(2) Fuel: 17.18 TPH (34,360 #/hr.) coal @ 2% S

#/hr. SO_2 = (17.18)(2000#/ton)(.02#S/#fuel)(64# SO_2/32#S)

#/hr. SO_2 = 1374.4

Total SO_2 Input = 1669.2#/hr.

Sulfur Out - Calculated as Equivalent SO_2

(A) Cement Clinker: 87.8 TPH @ 0.92% SO_3

#/hr. SO_2 = (87.8)(2000#/ton)(.0092#SO_3/#clinker)(64#SO_2/80#SO_3)

#/hr. SO_2 = 1297.1

(B) Gaseous Emissions should be equivalent to difference between Sulfur Input & Cement Clinker Sulfur Out

#/hr. SO_2 = 372.1#

Percent Sulfur Absorbed in Kiln System

1669.2 - 372.1/1669.2 = 77.7%

Potential Emissions = 372.2 #/hr. x 8760 ÷ 2000 = 1630.4 TPY

STACK TEST RESULTS - SO_2

Date: 4/30/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. °F
1	138.28	.17	16.5	3.5	.19	4.93	863.6	1.4	153911	356.8
2	138.28	.17	16.5	3.6	.19	5.40	709.1	1.3	147463	364.6
3	138.28	.22	16.5	3.88	.19	4.97	332.3	2.9	145883	362.8

te: 5/11/82

Run No.	Kiln Feed	Feed SO_3%	Coal (tph)	Coal SO_3%	Clinker SO_3%	Dust SO_3%	Tested SO_2	% O_2	DSCFM	Stack Temp. °F
1	127.59	.11	13.9	4.17	.82	4.79	318.52	3.4	155886	343.1
2	127.59	.11	13.5	3.77	1.27	4.55	294.72	2.9	149023	343.9
3	127.59	.11	14.4	3.72	.84	4.35	265.46	2.8	149124	346.2
4	127.59	.12	14.4	3.22	.86	4.35	197.09	3.1	153814	343.3
5	127.59	.10	14.4	3.36	1.03	4.52	264.91	2.9	151523	344.3
6	127.59	.10	15.5	3.39	.72	4.33	578.92	1.6	148903	352.3

DISPERSION MODELING EVALUATION

Introduction

ESE has completed a dispersion modeling evaluation of Lonestar's sulfur dioxide (SO2) impacts with Kilns 1, 2 and 3 all burning coal. K1 and K2 were modeled emitting a maximum of 100 lbs/hr each when burning coal, and K3 was modeled emitting a maximum of 400 lbs/hr. The purpose of this evaluation was to determine compliance with PSD Class I and Class II allowable increments, and with Federal, State and Dade County Ambient Air Quality Standards (AAQS) when all three kilns are fired with coal. Presented below is a summary of the methodology and results of the modeling evaluation.

Methodology

The methodology used in the evaluation was the same as that presented in the December 17, 1981 modeling evaluation performed for K3 only on coal, except that default values for the wind profile exponents were used. The U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Regulation (DER) approved Industrial Source Complex Short-Term (ISCST) model was used to estimate annual, 24-hour and 3-hour SO2 impacts due to Lonestar and nearby significant sources. To evaluate compliance with Dade County AAQS, 4-hour and 1-hour concentrations were also examined. A 5-year meteorological data base (1970-1974) from Miami International Airport was used in conjunction with the ISCST.

For Class I Prevention of Significant Deterioration (PSD) impacts, 33 discrete receptors were placed on the boundary of the Class I area (Everglades National Park). For short term averaging times, highest, second-highest concentrations at each receptor were utilized.

Class II PSD increment consumption and maximum impact concentrations were determined by executing the ISCST with a radial receptor grid placed around the Lonestar plant. Receptors ranged from 0.4 km to 2.8 km with a 0.4 km radial grid spacing. Lonestar and Resource Recovery were determined to be the only significant increment consuming sources in the area, as presented in previous Lonestar modeling reports. Highest, second-highest concentrations were utilized for short-term averaging times.

Lonestar's interaction with other sources were also examined in three additional 5-year ISCST model executions, i.e., receptors were placed downwind of Alton Box, Resource Recovery, and South Florida Materials (formerly Houdaille) in the directions aligning Lonestar with these sources. Since the modeling for receptors around Lonestar showed that Lonestar by itself will comply with all ambient air quality standards, the purpose of this modeling was to determine if Lonestar would cause or contribute to non-compliance of AAQS in the vicinity of these other sources. A 0.2 km receptor spacing was utilized in these model runs.

Highest, second-highest predicted short-term concentrations were refined with the ISCST for cases where standards were predicted to be approached or exceeded. Based on the modeling results, refinements were performed for only the 4-hour averaging time since the Dade County 4-hour AAQS was being approached. A 0.1 km receptor spacing was utilized to refine the concentrations.

Stack parameters used in the modeling are shown in Table 1. The changes since the December 17, 1981 modeling are shown in parentheses, and consist of the $SO2$ emission rates for Kilns 1, 2 and 3, and stack parameters for South Florida Materials. Updated parameters for South Florida Materials were provided by Scott Quass of your staff, who researched the permit file of the DER's West Palm Beach office.

<u>Results</u>

Table 2 presents the maximum air quality impacts on PSD Class I and Class II increments, and Florida and Dade County AAQS. The dispersion modeling analysis predicted that Class I and Class II area impacts will not exceed the allowable PSD increments, and no Florida AAQS will be exceeded due to Kilns 1, 2 and 3 burning coal. The increment consumption values shown in Table 2 are conservative since they reflect Lonestar's entire emissions as being increment consuming; only emissions above those due to natural gas firing in K1, K2 and K3 are increment consuming.

Lonestar also complies with all Dade County AAQS. There is a predicted violation of Dade County AAQS which occurs downwind of Alton Box in the direction of interaction with Lonestar. As shown by the "Lonestar only" impacts, Lonestar's potential maximum individual impact is relatively small and well below the Dade County AAQS. Upon further investigation, it was shown that Lonestar does not contribute significantly to the predicted Alton Box violations. These results are based upon Alton Box emitting 14.4 lbs/hr for each hour of the day (346 lbs/day). Updated information provided by Alton Box showed they burned up to 40 gal/hr of up to 3.0% sulfur fuel oil for 16 hrs/day. This fuel usage would result in only 307 lbs/day being emitted; therefore, Alton Box's maximum impacts may be overestimated by about 10 percent.

Conclusion

In conclusion, the dispersion modeling evaluation shows that the operation of Kilns 1, 2 and 3 at Lonestar on coal, emitting 100, 100 and 400 lbs/hr SO2, respectively, is in compliance with Federal, State and Dade County ambient air quality standards and PSD increments. Lonestar's contributions to predicted violations in the vicinity of Alton Box are shown to be insignificant.

Table 1. Stack Parameters Used in Lonestar Modeling Evaluation

Source	SO2 Emission Rate (g/sec)	Stack Height (m)	Stack Diameter (m)	Stack Gas Velocity (m/sec)	Stack Temp. (°K)	
Kiln #1	12.60(2.26)	61.0	2.1	11.86	465.0	
Kiln #2	12.60(1.03)	61.0	2.1	10.55	447.0	
Kiln #3	50.40(63.70)	61.0	4.33	9.98	454.8	
Alton Box	1.81	9.1	0.50	10.00	491.0	60TPY
South Fla. Mat.	2.38	11.60	1.08	21.30	363.0	Source
(Houdaille)		(12.2)	(1.07)	(30.10)	(397.0)	
Resource Recovery	14.00	45.7	2.70	14.00	489.0	

Note: Numbers in parentheses indicate value used in previous modeling, if different from that used in present study.

Table 2. Summary of Lonestar Modeling Results, K3 Burning Coal

Scenario	Maximum Concentrations (ug/m 3) Annual	24-hour	4-hour	3-hour	1-hour
Class I Increment Consumption*					
Lonestar Only	0.3	2.9	NA	13.9	NA
Lonestar & Resource Recovery	0.4	3.0	NA	13.9	NA
Allowable Class I Increments	2.0	5.0	NA	25.0	NA
Class II Increment Consumption*					
Lonestar Only	2.2	16.8	NA	63.3	NA
Lonestar & Resource Recovery	2.4	16.8	NA	63.3	NA
Allowable Class II Increments	20	91	NA	512	NA
Total Air Quality Impacts					
Receptors in Vicinity of Lonestar	3.0	16.8	56.3	63.6	107.2
Receptors in Vicinity of South Florida Materials (Houdaille)**	2.1	19.5	53.3	58.6	95.5
Receptors in Vicinity of Resource Recovery**	1.2	11.2	29.2	34.5	56.9
Receptors in Vicinity of Alton Box**					
All Sources	6.8	32.9	99.8	108.2	155.1
Lonestar Only	0.4	5.7	16.6	20.7	34.0
Dade County AAQS	NA	28.6	57.2	NA	286.0
Florida AAQS	60	260	NA	1300	NA

Note: NA = Not Applicable
*Values shown assume that all Lonestar emissions consume increments, therefore, numbers are conservative.
**Receptors were placed downwind of indicated source in direction which aligned Lonestar with the respective source.

Scott Quaas

LONESTAR FLORIDA PENNSUCO, INC.

6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

November 19, 1982

Mr. Thomas W. Devine, Director
Air & Waste Management Division
Environmental Protection Agency - Region IV
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Devine:

Re: PSD-FL-050; Lonestar Florida Pennsuco, Inc.;
Kilns 1, 2 and 3; Request for Revision of Sulfur
Dioxide Emission Limitations

Please find enclosed the support documentation for the modeling analysis which accompanied our November 19, 1982 letter on the referenced subject.

Sincerely yours,

Albert W. Townsend

Albert W. Townsend
Manager
Real Estate & Environmental Affairs

Encl.
AWT/jh
cc: S. Smallwood-DER

July 15, 1982

AP - Dade County
Lonestar Florida/Pennsuco
Incorporated
Coal Conversion
Kilns 1,2, and 3

Mr. Scott Quaas
Environmental Specialist
Lonestar Florida/Pennsuco, Inc.
Post Office Box 122035 PVS
Hialeah, Florida 33012

Dear Mr. Quaas:

Re: File No. AC13-54054; request for extension of construction permit for coal conversion of kilns 1,2, and 3.

This Department is in receipt of your letter of June 23, 1982 stating that kiln 3 is still out of compliance with the present specific emission limiting standard for sulfur dioxide (27.51 lb/hr) and that further testing is planned for when the unit is run at full capacity. These tests will determine the success of system improvements to date to show compliance with the construction permit.

Since reasonable assurance that the conversion of kiln 3 can meet the permitted emission limit for sulfur dioxide has not yet been demonstrated, the processing of the request for an extension of the permit which includes kilns 1 and 2 is being delayed. Processing will continue upon receipt of test reports on other information which shows kiln 3 in compliance with the permit conditions. If there are any questions, please contact Mr. I. Goldman at this office.

Sincerely,

John A. Guidry
Supervisor
Industrial/Solid Waste/Air Permitting Section

JAG/ige

cc: Metropolitan Dade County Environmental Resources Management

BEST AVAILABLE COPY

LONESTAR FLORIDA/PENNSUCO, INC.

Cement and Aggregate Division
Post Office Box 122035
Palm Village Station
Hialeah, Florida 33012
(305) 823-8800

RECEIVED
JUN 25 1982
Dept. of Environmental Reg.
West Palm Beach

DER-WPB	Copy ✓ Action	Route #

REMARKS: We should discuss B-3 with Roy & Enforcement. RR

June 23, 1982

Mr. John A. Guidry, Supervisor
Solid Waste/Industrial Waste/Air Permitting
South Florida Subdistrict
Department of Environmental Regulation
Post Office Box 3858
West Palm Beach, Florida 33402

Attention: Mr. I. Goldman

Re: File No. AC 13-54054; extension to construction permit for the coal conversion of Kilns #1, #2, and #3

Dear Mr. Guidry:

In response to your request for additional information the following is offered to complete the permit extension application.

As you are aware, the conversion of Kiln #3 to coal has been completed and the initial compliance test showed sulfur dioxide emissions in excess of the permitted limits. A remodeling of Kiln #3 on coal, utilizing the sulfur dioxide emission rates from that test, showed compliance with all applicable county, state and federal ambient air quality standards. This revised model has been previously submitted to E.P.A. and D.E.R.'s Tallahassee office. It is apparent from this revised model that the intent of the regulations has been met and that only non-compliance with the specific emission limiting standard for sulfur dioxide exists.

Subsequent to the initial compliance test, we have made modifications to the kiln as well as operational changes which have shown improvements in the absorption of sulfur in the kiln system. Unfortunately, the current economic situation has caused a shutdown of the entire cement production facilities and it may be sometime before we can return Kiln #3 to service.

Prior to this shutdown, two sets of emission tests were performed. One set (required by E.P.A. as a compliance test) a copy of which will be forthcoming, showed no improvement in sulfur absorption. A second expanded test showed a marked increase of sulfur absorption with a resultant reduction in sulfur dioxide emissions. As we are still trying to further reduce the sulfur dioxide emissions from this kiln, it would not be prudent as this time to re-negotiate our emission limiting standard.

In answer to your question concerning the commencement of construction on the modifications to Kilns #1 and #2, we are planning to convert these units to coal as soon as the economic situation allows.

In response to your question whether Kilns #1 and #2 would be converted prior to Kiln #3 being brought into compliance, it appears that Kiln #3 will be restarted during mid-summer and we can then complete our study of sulfur dioxide emission reductions and re-negotiate our emission limiting standard, if found necessary. As stated above, the economic situation will prohibit the conversion i.e. start-up of Kilns #1 and #2 on coal, within the next twelve months. Therefore, we feel that Kiln #3 will be in compliance prior to the completion of the coal conversion on Kiln #1 and #2.

It is for the reasons stated above that a three year extension, until May 31, 1985, to our existing construction permit has been requested. This additional information should be sufficient to complete the application and we await the receipt of the permit extension.

Sincerely,

Scott Quaas

Scott Quaas
Environmental Specialist

SQ/dc

CC: A. Townsend
D. Coppinger

LONESTAR FLORIDA PENNSUCO, INC.
6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

DER
MAY 12 1982
BAQM

DER
MAY 12 1982
BAQM

May 10, 1982

Mr. Kent Williams
Air Facilities Branch
U.S. Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Williams:

Reference: LONESTAR FLORIDA PENNSUCO, INC.
COAL CONVERSION MODEL

In your letter of March 10, 1982, you raised two questions on the subject model.

1) Why the stack parameters changed?
2) What effect the EPA's recommended default exponent value would have on the 3 and 24 hour results?

Enclosed please find a model using the default value along with a summary letter from David Buff on Environmental Science & Engineering Inc.

As is evident, there is no violation of county, state or federal amient air quality standard.

On the questions of stack flow characteristic changes, the initial application used parameters which were assumed rather than actual, which were used on this latter round of modeling.

Hopefully, this information will satisfy your staff as well as Dade County's concern over the modeling results.

Sincerely yours,

Albert W. Townsend

Albert W. Townsend
Manager
Real Estate & Environmental Affairs

ATW/jh
cc: B. Mangis, D. Coppinger, S. Quaas
Dade County Environmental Resources Management
Florida Dept. of Environmental Regulation Regulation

METROPOLITAN DADE COUNTY, FLORIDA

METRO-DADE

ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING—RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

DER
FEB 03 1983
BAQM

DER-WPB	Copy ✓ Action	Route &

REMARKS:

April 23, 1982

Roy M. Duke, P.E.
Subdistrict Manager
Florida Department of Environmental Regulation
Post Office Box 3858
West Palm Beach, Florida 33402

RE: LONESTAR FLORIDA PENNSUCO INC., REQUEST FOR EXTENSION OF DER CONSTRUCTION PERMIT # AC13-27742

Dear Mr. Duke:

This Department has reviewed the referenced request by Lonestar for a three year extension of their coal conversion construction permit and recommends that said request be denied for kilns #1 and #2, and that a conditional permit extension be granted for kiln #3.

As you are aware, Lonestar kiln #3 is the only kiln at the subject facility that has been converted to coal fuel thus far, with a subsequent stack test on July 15, 1981 showing the sulfur dioxide emissions from that kiln to be 505.79 lbs/hr. DERM believes that this violation of the 26.3 lbs/hr permitted level for sulfur dioxide for kiln #3 as contained in EPA Permit #PSD-FL-050 and DERM Permit #AC13-27742 can result in violation of the Dade County Ambient Standards for that pollutant. DERM is therefore requiring that Lonestar conduct an ambient monitoring program to determine actual levels of sulfur dioxide, and Lonestar's contribution in the areas of greater impact.

Furthermore, the high level of sulfur dioxide emissions from kiln #3 indicates that assumptions regarding sulfur absorption rates in the kilns on which the original coal conversion applications were based are erroneous. Consequently, this Department feels that Lonestar must provide revised projections of pollutant emissions, especially for sulfur dioxide, that would result from conversion of kilns 1 and 2 to coal fuel, before any further permitting actions can be considered for these kilns to convert to coal.

DERM hereby proposes that extension of the above-mentioned permit be granted for kiln #3 only, with the attached condition that the existing violation be resolved with all the regulatory agencies concerned within eighteen months of the granting of such extension.

RECEIVED
APR 30 1982
Dept. of Environmental Reg.
West Palm Beach

Your cooperation in protecting Dade County's ambient air quality is greatly appreciated. If you have any questions on any of the above, please do not hesitate to call.

Yours sincerely,

Rafael Rodon

Rafael Rodon, P.E.
Acting Chief
Environmental Planning Division
Environmental Resources Management

RR:HPW:toc

cc: Ed Cahill
Bill Brant
Joe Stilwell
Al Townsend, Lonestar
Tommie Gibbs, EPA

1 GUN CLUB ROAD
). BOX 3858
ST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR
Vicki Tschinkel
[redacted]
SECRETARY
Roy M. Duke
[redacted]
SUBDISTRICT MANAGER

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTH FLORIDA SUBDISTRICT

COMPLETENESS SUMMARY
AIR POLLUTION SOURCES

SOURCE NAME: Lonestar Florida Pennsuco, Inc
Kilns 1,2 &3
APPLICANT NAME: Albert W. Townsend
Manager, Real Estate & Env. Affairs
APPLICANT ADDRESS: 6451 N. Federal Highway
Fort Lauderdale, FL 33308

DATE RECEIVED: 3/31/82
DATE REVIEWED: 4/27/82
REVIEWED BY: I. Goldman

Your application for a permit to construct/operate this referenced project has been received, and reviewed for completeness. The following checked items are needed to complete your application.

( ) Application fee of $20. Make check payable to the Department of Environmental Regulation.

( ) See comments on application, copy attached.

( ) Letter authorizing applicant to represent owner.

( ) 8½" x 11" diagram of flow process.

( ) 8½" x 11" location map.

( ) 8½" x 11" plant layout sketch showing emission points.

( ) Test results showing compliance with emission limitations of the department.

( ) Air diffusion modeling results showing compliance with ambient air standards and PSD increment.

( ) Engineer's report pursuant to Section 17-4.21(1)(c), F.A.C.

(X) Other: (Any section of the application which is incomplete or lacks sufficient information to be evaluated)

A. The Stack test on Kiln 3 showed that the actual emissions of sulfur dioxide were 505.59 lb/hr with an allowable emission rate of 27.51 lb/hr. Indicate how you intend to bring the sulfur dioxide emissions into compliance.

B. Has any construction commenced on the modification to Kilns 1 & 2? If so please list what has been done.

C. Do you intend to convert Kilns 1 and 2 before Kiln 3 is brought into compliance?

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO.

ACTION DUE DATE

TO: (NAME, OFFICE, LOCATION)	
1. Clair Fancy ~~Larry~~	INITIAL / DATE
2. BAQM Cleve, Willard	INITIAL / DATE
3. Tallahassee	INITIAL / DATE
4.	INITIAL / DATE

REMARKS:

For info only

Background documents on Lone-star you may be able to use

Might be good background for Lonestar Permit.

INFORMATION
- REVIEW & RETURN
- REVIEW & FILE
- INITIAL & FORWARD

DISPOSITION
- REVIEW & RESPOND
- PREPARE RESPONSE
- FOR MY SIGNATURE
- FOR YOUR SIGNATURE
- LET'S DISCUSS
- SET UP MEETING
- INVESTIGATE & REPT
- INITIAL & FORWARD
- DISTRIBUTE
- CONCURRENCE
- FOR PROCESSING
- INITIAL & RETURN

FROM: D. Goldman

DATE: 1/31/83

PHONE

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTH FLORIDA
SUBDISTRICT

3301 GUN CLUB ROAD
P.O. BOX 3858
WEST PALM BEACH, FLORIDA 33402
305/689-5800

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

Roy M. Duke
SUBDISTRICT MANAGER

April 28, 1982

Mr. Albert W. Townsend
Manager, Real Estate &
Environmental Affairs
Lonestar Florida Pennsuco, Inc.
6451 North Federal Highway
Fort Lauderdale, FL 33308

AP - Dade County
Lonestar Florida
Pennsuco, Inc.
Coal Conversion
Kilns 1, 2 & 3

Dear Mr. Townsend:

This is to acknowledge receipt of your application, file number AC 13-54054, for a permit to:

Construct sources of air pollution

_____ This letter constitutes notice that a permit will be required for your project pursuant to Chapter(s) _____ __________, Florida Statutes.

_____ Your application for permit is complete as of __________ and processing has begun. You are advised that the department under Chapter 120, Florida Statutes, must take final action on your application within ninety (90) days unless the time is tolled by an administrative hearing.

XXXX Your application for permit is incomplete. Please provide the information listed on the attached sheet promptly. Evaluation of your proposed project will be delayed until all requested information has been received.

_____ The additional information received on __________ was reviewed, however, the items listed on the attached sheet remain incomplete. Evaluation of your proposed project will continue to be delayed until we receive all requested information.

_____ At this time no permit is required for your project by this department, and there are no objections to your proposal. Any modifications in your plans should be submitted for review, as changes may result in permits being required. This letter does not relieve you from the need to obtain any other permits (local, state or federal) which may be required.

If you have any questions, please contact I. Goldman of this office. When referring to this project, please use the file number indicated above.

Sincerely,

John A. Guidry
Supervisor
Industrial/Solid Waste/Air Permitting

cc: Metro Dade County
Environmental Resource
Management

JAG:igj

DER Form 17-1.122(57)

3301 GUN CLUB ROAD
P.O. BOX 3858
WEST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR
Vicki Tschinkel
[redacted]
SECRETARY
Roy M. Duke
[redacted]
SUBDISTRICT MANAGER

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTH FLORIDA SUBDISTRICT

COMPLETENESS SUMMARY
AIR POLLUTION SOURCES

SOURCE NAME: Lonestar Florida Pennsuco, Inc
Kilns 1,2 &3
APPLICANT NAME: Albert W. Townsend
Manager, Real Estate & Env. Affairs
APPLICANT ADDRESS: 6451 N. Federal Highway
Fort Lauderdale, FL 33308

DATE RECEIVED: 3/31/82
DATE REVIEWED: 4/27/82
REVIEWED BY: I. Goldman

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DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO.	
ACTION DUE DATE	

TO: (NAME, OFFICE, LOCATION)	INITIAL / DATE
1. Clair Fancy ~~Larry~~	INITIAL / DATE
2. BAQM Cleve, Willard	INITIAL / DATE
3. Tallahassee	INITIAL / DATE
4.	INITIAL / DATE

REMARKS:

For info only

Background documents on Lonestar you may be able to use

Might be good background for Lonestar Permit.

INFORMATION
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- INVESTIGATE & REPT
- INITIAL & FORWARD
- DISTRIBUTE
- CONCURRENCE
- FOR PROCESSING
- INITIAL & RETURN

FROM: D. Goldman

DATE: 1/31/83

PHONE:

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

April 21, 1982
ESE No. 79-112-008

Mr. Albert W. Townsend
Manager, Real Estate & Environmental Affairs
Lonestar Florida, Inc.
6451 North Federal Highway
Ft. Lauderdale, Florida 33308

Dear Mr. Townsend:

Per your request and in response to EPA's comments concerning the recent modeling of Kiln #3 on coal (ESE letter report of December 17, 1981), ESE has remodeled the subject source. The methodology utilized in the revised modeling was identical to the methodology presented in the December 17 report, except in one respect. In this revised analysis, the default values for the wind profile exponents in the ISCST model were utilized, instead of user specified values. Only the identified worst-case 24-hour, 4-hour, 3-hour and 1-hour meteorological periods for total air quality impacts, identified from the previous modeling effort, were remodeled. In addition, only the cases of receptors in the vicinity of Lonestar and Alton Box were evaluated.

Presented in the attached table is a comparison of the original modeling results and the revised modeling results (default values). The contributions of the three Lonestar kilns to the maximum predicted impacts are also presented. As shown in the table, for receptors near Lonestar, the maximum predicted impacts have increased slightly for all averaging times except for the 1-hour case. These increases are all less than 3 ug/m^3. Kiln 3 is the primary contributor to these maximum predicted impacts, accounting for up to 92 percent of the total concentration. The revised maximum concentrations are predicted to be below the AAQS in the immediate vicinity of the Lonestar plant, where maximum Lonestar impacts occur. For the 24-hour average, maximum impacts are less than 40 percent of the AAQS; for the 4-hour averaging time, maximum impacts are less than 66 percent of the AAQS and for the 1-hour averaging time, maximum impacts are less than 30 percent of the AAQS.

For the case of receptors in the vicinity of Alton Box, no changes in the maximum impacts are predicted. This is a function of Alton Box being the sole contributor to the maximum impacts and Alton Box's short stacks, which would be less affected by changes in the wind profile exponents than would sources with taller stacks. For the case of Lonestar only impacts in the vicinity of Alton Box, all maximum predicted impacts have decreased slightly (by up to 1.5 ug/m^3). Kiln3 is the primary contributor to these impacts, which are less than EPA promulgated significant impact levels (5 ug/m^3, 24-hour average; 25 ug/m^3, 3-hour average). These results indicate that by using the default wind profile exponents, less impact due to Lonestar is predicted at these more distant receptors.

P.O. BOX ESE • GAINESVILLE, FLORIDA 32602 • 904/372-3318 • TWX 810-825-6310

Most importantly, the revised modeling evaluation, like the earlier modeling study, shows that Lonestar is neither causing or significantly contributing to predicted levels in exceedance of the Dade County AAQS.

Enclosed also are five (5) sets of supportive computer model printouts. If you should have any questions concerning this report, please call.

Sincerely,

David A. Buff

David A. Buff, P.E.
Senior Engineer
Project Operations

DAB/sn

Comparison of Lonestar SO2 Modeling Results Using User Specified and Default Values of Wind Profile Exponents

Scenario	Total Air Quality Impacts* (ug/m^3) 24-hour	4-hour	3-hour	1-hour
Receptors in Vicinity of Lonestar				
Previous Modeling+	10.5	35.9	42.3	77.1
Revised Modeling**	11.0	37.4	44.7	76.8
Kiln 3 Contribution	9.9	34.1	40.6	71.0
Kiln 1 and 2 Contribution	1.1	3.0	3.7	5.5
Receptors in Vicinity of Alton Box				
Previous Modeling+--All Sources	56.9	139.5	137.4	164.0
Revised Modeling**--All Sources	56.9	139.5	137.4	164.0
Kilns 1,2, and 3 Contribution	0.0	0.0	0.0	0.0
Previous Modeling+--Lonestar Only	4.6	12.9	14.9	38.0
Revised Modeling**--Lonestar Only	4.4	11.2	14.6	30.6
Kiln 3 Contribution	4.1	10.5	13.6	29.1
Kilns 1 and 2 Contribution	0.3	0.7	1.0	1.5
Dade County AAQS	28.6	57.2	1300++	286.0

* Includes impacts from all modeled sources.
\+ Using user specified values of wind profile exponents.
** Using default values of wind profile exponents.
++ Florida AAQS

LONESTAR FLORIDA PENNSUCO, INC.
6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

DER-WPB Copy ✓ Route #
Action A
D
REMARKS: Need on Pats

March 30, 1982

Mr. Roy M. Duke, P.E.
Subdistrict Manager
Florida Dept. of Environmental Regulation
P.O. Box 3858
West Palm Beach, FL 33402

Dear Mr. Duke:

Reference: Lonestar Florida Pennsuco, Inc., Coal Conversion
Permit AC 13-2774 Expires 5/31/82

As you are aware, Lonestar has encountered some difficulties with complying with the above referenced construction permit allowing SO_2 emissions on Kiln #3. The attached letter explains the problem.

As of this date, Kiln #1 and 2 have not been converted to coal but are still slated for conversion as soon as the economic situation improves.

Therefore, we respectfully request a three year extension, until May 31, 1985 to our existing construction permits.

If you have any questions please free to call me.

Sincerely yours,

Albert W. Townsend
Manager
Real Estate & Environmental Affairs

Attachment
AWT/jh
cc: B. Mangis
D. Coppinger

RECEIVED
MAR 31 1982
Dept. of Environmental Reg.
West Palm Beach

Copy! Jim Williams, S Fla Subdistrict & Dade Co Local Program, Mr. Wong then to Larry George

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

MAR 10 1982

DER
MAR 15 1982
BAQM

REF: 4AW-AF

Mr. Albert W. Townsend
Manager, Real Estate and
Environmental Affairs
Lonestar Florida Pennsuco, Inc.
6451 N. Federal Highway
Fort Lauderdale, Florida 33308

Dear Mr. Townsend:

My staff has reviewed your recent SO_2 modeling submittal for Lonestar's No. 3 kiln and offer the following comments:

1. It appears that there was a change in emission rates for all 3 kilns, as well as lower exit velocities and stack temperature, from that of the original modeling. Please explain these changes in modeling parameters and why, even though the ground level impacts increased slightly, the increases were not as large as expected.

2. It is also suggested that the ISCST model be re-run using EPA's recommended default exponent values for the critical 3 and 24 hour periods. This needs to be done in order to satisfy Dade County's concern over the modeling impact. Either set of exponent values (wind profile vs. default), should show that Lonestar, by itself, will not contribute to a violation of any Federal, State, or Local SO_2 Standard. In addition, kiln No. 3's contribution to the modeled impacts needs to be identified.

If you have any questions concerning this matter, please contact Kent Williams of my staff at (404) 881-4552.

Sincerely yours,

Kent Williams

for Tommie A. Gibbs, Chief
Air Facilities Branch

cc: Clair Fancy, FDER

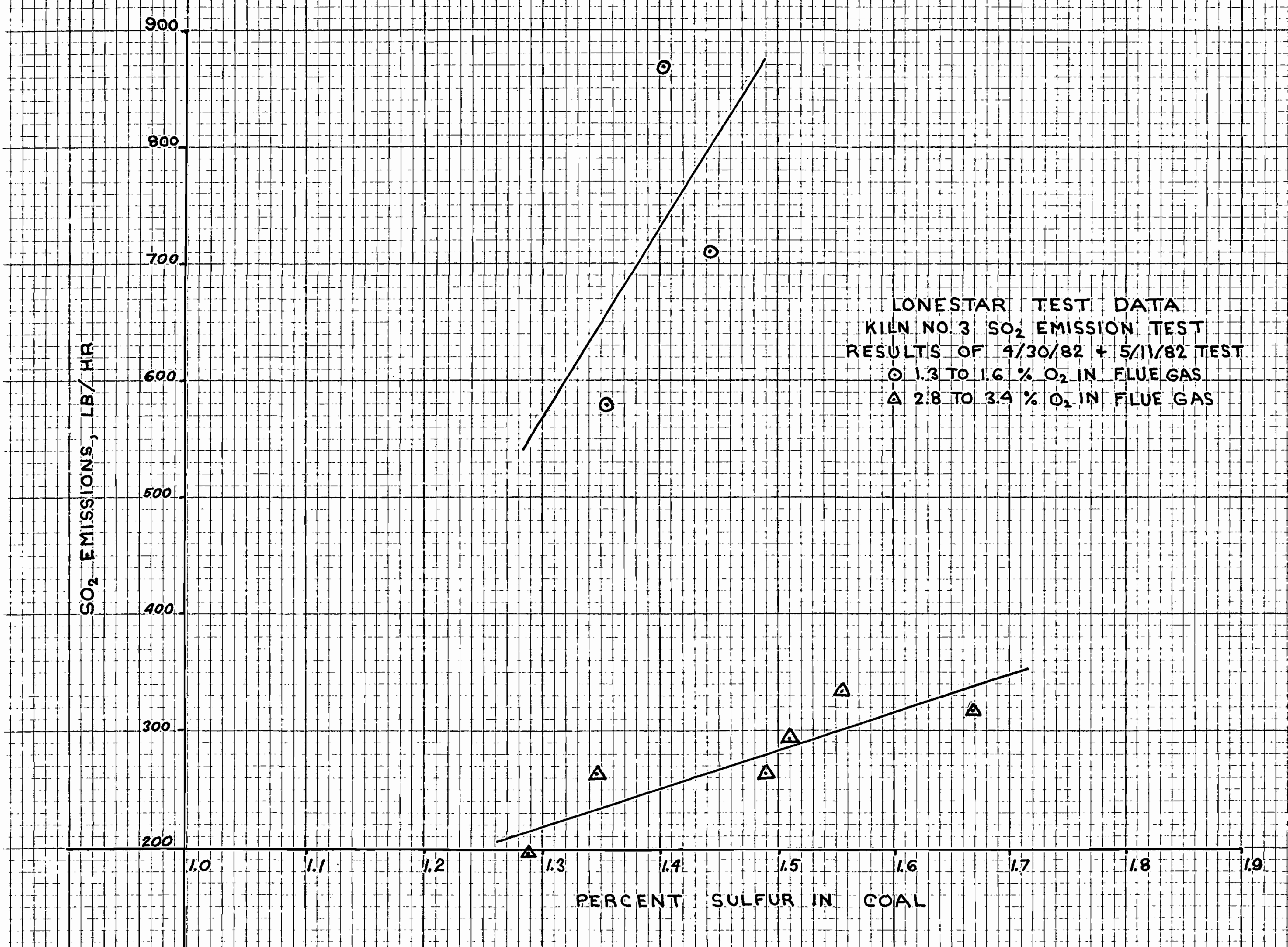

LONESTAR TEST DATA
KILN NO. 3 SO_2 EMISSION TEST
RESULTS OF 4/30/82 + 5/11/82 TEST
⊙ 1.3 TO 1.6 % O_2 IN FLUE GAS
△ 2.8 TO 3.4 % O_2 IN FLUE GAS
SO_2 EMISSIONS, LB/HR
900
800
700
600
500
400
300
200
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
PERCENT SULFUR IN COAL

FIGURE 1

PSD-FL-050

Final Determination

PSD - FL - 0050
LONESTAR, CEMENT
HIALEAH

1980

I. Applicant

Lonestar Florida/Pennsuco, Inc.
Cement and Aggregate Division
P. O. Box 122035
Palm Village Station
Hialeah, Florida 33012

II. Location

The proposed modification is located at the applicant's existing Portland Cement Plant at 11000 N.W. 121 Street, Hialeah (Dade County), Florida. The UTM coordinates are: Zone 17-562.75 km East and 2861.65 km North.

III. Project Description

The applicant proposes to convert fuel used in kilns #1, #2, and #3 from the permitted gas or oil firing to coal firing. Each kiln has one emission point. The coal to be fired will have a maximum sulfur content of 2 percent.

Further, the applicant proposes to construct a coal handling system with four (4) emission points. Each of these points are to be controlled by baghouse dust collectors.

A summary of new and modified facilities is shown in Table 1.

IV. Source Impact Analysis

Table 2 summarizes the total potential to emit (uncontrolled) from the proposed modification. The proposed modification has the potential to emit greater than 100 tons per year of particulates (TSP) and sulfur dioxide (SO_2). Therefore, in accordance with the provisions of Title 40, Code of Federal Regulations, Part 52.21 (40 CFR 52.21) promulgated June 19, 1978, a Prevention of Significant Deterioration (PSD) review is required for each of these pollutants.

TABLE 1

SUMMARY OF PROJECT

Facilities	Operating Capacity, Tons/Hour Input	Fuel	Process Weight Tons/Hour	Product Cement Clinker Tons/Hour
New Coal Handling				
Mill A	23	N/A	N/A	N/A
Mill B	15	N/A	N/A	N/A
Feedbin & Elevator	150[a]	N/A	N/A	N/A
Hopper & Weight Feeder	150[a]	N/A	N/A	N/A
Modified (After)	Feed	Coal (T/hr)		
#1 Kiln	40.5	7.5	48[c]	25
#2 Kiln	40.5	7.5	48[c]	25
#3 Kiln	141.75[b]	23		87.5
		38		137.5
Modified (Before)		Gas (MMCF/hr)		
#1 Kiln	40.5	.18	40.5[c]	25
#2 Kiln	40.5	.18	40.5[c]	25
#3 Kiln	141.75[b]	.54		87.5
		.90		137.5

[a] Intermittent capacity since average capacity equals the sum of the two mills (38 tons/hr).

[b] Basis of particulate emission standard - standards of Performance for New Stationary Sources (NSPS); 40 CFR 60 Subpart F.

[c] Basis of particulate emission standard - Florida State Implementation Plan (SIP); 17-2.05 (2) FAC.

The change in potential nitrogen oxide emissions due to the modification are not quantified. Without data to the contrary, the applicant has assumed the modification is subject to PSD review for nitrogen oxides. All other regulated pollutants are not subject to PSD review because potential emissions increase by less than 100 tons per year.

Full PSD review consists of:

1. Control Technology Review
2. Air Quality Review
   a. Impact upon Ambient Air Quality
   b. Impact upon Increment
   c. Impact upon Soils, Visibility and Vegetation
   d. Impact upon Class I Areas
3. Growth Analysis

Table 3 summarizes allowable emissions and the various categories of changes that determine the level of PSD review required under the regulations. Each type of facility and each pollutant is classified.

Line E of Table 3 shows that TSP has increased allowable emissions of less than 50 tons per year. With no limits placed upon operating time, 50 tons per year is more restrictive than the additional 100 pounds per hour or 1000 pounds per day criteria. Therefore, consistent with the provisions of 40 CFR 52.21(j) and (k), PSD review for particulates is limited to:

1. Ensuring compliance with State Implementation Plans (SIP) and Federal Regulations (40 CFR Parts 60 and 61), and
2. Impacts upon Class I areas and upon areas of known increment violation.

Table 3 shows that SO_2 increased allowable emissions of 562 tons per year requires full PSD review.

TABLE 2

APPLICABILITY SUMMARY

Facilities	Potential to Emit (Uncontrolled), Tons/Year				
	TSP	SO_2	NO_x	CO	HC
A. New	25100[a]	0	0	0	0
B. Modificed (After)	137313[b]	612[c]	(d)	Negl.	Negl.
C. Modified (Before)	137313[b]	50[e]	(d)	Negl.	Negl.
Net Increase from Modification[f]	25100	562	(d)	Negl.	Negl.
Accumulated from Previous Modification[g]	N/A	97	N/A	6.6	38
Total Increase	25100	659	(d)	6.6	38

[a] Calculated from vender guaranteed controlled emissions (5.7 lb/hr) and assumed 99.9% efficiency.

[b] Based on AP-42 Table 8.6-1 uncontrolled emissions 228 pounds of particulate per ton on cement ash in coal is absorbed in the cement product. Substantially less kiln feed ash in required for coal burning.

[c] Potential emissions is based on the proposed allowable emission rate which is based on absorption of SO_2 in the clinker of 91.3 percent in kilns #1 and #2 and 98.7 percent in kiln #3.

[d] The change in nitrogen oxides emissions are not quantified. Without data to the contrary, the applicant assumed PSD review applies. (See discussion in Section IV, A.4).

[e] Based upon test results on existing facilities.

[f] Source is subject to PSD review for specific pollutant if potential increased by 100 tons/year or more.

[g] PSD-FL-028 was not major for SO_2, HC, and CO, thus potential increases are accumulated.

TABLE 3

ALLOWABLE EMISSIONS, TONS PER YEAR

(No Limits Upon Hours Per Year)

Facilities	TSP	SO_2	NO_x
A. New or Reconstructed	25.4		
B. Modified (After)	468.2	612	<2624[a]
C. Modified (Before)	460.3	50	2624
D. Increases from Modified	7.9	562	NONE
E. Increase New and Modified (A&D)	33.3	562	NONE

[a] The applicant will determine minimum NO_x emission rates with performance tests following start-up. The proposed allowable represent the maximum allowable rate.

It should be noted that the application was reviewed under the Partial Stay of PSD Regulations, published February 5, 1980 and the proposed revisions to the PSD regulations referenced in that partial stay. It was determined that the exemption outlined in the partial stay does not apply and that the proposed modification is subject to review under existing PSD regulations (promulgated 6/19/78) because:

1. The existing source is a major source of particulates as defined in the September 5, 1979 proposed revised regulations (greater than 100 tons of allowable emissions), and the proposed modification would significantly (greater than 10 tons per year) increase allowable emissions of particulates. And further,

2. The proposed modification alone is making the source a major modification because sulfur dioxide emissions increase by greater than 100 tons per year, irrespective of the sulfur dioxide emissions from the existing source.

A. Control Technology Review

Although these facilities are exempt from a Best Available Control Technology (BACT) review for the specific pollutants (TSP) and NO_x, they are required to meet all applicable emission limits and standards of performance under the Florida State Implementation Plan (SIP) and Federal Regulations (40 CFR Parts 60 and 61). In addition, and as discussed later in this section, the modification is subject to BACT review for SO_2. Several of the facilities proposed for construction are subject to Federal New Source Performance Standards (NSPS) and/or requirements under the Florida SIP. These requirements are referenced in Table 4 which summarizes the allowable emission limits for the proposed emission limits for the proposed new and modified facilities. Only the most stringent requirement of (1) NSPS, (2) Florida SIP, (3) Florida permit, or (4) allowable limit proposed by the applicant is listed.

The limitations upon emissions of nitrogen oxides from the three kilns were proposed by the applicant and are conditions of this permit to ensure the

TABLE 4

SUMMARY OF ALLOWABLE EMISSIONS LIMITS

Facility/Pollutant	Basis for Requirement	Emissions Limits Standard	lbs/hr
23 Ton Mill			
TSP	Proposed by Applicant, Florida BACT	$\leq$.01 grains/ACF	$\leq$ 3.1
Opacity	NSPS Subpart Y (40 CFR 60.252)	<20%	-
15 Ton Mill			
TSP	Same	$\leq$.01 grains/ACF	$\leq$2.1
Opacity	Same	<20%	-
Feedbin & Elevator			
TSP	Same	<.01 grains/ACF	$\leq$0.3
Opacity	Same	<20%	-
Hopper & Weight Feeder			
TSP	Same	$\leq$.01 grains/ACF	$\leq$0.3
Opacity	Same	<20%	-
#1 Kiln			
TSP	Florida SIP, Operating Permit	Florida Process Weight Equation	$\leq$32.2
SO_2	Proposed by Applicant as BACT	$\leq$2% S in Coal, 2.27 lbs/ton[a]	$\leq$56.7
NO_x	Proposed by Applicant	<4.73 lbs/Ton[a]	<118

TABLE 4

SUMMARY OF ALLOWABLE EMISSIONS LIMITS

(Continued)

Facility/Pollutant	Basis for Requirement	Emissions Limits Standard	lbs/hr
#2 Kiln			
TSP	Florida Permit	Florida Process Weight Equation	≤32.2
SO_2	Proposed by Applicant as BACT	≤2% S in Coal, 2.27 lbs/Ton[a]	≤56.7
NO_x	Proposed by Applicant	<4.79 lbs/Ton[a]	<118
#3 Kiln			
TSP	Florida SIP & Federal NSPS Subpart F (40 CFR 60.62)	≤0.30 lb/Ton feed[b]	≤42.5
SO_2	Proposed by Applicant as BACT	≤2% S in Coal, 0.3 lbs/Ton[a]	≤26.3
NO_x	Proposed by Applicant	<6.77 lbs/Ton[a]	≤592
Opacity	Federal NSPS Subpart F (40 CFR 60.62)	≤20%	-

[a] Pounds of pollutant per ton of clinker produced.

[b] Pounds of TSP per ton of feed (except fuel).

validity of the exemption from further PSD review (no net increase in emissions).

The three kilns emitting increased sulfur dioxide are reviewed for a determination of Best Available Control Technology (BACT). To achieve the limited emissions of Table 4 the following control technologies will be utilized:

1. Coal Handling System - Particulates

All potential particulate emissions points are controlled by baghouse type dust collectors. These are to control 99.9 percent of the particles above 0.5 microns. The exhaust gases will have a maximum concentration of 0.01 grains per actual cubic foot.

These have been proposed to the State of Florida to meet the SIP BACT requirements.

These facilities must not emit gases which exhibit 20 percent opacity or greater. These baghouses and properly ducted dust collection system should comply with this requirement.

2. Kilns - Particulates

The existing kilns will continue to utilize their existing electrostatic precipitators to maintain compliance with the emission standards specified in their operating permits in accordance with the Florida SIP. Number 3 kiln will continue to operate in compliance with the NSPS standards under which it has been certified with continued compliance verified by the State of Florida.

A small increase in allowable TSP emissions is due to the addition of the solid coal to the process weight. The allowable emissions are calculated according to the Florida SIP process weight rule. The actual emissions will probably not increase because the ash introduced with the coal (compared with gas as a fuel) is compensated by a decrease in fly ash in the cement feed materials.

3. Kilns - Sulfur Dioxide (BACT)

The three kilns are subject to a BACT review for the control of sulfur dioxide.

Sulfur dioxide potentially is derived from sulfur in the process feed materials and from sulfur in the fuel.

The majority of this potential sulfur dioxide combines with the process products (limestone). The efficiency of this absorption is a function of the size and design (mixing of gas and solids) of the kilns and also of the type of particulate control (baghouse is better than electrostatic precipitator - due to intimate contact of gas with fine particles). Since the three kilns and their particulate controls are existing these parameters will not change. The applicant presents test results using oil (2.38% sulfur) as fuel. These results show that 91.3 percent of the potential sulfur dioxide was absorbed by the products in the smaller kilns (#1 and #2), and that 98.7 percent of the potential sulfur dioxide was absorbed in the larger kiln (#3). The applicant proposes BACT be the use of low sulfur coal (maximum 2% sulfur) and a maximum of 2.27 pounds of SO_2 per ton of clinker produced from kiln #1 and #2, and 0.30 pounds of SO_2 per ton of clinker produced from kiln #3.

EPA concurs with the applicant that for the cases of existing kilns with existing particulate control technology these do constitute BACT. Further the applicant used these emission rates at full design operating rates in its air quality presentation.

4. Kilns - Nitrogen Oxides

The applicant has proposed to run tests to optimize operating conditions. The criteria to judge such optimization would be:

a. satisfactory product,

b. energy economy,

c. minimum NO_x emissions, and

d. continued negligible emissions of carbon monoxide and hydrocarbons.

The applicant further stipulates that the NO_x emissions shall be less than those from the existing gas fueled operation. These current NO_x emissions have been established by tests to be 6.77 pounds of NO_x per ton of clinker produced from Kiln #3 and 4.7 pounds per ton from Kilns #1 and #2.

The applicant has presented published[1] test data which reports emissions of nitrogen oxides are less using coal than when using gas or oil as a fuel for cement kilns. This report attributes this reduction to the characteristics of the flame. It has been described as a longer, "lazier" flame (with lower temperature in the center of the flame). The conclusion that reduced emissions of nitrogen oxides are experienced when cement kilns are converted from gas to coal fuel has also been reported in reference 2.

The coal to be used in this proposed modification will contain ∿1.7 percent nitrogen (compared with ∿0 percent for gas or <.5 percent for oil). Therefore, the potential for fuel derived NO_x is greater. The literature[2] confirms that less than 20 percent of the fuel nitrogen will be converted to nitrogen oxides and that the amount of conversion is a function of the same flame characteristic variables (maximum temperature, and time at high temperature) that control thermally derived NO_x (oxidation of atmospheric nitrogen). AP-42 emission factors and NSPS for large utility boilers seem to indicate the potential for increased NO_x emissions of coal firing over gas firing. Regardless of these factors that indicate nitrogen oxide emissions could increase, the EPA concurs with the applicant that operating conditions can be found which will result in reduced emissions, or at least no net increased emissions. Therefore, with testing to find allowable operating conditions required as a permit condition. No net increase in NO_x emissions will occur and no air quality impact analysis is required for NO_x consistent with paragraph (k) of 40 CFR 52.21.

TABLE 5

AIR QUALITY IMPACT ANALYSIS

	SO_2, micrograms/meter^3		
	Annual	24-hour average[a]	3-hour average[a]
NAAQS	80	365	1300
Class II Increments	20	91	512
Maximum Predicted Concentration	0.63	4.90	18
Significance Level	1	5	25

[a] Not to be exceeded more than once per year.

B. Air Quality Review - 40 CFR 52.21 (ℓ)

The applicant has demonstrated with the modeling results summarized in Table 5 that the impact upon the annual, 24-hour and 3-hour National Ambient Air Quality Standards for SO_2 and upon the annual and 24-hour Class II increment are below the significance levels as published 43 FR 26398, June 19, 1978.

The modeling was conservatively run upon the total SO_2 emissions from the three kilns rather than only the increase (coal less gas).

The CRSTER model was used to determine maximum predicted annual concentrations and to identify worst-case 24-hour and 3-hour meteorological conditions. The CRSTER was run using five years (1970-1974) of meteorological data. The maximum short term 24-hour and 3-hour predictions were made using the PTMTP-W model.

The lack of significant impact indicated by this modeling eliminates requirements for monitoring, detailed NAAQS and increment impact analyses, growth impacts and additional impact analyses upon visibility, soils, and vegetation.

C. Class I Area Impact

The proposed modification is located about 30 km from the Everglades National Park. As discussed previously maximum impacts which occur in the vicinity of the plant are insignificant. On the basis that further dilution will occur over the 30 kilometers, the impact on this Class I area is considered insignificant and detailed assessment of Class I area impacts is not required.

V. Conclusions

EPA Region IV proposes a final determination of approval for construction of the new coal handling facilities and the conversion to coal as a fuel for kilns #1, #2, and #3 by Lonestar Florida/Pennsuco, Inc. as proposed in its application dated February 11, 1980 as amended by letter dated April 25, 1980.

The conditions set forth in the permit are as follows:

1. The modifications and the facilities constructed shall be in accordance with the capacities and specifications stated in the application. Specifically included are the operating capacities listed in Table 1 for new and modified facilities.

2. Particulate emissions from each of the four new emitting points of the coal handling system shall not exceed 0.01 grains per actual cubic foot or the emission limits listed in Table 4.

3. Visible emissions from four emission points of the coal handling system shall be less than 20 percent opacity. Visible emissions from any fugitive sources associated with the coal handling system shall be less than 20 percent opacity. Opacity shall be measured by EPA standard method 9.

Kiln 1+2 SO_2 std

4. Emissions of sulfur dioxide from #1 and #2 kilns shall not exceed 56.7 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 2.27 pounds per ton of clinker produced.

Kiln 3 SO_2 std

5. Emissions of sulfur dioxide from #3 kiln shall not exceed 26.3 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 0.30 pounds per ton of clinker produced.

2% S in Coal

6. The coal used to fuel kilns #1, #2 and #3 shall have a sulfur content of 2 percent or less.

7. Tests shall be run to optimize the operating conditions toward a minimum emissions of nitrogen oxides. The results of the test shall be analyzed and the resulting optimum operating conditions shall be described to EPA Region IV with a plan describing how continuing compliance will be maintained.

8. Emissions of nitrogen oxides from #1 and #2 kilns shall be less than 118 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of nitrogen oxides shall not exceed 4.73 pounds per ton of clinker produced.

9. Emissions of nitrogen oxides from #3 kiln shall be less than 592 pounds per hour from each kiln at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of nitrogen oxides shall not exceed 6.77 pounds per ton of clinker produced.

10. Visible emissions from #3 kiln shall be less than 20 percent opacity as measured by EPA standard method 9.

11. Compliance with all hourly emissions limits (Table 4) shall be determined by performance tests scheduled in accordance the General Conditions attached. The performance tests shall be in accordance with the provisions of reference methods in Appendix A of 40 CFR 60, except as provided under 40 CFR 60.8(b), as follows:

   a. Method 1 for sample and velocity traverses;

   b. Method 2 for velocity and volumetric flow rate;

   c. Method 3 for gas analysis;

   d. Method 5 for concentration of particulate matter and associated moisture content;

   e. Method 6 for concentration of SO_2; and

   f. Method 7 for concentration of NO_x. For Method 7, each run shall consist of at least four grab samples taken at approximately 15-minute intervals. The arithmetic mean of the samples shall constitute the run value.

g. For Method 6, the minimum sampling time shall be 20 minutes and the minimum sampling volume 0.02 dscm (0.71 dscf) for each sample. The arithmetic mean of two samples shall constitute one run. Samples shall be taken at approximately 30-minute intervals.

A compliance test shall consist of the average of at least three (3) consecutive runs.

The processes shall operate within 10 percent of maximum capacity during sampling.

12. The source will comply with the requirements of the attached General Conditions.

REFERENCES

1. Hilovsky, Robert J., PE; NO_x Reductions in the Portland Cement Industry with Conversion to Coal-Firing, Presented at the 1977 EPA Emission Inventory/Factor Workshop, Raleigh, North Carolina. September 13-15, 1977.

2. EPA-450/1-78-001, January 1978, Control Techniques for Nitrogen Oxide Emissions from Stationary Sources.

BEST AVAILABLE COPY

GENERAL CONDITIONS

1. The permittee shall notify the permitting authority in writing of the beginning of construction of the permitted source within 30 days of such action and the estimated date of start-up of operation.

2. The permittee shall notify the permitting authority in writing of the actual start-up of the permitted source within 30 days of such action and the estimated date of demonstration of compliance as required in the specific conditions.

3. Each emission point for which an emission test method is established in this permit shall be tested in order to determine compliance with the emission limitations contained herein within sixty (60) days of achieving the maximum production rate, but in no event later than 180 days after initial start-up of the permitted source. The permittee shall notify the permitting authority of the scheduled date of compliance testing at least thirty (30) days in advance of such test. Compliance test results shall be submitted to the permitting authority within forty-five (45) days after the complete testing. The permittee shall provide (1) sampling ports adequate for test methods applicable to such facility, (2) safe sampling platforms, (3) safe access to sampling platforms, and (4) utilities for sampling and testing equipment.

4. The permittee shall retain records of all information resulting from monitoring activities and information indicating operating parameters as specified in the specific conditions of this permit for a minimum of two (2) years from the date of recording.

5. If, for any reason, the permittee does not comply with or will not be able to comply with the emission limitations specified in this permit, the permittee shall provide the permitting authority with the following information in writing within five (5) days of such conditions:

   (a) description of noncomplying emission(s),

   (b) cause of noncompliance,

   (c) anticipated time the noncompliance is expected to continue or, if corrected, the duration of the period of noncompliance,

   (d) steps taken by the permittee to reduce and eliminate the noncomplying emission,

   and

   (e) steps taken by the permittee to prevent recurrence of the noncomplying emission.

   Failure to provide the above information when appropriate shall constitute a violation of the terms and conditions of this permit. Submittal of this report does not constitute a waiver of the emission limitations contained within this permit.

6. Any change in the information submitted in the application regarding facility emissions or changes in the quantity or quality of materials processed that will result in new or increased emissions must be reported to the permitting authority. If appropriate, modifications to the permit may then be made by the permitting authority to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause violation of the emission limitations specified herein.

7. In the event of any change in control or ownership of the source described in the permit, the permittee shall notify the succeeding owner of the existence of this permit by letter and forward a copy of such letter to the permitting authority.

8. The permittee shall allow representatives of the State environmental control agency or representatives of the Environmental Protection Agency, upon the the presentation of credentials:

   (a) to enter upon the permittee's premises, or other premises under the control of the permittee, where an air pollutant source is located or in which any records are required to be kept under the terms and conditions of the permit;

   (b) to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit, or the Act;

   (c) to inspect at reasonable times any monitoring equipment or monitoring method required in this permit;

   (d) to sample at reasonable times any emission of pollutants;

   and

   (e) to perform at reasonable times an operation and maintenance inspection of the permitted source.

9. All correspondence required to be submitted by this permit to the permitting agency shall be mailed to the:

   Chief, Air Facilities Branch
   Air and Hazardous Materials Division
   U.S. Environmental Protection Agency
   Region IV
   345 Courtland Street
   Atlanta, Georgia 30308

10. The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

The emission of any pollutant more frequently or at a level in excess of that authorized by this permit shall constitute a violation of the terms and conditions of this permit.

BEST AVAILABLE COPY

METROPOLITAN DADE COUNTY • FLORIDA

ENVIRONMENTAL RESOURCES MANAGEMENT

909 S.E. First Avenue
Brickell Plaza, Building - Rm. 402
Miami, Florida 33131
Telephone: 579—2760

May 13, 1980

DER
OCT 11 1983
SAOM

Warren G. Strahm, P.E.
Subdistrict Manager
Department of Environmental Regulation
P.O. Box 3858
West Palm Beach, Florida 33402

Reference: Application for Permits to Modify Three (3) Cement Kilns and Construct Coal Handling and Grinding Facility

Applicant: Lonestar Florida Pennsuco, Inc.

Location: 11000 N.W. 121 Street, Hialeah, Florida

Dear Mr. Strahm:

The referenced application has been reviewed with regards to the requirements of Chapters 17-2 and 17-4 of the Rules of the State of Florida Department of Environmental Regulation and Chapter 24, Dade County Pollution Control Ordinance. We offer no objections to the issuance of a construction permit for the aforementioned facility provided that the following comments are addressed satisfactorily or included as permit provisos:

1. Due to the increase in sulfur emissions associated with the proposed modification, the impact on Dade County's ambient SO_2 standards has to be addressed. According to an April, 1980 pollutant dispersion modeling study prepared by Environmental Science & Engineering, Inc., the maximum predicted SO_2 concentrations associated with kilns #1,2,& 3 fuel conversion are below Dade County ambient standards. However, the maximum four-hour interaction concentration with Alton Box Board Co., a manufacturing facility located approximately 7.5 kilometers southeast of the applicant, is projected to be 82.72 ug/m^3, exceeding the Chapter 24 standard of 57.2 ug/m^3. Since Alton Box Board is depicted to exceed the four-hour standard individually and Lonestar's emissions are apparently insignificant ($\ll$ 5ug/m^3) at the interaction receptor location, it is felt the applicant's proposed modification should not be denied on the basis of sulfur dioxide emissions. It is recommended that Alton Box Board demonstrate a SO_2 emissions reduction prior to the renewal of its permit.

RECEIVED
MAY 22 1980
Dept. of Environmental Reg.
West Palm Beach

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO.	
ACTION DUE DATE	

TO: (NAME, OFFICE, LOCATION)		
1. C. Holladay-BAQM DER/TALLAHASSEE	INITIAL	DATE
2.	INITIAL	DATE
3.	INITIAL	DATE
4.	INITIAL	DATE

DER
OCT 11 1983
BAQM

REMARKS:

FYI as requested.

I'm not too sure if this will help as it refers only to the previously approved SO_2 emission limits (BACT). As discussed w/ Larry George, we should consider FAC Rule 17-2.500(d) which implies modeling only changes of Lonestar emissions (since baseline date) to determine area of significant impact. (?). The existing violation would still have to be addressed by anyone whose facility significantly impacted a violation (Alton Box, Lonestar & (others?)). This may be a conflict in the rule (and previously proposed rule) whereby we would be allowing an insignificant increase at a "known point of violation" but requiring the same facility to decrease the same pollutants at the facility through enforcement.

INFORMATION	
	REVIEW & RETURN
	REVIEW & FILE
	INITIAL & FORWARD

DISPOSITION	
	REVIEW & RESPOND
	PREPARE RESPONSE
	FOR MY SIGNATURE
	FOR YOUR SIGNATURE
	LET'S DISCUSS
	SET UP MEETING
	INVESTIGATE & REPT
	INITIAL & FORWARD
	DISTRIBUTE
	CONCURRENCE
	FOR PROCESSING
	INITIAL & RETURN

FROM: [illegible] DER/WPB

DATE 10/7/83

PHONE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

MAY 30 1980

REF: 4AH-AF

Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Division of Environmental Programs
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Smallwood:

Enclosed for your review and comment are the Public Notice and Preliminary PSD Determination for the Lonestar Florida/Pennsuco proposed kiln fuel conversion and addition of coal handling system in Dade County, Florida. The public notice will appear in a local newspaper, the Miami Herald, in the near future.

Please let my office know if you have comments or questions regarding this determination. You may contact Mr. Kent Williams of my staff at 404/881-4552 or Mr. Jeffrey L. Shumaker of TRW Inc. at 919/541-9100. TRW Inc. is under contract to EPA, and TRW personnel are acting as authorized representatives of the Agency in providing aid to the Region IV PSD review program.

Sincerely yours,

Tommie A. Gibbs

Tommie A. Gibbs, Chief
Air Facilities Branch

TAG:JLS:jbt

Enclosure

PUBLIC NOTICE
PSD-FL-050

A modification to an existing air pollution source is proposed for construction by Lonestar Florida/Pennsuco near the city of Hialeah in Dade County, Florida. Three existing oil or gas fired Portland Cement kilns will be converted to coal firing. In addition, a coal handling facility will be constructed.

The proposed construction has been reviewed by the U.S. Environmental Protection Agency (EPA) under Federal Prevention of Significant Deterioration (PSD) Regulations (40 CFR 52.21), and EPA has made a Preliminary Determination that the construction can be approved provided certain conditions are met. A summary of the basis for this determination and the application for a permit submitted by Lonestar are available for public review in the Dade County Environmental Resources Management Office in the Brickwell Plaza Building, Suite 402, 909 Southeast 1st Avenue, Miami, Florida.

The maximum allowable emissions increase of the various pollutants emitted by this kiln are as follows (in tons per year).

TSP	NO_x	SO_2	CO	HC
33.3	0	562	Negl.	Negl.

Consistent with the exemptions stated in paragraph (k) of 40 CFR 52.21, the TSP increment consumed by the source was not determined. In addition, the SO_2 increment consumption was not calculated because the net impact resulting from the net emissions increase of ambient air quality was shown to be insignificant. Due to the small expected impact on Class I area, which is less than the significance levels defined by EPA (1 ug/m^3 annual and 5 ug/m^3 24-hour), a detailed Class I area impact analysis is not required.

Finally, any person may submit written comments to EPA regarding the proposed modification. All comments, postmarked not later than 30 days from the date of this notice, will be considered by EPA in making a Final Determination regarding approval for construction of this source. These comments will be made available for public review at the above location. Furthermore, a public hearing can be requested by any person. Such requests should be submitted within 15 days of the date of this notice. Letters should be addressed to:

Mr. Tommie A. Gibbs, Chief
Air Facilities Branch
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30308

PSD-FL-050

Preliminary Determination Summary

I. Applicant

Lonestar Florida/Pennsuco, Inc.
Cement and Aggregate Division
P. O. Box 122035
Palm Village Station
Hialeah, Florida 33012

II. Location

The proposed modification is located at the applicant's existing Portland Cement Plant at 11000 N.W. 121 Street, Hialeah (Dade County), Florida. The UTM coordinates are: Zone 17-562.75 km East and 2861.65 km North.

III. Project Description

The applicant proposes to convert fuel used in kilns #1, #2, and #3 from the permitted gas or oil firing to coal firing. Each kiln has one emission point. The coal to be fired will have a maximum sulfur content of 2 percent.

Further, the applicant proposes to construct a coal handling system with four (4) emission points. Each of these points are to be controlled by baghouse dust collectors.

A summary of new and modified facilities is shown in Table 1.

IV. Source Impact Analysis

Table 2 summarizes the total potential to emit (uncontrolled) from the proposed modification. The proposed modification has the potential to emit greater than 100 tons per year of particulates (TSP) and sulfur dioxide (SO_2). Therefore, in accordance with the provisions of Title 40, Code of Federal Regulations, Part 52.21 (40 CFR 52.21) promulgated June 19, 1978, a Prevention of Significant Deterioration (PSD) review is required for each of these pollutants.

TABLE 1

SUMMARY OF PROJECT

Facilities	Operating Capacity, Tons/Hour Input	Fuel	Process Weight Tons/Hour	Product Cement Clinker Tons/Hour
New Coal Handling				
Mill A	23	N/A	N/A	N/A
Mill B	15	N/A	N/A	N/A
Feedbin & Elevator	150[a]	N/A	N/A	N/A
Hopper & Weight Feeder	150[a]	N/A	N/A	N/A
Modified (After)	Feed	Coal (T/hr)		
#1 Kiln	40.5	7.5	48[c]	25
#2 Kiln	40.5	7.5	48[c]	25
#3 Kiln	141.75[b]	23		87.5
		38		137.5
Modified (Before)		Gas (MMCF/hr)		
#1 Kiln	40.5	.18	40.5[c]	25
#2 Kiln	40.5	.18	40.5[c]	25
#3 Kiln	141.75[b]	.54		87.5
		.90		137.5

[a] Intermittent capacity since average capacity equals the sum of the two mills (38 tons/hr).

[b] Basis of particulate emission standard - standards of Performance for New Stationary Sources (NSPS); 40 CFR 60 Subpart F.

[c] Basis of particulate emission standard - Florida State Implementation Plan (SIP); 17-2.05 (2) FAC.

The change in potential nitrogen oxide emissions due to the modification are not quantified. Without data to the contrary, the applicant has assumed the modification is subject to PSD review for nitrogen oxides. All other regulated pollutants are not subject to PSD review because potential emissions increase by less than 100 tons per year.

Full PSD review consists of:

1. Control Technology Review
2. Air Quality Review
   a. Impact upon Ambient Air Quality
   b. Impact upon Increment
   c. Impact upon Soils, Visibility and Vegetation
   d. Impact upon Class I Areas
3. Growth Analysis

Table 3 summarizes allowable emissions and the various categories of changes that determine the level of PSD review required under the regulations. Each type of facility and each pollutant is classified.

Line E of Table 3 shows that TSP has increased allowable emissions of less than 50 tons per year. With no limits placed upon operating time, 50 tons per year is more restrictive than the additional 100 pounds per hour or 1000 pounds per day criteria. Therefore, consistent with the provisions of 40 CFR 52.21(j) and (k), PSD review for particulates is limited to:

1. Ensuring compliance with State Implementation Plans (SIP) and Federal Regulations (40 CFR Parts 60 and 61), and
2. Impacts upon Class I areas and upon areas of known increment violation.

Table 3 shows that SO_2 increased allowable emissions of 562 tons per year requires full PSD review.

TABLE 2

APPLICABILITY SUMMARY

Facilities	Potential to Emit (Uncontrolled), Tons/Year				
	TSP	SO_2	NO_x	CO	HC
A. New	25100[a]	0	0	0	0
B. Modificed (After)	137313[b]	612[c]	(d)	Negl.	Negl.
C. Modified (Before)	137313[b]	50[e]	(d)	Negl.	Negl.
Net Increase from Modification[f]	25100	562	(d)	Negl.	Negl.
Accumulated from Previous Modification[g]	N/A	97	N/A	6.6	38
Total Increase	25100	659	(d)	6.6	38

[a] Calculated from vender guaranteed controlled emissions (5.7 lb/hr) and assumed 99.9% efficiency.

[b] Based on AP-42 Table 8.6-1 uncontrolled emissions 228 pounds of particulate per ton on cement ash in coal is absorbed in the cement product. Substantially less kiln feed ash in required for coal burning.

[c] Potential emissions is based on the proposed allowable emission rate which is based on absorption of SO_2 in the clinker of 91.3 percent in kilns #1 and #2 and 98.7 percent in kiln #3.

[d] The change in nitrogen oxides emissions are not quantified. Without data to the contrary, the applicant assumed PSD review applies. (See discussion in Section IV, A.4).

[e] Based upon test results on existing facilities.

[f] Source is subject to PSD review for specific pollutant if potential increased by 100 tons/year or more.

[g] PSD-FL-028 was not major for SO_2, HC, and CO, thus potential increases are accumulated.

TABLE 3

ALLOWABLE EMISSIONS, TONS PER YEAR

(No Limits Upon Hours Per Year)

Facilities	TSP	SO_2	NO_x
A. New or Reconstructed	25.4		
B. Modified (After)	468.2	612	<2624[a]
C. Modified (Before)	460.3	50	2624
D. Increases from Modified	7.9	562	NONE
E. Increase New and Modified (A&D)	33.3	562	NONE

[a] The applicant will determine minimum NO_x emission rates with performance tests following start-up. The proposed allowable represent the maximum allowable rate.

It should be noted that the application was reviewed under the Partial Stay of PSD Regulations, published February 5, 1980 and the proposed revisions to the PSD regulations referenced in that partial stay. It was determined that the exemption outlined in the partial stay does not apply and that the proposed modification is subject to review under existing PSD regulations (promulgated 6/19/78) because:

1. The existing source is a major source of particulates as defined in the September 5, 1979 proposed revised regulations (greater than 100 tons of allowable emissions), and the proposed modification would significantly (greater than 10 tons per year) increase allowable emissions of particulates. And further,

2. The proposed modification alone is making the source a major modification because sulfur dioxide emissions increase by greater than 100 tons per year, irrespective of the sulfur dioxide emissions from the existing source.

A. Control Technology Review

Although these facilities are exempt from a Best Available Control Technology (BACT) review for the specific pollutants (TSP) and NO_x, they are required to meet all applicable emission limits and standards of performance under the Florida State Implementation Plan (SIP) and Federal Regulations (40 CFR Parts 60 and 61). In addition, and as discussed later in this section, the modification is subject to BACT review for SO_2. Several of the facilities proposed for construction are subject to Federal New Source Performance Standards (NSPS) and/or requirements under the Florida SIP. These requirements are referenced in Table 4 which summarizes the allowable emission limits for the proposed emission limits for the proposed new and modified facilities. Only the most stringent requirement of (1) NSPS, (2) Florida SIP, (3) Florida permit, or (4) allowable limit proposed by the applicant is listed.

The limitations upon emissions of nitrogen oxides from the three kilns were proposed by the applicant and are conditions of this permit to ensure the

TABLE 4

SUMMARY OF ALLOWABLE EMISSIONS LIMITS

Facility/Pollutant	Basis for Requirement	Emissions Limits Standard	lbs/hr
23 Ton Mill			
TSP	Proposed by Applicant, Florida BACT	<.01 grains/ACF	≤ 3.1
Opacity	NSPS Subpart Y (40 CFR 60.252)	<20%	-
15 Ton Mill			
TSP	Same	≤.01 grains/ACF	≤2.1
Opacity	Same	<20%	-
Feedbin & Elevator			
TSP	Same	<.01 grains/ACF	≤0.3
Opacity	Same	<20%	-
Hopper & Weight Feeder			
TSP	Same	≤.01 grains/ACF	≤0.3
Opacity	Same	<20%	-
#1 Kiln			
TSP	Florida SIP, Operating Permit	Florida Process Weight Equation	≤32.2
SO_2	Proposed by Applicant as BACT	≤2% S in Coal, 2.27 lbs/ton[a]	≤56.7
NO_x	Proposed by Applicant	<4.73 lbs/Ton[a]	<118

TABLE 4

SUMMARY OF ALLOWABLE EMISSIONS LIMITS

(Continued)

Facility/Pollutant	Basis for Requirement	Emissions Limits Standard	lbs/hr
#2 Kiln			
TSP	Florida Permit	Florida Process Weight Equation	$\leq$32.2
SO_2	Proposed by Applicant as BACT	$\leq$2% S in Coal, 2.27 lbs/Ton[a]	$\leq$56.7
NO_x	Proposed by Applicant	<4.79 lbs/Ton[a]	<118
#3 Kiln			
TSP	Florida SIP & Federal NSPS Subpart F (40 CFR 60.62)	$\leq$0.30 lb/Ton feed[b]	$\leq$42.5
SO_2	Proposed by Applicant as BACT	$\leq$2% S in Coal, 0.30 lbs/Ton[a]	$\leq$26.3
NO_x	Proposed by Applicant	<6.77 lbs/Ton[a]	$\leq$592
Opacity	Federal NSPS Subpart F (40 CFR 60.62)	$\leq$20%	-

[a] Pounds of pollutant per ton of clinker produced.

[b] Pounds of TSP per ton of feed (except fuel).

validity of the exemption from further PSD review (no net increase in emissions).

The three kilns emitting increased sulfur dioxide are reviewed for a determination of Best Available Control Technology (BACT). To achieve the limited emissions of Table 4 the following control technologies will be utilized:

1. Coal Handling System - Particulates

All potential particulate emissions points are controlled by baghouse type dust collectors. These are to control 99.9 percent of the particles above 0.5 microns. The exhaust gases will have a maximum concentration of 0.01 grains per actual cubic foot.

These have been proposed to the State of Florida to meet the SIP BACT requirements.

These facilities must not emit gases which exhibit 20 percent opacity or greater. These baghouses and properly ducted dust collection system should comply with this requirement.

2. Kilns - Particulates

The existing kilns will continue to utilize their existing electrostatic precipitators to maintain compliance with the emission standards specified in their operating permits in accordance with the Florida SIP. Number 3 kiln will continue to operate in compliance with the NSPS standards under which it has been certified with continued compliance verified by the State of Florida.

A small increase in allowable TSP emissions is due to the addition of the solid coal to the process weight. The allowable emissions are calculated according to the Florida SIP process weight rule. The actual emissions will probably not increase because the ash introduced with the coal (compared with gas as a fuel) is compensated by a decrease in fly ash in the cement feed materials.

3. Kilns - Sulfur Dioxide (BACT)

The three kilns are subject to a BACT review for the control of sulfur dioxide.

Sulfur dioxide potentially is derived from sulfur in the process feed materials and from sulfur in the fuel.

The majority of this potential sulfur dioxide combines with the process products (limestone). The efficiency of this absorption is a function of the size and design (mixing of gas and solids) of the kilns and also of the type of particulate control (baghouse is better than electrostatic precipitator - due to intimate contact of gas with fine particles). Since the three kilns and their particulate controls are existing these parameters will not change. The applicant presents test results using oil (2.38% sulfur) as fuel. These results show that 91.3 percent of the potential sulfur dioxide was absorbed by the products in the smaller kilns (#1 and #2), and that 98.7 percent of the potential sulfur dioxide was absorbed in the larger kiln (#3). The applicant proposes BACT be the use of low sulfur coal (maximum 2% sulfur) and a maximum of 2.27 pounds of SO_2 per ton of clinker produced from kiln #1 and #2, and 0.30 pounds of SO_2 per ton of clinker produced from kiln #3.

EPA concurs with the applicant that for the cases of existing kilns with existing particulate control technology these do constitute BACT. Further the applicant used these emission rates at full design operating rates in its air quality presentation.

4. Kilns - Nitrogen Oxides

The applicant has proposed to run tests to optimize operating conditions. The criteria to judge such optimization would be:

a. satisfactory product,
b. energy economy,
c. minimum NO_x emissions, and
d. continued negligible emissions of carbon monoxide and hydrocarbons.

The applicant further stipulates that the NO_x emissions shall be less than those from the existing gas fueled operation. These current NO_x emissions have been established by tests to be 6.77 pounds of NO_x per ton of clinker produced from Kiln #3 and 4.7 pounds per ton from Kilns #1 and #2.

The applicant has presented published[1] test data which reports emissions of nitrogen oxides are less using coal than when using gas or oil as a fuel for cement kilns. This report attributes this reduction to the characteristics of the flame. It has been described as a longer, "lazier" flame (with lower temperature in the center of the flame). The conclusion that reduced emissions of nitrogen oxides are experienced when cement kilns are converted from gas to coal fuel has also been reported in reference 2.

The coal to be used in this proposed modification will contain ∿1.7 percent nitrogen (compared with ∿0 percent for gas or <.5 percent for oil). Therefore, the potential for fuel derived NO_x is greater. The literature[2] confirms that less than 20 percent of the fuel nitrogen will be converted to nitrogen oxides and that the amount of conversion is a function of the same flame characteristic variables (maximum temperature, and time at high temperature) that control thermally derived NO_x (oxidation of atmospheric nitrogen). AP-42 emission factors and NSPS for large utility boilers seem to indicate the potential for increased NO_x emissions of coal firing over gas firing. Regardless of these factors that indicate nitrogen oxide emissions could increase, the EPA concurs with the applicant that operating conditions can be found which will result in reduced emissions, or at least no net increased emissions. Therefore, with testing to find allowable operating conditions required as a permit condition. No net increase in NO_x emissions will occur and no air quality impact analysis is required for NO_x consistent with paragraph (k) of 40 CFR 52.21.

B. Air Quality Review - 40 CFR 52.21 (ℓ)

The applicant has demonstrated with the modeling results summarized in Table 5 that the impact upon the annual, 24-hour and 3-hour National Ambient Air Quality Standards for SO_2 and upon the annual and 24-hour Class II increment are below the significance levels as published 43 FR 26398, June 19, 1978.

The modeling was conservatively run upon the total SO_2 emissions from the three kilns rather than only the increase (coal less gas).

The CRSTER model was used to determine maximum predicted annual concentrations and to identify worst-case 24-hour and 3-hour meteorological conditions. The CRSTER was run using five years (1970-1974) of meteorological data. The maximum short term 24-hour and 3-hour predictions were made using the PTMTP-W model.

The lack of significant impact indicated by this modeling eliminates requirements for monitoring detailed NAAQS and increment impact analyses, growth impacts and additional impact analyses upon visibility, soils, and vegetation.

C. Class I Area Impact

The proposed modification is located about 30 km from the Everglades National Park. As discussed previously maximum impacts which occur in the vicinity of the plant are insignificant. On the basis that further dilution will occur over the 30 kilometers, the impact on this Class I area is considered insignificant and detailed assessment of Class I area impacts is not required.

V. Conclusions

EPA Region IV proposes a preliminary determination of approval for construction of the new coal handling facilities and the conversion to coal as a fuel for kilns #1, #2, and #3 by Lonestar Florida/Pennsuco, Inc. as proposed in its application dated February 11, 1980 as amended by letter dated April 25, 1980.

The conditions set forth in the permit are as follows:

TABLE 5

AIR QUALITY IMPACT ANALYSIS

	SO_2, micrograms/meter^3		
	Annual	24-hour average[a]	3-hour average[a]
NAAQS	80	365	1300
Class II Increments	20	91	512
Maximum Predicted Concentration	0.63	4.90	18
Significance Level	1	5	25

[a] Not to be exceeded more than once per year.

1. The modifications and the facilities constructed shall be in accordance with the capacities and specifications stated in the application. Specifically included are the operating capacities listed in Table 1 for new and modified facilities.

2. Particulate emissions from each of the four new emitting points of the coal handling system shall not exceed 0.01 grains per actual cubic foot or the emission limits listed in Table 4.

3. Visible emissions from four emission points of the coal handling system shall be less than 20 percent opacity. Visible emissions from any fugitive sources associated with the coal handling system shall be less than 20 percent opacity. Opacity shall be measured by EPA standard method 9.

4. Emissions of sulfur dioxide from #1 and #2 kilns shall not exceed 56.7 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of sulfur dioxide shall not exceed 2.27 pounds per ton of clinker produced.

5. Emissions of sulfur dioxide from #3 kiln shall not exceed 26.3 pounds per hour at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of sulfur dioxide shall not exceed 0.30 pounds per ton of clinker produced.

6. The coal used to fuel kilns #1, #2 and #3 shall have a sulfur content of 2 percent or less.

7. Tests shall be run to optimize the operating conditions toward a minimum emissions of nitrogen oxides. The results of the test shall be analyzed and the resulting optimum operating conditions shall be described to EPA Region IV with a plan describing how continuing compliance will be maintained.

8. Emissions of nitrogen oxides from #1 and #2 kilns shall be less than 118 pounds per hour from each kiln at the maximum operating rate of 25 tons per hour of clinker produced per kiln. At lesser operating rates the emissions of nitrogen oxides shall not exceed 4.73 pounds per ton of clinker produced.

9. Emissions of nitrogen oxides from #3 kiln shall be less than 592 pounds per hour from each kiln at the maximum operating rate of 87.5 tons per hour of clinker produced. At lesser operating rates the emissions of nitrogen oxides shall not exceed 6.77 pounds per ton of clinker produced.

10. Visible emissions from #3 kiln shall be less than 20 percent opacity as measured by EPA standard method 9.

11. Compliance with all emissions limits shall be determined by performance tests. Performance tests shall be conducted in accordance with the provisions of 40 CFR 60.8 and as such shall use appropriate EPA standard methods outlined in 40 CFR 60 Appendix A. The processes shall operate within 10 percent of maximum capacity during sampling.

12. The source will comply with the requirements of the attached General Conditions.

REFERENCES

1. Hilovsky, Robert J., PE; NO_x Reductions in the Portland Cement Industry with Conversion to Coal-Firing, Presented at the 1977 EPA Emission Inventory/Factor Workshop, Raleigh, North Carolina. September 13-15, 1977.

2. EPA-450/1-78-001, January 1978, Control Techniques for Nitrogen Oxide Emissions from Stationary Sources.

3301 GUN CLUB ROAD
P.O. BOX 3858
WEST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR

JACOB D. VARN
SECRETARY

WARREN G. STRAHM
SUBDISTRICT MANAGER

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTH FLORIDA SUBDISTRICT

February 15, 1980

Dade County
AC - Lonestar Florida/Pennsuco, Inc.
(Portland Cement)

Mr. Al Townsend
Coordinator of Ecological Planning
Lonestar Florida/Pennsuco, Inc.
Post Office Box 2035, P.V.S.
Hialeah, Florida 33012

Dear Mr. Townsend:

Re: Air Permit Construction Applications AC 13-27739 (Kiln #1), AC 13-27740 (Kiln #2), AC 13-27741 (Kiln #3), and AC 13-27742 (Coal Handling System)

Technical review of the above referenced applications has been completed by our air permitting staff. It has been determined that the PSD/BACT portions of your applications are complete. Therefore, it is acceptable for you to proceed with public notice, which is enclosed. Certification of the notice must be submitted to this office as well as the Local Program.

If you should have any questions regarding the public notice, please contact Mr. Jim Bauch of this office, telephone 305/689-5800.

Sincerely,

Warren G. Strahm
Subdistrict Manager

WGS:jbs

Enclosure

cc: Victoria Martinez, DER/Tallahassee
David A. Buff, P.E., Environmental Sciences and Engineering, Inc.
Ewart Anderson, Metropolitan Dade Co. Environmental Resources Mgmt.

NOTICE OF RECEIPT OF APPLICATION FOR PERMIT TO CONSTURCT AIR POLLUTION SOURCE

TO WHOM IT MAY CONCERN:

The Florida Department of Environmental Regulation has received four (4) applications for Construction and Determination of Best Available Control Technology to minimize air pollutant emissions from four (4) sources of air pollution entitled:

1. Portland Cement Finish Kiln #1 - Fuel conversion
2. Portland Cement Kiln #2 - Fuel conversion
3. Portland Cement Kiln #3 - Fuel conversion
4. Coal Handling System

All sources are located at 1100 Northwest 121 Street, Pennsuco, Dade County, Florida.

These applications have been submitted by Lonestar Florida/Pennsuco, Inc. pursuant to Chapter 17-2, Florida Administrative Code, of the Department's rules regarding the control of emissions which may affect the maintenance of national air quality standards.

Copies of the aforementioned applications, the technical analyses performed by the Department's staff and their proposed decisions are available for public inspection at the following location(s):

State of Florida Department of Environmental Regulation
Post Office Box 3858
3301 Gun Club Road
West Palm Beach, Florida 33402

or

Metropolitan Dade County Environmental Resources Management
909 Southeast 1 Avenue
Brickell Plaza Building, Room 402
Miami, Florida 33131

Persons wishing to comment on any aspect of this action are required to submit their comments in writing to the address above within thirty (30) days of publication of this notice.

3301 GUN CLUB ROAD
P.O. BOX 3858
WEST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR

JACOB D. VARN
SECRETARY

WARREN G. STRAHM
SUBDISTRICT MANAGER

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTH FLORIDA SUBDISTRICT

February 15, 1980

Dade County
AP - Lonestar Florida/Pennsuco,Inc.
(Portland Cement Manufacturing Facilities)

Mrs. Liz Cloud
Florida Administrative Weekly
Department of State
The Capitol
Tallahassee, Florida 32304

Dear Mrs. Cloud:

Re: Receipt of an Application for B.A.C.T. Determination

Please publish the attached notice in the earliest issue of the Florida Administrative Weekly on or before February 27, 1980.

Should you have any questions please contact this office, telephone 305/689-5800, SUNCOM 451-5005.

Sincerely,

Warren G. Strahm
Subdistrict Manager

WGS:jbs

Enclosure

cc: Victoria Martinez, DER/Tallahassee (BAQM)
Geneva Hartsfield, DER Commission/Tallahassee (2 copies)

NOTICE OF RECEIPT OF B.A.C.T. APPLICATION

THE DEPARTMENT OF ENVIRONMENTAL REGULATION announces receipt on February 8, 1980 of four (4) applications for determination of Best Available Control Technology to minimize air pollutant emissions from four (4) sources of air pollution entitled:

1. Coal Handling System
2. Portland Cement Kiln #1 - Fuel conversion
3. Portland Cement Kiln #2 - Fuel conversion
4. Portland Cement Kiln #3 - Fuel conversion

All sources are located at 1100 Northwest 121 Street, Pennsuco, Dade County, Florida.

Information regarding the applications may be obtained by writing to:

Mr. Warren G. Strahm, Subdistrict Manager
State of Florida Department of Environmental Regulation
Post Office Box 3858
West Palm Beach, Florida 33402

Telephone 305/689-5800

LONESTAR FLORIDA PENNSUCO, INC.
6451 N. Federal Highway
Fort Lauderdale, Florida 33308
Post Office Box 6097
Fort Lauderdale, Florida 33310
(305) 491-0900

February 8, 1980

Warren G. Strahm, P.E.
Subdistrict Manager
Florida Department of Environmental Regulation
P.O. Box 3858
West Palm Beach, Florida 33402

Dear Mr. Strahm:

Please find enclosed four (4) air permit applications for construction and modification to allow a conversion from natural gas to coal as a primary fuel source at our Portland Cement Plant in Dade County, Florida. Three (3) of the applications relate to existing cement kilns at our Pennsuco plant which the company desires to fire with coal at the earliest possible date. The fourth application addresses the coal handling and grinding facility which must also be constructed as soon as possible to affect this necessary measure.

I am sure you are aware of several obvious advantages to these proposals. Although coal is plentiful Lonestar is presently utilizing natural gas as a primary energy source at these facilities. Supplies of natural gas are becoming increasingly uncertain and more expensive. The same is true of fuel oil as the company uses on a limited basis as a back-up energy source. These factors are particularly critical since the cement industry is extremely energy intensive. Energy costs amount to almost one half of the production costs of the finished product. With todays energy situation, and predictions that the nations energy problems will become worse, its mandatory that the company convert the plant to coal and at the earliest possible date.

As shown in the enclosed applications and supporting documentation the environmental impacts of this energy conversion will be minimal. Particularly emissions from the kilns will not increase and baghouses will be employed to control dust emissions from the coal handling and grinding facilities. Ambient concentrations of both SO_2 and particulates will be insignificant and NOx will be substantially reduced.

RECEIVED
FEB 8 1980
Dept. of Environmental Reg.
West Palm Beach

LONESTAR FLORIDA/PENNSUCO, INC.

I look forward to working closely with you and your staff toward processing these applications as expeditiously as possible. We would like to meet with your staff soon to discuss these applications in detail and quickly resolve any questions you may have on this important project.

Sincerely,

Albert W. Townsend

Albert W. Townsend
Coordinator of
Environmental Planning

Encl.
AWT/jh
cc: Ewart Anderson
DCERM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PAID FEB - 8 1980 Dept. of Environmental Reg. West Palm Beach

RECEIVED FEB 1980 BUREAU AQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Portland Cement Kiln #1 [ ] New[1] [X] Existing[1]

APPLICATION TYPE: [ ] Construction [ ] Operation [X] Modification

COMPANY NAME: Lonestar Florida/Pennsuco, Inc. COUNTY: Dade

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Kiln #1 with electrostatic precipitator

SOURCE LOCATION: Street 11000 N.W. 121 St. City Hialeah

UTM: East 562.75 North 2861.25

Latitude ____ ° ____ ' ____ "N Longitude ____ ° ____ ' ____ "W

APPLICANT NAME AND TITLE: Albert W. Townsend, Coordinator Ecological Planning

APPLICANT ADDRESS: P.O. Box 2035, P.V.S., Hialeah, FL 33012

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Lonestar Florida/Pennsuco, Inc.

I certify that the statements made in this application for a fuel conversion (modification) permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Albert W. Townsend

Albert W. Townsend, Coordinator Ecological Planning
Name and Title (Please Type)

Date: 2-8-80 Telephone No. (305) 823-8800

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

RECEIVED FEB 8 1980 Dept. of Environmental Reg. West Palm Beach

Signed: David A. Buff

David A. Buff
Name (Please Type)

Environmental Science and Engineering, Inc.
Company Name (Please Type)

P.O. Box 13454, Gainesville, FL 32604
Mailing Address (Please Type)

(Affix Seal) DAVID A. BUFF CERTIFICATE STATE OF FLORIDA REGISTERED ENGINEER

Florida Registration No. 19011 Date: 2-8-80 Telephone No. (904) 372-3318

[1]See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

SEE ATTACHMENT

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction As soon as permit issued   Completion of Construction 12/31/81

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

NA

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

AO 13-8960 issued May 12, 1978 expires May 1, 1983

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes X No

F. Normal equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ; if power plant, hrs/yr ____ ;

if seasonal, describe:

G. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes
   a. If yes, has "offset" been applied? No
   b. If yes, has "Lowest Achievable Emission Rate" been applied? No
   c. If yes, list non-attainment pollutants.
      Ozone
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

See Attached Sheet

ATTACHMENT, P. 2, ITEM II-A

Kiln # 1 will be modified to utilize coal as a primary fuel source, rather than natural gas or fuel oil. Particulate emissions, which will not increase due to this proposed modification, will be controlled by an existing electrostatic precipitator. SO_2 emissions will be substantially reduced through limestone absorption during combustion. The modification will result in full compliance with applicable standards.

SECTION II, ITEM G: SUPPORTIVE INFORMATION AND JUSTIFICATIONS

1. Dade County has been designated as a nonattainment area for ozone (Federal Register, Vol. 44, No. 9.) The area is in attainment for all other pollutants.
   a. Non-methane hydrocarbon emissions will not increase as a result of this modification, therefore offsets are not required (Federal Register, Vol. 44, No. 11).
   b. Not applicable, see Item (a).

2. U.S. EPA Requirements: Allowable emissions of all pollutants, except sulfur dioxide, will not increase by greater than 50 tons per year, and are therefore exempt from BACT review (Federal Register, Vol. 43 No. 118).

   FDER Requirements: BACT review is required if any increase over the baseline concentration results due to the modification.

   Since only sulfur dioxide emissions will increase as the result of this modification, BACT is required only for this pollutant.

3. Potential emissions of sulfur dioxide will be greater than 100 tons per year and allowable emissions of sulfur dioxide will increase by greater than 50 tons per year. (see emission estimates)

4. New Source Performance Standards (NSPS) for Portland Cement plants apply only to emissions of particulate matter. This application does not encompass any physical change or change in operation which will increase particulate emissions. A "modification" as that term is used to apply NSPS, only includes changes which increase emissions of a pollutant to which a standard applies. Since this application does not propose such a change, state standards for existing Portland Cement plants are applicable and will be complied with.

5. Self Explanatory

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Limestone	Particulate	6.66*	71,037	
Staurolite	Particulate	0.44*	4,698	
Bottom Ash (Mineral Aggregates)	Particulate	0.29*	3,078	
Sand	Particulate	0.55*	2,187	

*Based on the proportion of estimated uncontrolled emissions From AP-42

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 81,000 (not including coal utilization)

2. Product Weight (lbs/hr): 50,000

C. Airborne Contaminants Emitted:

See Attachment

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Koppers Electrostatic	Particulate	99+	0.1 - 80	Attached
Precipitator (Existing)				Stack Test

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. — 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard

[4]Emission, if source operated without control (See Section V, Item 3)

[5]If Applicable

Section III, Item C Airborne Contaminants Emitted

Name of Contaminant	Emissions Maximum #/Hr.	Emissions Actual T/Yr.	Allowed Emissions Rate Per Chapter 17-2, F.A.C.	Allowable Emissions #/Hr. Coal	Allowable Emissions #/Hr. Gas/Oil	Potential Emissions #/Hr.	Potential Emissions T/Yr.	Relate To Flow Diagram
Particulate	32.2	140.9	17-2.05 (2) Process Weight Table	32.2	31.3	5,700	24,966	A
Coal Fired								
Sulfur Dioxide	56.7	248.4	NA	NA	NA	56.7	248.4	A
Nitrogen Oxide	42.3	185.3	NA	NA	NA	42.3	185.3	A
Hydrocarbons	Neg	Neg	NA	NA	NA	NA	NA	A
Carbon Monoxide	Neg	Neg	NA	NA	NA	NA	NA	A
Gas Fired								
Sulfur Dioxide	4.5	19.7	NA	NA	NA	4.5	19.7	A
Nitrogen Oxide	169.3	741.3	NA	NA	NA	169.3	741.3	A
Hydrocarbons	Neg	Neg	NA	NA	NA	NA	NA	A
Carbon Monoxide	Neg	Neg	NA	NA	NA	NA	NA	A
Oil Fired								
Sulfur Dioxide	45.3	198.6	NA	NA	NA	45.3	198.6	A
Nitrogen Oxides	112.1	491.0	NA	NA	NA	112.1	491.0	A
Hydrocarbon	Neg	Neg	NA	NA	NA	NA	NA	A
Carbon Monoxide	Neg	Neg	NA	NA	NA	NA	NA	A

Section V, Item 2: Emission Estimates

Particulates:

Coal, Gas and Oil: The fuel switch to coal will decrease the required bottom ash input to make clinker; therefore, particulate emissions from this fuel switch will not increase. The stack test attached (June, 1979) accurately predicts the expected particulate emissions.

Maximum = Allowable (Process Weight Table) = $17.31\ P^{0.16} = 17.31\ (48)^{0.16} = 32.2$ #/hr.

Annual = 32.2 #/hr. x 8760 hrs/yr ÷ 2000 #/ton = 140.85 TPY

Potential: Based on AP-42 Uncontrolled emission factor of 228 #/ton
228 #/ton x 25 ton/hr = 5700 #/hr.
5700 #/hr x 8760 hr/yr ÷2000 #/ton = 24,966 TPY

Section V, Item 2 Emission Estimates (continued)

Sulfur Dioxide

Calculations based upon 0.08% SO_3 in raw feed, 2.0% S coal, and 91.3% SO_2 removal inherent in process based upon stack test results.

Coal:

Feed: 81,000 #/hr. x 0.0008 x $\frac{32}{80}$ = 25.92 #S/hr.

Fuel: 15,000 #/hr. x 0.02 = 300.0 #S/hr.

Total Input SO_2: = x 2

651.84 #SO_2/hr.

Maximum emitted = 651.84 x (1 - 0.913) = 56.7 #SO_2/hr.
Annual & Potential = 56.7 #/hr x 8760 hr/yr ÷ 2000 #/ton
= 248.4 TPY

Gas:

Feed: 81,000 #/hr x 0.0008 x $\frac{32}{80}$ = 25.92 #S/hr.
x2
Total Input = 51.84 #SO_2/hr.

Maximum Emitted = 51.84 #/hr x (1 - 0.913) = 4.5 #SO_2/hr.
Annual & Potential = 4.5#/hr x 8760 ÷ 2000 = 19.7 TPY

Oil: Base on recent stack test (June, 1979)

Maximum emitted = 0.2519 #/MM BTu x 180 MM BTu/hr = 45.3 # SO_2/hr
Annual & Potential = 45.3 #/hr x 8760 ÷ 2000 = 198.6 TPY

Nitrogen Oxides:

Coal:

From NO_x stack tests (see attached summary sheet), NO_x emissions on gas were 565 #/hr @ 83.4 TPH clinker production, or 6.77 #/ton.

Attached literature, "NO Reductions in the Portland Cement Industry With Conversion to Coal Firing," cites a 75% reduction in NO_x when converting from gas to coal.

Maximum emissions: 6.77 #/ton x 0.25 x 25 TPH = 42.3 #/hr
Annual = 42.3 #/hr x 8760 ÷ 2000 = 185.3 TPY

Gas:

Used June, 1979 stack test on Kiln #3 and proportioned with heat input.

6.77 #/ton x TPH = 169.3 # NO_x/hr.

Annual & Potential = 169.3 #/hr. x 8760 ÷ 2000 = 741.3 TPY

Oil:

Used June, 1979 stack test on Kiln #3 and proportioned with heat input.

374 #NO_x/hr ÷ 83.4 TPH = 4.48 #NO_x/ton

4.48 #/ton x 25.0 TPH = 112.1 #NO_x/hr

Annual & Potential =112.1 #/hr. x 8760 ÷ 2000 = 491.0 TPY

EMISSION ESTIMATES

Results of Nitrogen Oxides Stack Tests on Kiln No. 3 at LSF/P

Date	Process Rate (dry tons/hr)	Fuel	Run	Oxygen Content in Kiln (%)	NO_2 Emissions (lbs/hr)	NO_2 Emissions (ppm)
3/27/79	150.9	Gas	1	1.7	544*	544
	150.9	Gas	2	1.7	864*	863
	150.9	Gas	3	1.7	514*	514
	150.9	Gas	4	1.7	790*	789
	150.9	Gas	5	1.7	295*	294
	150.9	Gas	6	1.7	382*	381
AVERAGE					565*	564
3/30/79	150.1	Oil	1	2.1	312	288
	150.1	Oil	2	2.1	331	306
	150.1	Oil	3	2.1	279	258
	150.1	Oil	4	2.1	478	442
	150.1	Oil	5	2.1	469	434
AVERAGE					374	346

*Based on the same gas flow rate as oil firing.

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Coal	12,000	15,000	180 (144 ave)
Gas	0.14	.18	180
Fuel Oil	23.6	29.6	180

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:	Coal	Gas	Oil			Coal	Gas	Oil	
Percent Sulfur:	2.0	0.0	2.37		Percent Ash:	10-12%	0	<1%	
Density:	N/A	N/A	8.34	lbs/gal	Typical Percent Nitrogen:	3%	0	<1%	
Heat Capacity:	12000	N/A	17,386	BTU/lb		N/A	N/A	145,000	BTU/gal

Other Fuel Contaminants (which may cause air pollution): NA

F. If applicable, indicate the percent of fuel used for space heating. Annual Average NA Maximum

G. Indicate liquid or solid wastes generated and method of disposal.

Captured dust is reintroduced into system or sold. No liquid waste

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 200 ft. Stack Diameter: 6.89 ft.

Gas Flow Rate: 118,899 ACFM Gas Exit Temperature: 390 °F.

Water Vapor Content: 24 % Velocity: 51 FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste

Total Weight Incinerated (lbs/hr) Design Capacity (lbs/hr)

Approximate Number of Hours of Operation per day days/week

Manufacturer

Date Constructed Model No.

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______________ ft. Stack Diameter ______________ Stack Temp. ______________

Gas Flow Rate: ______________ ACFM ______________ DSCFM* Velocity ______________ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) ______________

Brief description of operating characteristics of control devices: ______________

____

____

____

____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

____

____

____

____

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation.

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.,) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.).

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

Calculations from attached stack test:

No. 1 Kiln

Raw Feed - 39.35 T/hr. (dry) @ 0.08% SO_3

Feed to Clinker ratio = 1.62

Clinker Production = 24.3 T/hr.

Energy Consumption = 6.6 MM BTU/ T. Clinker

Fuel Oil - 18,360 BTU/# @ 2.38% S.

Fuel Oil Consumption

$$\frac{6.6 \times 24.3}{0.01836} = 8{,}735 \text{ \#/hr.}$$

Sulfur into the system

Feed -

$$39.35 \times 2000 \times 0.0008 \times \frac{32}{80} = 25.2 \text{ \#/hr.}$$

@ 1% sulfur in oil

25.2

Fuel -

8,735 x 0.0238 = 207.9 #/hr. 103.95

Total S. = 233.1 #/hr. 129.15

Total in as SO_2 = 466.2 #/hr. 258.3

SO_2 Emission

Test data = 0.2519 #SO_2/MM BTU

Total SO_2 Emission = 0.2519 x 24.3 x 6.6 = 40.4 #/hr.

Absorption Factor

$$\frac{466.2 - 40.4}{466.2} = 91.3\%$$

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[ ] Yes [X] No

Contaminant	Rate or Concentration
Sulfur Dioxide	No Standard

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [X] No

Contaminant	Rate or Concentration
SO_2	100% of potential emission rate

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
SO_2	100 % of potential emission rate

D. Describe the existing control and treatment technology (if any).

1. Control Device/System: See attached stack test and absorption calculations which document the high rate of removal of SO_2 inherent in the kiln.
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1. Due to the inherent removal of SO_2 (91.3% as documented in the attached stack test) it is considered impractical and economically unfeasible to evaluate other treatment technology

a. Control Device: Other technologies such as a baghouse would not significantly reduce

b. Operating Principles: SO_2 emissions and would require substantial cash outlays and replacement of the existing E.S.P.

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power — KWH design rate.

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected: See Section VI. E. above

1. Control Device:
2. Efficiency*:
3. Capital Cost:
4. Life:
5. Operating Cost:
6. Energy:
7. Maintenance Cost:
8. Manufacturer:
9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

Sulphur dioxide emissions will be controlled by utilizing coal having a sulphur contect of no greater than 2%. In addition, any SO_2 emissions from burning this low sulphur coal will be reduced through limestone absorption in the cement clinker product. This inherent removal of SO_2 is estimated to be 91.3% efficient or greater based upon stack tests performed on this kiln.

Alternative controls for SO_2 were rejected since retrofitting the existing kiln with additional control devices would have only a minimal effect on emissions and would prohibit the company from implementing the conversion to coal.

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII — PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data N/A

1. ________ no sites ________ TSP ____( ) SO^2* ________ Wind spd/dir

Period of monitoring ___/___/___ to ___/___/___
(month day year) (month day year)

Other data recorded ________

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? ____ Yes ____ No

b) Was instrumentation calibrated in accordance with Department procedures? ____ Yes ____ No ____ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 1 / 1 / 70 to 12 / 31 / 74
(month day year) (month day year)

2. Surface data obtained from (location) Miami

3. Upper air (mixing height) data obtained from (location) Miami

4. Stability wind rose (STAR) data obtained from (location) NA

C. Computer Models Used

1. CRSTER Single Source — Modified? If yes, attach description.

2. PTMTP-W — Modified? If yes, attach description.

3. ________ Modified? If yes, attach description.

4. ________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	See Section III, C.	grams/sec
SO^2	See Section III, C.	grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

See Attached

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT

Page 10, Item VII (G)

The switch to coal as a primary fuel will have a minimal impact on air quality and at the same time will assume a plentiful supply of fuel for years to come. Supplies of oil and natural gas are of uncertain duration, and the cost of these scarce resources continues to rise. Without the fuel conversion, an interruption in oil or gas deliveries could result in plant shutdowns, or production curtailments with enormous economic consequences.

The abundance of coal, in comparison with oil and natural gas, is well documented. Coal constitutes approximately 90% of the nation's known energy reserves, yet currently supplies only 18% of the nation's energy consumption. The policy of the federal government is committed to increased coal utilization by industry. Conversions such as the modification proposed herein is in accord with this national policy, and at the same time will have minimal environmental impacts.

State of Florida

Department of State

I certify from the records of this office that LONESTAR FLORIDA PENNSUCO, INC. is a corporation organized under the laws of the State of Delaware, authorized to transact business within the State of Florida, qualified on January 4, 1978.

The charter number for this corporation is 839774.

I further certify that said corporation has filed all annual reports and paid all annual report filing fees due this office through December 31, 1979, and its status is active.

Given under my hand and the
Great Seal of the State of Florida,
at Tallahassee, the Capital, this the
6th day of Feb., 1980

George Firestone
Secretary of State

CER 101 Rev. 5-79

LONESTAR FLORIDA/PENNSUCO, INC.
6451 N. Federal Highway
Ft. Lauderdale, Florida 33308

February 15, 1979

State of Florida
Department of Environmental Regulation
and/or
Various Counties Within Florida

Gentlemen:

This letter authorizes the signatures of either Mr. Albert W. Townsend, Coordinator of Ecological Planning or Mr. Carl R. Metzgar, Manager Administrative Services, for the purpose of permit changes, applications and renewals.

Very truly yours,

LONESTAR FLORIDA PENNSUCO, INC.

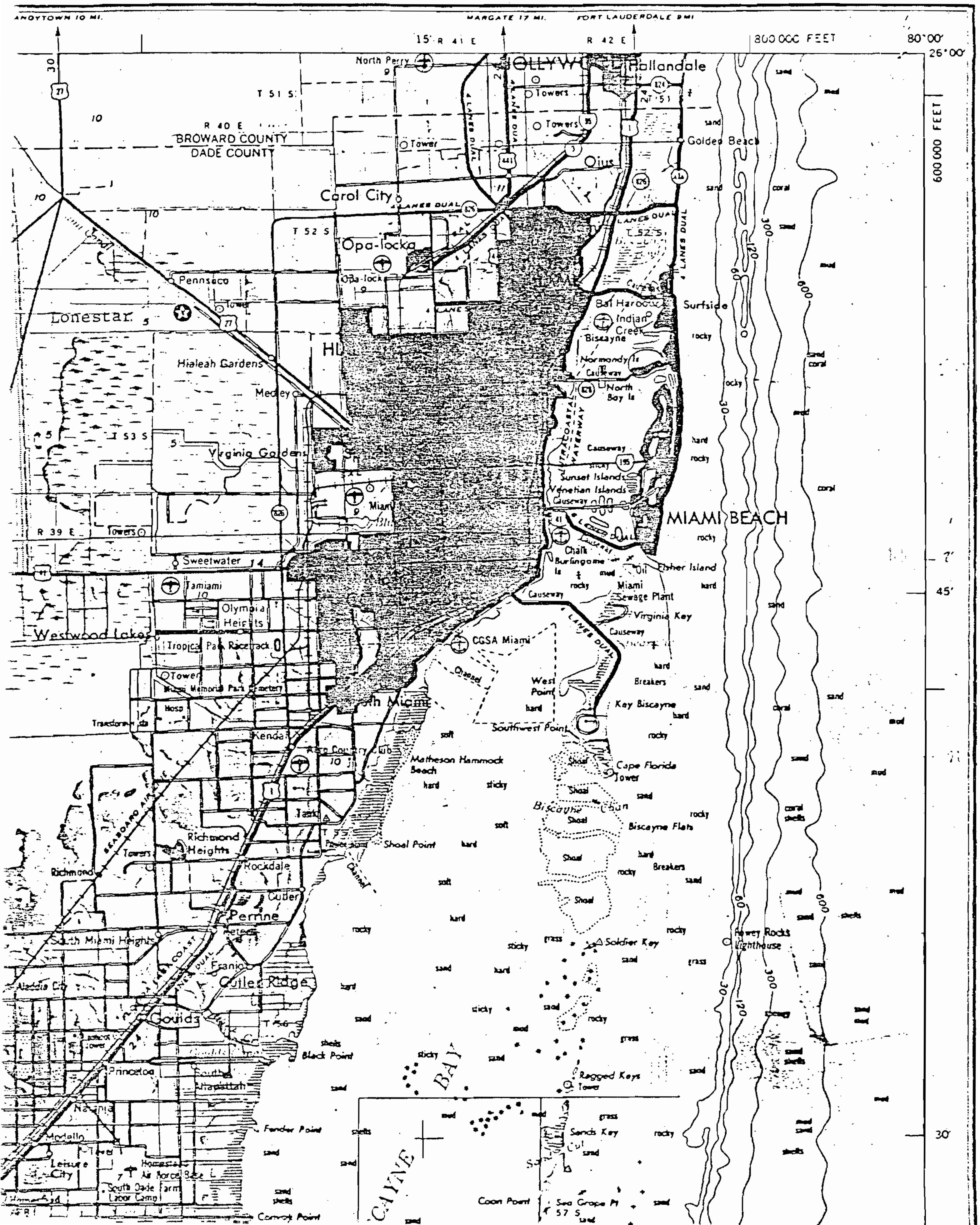
PNStoms

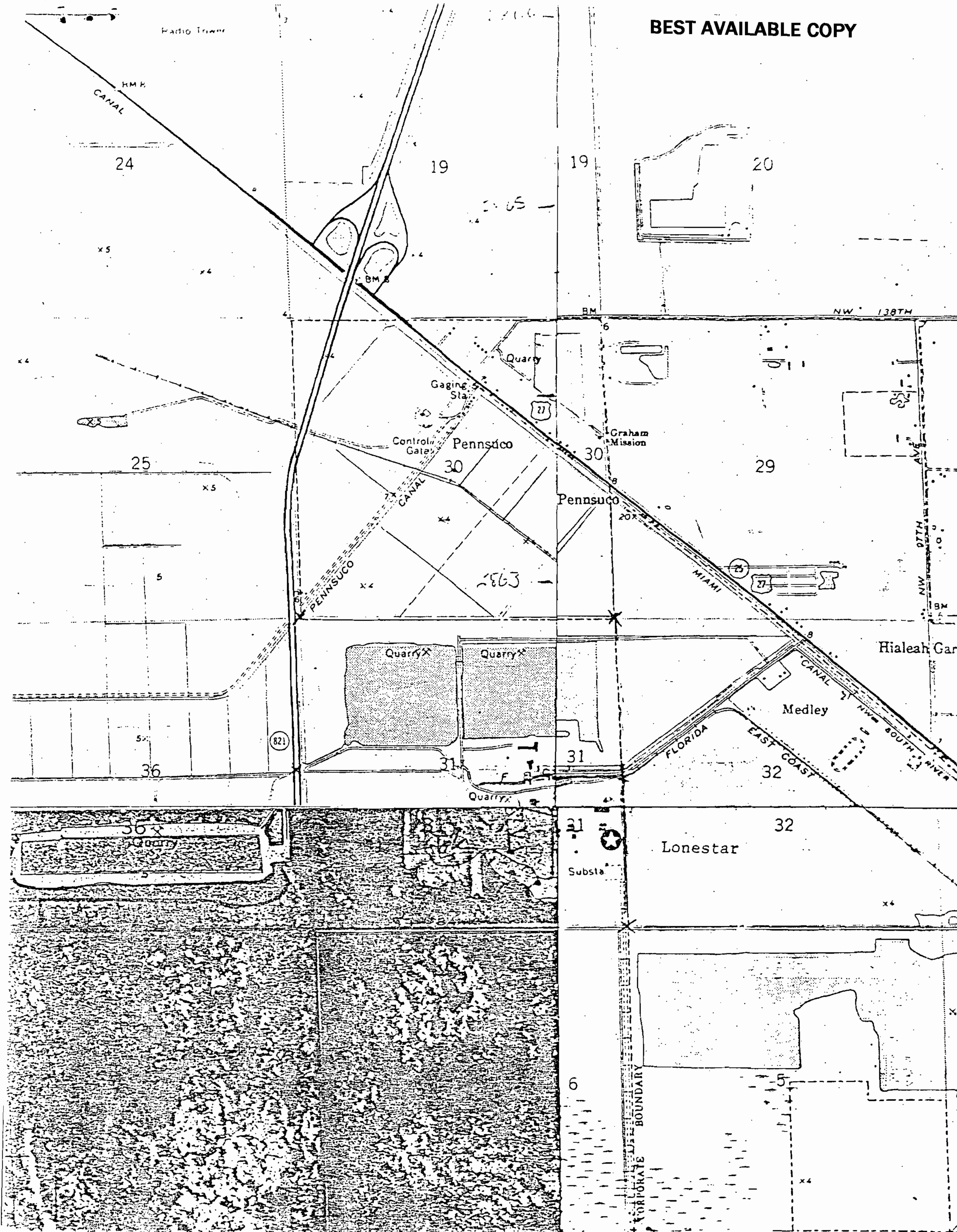
Paul N. Stoms
President

CRM/jh

BEST AVAILABLE COPY

NG 17-8

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Medley
FLORIDA
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CORPORATE BOUNDARY

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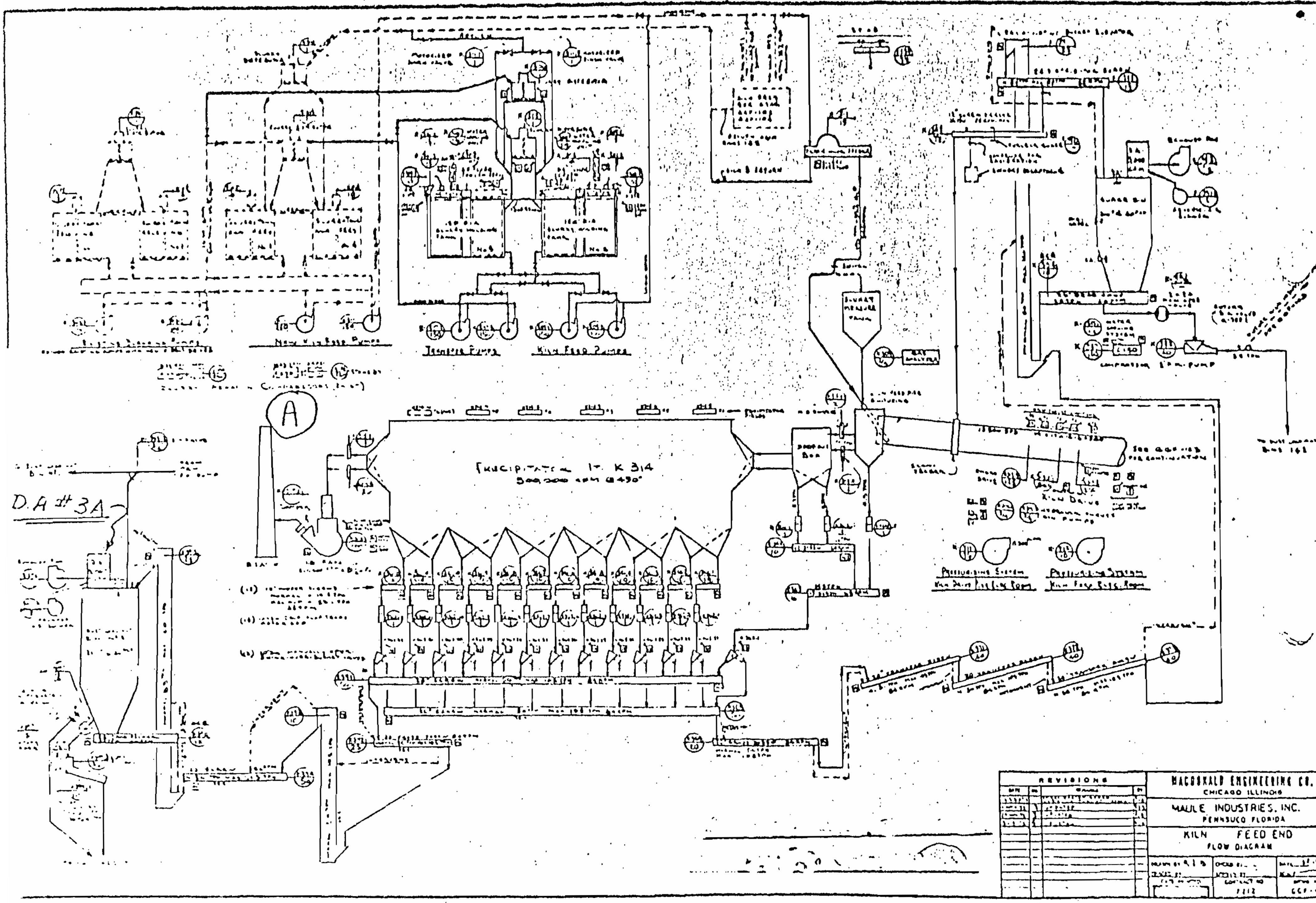

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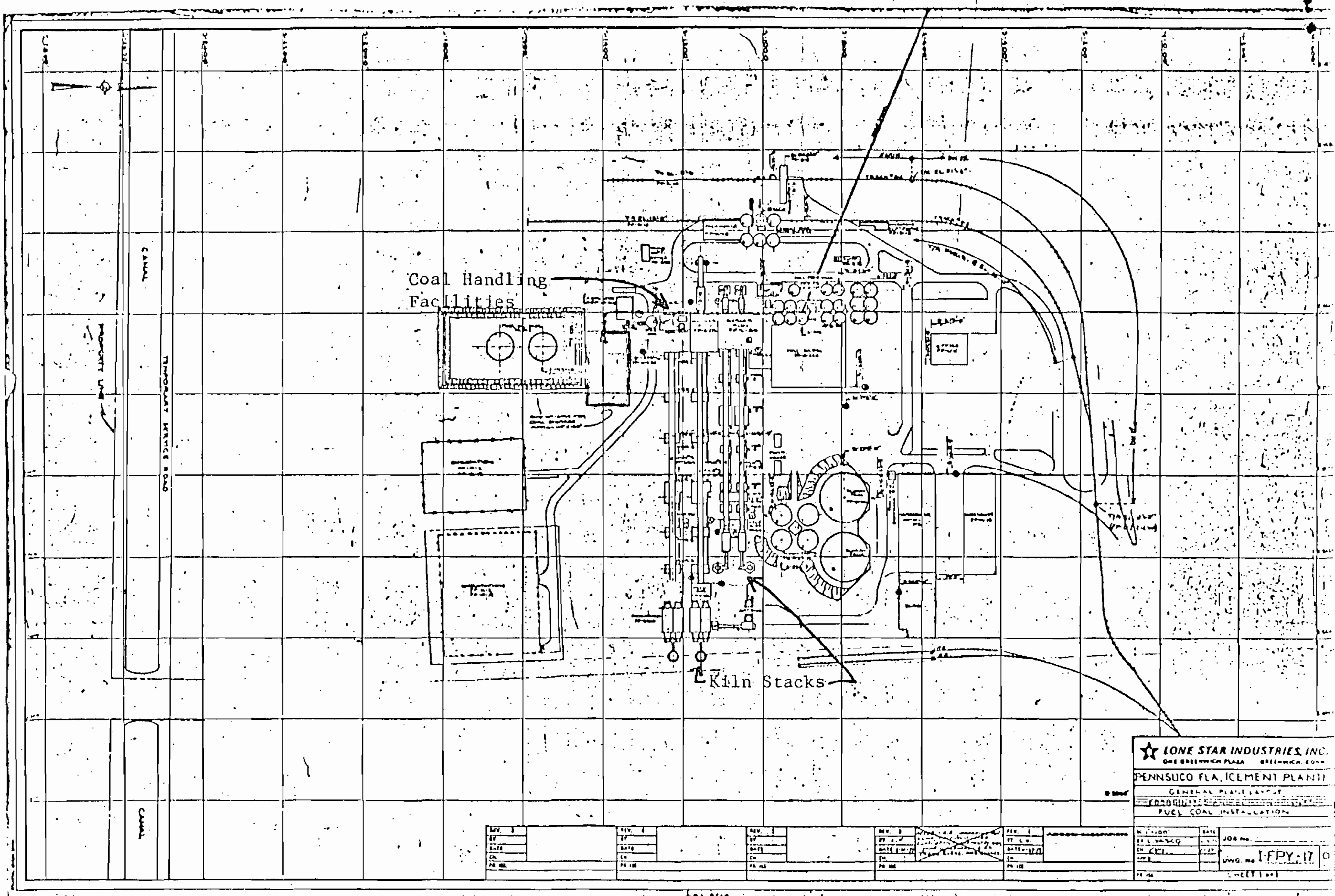


kiln #1

ATTACHMENT: SECTION V, ITEM 5, PAGE 5

Calculations from attached stack test:

No. 1 Kiln

Raw Feed - 39.35 T/hr. (dry) @ 0.08% SO_3

Feed to Clinker ratio = 1.62

Clinker Production = 24.3 T/hr.

Energy Consumption = 6.6 MM BTU/ T. Clinker

Fuel Oil - 18,360 BTU/# @ 2.38% S.

Fuel Oil Consumption

$$\frac{6.6 \times 24.3}{0.01836} = 8{,}735 \text{ \#/hr.}$$

Sulfur into the system

Feed -

$$39.35 \times 2000 \times 0.0008 \times \frac{32}{80} = 25.2 \text{ \#/hr.}$$

Fuel -

8,735 x 0.0238 = 207.9 #/hr.

Total S. = 233.1 #/hr.

Total in as SO_2 = 466.2 #/hr.

SO_2 Emission

Test data = 0.2519 #SO_2/MM BTU

Total SO_2 Emission = 0.2519 x 24.3 x 6.6 = 40.4 #/hr.

Absorption Factor

$$\frac{466.2 - 40.4}{466.2} = 91.3\%$$

Kiln # 1

Kiln # 2 same as 1

Section V, Item 2 Emission Estimates (continued)

Sulfur Dioxide

Calculations based upon 0.08% SO_3 in raw feed, 2.0% S coal, and 91.3% SO_2 removal inherent in process based upon stack test results.

Coal:

Feed: 81,000 #/hr. x 0.0008 x $\frac{32}{80}$ = 25.92 #S/hr. ✓

Fuel: 15,000 #/hr. x 0.02 = 300.0 #S/hr. ✓

Total Input SO_2: = x 2

651.84 #SO_2/hr.

Maximum emitted = 651.84 x (1 - 0.913) = 56.7 #SO_2/hr.

Annual & Potential = 56.7 #/hr x 8760 hr/yr ÷ 2000 #/ton = 248.4 TPY

Gas:

Feed: 81,000 #/hr x 0.0008 x $\frac{32}{80}$ = 25.92 #S/hr.

x2

Total Input = 51.84 #SO_2/hr.

Maximum Emitted = 51.84 #/hr x (1 - 0.913) = 4.5 #SO_2/hr.

Annual & Potential = 4.5#/hr x 8760 ÷ 2000 = 19.7 TPY

Oil: Base on recent stack test (June, 1979)

Maximum emitted = 0.2519 #/MM BTu x 180 MM BTu/hr = 45.3 # SO_2/hr

Annual & Potential = 45.3 #/hr x 8760 ÷ 2000 = 198.6 TPY

kiln #3

ATTACHMENT: SECTION V, ITEM 5, PAGE 5

Calculations from attached stack test:

No. 3 Kiln

Raw Feed - 135.1 T/hr. (dry) @ 0.08% SO_3

Feed to Clinker ratio 1.62 to 1

Clinker Production = 83.4 T/hr.

Energy Consumption 5.6 MM BTU/T. Clinker

Fuel Oil - 18,360 BTU/# @ 2.38 % S.

Fuel Oil Consumption

$$\frac{5.6 \text{ MM BTU}}{\text{T.Clinker} \times 0.01836 \text{ MM BTU/\#}} \times \frac{83.4 \text{ T. Clinker}}{\text{hr.}} = \quad 25,438 \text{ \#/hr. of fuel oil}$$

Sulfur into the system

Feed -

$$135.1 \times 2000 \times 0.0008 \times \frac{32}{80} = 86.4 \text{ \#/hr.}$$

Fuel -

25,438 x .0238 =	605.4 #/hr.
Total S. =	691.8 #/hr.
As SO_2 =	1,383.6 #/hr.

SO_2 Emission

Test Data = 0.397 #SO_2/MM BTU

Total SO_2 Emission = 0.397 x 83.4 x 5.6 = 18.5 #/hr.

Absorption Factor

$$\frac{1383.6 - 18.5}{1383.6} = 98.7 \%$$

Kiln # 3

Section V, Item #2: Emission Estimates

Sulfur Dioxide:

Calculation based upon 0.08% SO_3 in raw feed, 2.0% coal and 98.7% SO_2 removal inherent inprocess based upon stack test results.

Coal: based on recent stack test on similar sulfur content oil

Sulfur input:
feed: 283,500 lbs/hr x 0.0008 x 32/80 = 90.72 #/hr
fuel: 46,000 lbs/hr x 0.02 = 920.00 #/hr

Total input: 1010.72 #/hr. sulfur
x2
=2021.44 #/hr SO_2

Maximum emitted=2021.44 #/hr x (1-.987) = 26.28 #/hr.
Annual & Potential=26.28 #/hr x 8760 ÷ 2000 = 115.1 TPY

Gas: 283,500 lbs/hr x 0.0008 x 32/80 x 2 x (1-.987) = 2/36 #/hr SO_2
Annual & Potential =2.36 #/hr x 8760 ÷ 2000 = 10.3 TPY

Oil: Based on recent stack test at 2.37% sulfur, #6 fuel oil

0.0397 #/MMBTU x 552 MMBTU/hr. (max.) = 21.9 #/hr
Annual & Potential = 21.9 #/hr x 8760 ÷ 2000 = 95.9 TPY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

RECEIVED FEB 1980 BUREAU AQM

PAID FEB - 9 1980 Dept. of Environmental Reg. West Palm Beach

SOURCE TYPE: Portland Cement Kiln #2 [ ] New[1] [X] Existing[1]

APPLICATION TYPE: [ ] Construction [ ] Operation [X] Modification

COMPANY NAME: Lonestar Florida/Pennsuco, Inc. COUNTY: Dade

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Kiln #2 with electrostatic precipitator

SOURCE LOCATION: Street 11000 N.W. 121 St. City Hialeah

UTM: East 562.75 North 2861.25

Latitude ___ ° ___ ' ___ "N Longitude ___ ° ___ ' ___ "W

APPLICANT NAME AND TITLE: Albert W. Townsend, Coordinator Ecological Planning

APPLICANT ADDRESS: P.O. Box 2035, P.V.S., Hialeah, FL 33012

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Lonestar Florida/Pennsuco, Inc.

I certify that the statements made in this application for a fuel conversion (modification) permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Albert W. Townsend

Albert W. Townsend, Coordinator Ecological Planning
Name and Title (Please Type)

Date: 2-8-80 Telephone No. (305) 823-8800

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

RECEIVED FEB 8 1980 Dept. of Environmental Reg. West Palm Beach

Signed: David A. Buff

David A. Buff
Name (Please Type)

Environmental Science and Engineering, Inc.
Company Name (Please Type)

P.O. Box 13454, Gainesville, FL 32604
Mailing Address (Please Type)

(Affix Seal) DAVID A. BUFF CERTIFICATE NO. 19011 STATE OF FLORIDA REGISTERED ENGINEER

Florida Registration No. 19011 Date: 2-8-80 Telephone No. (904) 372-3318

[1]See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

SEE ATTACHMENT

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction As soon as permit issued Completion of Construction 12/31/81

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

NA

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

AO 13-8961 issued June 1, 1978 expires May 1, 1983

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? _____ Yes X No

F. Normal equipment operating time: hrs/day 24; days/wk 7; wks/yr 52; if power plant, hrs/yr _____;

if seasonal, describe:

G. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes
   a. If yes, has "offset" been applied? No
   b. If yes, has "Lowest Achievable Emission Rate" been applied? No
   c. If yes, list non-attainment pollutants.
      Ozone
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

See Attached Sheet

ATTACHMENT, P. 2, ITEM II-A

Kiln # ~~1~~ 2 will be modified to utilize coal as a primary fuel source, rather than natural gas or fuel oil. Particulate emissions, which will not increase due to this proposed modification, will be controlled by an existing electrostatic precipitator. SO_2 emissions will be substantially reduced through limestone absorption during combustion. The modification will result in full compliance with applicable standards.

SECTION II, ITEM G: SUPPORTIVE INFORMATION AND JUSTIFICATIONS

1. Dade County has been designated as a nonattainment area for ozone (Federal Register, Vol. 44, No. 9.) The area is in attainment for all other pollutants.
   a. Non-methane hydrocarbon emissions will not increase as a result of this modification, therefore offsets are not required (Federal Register, Vol. 44, No. 11).
   b. Not applicable, see Item (a).

2. U.S. EPA Requirements: Allowable emissions of all pollutants, except sulfur dioxide, will not increase by greater than 50 tons per year, and are therefore exempt from BACT review (Federal Register, Vol. 43 No. 118).

   FDER Requirements: BACT review is required if any increase over the baseline concentration results due to the modification.

   Since only sulfur dioxide emissions will increase as the result of this modification, BACT is required only for this pollutant.

3. Potential emissions of sulfur dioxide will be greater than 100 tons per year and allowable emissions of sulfur dioxide will increase by greater than 50 tons per year. (see emission estimates).

4. New Source Performance Standards (NSPS) for Portland Cement plants apply only to emissions of particulate matter. This application does not encompass any physical change or change in operation which will increase partculate emissions. A "modification" as that term is used to apply NSPS, only includes changes which increase emissions of a pollutant to which a standard applies. Since this application does not propose such a change, state standards for existing Portland Cement plants are applicable and will be complied with.

5. Self Explanatory

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Limestone	Particulate	6.66*	71,037	
Staurolite	Particulate	0.44*	4,698	
Bottom Ash (Mineral Aggregates)	Particulate	0.29*	3,078	
Sand	Particulate	0.55*	2,187	

*Based on the proportion of estimated uncontrolled emissions From AP-42

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 81,000 (not including coal utilization)

2. Product Weight (lbs/hr): 50,000

C. Airborne Contaminants Emitted:

See Attachment

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Koppers Electrostatic	Particulate	99+	0.1 - 80	Attached
Precipitator (Existing)				Stack Test

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. — 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard

[4]Emission, if source operated without control (See Section V, Item 3)

[5]If Applicable

Section III, Item C Airborne Contaminants Emitted

Name of Contaminant	Emissions Maximum #/Hr.	Emissions Actual T/Yr.	Allowed Emissions Rate Per Chapter 17-2, F.A.C.	Allowable Emissions #/Hr. Coal	Allowable Emissions #/Hr. Gas/Oil	Potential Emissions #/Hr.	Potential Emissions T/Yr.	Relate To Flow Diagram
Particulate	32.2	140.9	17-2.05 (2) Process Weight Table	32.2	31.3	5,700	24,966	A
<u>Coal Fired</u>								
Sulfur Dioxide	56.7	248.4	NA	NA	NA	56.7	248.4	A
Nitrogen Oxide	42.3	185.3	NA	NA	NA	42.3	185.3	A
Hydrocarbons	Neg	Neg	NA	NA	NA	NA	NA	A
Carbon Monoxide	Neg	Neg	NA	NA	NA	NA	NA	A
<u>Gas Fired</u>								
Sulfur Dioxide	4.5	19.7	NA	NA	NA	4.5	19.7	A
Nitrogen Oxide	169.3	741.3	NA	NA	NA	169.3	741.3	A
Hydrocarbons	Neg	Neg	NA	NA	NA	NA	NA	A
Carbon Monoxide	Neg	Neg	NA	NA	NA	NA	NA	A
<u>Oil Fired</u>								
Sulfur Dioxide	45.3	198.6	NA	NA	NA	45.3	198.6	A
Nitrogen Oxides	112.1	491.0	NA	NA	NA	112.1	419.0	A
Hydrocarbon	Neg	Neg	NA	NA	NA	NA	NA	A
Carbon Monoxide	Neg	Neg	NA	NA	NA	NA	NA	A

Section V, Item 2: Emission Estimates

Particulates:

Coal, Gas and Oil: The fuel switch to coal will decrease the required bottom ash input to make clinker; therefore, particulate emissions from this fuel switch will not increase. The stack test attached (June, 1979) accurately predicts the expected particulate emissions.

Maximum = Allowable (Process Weight Table) = $17.31\ P^{0.16} = 17.31\ (48)^{0.16} = 32.2$ #/hr.

Annual = 32.2 #/hr. x 8760 hrs/yr ÷ 2000 #/ton = 140.85 TPY

Potential: Based on AP-42 Uncontrolled emission factor of 228 #/ton
228 #/ton x 25 ton/hr = 5700 #/hr.
5700 #/hr x 8760 hr/yr ÷2000 #/ton = 24,966 TPY

Section V, Item 2 Emission Estimates (continued)

Sulfur Dioxide

Calculations based upon 0.08% SO_3 in raw feed, 2.0% S coal, and 91.3% SO_2 removal inherent in process based upon stack test results.

Coal:

Feed: 81,000 #/hr. x 0.0008 x $\frac{32}{80}$ = 25.92 #S/hr.

Fuel: 15,000 #/hr. x 0.02 = 300.0 #S/hr.

Total Input SO_2: = x 2

651.84 #SO_2/hr.

Maximum emitted = 651.84 x (1 - 0.913) = 56.7 #SO_2/hr.

Annual & Potential = 56.7 #/hr x 8760 hr/yr ÷ 2000 #/ton
= 248.4 TPY

Gas:

Feed: 81,000 #/hr x 0.0008 x $\frac{32}{80}$ = 25.92 #S/hr.
x2

Total Input = 51.84 #SO_2/hr.

Maximum Emitted = 51.84 #/hr x (1 - 0.913) = 4.5 #SO_2/hr.

Annual & Potential = 4.5#/hr x 8760 ÷ 2000 = 19.7 TPY

Oil: Base on recent stack test (June, 1979)

Maximum emitted = 0.2519 #/MM BTu x 180 MM BTu/hr = 45.3 # SO_2/hr

Annual & Potential = 45.3 #/hr x 8760 ÷ 2000 = 198.6 TPY

Nitrogen Oxides:

Coal:

From NO_x stack tests (see attached summary sheet), NO_x emissions on gas were 565 #/hr @ 83.4 TPH clinker production, or 6.77 #/ton.

Attached literature, "NO Reductions in the Portland Cement Industry With Conversion to Coal Firing," cites a 75% reduction in NO_x when converting from gas to coal.

Maximum emissions: 6.77 #/ton x 0.25 x 25 TPH = 42.3 #/hr
Annual = 42.3 #/hr x 8760 ÷ 2000 = 185.3 TPY

Gas:

Used June, 1979 stack test on Kiln #3 and proportioned with heat input.

6.77 #/ton x TPH = 169.3 # NO_x/hr.

Annual & Potential = 169.3 #/hr. x 8760 ÷ 2000 = 741.3 TPY

Oil:

Used June, 1979 stack test on Kiln #3 and proportioned with heat input.

374 #NO_x/hr ÷ 83.4 TPH = 4.48 #NO_x/ton

4.48 #/ton x 25.0 TPH = 112.1 #NO_x/hr

Annual & Potential =112.1 #/hr. x 8760 ÷ 2000 = 491.0 TPY

EMISSION ESTIMATES

Results of Nitrogen Oxides Stack Tests on Kiln No. 3 at LSF/P

Date	Process Rate (dry tons/hr)	Fuel	Run	Oxygen Content in Kiln (%)	NO_2 Emissions (lbs/hr)	NO_2 Emissions (ppm)
3/27/79	150.9	Gas	1	1.7	544*	544
	150.9	Gas	2	1.7	864*	863
	150.9	Gas	3	1.7	514*	514
	150.9	Gas	4	1.7	790*	789
	150.9	Gas	5	1.7	295*	294
	150.9	Gas	6	1.7	382*	381
AVERAGE					565*	564
3/30/79	150.1	Oil	1	2.1	312	288
	150.1	Oil	2	2.1	331	306
	150.1	Oil	3	2.1	279	258
	150.1	Oil	4	2.1	478	442
	150.1	Oil	5	2.1	469	434
AVERAGE					374	346

*Based on the same gas flow rate as oil firing.

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Coal	12,000	15,000	180
Gas	0.14	.18	180
Fuel Oil	23.6	29.6	180

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:	Coal	Gas	Oil			Coal	Gas	Oil	
Percent Sulfur:	2.0	0.0	2.37		Percent Ash:	10-12%	0	<1%	
Density:	N/A	N/A	8.34	lbs/gal	Typical Percent Nitrogen:	3%	0	<1%	
Heat Capacity:	12000	N/A	17,386	BTU/lb		N/A	N/A	145,000	BTU/gal

Other Fuel Contaminants (which may cause air pollution): NA

F. If applicable, indicate the percent of fuel used for space heating. Annual Average NA Maximum ______

G. Indicate liquid or solid wastes generated and method of disposal.

Captured dust is reintroduced into system or sold. No liquid waste

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 200 ft. Stack Diameter: 6.89 ft.

Gas Flow Rate: 118,889 ACFM Gas Exit Temperature: 360 °F.

Water Vapor Content: 24 % Velocity: 50.9 FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste ______

Total Weight Incinerated (lbs/hr) ______ Design Capacity (lbs/hr) ______

Approximate Number of Hours of Operation per day ______ days/week ______

Manufacturer ______

Date Constructed ______ Model No. ______

	Volume (ft)^3	Heat Release (BTU/hr)	Fuel		Temperature (^oF)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______________ ft. Stack Diameter ______________ Stack Temp. ______________

Gas Flow Rate: ______________ ACFM ______________ DSCFM* Velocity ______________ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) ______________

Brief description of operating characteristics of control devices: ______________

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation.
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.,) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.).
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

ATTACHMENT: SECTION V, ITEM 5, PAGE 5

Calculations from attached stack test:

No. 1 Kiln

Raw Feed - 39.35 T/hr. (dry) @ 0.08% SO_3

Feed to Clinker ratio = 1.62

Clinker Production = 24.3 T/hr.

Energy Consumption = 6.6 MM BTU/ T. Clinker

Fuel Oil - 18,360 BTU/# @ 2.38% S.

Fuel Oil Consumption

$$\frac{6.6 \times 24.3}{0.01836} = 8,735 \text{ \#/hr.}$$

Sulfur into the system

Feed -

$$39.35 \times 2000 \times 0.0008 \times \frac{32}{80} = 25.2 \text{ \#/hr.}$$

Fuel -

8,735 x 0.0238 =	207.9 #/hr.
Total S. =	233.1 #/hr.
Total in as SO_2 =	466.2 #/hr.

SO_2 Emission

Test data = 0.2519 #SO_2/MM BTU

Total SO_2 Emission = 0.2519 x 24.3 x 6.6 = 40.4 #/hr.

Absorption Factor

$$\frac{466.2 - 40.4}{466.2} = 91.3\%$$

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[ ] Yes [X] No

Contaminant	Rate or Concentration
Sulfur Dioxide	No Standard

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [ ] No

Contaminant	Rate or Concentration
SO_2	100% of potential emission rate

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
SO_2	100% of potential emission rare

D. Describe the existing control and treatment technology (if any).

1. Control Device/System: See attached stack test and absorption calculations which document the high rate of removal of SO_2 inherent in the kiln.
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1. Due to the inherent removal of SO_2 (91.3% as documented in the attached stack test) it is considered impractical and economically unfeasible to evaluate other treatment technology.

a. Control Device: Other technologies such as a baghouse would not significantly reduce

b. Operating Principles: SO_2 emissions and would require substantial cash outlays and replacement of the existing E.S.P.

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power — KWH design rate.

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected: See Section VI. E. above

1. Control Device:
2. Efficiency*:
3. Capital Cost:
4. Life:
5. Operating Cost:
6. Energy:
7. Maintenance Cost:
8. Manufacturer:
9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

Sulphur dioxide emissions will be controlled by utilizing coal having a sulphur contect of no greater than 2%. In addition, any SO_2 emissions from burning this low sulphur coal will be reduced through limestone absorption in the cement clinker product. This inherent removal of SO_2 is estimated to be 91.3% efficient or greater based upon stack tests performed on this kiln.

Alternative controls for SO_2 were rejected since retrofitting the existing kiln with additional control devices would have only a minimal effect on emissions and would prohibit the company from implementing the conversion to coal.

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data N/A

1. ______ no sites ______ TSP ______ ( ) SO^2* ______ Wind spd/dir

Period of monitoring ___/___/___ to ___/___/___ (month day year to month day year)

Other data recorded ______

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? ____ Yes ____ No

b) Was instrumentation calibrated in accordance with Department procedures? ____ Yes ____ No ____ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 1 / 1 / 70 to 12 / 31 / 74 (month day year to month day year)

2. Surface data obtained from (location) Miami

3. Upper air (mixing height) data obtained from (location) Miami

4. Stability wind rose (STAR) data obtained from (location) NA

C. Computer Models Used

1. CRSTER Single Source ______ Modified? If yes, attach description.

2. PTMTP-W ______ Modified? If yes, attach description.

3. ______ Modified? If yes, attach description.

4. ______ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	See Section III, C. grams/sec
SO^2	See Section III, C. grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

See Attached

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT

Page 10, Item VII (G)

The switch to coal as a primary fuel will have a minimal impact on air quality and at the same time will assume a plentiful supply of fuel for years to come. Supplies of oil and natural gas are of uncertain duration, and the cost of these scarce resources continues to rise. Without the fuel conversion, an interruption in oil or gas deliveries could result in plant shutdowns, or production curtailments with enormous economic consequences.

The abundance of coal, in comparison with oil and natural gas, is well documented. Coal constitutes approximately 90% of the nation's known energy reserves, yet currently supplies only 18% of the nation's energy consumption. The policy of the federal government is committed to increased coal utilization by industry. Conversions such as the modification proposed herein is in accord with this national policy, and at the same time will have minimal environmental impacts.

State of Florida

Department of State

I certify from the records of this office that LONESTAR FLORIDA PENNSUCO, INC. is a corporation organized under the laws of the State of Delaware, authorized to transact business within the State of Florida, qualified on January 4, 1978.

The charter number for this corporation is 839774.

I further certify that said corporation has filed all annual reports and paid all annual report filing fees due this office through December 31, 1979, and its status is active.

Given under my hand and the
Great Seal of the State of Florida,
at Tallahassee, the Capital, this the
6th day of Feb., 1980

GREAT SEAL OF THE STATE OF FLORIDA
IN GOD WE TRUST

George Firestone
Secretary of State

CER 101 Rev. 5-79

LONESTAR FLORIDA/PENNSUCO, INC.
6451 N. Federal Highway
Ft. Lauderdale, Florida 33308

February 15, 1979

State of Florida
Department of Environmental Regulation
and/or
Various Counties Within Florida

Gentlemen:

This letter authorizes the signatures of either Mr. Albert W. Townsend, Coordinator of Ecological Planning or Mr. Carl R. Metzgar, Manager Administrative Services, for the purpose of permit changes, applications and renewals.

Very truly yours,

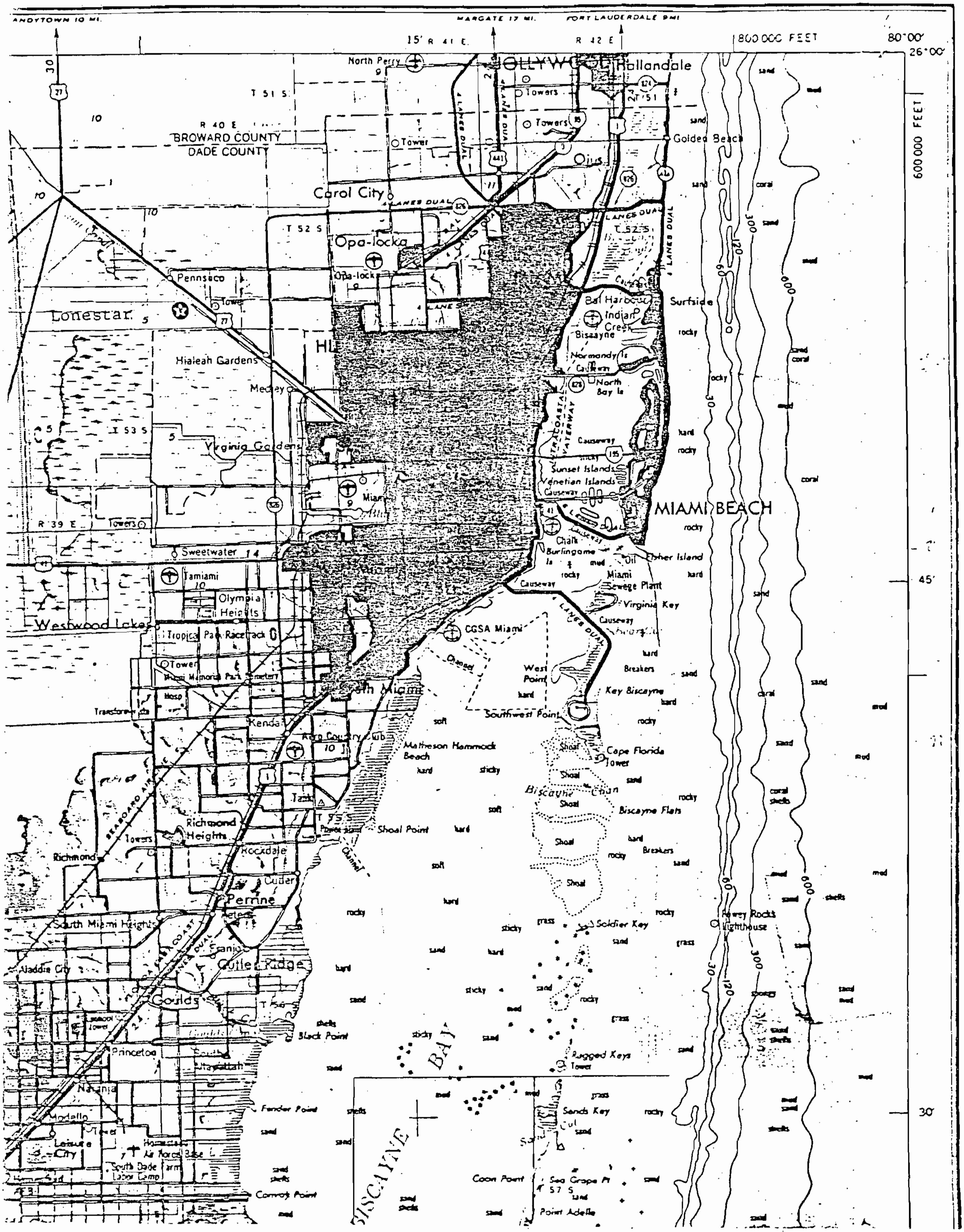
LONESTAR FLORIDA PENNSUCO, INC.

Paul N. Stoms
President

CRM/jh

BEST AVAILABLE COPY

NG 17-8



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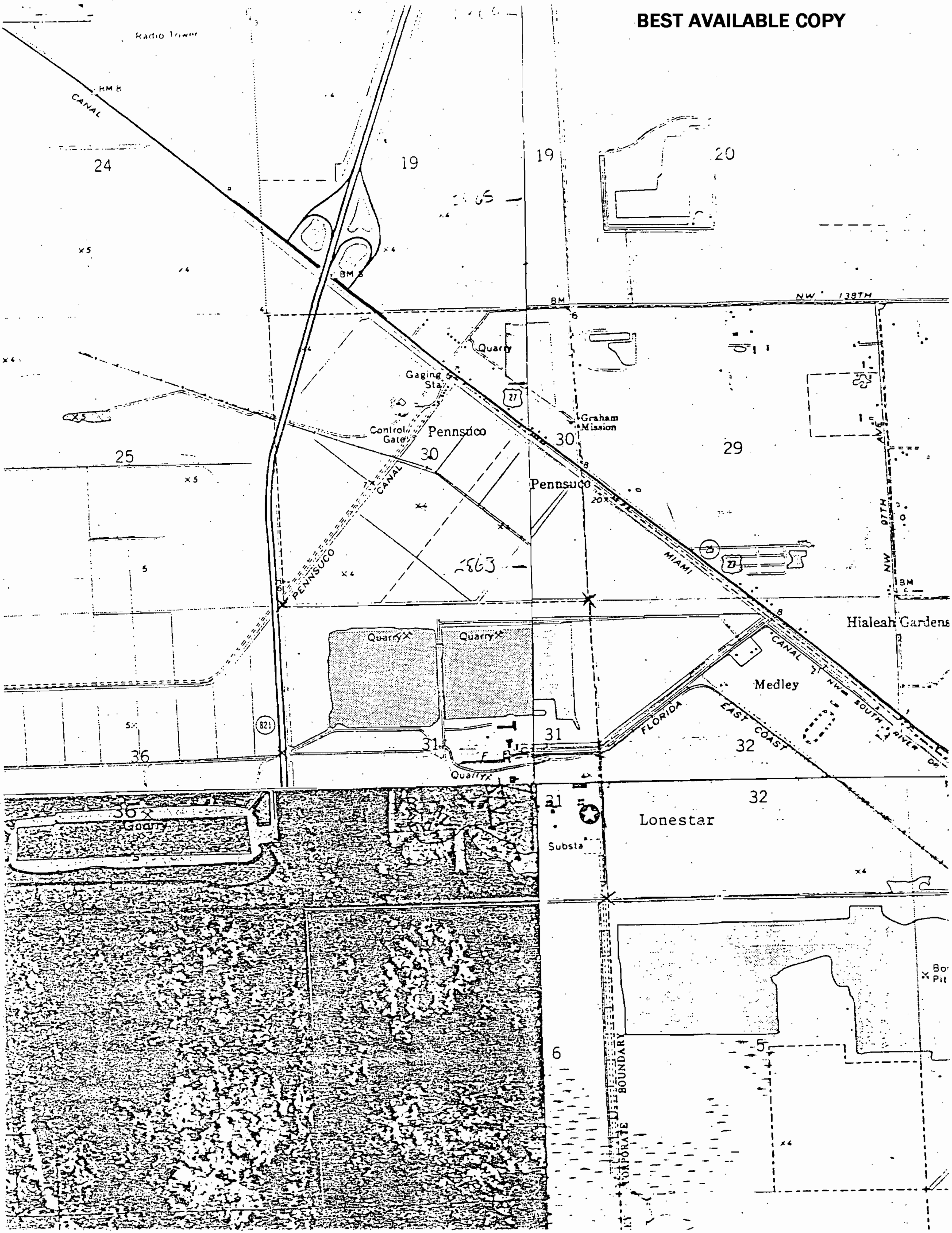

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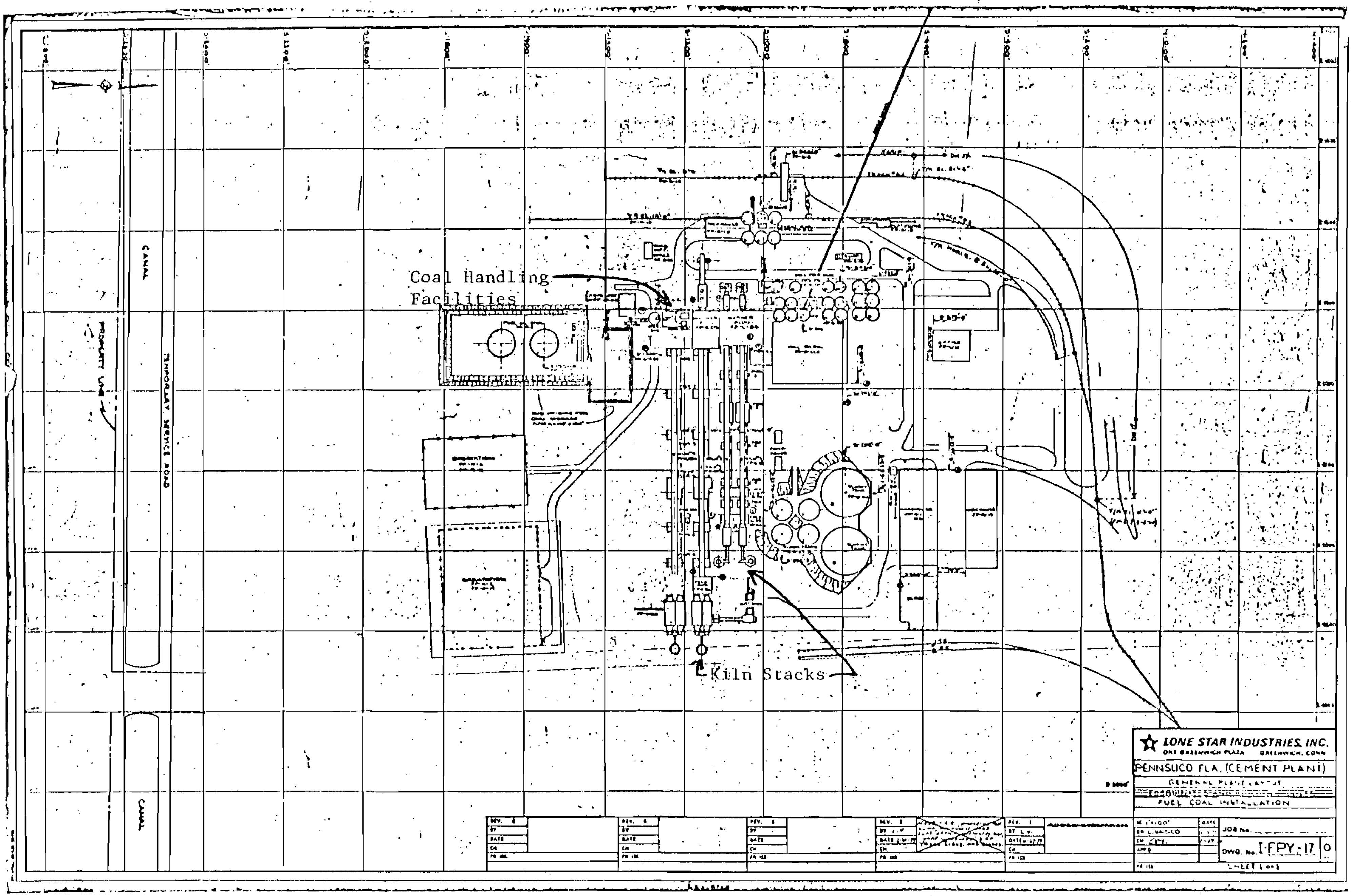

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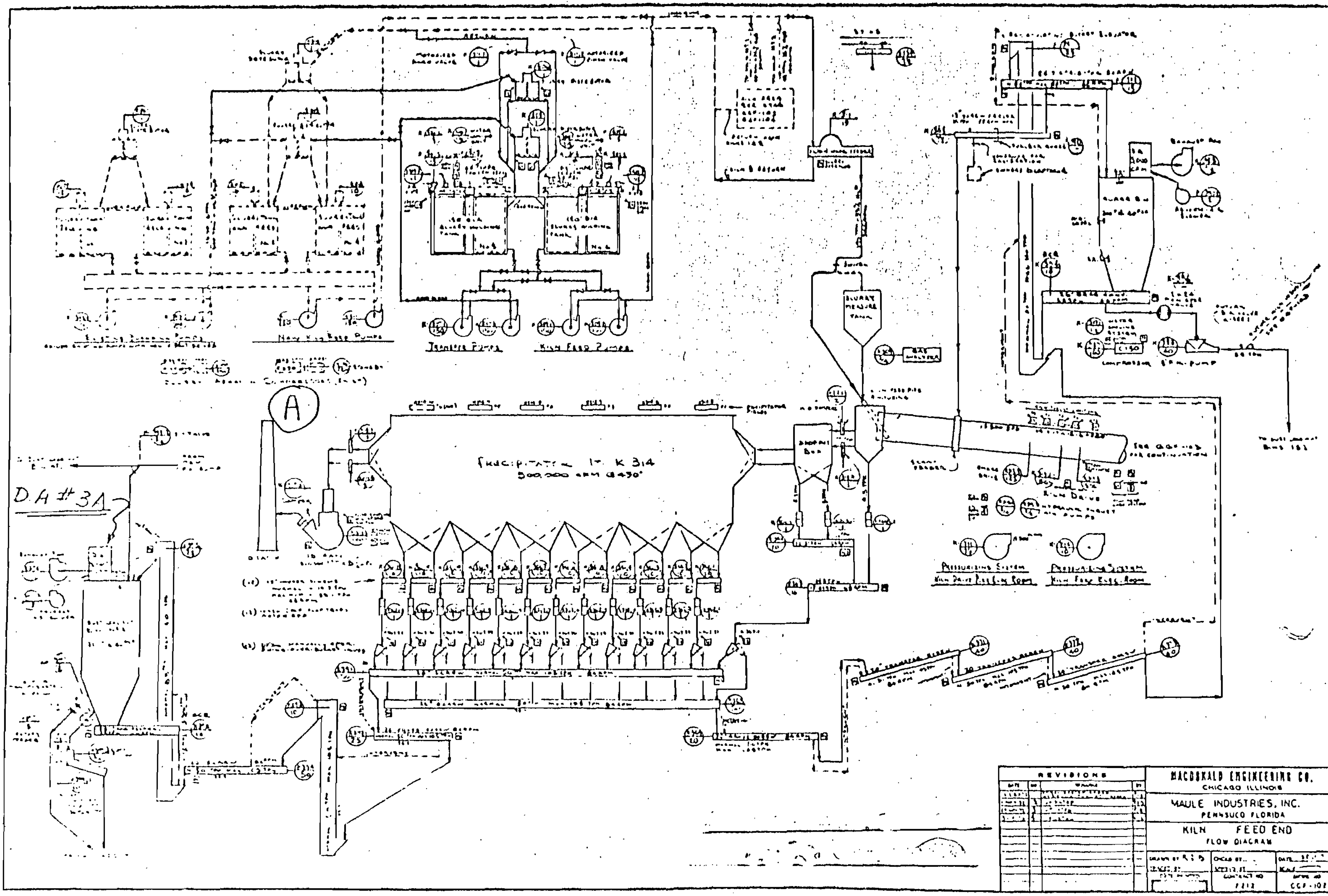


STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

PAID
RECEIVED FEB - 1980 BUREAU OF A Q M
Dept. of Environmental Reg. West Palm Beach

SOURCE TYPE: Portland Cement Kiln #3 [ ] New[1] [X] Existing[1]

APPLICATION TYPE: [ ] Construction [ ] Operation [X] Modification

COMPANY NAME: Lonestar Florida/Pennsuco, Inc. COUNTY: Dade

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Kiln #3 with Electrostatic Precipitator

SOURCE LOCATION: Street 11000 N. W. 121 Street City Hialeah

UTM: East 562.75 North 2861.65

Latitude ____ ° ____ ' ____ "N Longitude ____ ° ____ ' ____ "W

APPLICANT NAME AND TITLE: Albert W. Townsend, Coordinator of Ecological Planning

APPLICANT ADDRESS: P. O. Box 2035, P.V.S., Hialeah, Florida 33012

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Lonestar Florida/Pennsuco, Inc.

I certify that the statements made in this application for a Fuel Conversion (Modification) permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Albert W. Townsend

Albert W. Townsend, Coordinator of Ecological Planning
Name and Title (Please Type)

Date: 2-8-80 Telephone No. (305) 823-8800

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

RECEIVED FEB 8 1980 Dept. of Environmental Reg. West Palm Beach

Signed: David A. Buff

David A. Buff
Name (Please Type)

Environmental Science & Engineering, Inc.
Company Name (Please Type)

P. O. Box 13454, Gainesville, Florida 32604
Mailing Address (Please Type)

(Affix Seal) DAVID A. BUFF CERTIFICATE NO. 19011 STATE OF FLORIDA REGISTERED ENGINEER

Florida Registration No. 19011 Date: 2-8-80 Telephone No. (904) 372-3318

[1]See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

SEE ATTACHMENT

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction As soon as permit issued Completion of Construction 12/31/81

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

NA

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

AO 13-8960 issued May 12, 1978 expires May 1, 1983

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes X No

F. Normal equipment operating time: hrs/day 24; days/wk 7; wks/yr 52; if power plant, hrs/yr ____;

if seasonal, describe:

G. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes
   a. If yes, has "offset" been applied? No
   b. If yes, has "Lowest Achievable Emission Rate" been applied? No
   c. If yes, list non-attainment pollutants.

      Ozone
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

See Attached Sheet

ATTACHMENT, P. 2, ITEM II-A

Kiln # 3 will be modified to utilize coal as a primary fuel source, rather than natural gas or fuel oil. Particualte emissions, which will not increase due to this proposed modification will be controlled by an existing electrostatic precipitator. SO_2 emissions will be substantially reduced through limestone absorption during combustion. The modification will result in full compliance with applicable standards.

SECTION II, ITEM G: SUPPORTIVE INFORMATION AND JUSTIFICATIONS

1. Dade County has been designated as a nonattainment area for ozone (Federal Register, Vol. 44, No. 9.) The area is in attainment for all other pollutants.
   a. Non-methane hydrocarbon emissions will not increase as a result of this modification, therefore offsets are not required (Federal Register, Vol. 44, No. 11).
   b. Not applicable, see Item (a).

2. U.S. EPA Requirements: Allowable emissions of all pollutants, except sulfur dioxide, will not increase by greater than 50 tons per year, and are therefore exempt from BACT review (Federal Register, Vol. 43 No. 118).

   FDER Requirements: BACT review is required if any increase over the baseline concentration results due to the modification.

   Since only sulfur dioxide emissions will increase as the result of this modification, BACT is required only for this pollutant.

3. Potential emissions of particulate matter, sulfur dioxide and nitrogen oxides will be greater than 100 tons per year and allowable emissions of sulfur dioxide will increase by greater than 50 tons per year. (see emission estimates).

4. This application does not propose a change which increases particulate emissions. Accordingly, NSPS for Portland Cement kilns is not applicable to this application. As shown on the attached stack tests, this kiln complies with NSPS; Because this application only involves a fuel switch to coal, and particulate emissions will not increase, the attached stack test results may be assumed to accurately predict particulate emissions resulting from this change.

   By using coal as a primary fuel, less bottom ash (in the raw feed) is required for clinker production. This reduction in bottom ash requirements inherently negates the potential to create additional particulate emissions will remain unchanged or could be reduced as a result of the fuel switch.

5. Self explanatory.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Limestone	Particulate	6.66*	248629.5	Drawing 66F-102 K-311
Staurolite	Particulate	0.44*	16443.0	Drawing 66F-102
Bottom Ash (Mineral Aggregates)	Particulate	0.29*	10773.0	Drawing 66F-102
Sand	Particulate	0.55*	7654.5	Drawing 66F-102

*Based on the proportion of estimated uncontrolled emissions From AP-42

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 283,500

2. Product Weight (lbs/hr): 175,000

C. Airborne Contaminants Emitted:

See Attachment

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Koppers Electrostatic	Particulate	99.97	0.1 - 80	Attached
Precipitator Model				Stack Test
#370672-75 (Existing)				

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. — 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard

[4]Emission, if source operated without control (See Section V, Item 3)

[5]If Applicable

Section III, Item C Airborne Contaminants Emitted

Name of Contaminant	Emissions Maximum #/Hr.	Emissions Actual T/Yr.	Allowed Emissions Rate Per Chapter 17-2, F.A.C.	Allowable Emissions #/Hr.	Potential Emissions #/Hr.	Potential Emissions T/Yr.	Relate To Flow Diagram
Particulate	42.5	186.2	17-2.05(6) Table II, F(2) 0.3 lb/ton of feed to kiln	42.5	19,950	87,381	66F 102 K 3/4
<u>Coal Fired</u>							
Sulfur Dioxide	26.3	115.2	N/A	N/A	26.3	115.1	66F 102 K 3/4
Nitrogen Oxide	148.1	648.7	N/A	N/A	148.1	648.7	66F 102 K 3/4
Hydrocarbons	Neg.	Neg.	N/A	N/A	N/A	N/A	
Carbon Monoxide	Neg.	Neg.	N/A	N/A	N/A	N/A	66F 102 K 3/4
<u>Gas Fired</u>							
Sulfur Dioxide	2.4	10.3	N/A	N/A	2.4	10.3	66F 102 K 3/4
Nitorgen Oxide	565	2474.7	N/A	N/A	565	2474.7	66F 102 K 3/4
Hydrocarbons	Neg.	Neg.	N/A	N/A	N/A	N/A	66F 102 K 3/4
Carbon Monoxide	Neg.	Neg.	N/A	N/A	N/A	N/A	66F 102 K 3/4
<u>Oil Fired</u>							
Sulfur Dioxide	21.9	95.9	N/A	N/A	21.9	95.9	66F 102 K 3/4
Nitrogen Oxides	374	1638.1	N/A	N/A	37.4	1638.1	66F 102 K 3/4
Hydrocarbon	Neg.	Neg.	N/A	N/A	N/A	N/A	66F 102 K 3/4
Carbon Monoxide	Neg.	Neg.	N/A	N/A	N/A	N/A	66F 102 K 3/4

Section V, Item 2: Emission Estimates

Particulates:

Coal: Particulate emissions will not increase because of the decrease in required bottom ash input to make clinker. Therefore, the stack tests attached (June, 1979) accurately predicts the acutal emissions. See note accompanying item II. G, 4, above.

Maximum emission = 42.5 #/hr = allowable based on 0.3 lb/ton
Annual = 42.5 #/hr x 8760 ÷ 2000 = 186.2 TPY

Potential: Use AP-42 uncontrolled emission factor of 228 #/ton
87.5 ton/hr x 228 #/ton = 19,950 #/hr
19,950 #/hr x 8760 ÷ 2000 - 87,381 TPY

Gas: See Stack Test June, 1979.

Oil: See Stack Test June, 1979.

Section V, Item #2: Emission Estimates

Sulfur Dioxide:

Calculation based upon 0.08% SO_3 in raw feed, 2.0% coal and 98.7% SO_2 removal inherent inprocess based upon stack test results.

Coal: based on recent stack test on similar sulfur content oil

Sulfur input:
feed: 283,500 lbs/hr x 0.0008 x 32/80 = 90.72 #/hr
fuel: 46,000 lbs/hr x 0.02 = 920.00 #/hr

1010.72 #/hr. sulfur

Total input:

x2

=2021.44 #/hr SO_2

Maximum emitted=2021.44 #/hr x (1-.987) = 26.28 #/hr.
Annual & Potential=26.28 #/hr x 8760 ÷ 2000 = 115.1 TPY

Gas: 283,500 lbs/hr x 0.0008 x 32/80 x 2 x (1-.987) = 2/36 #/hr SO_2
Annual & Potential =2.36 #/hr x 8760 ÷ 2000 = 10.3 TPY

Oil: Based on recent stack test at 2.37% sulfur, #6 fuel oil

0.0397 #/MMBTU x 552 MMBTU/hr. (max.) = 21.9 #/hr
Annual & Potential = 21.9 #/hr x 8760 ÷ 2000 = 95.9 TPY

Section V, Item: 2 : Emission Estimates

Nitrogen Oxides:

Coal: (See kiln #1 application)

Maximum emissions= 6.77 #/ton x 0.25 x 87.5 TPH = 148.1 #/hr

Annual = 148.1 #/hr x 8760 ÷ 2000 = 648.7 TPY

Gas: Based on recent stack test June, 1979

Maximum emissions = 565 #/hr. of NO_x

Annual & Potential = 565 #/hr x 24 hrs/day x 365 days/yr ÷ 2000 #/ton = 2474.7 tons/yr

Oil: Based on recent stack test June, 1979

Maximum emission = 374 #/hr of NO_x

Annual & Potential = 374 #/hr x 24 hrs/day x 365 days/yr ÷ 2000 #/ton = 1638.1 tons/yr

EMISSION ESTIMATES

Results of Nitrogen Oxides Stack Tests on Kiln No. 3 at LSF/P

Date	Process Rate (dry tons/hr)	Fuel	Run	Oxygen Content in Kiln (%)	NO_2 Emissions (lbs/hr)	NO_2 Emissions (ppm)
3/27/79	150.9	Gas	1	1.7	544*	544
	150.9	Gas	2	1.7	864*	863
	150.9	Gas	3	1.7	514*	514
	150.9	Gas	4	1.7	790*	789
	150.9	Gas	5	1.7	295*	294
	150.9	Gas	6	1.7	382*	381
AVERAGE					565*	564
3/30/79	150.1	Oil	1	2.1	312	288
	150.1	Oil	2	2.1	331	306
	150.1	Oil	3	2.1	279	258
	150.1	Oil	4	2.1	478	442
	150.1	Oil	5	2.1	469	434
AVERAGE					374	346

*Based on the same gas flow rate as oil firing.

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Coal	40,000	46,000	552
Gas	0.47	.54	552
Oil	79	90.6	552

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis: Coal Gas Oil — Coal Gas Oil

Percent Sulfur: 2.0 0.0 2.37 — Percent Ash: 10-12% 0 1%

Density: N/A N/A 8.34 lbs/gal — Typical Percent Nitrogen: 3% 0 1%

Heat Capacity: 12,000 N/A 17,386 BTU/lb — N/A N/A 145,000 BTU/gal

Other Fuel Contaminants (which may cause air pollution): N/A

F. If applicable, indicate the percent of fuel used for space heating. Annual Average N/A Maximum

G. Indicate liquid or solid wastes generated and method of disposal.

1) Captured dust is insulflated into system.

2) No liquid waste

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 200 ft. Stack Diameter: 14 ft.

Gas Flow Rate: 327,270 ACFM Gas Exit Temperature: 390 °F.

Water Vapor Content: 27 % Velocity: 35.4 FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated	N/A						

Description of Waste N/A

Total Weight Incinerated (lbs/hr) N/A Design Capacity (lbs/hr) N/A

Approximate Number of Hours of Operation per day N/A days/week N/A

Manufacturer N/A

Date Constructed N/A Model No. N/A

	Volume (ft)^3	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______________ ft. Stack Diameter ______________ Stack Temp. ______________

Gas Flow Rate: ______________ ACFM ______________ DSCFM* Velocity ______________ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) ______________

Brief description of operating characteristics of control devices: ______________

____

____

____

____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

____

____

____

____

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation.

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.,) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.).

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

Calculations from attached stack test:

No. 3 Kiln

Raw Feed - 135.1 T/hr. (dry) @ 0.08% SO_3

Feed to Clinker ratio 1.62 to 1

Clinker Production = 83.4 T/hr.

Energy Consumption 5.6 MM BTU/T. Clinker

Fuel Oil - 18,360 BTU/# @ 2.38 % S.

Fuel Oil Consumption

$$\frac{5.6 \text{ MM BTU} \times 83.4 \text{ T. Clinker}}{\text{T.Clinker} \times 0.01836 \text{ MM BTU/\#} \quad \text{hr.}} = \quad 25,438 \text{ \#/hr. of fuel oil}$$

Sulfur into the system

Feed -

$$135.1 \times 2000 \times 0.0008 \times \frac{32}{80} = 86.4 \text{ \#/hr.}$$

Fuel -

25,438 x .0238 =	605.4 #/hr.
Total S. =	691.8 #/hr.
As SO_2 =	1,383.6 #/hr.

SO_2 Emission

Test Data = 0.397 #SO_2/MM BTU

Total SO_2 Emission = 0.397 x 83.4 x 5.6 = 18.5 #/hr.

Absorption Factor

$$\frac{1383.6 - 18.5}{1383.6} = 98.7\ \%$$

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[ ] Yes [X] No

Contaminant	Rate or Concentration
Sulfur Dioxide	No Standard

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [X] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
SO_2	100% of potential emission

D. Describe the existing control and treatment technology (if any).

1. Control Device/System: See attached stack test and absorption calculations which document the high rate of removal of SO_2 inherent in a kiln process.
2. Operating Principles:
3. Efficiency: *
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: 200 ft. b. Diameter: 14 ft.

c. Flow Rate: 327,270 ACFM d. Temperature: 390 °F

e. Velocity: 35.4 FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1. Due to the inherent removal of SO_2 (98.7% as documented in the attached stack test) it is considered impractical and economically unfeasible to evaluate other treatment technology.

a. Control Device: Other technologies such as a baghouse would not significantly reduce

b. Operating Principles: SO_2 emissions and would require substantial cash outlays and replacement of the existing E.S.P.

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power — KWH design rate.

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected: See Section VI. E.

1. Control Device:

2. Efficiency*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

Sulphur dioxide emissions will be controlled by utilizing coal having a sulphur contect of no greater than 2%. In addition, any SO_2 emissions from burning this low sulphur coal will be reduced through limestone absorption in the cement clinker product. This inherent removal of SO_2 is estimated to be 98.7% efficient or greater based upon stack tests performed on this kiln.

Alternative controls for SO_2 were rejected since retrofitting the existing kiln with additional control devices would have only a minimal effect on emissions and would prohibit the company from implementing the conversion to coal.

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data N/A

1. ________ no sites ________ TSP ________ ( ) SO^2* ________ Wind spd/dir

Period of monitoring ___/___/___ to ___/___/___
month day year month day year

Other data recorded ________

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? ____ Yes ____ No

b) Was instrumentation calibrated in accordance with Department procedures? ____ Yes ____ No ____ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 1 / 1 / 70 to 12 / 31 / 74
month day year month day year

2. Surface data obtained from (location) Miami

3. Upper air (mixing height) data obtained from (location) Miami

4. Stability wind rose (STAR) data obtained from (location) NA

C. Computer Models Used

1. CRSTER Single Source Modified? If yes, attach description.

2. PTMTP-W Modified? If yes, attach description.

3. ________ Modified? If yes, attach description.

4. ________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	See Section III, C. grams/sec
SO^2	See Section III, C. grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

See Attached

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT

Page 10, Item VII (G)

The switch to coal as a primary fuel will have a minimal impact on air quality and at the same time will assume a plentiful supply of fuel for years to come. Supplies of oil and natural gas are of uncertain duration, and the cost of these scarce resources continues to rise. Without the fuel conversion, an interruption in oil or gas deliveries could result in plant shutdowns, or production curtailments with enormous economic consequences.

The abundance of coal, in comparison with oil and natural gas, is well documented. Coal constitutes approximately 90% of the nation's known energy reserves, yet currently supplies only 18% of the nation's energy consumption. The policy of the federal government is committed to increased coal utilization by industry. Conversions such as the modification proposed herein is in accord with this national policy, and at the same time will have minimal environmental impacts.

State of Florida

Department of State

I certify from the records of this office that LONESTAR FLORIDA PENNSUCO, INC. is a corporation organized under the laws of the State of Delaware, authorized to transact business within the State of Florida, qualified on January 4, 1978.

The charter number for this corporation is 839774.

I further certify that said corporation has filed all annual reports and paid all annual report filing fees due this office through December 31, 1979, and its status is active.

Given under my hand and the Great Seal of the State of Florida, at Tallahassee, the Capital, this the 6th day of Feb., 1980

George Firestone
Secretary of State

CER 101 Rev. 5-79

LONESTAR FLORIDA/PENNSUCO, INC.
6451 N. Federal Highway
Ft. Lauderdale, Florida 33308

February 15, 1979

State of Florida
Department of Environmental Regulation
and/or
Various Counties Within Florida

Gentlemen:

This letter authorizes the signatures of either Mr. Albert W. Townsend, Coordinator of Ecological Planning or Mr. Carl R. Metzgar, Manager Administrative Services, for the purpose of permit changes, applications and renewals.

Very truly yours,

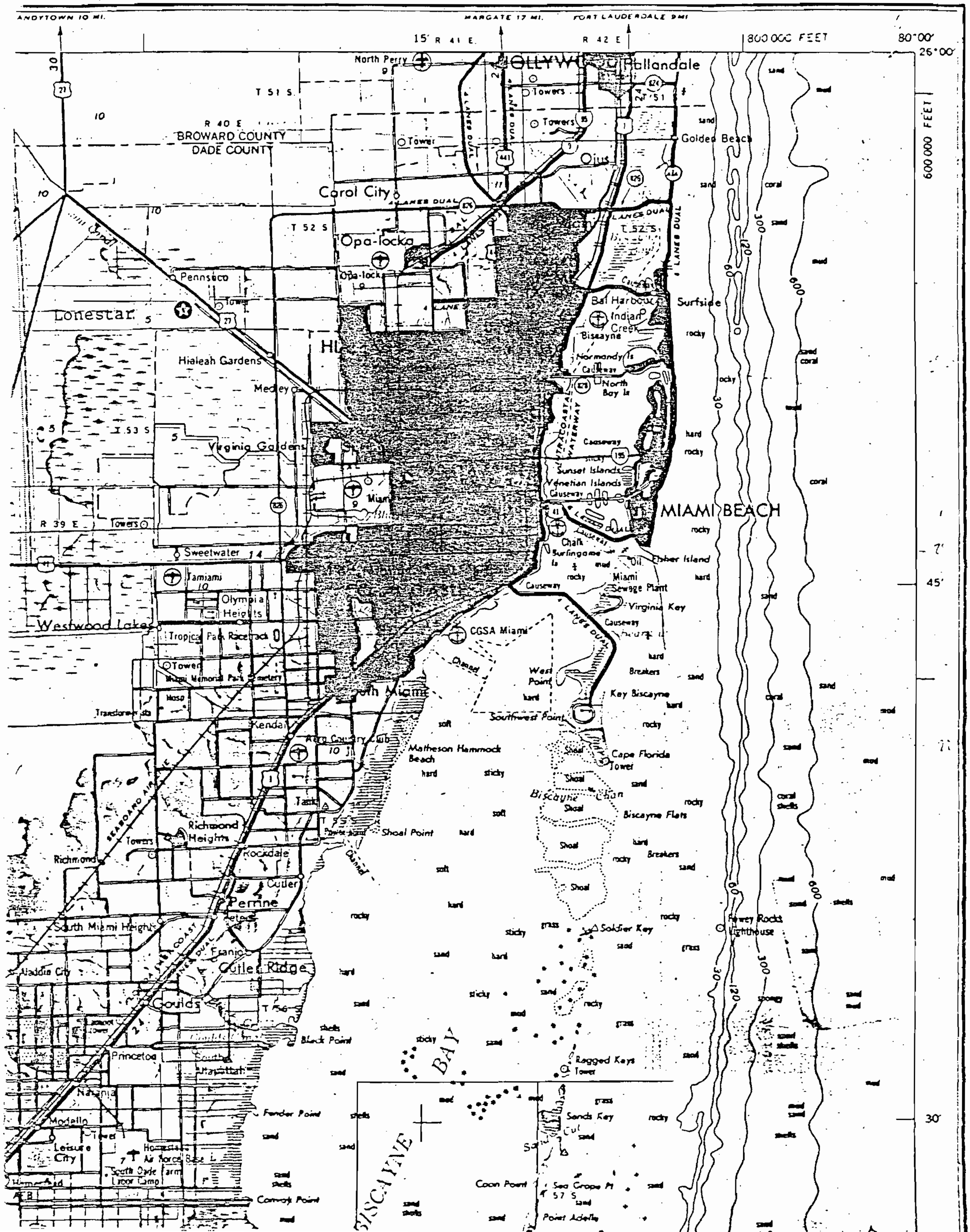
LONESTAR FLORIDA PENNSUCO, INC.

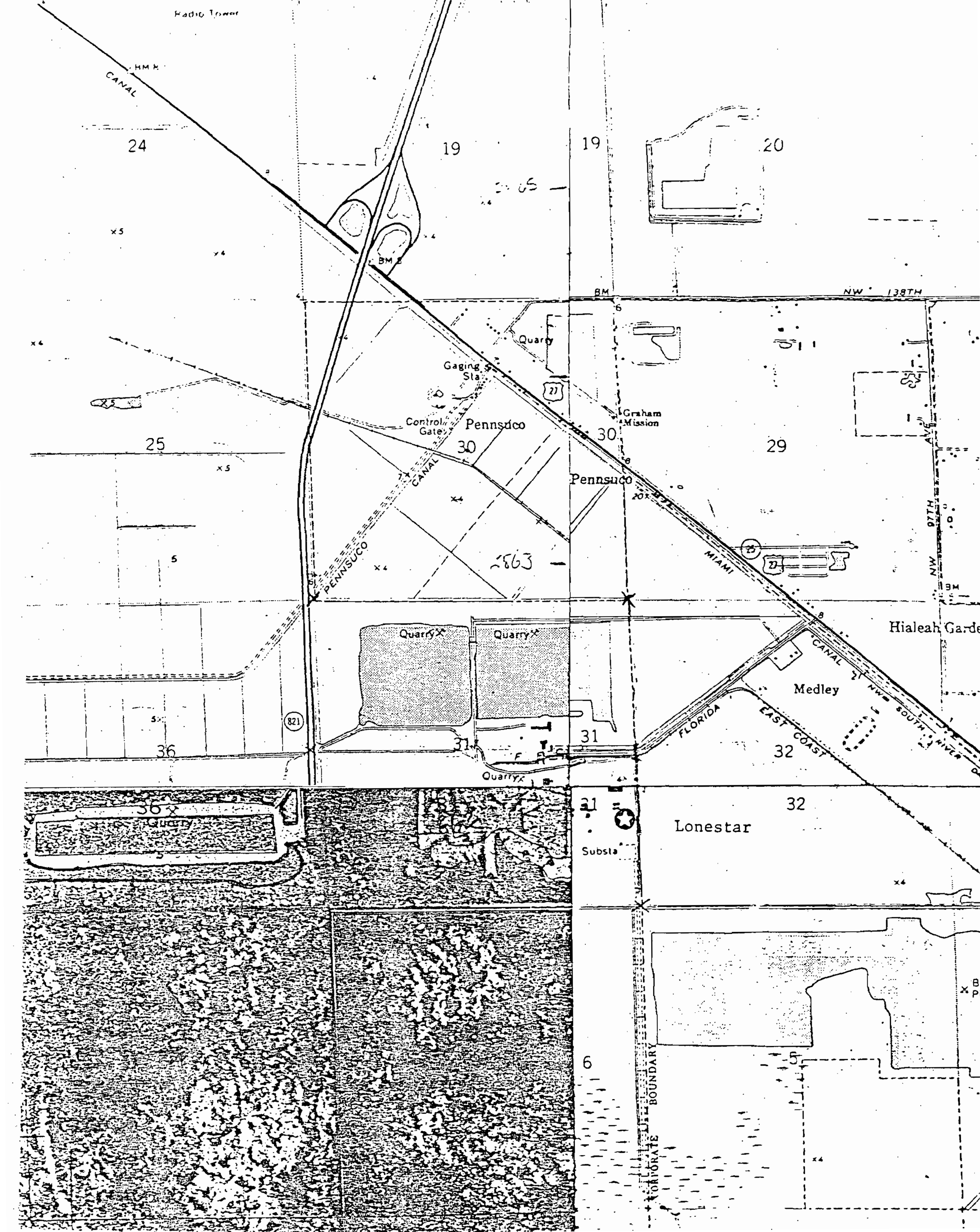
Paul N. Stoms
President

CRM/jh

BEST AVAILABLE COPY

NG 17-8

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Pennsuco
CANAL
PENNSUCO
MIAMI
NW 97TH AVE
Hialeah Garde
Quarry
Quarry
CANAL
Medley
FLORIDA
EAST COAST
NW SOUTH RIVER
821
36
31
31
32
Quarry
36
Quarry
31
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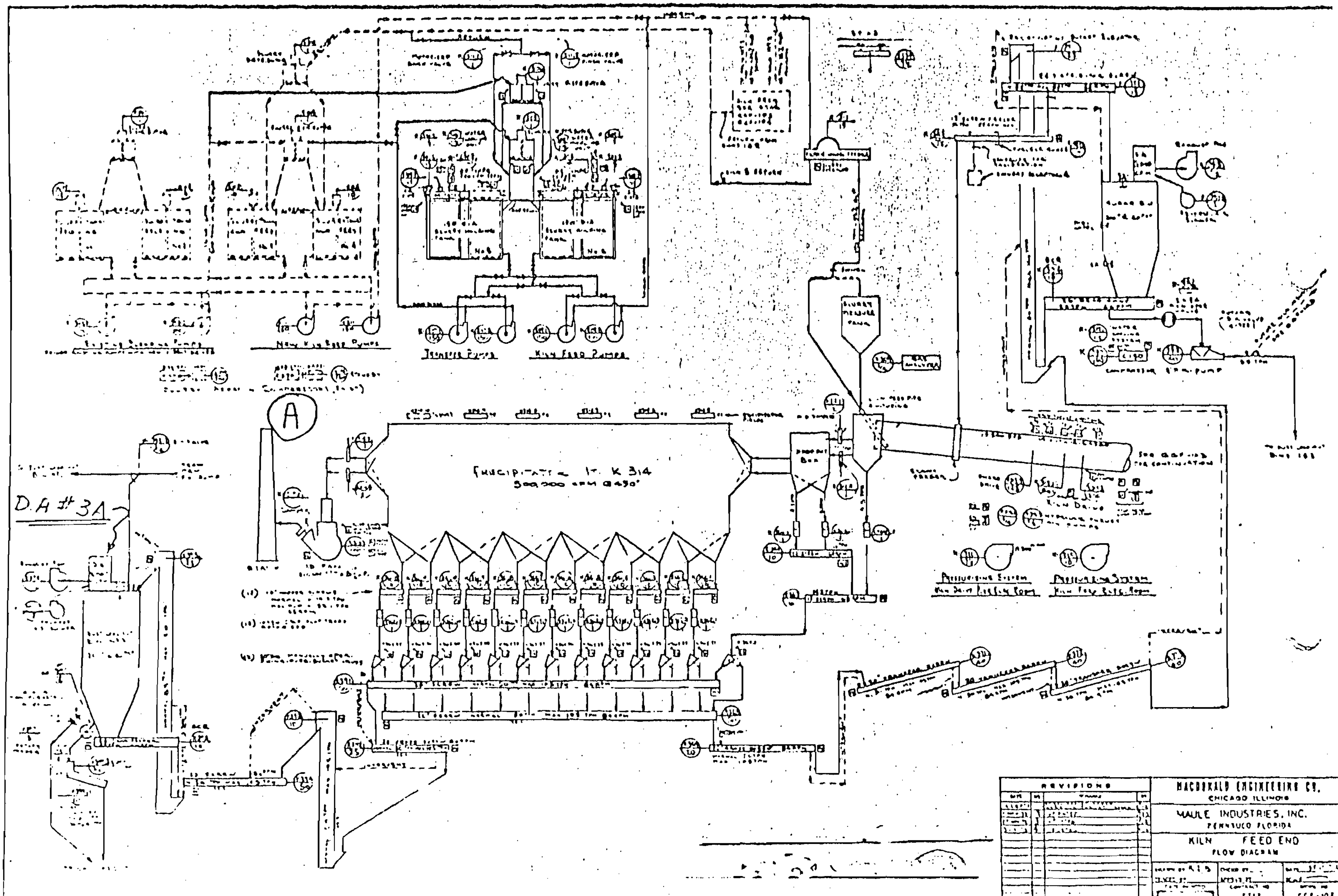
Lonestar
Substa
6
5
CORPORATE BOUNDARY


A
D.A #3A
Transfer Pumps
Kiln Feed Pumps
Pressurizing System
Pressurizing System
REVISIONS
MACDONALD ENGINEERING CO.
CHICAGO ILLINOIS
MAULE INDUSTRIES, INC.
PENNSUCO FLORIDA
KILN FEED END
FLOW DIAGRAM

ATTACHMENT B

STUDY GROUP RECOMMENDATIONS

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Air Quality Impact Analysis

Methodology

Short-term and annual atmospheric dispersion modeling was performed using two U.S EPA-approved models. Emissions rates and stack parameters utilized as input to the model are summarized in Table 1. The CRSTER Single Source Dispersion Model (EPA, 1977) was used to determine maximum predicted annual concentration as well as to identify worst-case 24-hour and 3-hour meteorological conditions for the Lonestar Facility. The maximum short-term impacts were then refined with the PTMTP-W model. The PTMTP-W allows the user to input spatially distributed sources and resolve the maximum concentration with a smaller receptor spacing. Each PTMTP-W case utilized a 100 receptor grid (1.0 x 1.0 kilometer with 0.1 kilometer spacing). Concentrations were not adjusted (i.e., a calibration factor of 1.0 was employed in the modeling).

A meteorological hourly data record for the years 1970-74 was input into the CRSTER model. This meteorological data was recorded at the Miami International Airport by the National Weather Service. The CRSTER Model processed each hour of the Miami data set to estimate hourly concentrations over 5 years. These concentrations were then averaged over each annual period, each 24-hour period and each 3-hour period to provide the user with the desired concentrations.

Sulfur Dioxide

Sulfur Dioxide (SO_2) emissions from the three existing kilns at Lonestar Florida/ Pennsuco include the total resulting emissions from the sulfur in the raw materials (i.e. limestone) and the sulfur in the coal, considering inherent SO_2 removal in the process as reflected in actual stack test. The total SO_2 emissions from the facility were used in the CRSTER modeling and worst-case meteorology was determined. A PTMTP-W model was used to refine the predicted concentration and spatially distribute the sources.

Particulate Matter

Particulate matter modeling was executed to determine the maximum increase in emissions due to the four proposed dust collectors. The four dust collectors will be close enough in proximity that they could be assumed to be at the same location for modeling purposes. A CRSTER model was executed in order to determine worst-case meteorlogy and the PTMTP-W was used to refine the maximum concentration with a smaller receptor spacing.

Results

Results of the modeling are presented in Table 2. The maximum predicted annual SO_2 concentration was 0.63 ug/m^3. The maximum 3-hour and 24-hour SO_2 concentrations were predicted to be 18 ug/m^3 and 4.90 ug/m^3 respectively. The maximum predicted increase in 24-hour total suspended (TSP) particulate matter concentrations is 4.59 ug/m^3. The maximum predicted increase in annual TSP concentrations is 0.69 ug/m^3.

Copies of the computer model outputs are attached.

P.O. BOX 13454 GAINESVILLE, FLORIDA 32604 904/372-3318

Conclusion

The results of the computer modeling show the maximum predicted concentrations for annual, 24-hour and 3-hour time periods are less than the significance levels as defined in the Federal Register, Vol.43, No. 118, June 19, 1978 and in the "Guidance on Prevention of Significant Deterioration (PSD), PSD Review", Florida Department of Environmental Regulation, October, 1978. As a result, no additional air quality analysis is necessary.

Table 1. Emission rates and stack parameters for the Lonestar, Florida/Pennsuco Facility.

SO_2 Sources Source	Emission Rate(g/s)	Stack Height (M)	Stack Temp. (°K)	Velocity (M/s)	Diameter (M)
Kiln #1	7.15	61.0	472.0	16.9	2.10
Kiln #2	7.15	61.0	455.0	15.5	2.10
Kiln #3	3.31	61.0	472.0	10.8	4.27

Particulate Sources Source	Emission Rate (g/s)	Stack Height (M)	Stack Temp. (°K)	Velocity (M/s)	Diameter (M)
Dust Collector 1	0.04	29.0	303. 311	25.9	0.30
Dust Collector 2	0.04	20.7	303. 311	25.9	0.30
Dust Collector 3	~~0.26~~ 0.39	24.4	336.0	~~19.8~~ 19.0	~~0.85~~ 1.07
Dust Collector 4	0.26	24.4	336.0	19.8	0.85

Table 2. Results of Air Quality Impact Analysis for the Lonestar, Florida/Pennsuco Facility.

	SO_2			Particulate	
	Annual	24-hr	3-hr	Annual	24-hour
Maximum Predicted Concentration (ug/m^3)	0.63	4.90	18	0.69	4.59
Significance Levels	1	5	25	1	5

SULFUR DIOXIDE

COMPUTER MODELING

RESULTS

```
PLANT NAME: LONESTAR                            POLLUTANT:   SO2      AIR QUALITY UNITS: GM/M**3
COAL CONVERSION - EXISTING KILNS 1,2,3

             MET FILE      REQUESTED
            STN NO. YR    STN NO. YR
 SURFACE     12839  70     12839  70
 UPPER AIR   12839  70     12839  70
PLANT LOCATION: RURAL
NO TAPE OUTPUT
MET DATA WILL NOT BE PRINTED

DAY-- 1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
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 * * * * * * * * * * * * * * *  N O T E  * * * * * * * * * * * * * * *

      ALL TABLES, INCLUDING SOURCE CONTRIBUTION, THAT CONTAIN "ANNUAL" IN THE HEADING ARE BASED

      ONLY ON THOSE DAYS MARKED BY A "1" IN THE ABOVE TABLE
```

RING DISTANCES(KM)= 0.90 1.20 1.50 1.80 2.10

STACK # 1--KILN 1&2
STACK # 2--KILN #3

STACK	MONTH	EMISSION RATE (GMS/SEC)	HEIGHT (METERS)	DIAMETER (METERS)	EXIT VELOCITY (M/SEC)	TEMP (DEG.K)	VOLUMETRIC FLO (M**3/SEC)
1	ALL	14.3000	61.00	2.10	16.20	464.00	56.11
2	ALL	3.3100	61.00	4.27	10.80	472.00	154.66

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 6.1519E-07 DIRECTION= 28 DISTANCE= 2.1 KM

YEAR= 70

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	6.72910E-08	9.53425E-08	1.05252E-07	1.05238E-07	1.01276E-07
2	5.30818E-08	7.95159E-08	9.19203E-08	9.53647E-08	9.45587E-08
3	4.11145E-08	6.08741E-08	6.96635E-08	7.15156E-08	7.02444E-08
4	3.41788E-08	4.89282E-08	5.49389E-08	5.57134E-08	5.42511E-08
5	4.80552E-08	6.86485E-08	7.75487E-08	8.02642E-08	8.01997E-08
6	5.22901E-08	6.97317E-08	7.74686E-08	8.01708E-08	8.03498E-08
7	5.95114E-08	7.50736E-08	7.91892E-08	7.76698E-08	7.39236E-08
8	6.75643E-08	8.59525E-08	9.15539E-08	9.08065E-08	8.74583E-08
9	6.38586E-08	8.17488E-08	8.76212E-08	8.72075E-08	8.42825E-08
10	5.54083E-08	7.54093E-08	8.30712E-08	8.35297E-08	8.08265E-08
11	5.12479E-08	7.46622E-08	8.37361E-08	8.45582E-08	8.17221E-08
12	5.80123E-08	9.06215E-08	1.05759E-07	1.10593E-07	1.10313E-07
13	5.57110E-08	9.10630E-08	1.10587E-07	1.20110E-07	1.24070E-07
14	4.83917E-08	9.07648E-08	1.20897E-07	1.40259E-07	1.51748E-07
15	4.98467E-08	9.27427E-08	1.21383E-07	1.38430E-07	1.47848E-07
16	7.10543E-08	1.32878E-07	1.74292E-07	1.98888E-07	2.12276E-07
17	7.11460E-08	1.23693E-07	1.53741E-07	1.68710E-07	1.75299E-07
18	6.18585E-08	1.09585E-07	1.40791E-07	1.59355E-07	1.69914E-07
19	4.47572E-08	6.90158E-08	8.07930E-08	8.49862E-08	8.53063E-08
20	4.50310E-08	6.38597E-08	7.05777E-08	7.12907E-08	6.97361E-08
21	3.95149E-08	5.82534E-08	6.88076E-08	7.37351E-08	7.54209E-08
22	3.25294E-08	4.51237E-08	5.16315E-08	5.42889E-08	5.49004E-08
23	3.20944E-08	4.71907E-08	5.53936E-08	5.95993E-08	6.16550E-08
24	4.92868E-08	7.78400E-08	9.48651E-08	1.04917E-07	1.10660E-07
25	8.96754E-08	1.42468E-07	1.72369E-07	1.88683E-07	1.96638E-07
26	1.40568E-07	2.26376E-07	2.77127E-07	3.06180E-07	3.21280E-07
27	2.24273E-07	3.61984E-07	4.40803E-07	4.83124E-07	5.03339E-07
28	2.68906E-07	4.31867E-07	5.28515E-07	5.84512E-07	6.15186E-07
29	2.58388E-07	3.88083E-07	4.54613E-07	4.85995E-07	4.97817E-07
30	3.05008E-07	4.45491E-07	5.11702E-07	5.39363E-07	5.47220E-07
31	3.08718E-07	4.27860E-07	4.65926E-07	4.67371E-07	4.54137E-07
32	2.89829E-07	4.01006E-07	4.34865E-07	4.33482E-07	4.18270E-07
33	2.30748E-07	3.14411E-07	3.38024E-07	3.34676E-07	3.21148E-07
34	1.98643E-07	2.83936E-07	3.17225E-07	3.23530E-07	3.17824E-07
35	1.38795E-07	1.95404E-07	2.16286E-07	2.18574E-07	2.12895E-07
36	9.81581E-08	1.39813E-07	1.57381E-07	1.61875E-07	1.60405E-07

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 4.7680E-06 DIRECTION= 27 DISTANCE= 1.5 KM DAY=165

YEAR= 70

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	1.8493E-06 (191)	2.0091E-06 (88)	1.8661E-06 (187)	1.6419E-06 (187)	1.4420E-06 (187)
2	1.2344E-06 (187)	1.4876E-06 (187)	1.5827E-06 (163)	1.6468E-06 (163)	1.5817E-06 (187)
3	1.1232E-06 (124)	1.5256E-06 (124)	1.5748E-06 (124)	1.4689E-06 (145)	1.4565E-06 (145)
4	9.5314E-07 (161)	1.2246E-06 (178)	1.3546E-06 (178)	1.3561E-06 (178)	1.2958E-06 (220)
5	1.0618E-06 (177)	1.3550E-06 (220)	1.4694E-06 (92)	1.5855E-06 (92)	1.5752E-06 (219)
6	1.3567E-06 (160)	1.6004E-06 (177)	1.6644E-06 (92)	1.6669E-06 (92)	1.6007E-06 (327)
7	2.1836E-06 (160)	2.0957E-06 (160)	1.8824E-06 (224)	1.7090E-06 (19)	1.5996E-06 (19)
8	2.5010E-06 (175)	2.2588E-06 (42)	2.3126E-06 (42)	1.9915E-06 (160)	1.6685E-06 (160)
9	2.3460E-06 (175)	2.4220E-06 (175)	2.5337E-06 (175)	2.5150E-06 (175)	2.3794E-06 (175)
10	1.9604E-06 (179)	2.6746E-06 (179)	2.8625E-06 (179)	2.7709E-06 (179)	2.4594E-06 (157)
11	1.3057E-06 (160)	1.8604E-06 (161)	2.0638E-06 (161)	1.9486E-06 (161)	1.6589E-06 (105)
12	1.5568E-06 (159)	1.9197E-06 (160)	2.1879E-06 (72)	2.2306E-06 (295)	2.0323E-06 (295)
13	1.5734E-06 (217)	1.9840E-06 (295)	2.1957E-06 (295)	2.2676E-06 (304)	2.3042E-06 (304)
14	1.2086E-06 (159)	1.5154E-06 (159)	1.9218E-06 (7)	2.1854E-06 (73)	2.5433E-06 (73)
15	1.1146E-06 (321)	1.5680E-06 (340)	1.8930E-06 (321)	1.9164E-06 (328)	2.1031E-06 (340)
16	1.4770E-06 (97)	2.1194E-06 (299)	2.6161E-06 (299)	2.8402E-06 (328)	2.8018E-06 (299)
17	1.5224E-06 (97)	2.0746E-06 (310)	2.2886E-06 (360)	2.2704E-06 (362)	2.1080E-06 (13)
18	1.1703E-06 (322)	1.6530E-06 (310)	1.7743E-06 (310)	1.8393E-06 (58)	2.2412E-06 (52)
19	9.8343E-07 (311)	1.3700E-06 (311)	1.4011E-06 (311)	1.4615E-06 (181)	1.4020E-06 (126)
20	1.3188E-06 (311)	1.2354E-06 (312)	1.3614E-06 (182)	1.2153E-06 (311)	1.0936E-06 (322)
21	9.7636E-07 (75)	1.0683E-06 (75)	1.1788E-06 (290)	1.3785E-06 (44)	1.5042E-06 (290)
22	9.5227E-07 (75)	1.0997E-06 (75)	9.7789E-07 (75)	8.7069E-07 (364)	9.5260E-07 (290)
23	9.1678E-07 (75)	1.0845E-06 (75)	1.1706E-06 (283)	1.2726E-06 (283)	1.1933E-06 (83)
24	1.1796E-06 (83)	1.8343E-06 (83)	2.0172E-06 (83)	1.9398E-06 (83)	1.8181E-06 (278)
25	1.2891E-06 (83)	1.7423E-06 (282)	2.0787E-06 (282)	2.1289E-06 (121)	2.1005E-06 (282)
26	2.3894E-06 (120)	2.6608E-06 (312)	2.5463E-06 (254)	2.5435E-06 (121)	2.7646E-06 (312)
27	2.8157E-06 (170)	4.2649E-06 (170)	4.7680E-06 (165)	4.6167E-06 (165)	4.3484E-06 (165)
28	2.0647E-06 (227)	2.8514E-06 (138)	3.0520E-06 (138)	3.2398E-06 (140)	3.9345E-06 (140)
29	2.2185E-06 (196)	2.7420E-06 (195)	2.9408E-06 (195)	2.9905E-06 (242)	3.3253E-06 (242)
30	2.7286E-06 (238)	3.8825E-06 (232)	4.4258E-06 (232)	4.4132E-06 (195)	4.4268E-06 (232)
31	2.9108E-06 (216)	3.3461E-06 (247)	3.2886E-06 (247)	2.9836E-06 (247)	2.6252E-06 (247)
32	3.0805E-06 (183)	3.2969E-06 (100)	3.0568E-06 (100)	2.6828E-06 (100)	2.4323E-06 (193)
33	2.6248E-06 (225)	2.5044E-06 (203)	2.6575E-06 (225)	2.5444E-06 (203)	2.2924E-06 (203)
34	2.5251E-06 (203)	2.9228E-06 (225)	2.7043E-06 (111)	2.8004E-06 (271)	2.8623E-06 (271)
35	1.9888E-06 (137)	2.4839E-06 (221)	2.1976E-06 (221)	1.8740E-06 (363)	2.0789E-06 (318)
36	2.3497E-06 (221)	2.8979E-06 (221)	2.7476E-06 (221)	2.3963E-06 (221)	2.0357E-06 (221)

BEST AVAILABLE COPY

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 3-HOUR CONC= 1.7721E-05 DIRECTION= 31 DISTANCE= 1.2 KM DAY=238 |I

YEAR= 70

SECOND HIGHEST 3-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 K
1	8.6241E-06 (187, 4)	1.0006E-05 (191, 4)	9.6600E-06 (191, 4)	8.7575E-06 (191, 4)	7.8810E-06 (
2	8.3602E-06 (249, 4)	8.9817E-06 (191, 4)	8.7778E-06 (191, 4)	8.2173E-06 (222, 3)	8.8187E-06 (
3	5.9442E-06 (249, 4)	7.5214E-06 (146, 4)	8.0711E-06 (81, 5)	8.2507E-06 (81, 5)	8.0661E-06 (
4	6.8696E-06 (146, 4)	9.6833E-06 (178, 3)	1.0744E-05 (178, 3)	1.0753E-05 (178, 3)	9.6832E-06 (
5	8.3592E-06 (177, 4)	9.2249E-06 (224, 5)	9.8797E-06 (224, 5)	8.6503E-06 (219, 4)	7.9420E-06 (
6	8.6216E-06 (92, 4)	9.7158E-06 (92, 4)	8.8641E-06 (92, 4)	7.5905E-06 (92, 4)	7.2364E-06 (
7	1.0720E-05 (160, 4)	1.0969E-05 (19, 5)	1.1060E-05 (177, 4)	9.0037E-06 (177, 4)	7.5918E-06 (
8	9.7895E-06 (175, 4)	9.8704E-06 (347, 4)	1.0601E-05 (180, 4)	1.0235E-05 (180, 4)	9.2457E-06 (
9	1.1055E-05 (175, 4)	1.0925E-05 (42, 5)	1.0450E-05 (347, 4)	1.0312E-05 (175, 3)	9.8357E-06 (
10	1.1912E-05 (157, 5)	1.3740E-05 (179, 5)	1.3130E-05 (179, 5)	1.1671E-05 (179, 5)	1.0028E-05 (
11	7.8122E-06 (157, 5)	1.2507E-05 (161, 4)	1.2314E-05 (105, 5)	1.0516E-05 (105, 5)	8.7477E-06 (
12	7.0476E-06 (72, 5)	1.0388E-05 (316, 4)	1.0272E-05 (316, 4)	9.6044E-06 (30, 5)	8.6693E-06 (
13	8.1043E-06 (217, 5)	1.0613E-05 (304, 4)	1.1884E-05 (41, 4)	1.1824E-05 (41, 4)	1.1104E-05 (
14	6.1762E-06 (321, 4)	9.2174E-06 (20, 4)	1.0459E-05 (20, 4)	1.0230E-05 (20, 4)	9.4265E-06 (
15	6.4193E-06 (340, 5)	1.0147E-05 (326, 4)	1.1305E-05 (326, 4)	1.0921E-05 (10, 4)	1.0076E-05 (
16	8.1225E-06 (362, 4)	1.0253E-05 (299, 4)	1.1339E-05 (299, 4)	1.0895E-05 (299, 4)	1.0271E-05 (
17	7.1391E-06 (10, 5)	1.0060E-05 (321, 5)	1.1094E-05 (360, 4)	1.0781E-05 (360, 4)	9.8639E-06 (
18	8.7210E-06 (105, 4)	1.1246E-05 (305, 4)	1.2443E-05 (305, 4)	1.2002E-05 (305, 4)	1.0946E-05 (
19	6.5482E-06 (322, 5)	7.6327E-06 (322, 5)	6.8371E-06 (322, 5)	6.2105E-06 (181, 3)	5.5828E-06 (
20	7.9326E-06 (159, 5)	7.2814E-06 (322, 5)	6.4888E-06 (305, 4)	6.0903E-06 (184, 3)	5.8822E-06 (
21	6.7144E-06 (123, 4)	7.3930E-06 (311, 4)	7.3732E-06 (176, 3)	8.4467E-06 (176, 3)	8.0607E-06 (
22	6.9738E-06 (164, 4)	7.1718E-06 (250, 4)	7.2015E-06 (364, 4)	6.9655E-06 (364, 4)	6.4335E-06 (
23	7.0981E-06 (75, 4)	8.0574E-06 (164, 4)	7.8182E-06 (164, 4)	7.5268E-06 (83, 4)	6.9550E-06 (
24	6.5270E-06 (75, 4)	7.5466E-06 (83, 4)	7.2669E-06 (83, 5)	7.3232E-06 (107, 6)	7.1776E-06 (
25	9.6842E-06 (83, 5)	9.6517E-06 (120, 4)	7.8444E-06 (284, 4)	8.0727E-06 (284, 4)	7.7019E-06 (
26	1.2835E-05 (254, 4)	1.3456E-05 (120, 4)	1.2908E-05 (282, 4)	1.2068E-05 (282, 4)	1.0771E-05 (
27	1.2591E-05 (170, 5)	1.5911E-05 (170, 5)	1.5056E-05 (107, 4)	1.3484E-05 (169, 4)	1.2737E-05 (
28	1.0317E-05 (135, 4)	1.5389E-05 (138, 5)	1.6483E-05 (138, 5)	1.5537E-05 (138, 5)	1.3930E-05 (
29	1.1281E-05 (197, 5)	1.2387E-05 (171, 4)	1.2428E-05 (171, 4)	1.1839E-05 (194, 3)	1.1594E-05 (
30	1.3340E-05 (197, 5)	1.4596E-05 (238, 4)	1.4060E-05 (200, 4)	1.2932E-05 (200, 4)	1.2014E-05 (
31	1.5011E-05 (238, 4)	1.7721E-05 (238, 4)	1.6285E-05 (238, 4)	1.5220E-05 (275, 5)	1.3328E-05 (
32	1.3325E-05 (213, 5)	1.6802E-05 (213, 5)	1.6793E-05 (213, 5)	1.5360E-05 (213, 5)	1.3567E-05 (
33	1.1108E-05 (225, 4)	1.2450E-05 (193, 5)	1.2062E-05 (182, 6)	1.1416E-05 (303, 5)	1.0577E-05 (
34	1.4944E-05 (199, 4)	1.4766E-05 (203, 4)	1.5883E-05 (115, 5)	1.5002E-05 (115, 5)	1.3492E-05 (
35	1.0988E-05 (221, 4)	1.1839E-05 (137, 4)	1.1652E-05 (221, 4)	1.0137E-05 (363, 5)	9.2824E-06 (
36	7.9183E-06 (187, 5)	1.0183E-05 (221, 5)	1.0290E-05 (221, 5)	9.5162E-06 (188, 5)	1.0253E-05 (

PLANT NAME: LONESTAR   POLLUTANT: SO2   AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 5.3122E-07 DIRECTION= 30 DISTANCE= 1.5 KM

YEAR= 71

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	5.92009E-08	8.24463E-08	9.08021E-08	9.25065E-08	9.14509E-08
2	4.68535E-08	6.52774E-08	7.26681E-08	7.51871E-08	7.54614E-08
3	3.96085E-08	5.99729E-08	7.19243E-08	7.88886E-08	8.26037E-08
4	5.12974E-08	7.13001E-08	7.84346E-08	7.91964E-08	7.72465E-08
5	5.72159E-08	8.01394E-08	9.20984E-08	9.76862E-08	9.96978E-08
6	4.92718E-08	6.64083E-08	7.57271E-08	8.04060E-08	8.25179E-08
7	3.78171E-08	5.35808E-08	6.23392E-08	6.60530E-08	6.68610E-08
8	3.11243E-08	4.57759E-08	5.34355E-08	5.60412E-08	5.58446E-08
9	2.80435E-08	4.01294E-08	4.62366E-08	4.86075E-08	4.90967E-08
10	3.66655E-08	5.42213E-08	6.32452E-08	6.66880E-08	6.72010E-08
11	5.26887E-08	7.81390E-08	9.09007E-08	9.56495E-08	9.61956E-08
12	7.00524E-08	1.06495E-07	1.25090E-07	1.32092E-07	1.33023E-07
13	6.57231E-08	9.83846E-08	1.16310E-07	1.24277E-07	1.26852E-07
14	5.98785E-08	9.57502E-08	1.21857E-07	1.37772E-07	1.46403E-07
15	5.17762E-08	7.90677E-08	9.97402E-08	1.13582E-07	1.22443E-07
16	5.08128E-08	7.82530E-08	9.67887E-08	1.08966E-07	1.17096E-07
17	4.68663E-08	7.33373E-08	8.82707E-08	9.59986E-08	9.98943E-08
18	5.56351E-08	9.29774E-08	1.14032E-07	1.23962E-07	1.27849E-07
19	4.88765E-08	8.03628E-08	9.70546E-08	1.03706E-07	1.04984E-07
20	5.34424E-08	8.26526E-08	9.92043E-08	1.07444E-07	1.10620E-07
21	7.89734E-08	1.28305E-07	1.61465E-07	1.81523E-07	1.91950E-07
22	7.53944E-08	1.25388E-07	1.61808E-07	1.85857E-07	1.99806E-07
23	1.06507E-07	1.71479E-07	2.11922E-07	2.35183E-07	2.46694E-07
24	1.69269E-07	2.64379E-07	3.15298E-07	3.40400E-07	3.50584E-07
25	1.57567E-07	2.55642E-07	3.16926E-07	3.54297E-07	3.75723E-07
26	1.51973E-07	2.38527E-07	2.88069E-07	3.15781E-07	3.30054E-07
27	1.85538E-07	2.78722E-07	3.24137E-07	3.45297E-07	3.53490E-07
28	2.62011E-07	3.86942E-07	4.37689E-07	4.52158E-07	4.49727E-07
29	3.27540E-07	4.63874E-07	5.04013E-07	5.00501E-07	4.79804E-07
30	3.50378E-07	4.91820E-07	5.31224E-07	5.25504E-07	5.03290E-07
31	2.51647E-07	3.52825E-07	3.82246E-07	3.79792E-07	3.65371E-07
32	1.48206E-07	2.20334E-07	2.50491E-07	2.59446E-07	2.58464E-07
33	9.26906E-08	1.42137E-07	1.65012E-07	1.73662E-07	1.75133E-07
34	8.39804E-08	1.32894E-07	1.58966E-07	1.71373E-07	1.75906E-07
35	6.98460E-08	1.07411E-07	1.26724E-07	1.35674E-07	1.38934E-07
36	6.81615E-08	1.00526E-07	1.16697E-07	1.24531E-07	1.27992E-07

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 4.2477E-06 DIRECTION= 29 DISTANCE= 1.5 KM DAY=208

YEAR= 71

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	1.6104E-06 (9)	1.9147E-06 (9)	1.7617E-06 (226)	1.7979E-06 (226)	1.7428E-06 (226)
2	1.3847E-06 (9)	1.5884E-06 (9)	1.6607E-06 (10)	1.6239E-06 (10)	1.5501E-06 (10)
3	1.1688E-06 (173)	1.7474E-06 (254)	1.8231E-06 (254)	1.8541E-06 (225)	2.1433E-06 (256)
4	1.3918E-06 (121)	1.6654E-06 (149)	1.8739E-06 (149)	1.9684E-06 (149)	1.9907E-06 (149)
5	2.4399E-06 (166)	2.4448E-06 (166)	2.2810E-06 (149)	2.3266E-06 (149)	2.1642E-06 (223)
6	2.3089E-06 (223)	2.4061E-06 (166)	2.2308E-06 (223)	1.9121E-06 (223)	1.7453E-06 (149)
7	1.1508E-06 (141)	1.4228E-06 (166)	1.3402E-06 (141)	1.2898E-06 (141)	1.3076E-06 (75)
8	8.5642E-07 (223)	1.0941E-06 (334)	1.0608E-06 (334)	1.0802E-06 (165)	1.1033E-06 (85)
9	8.2559E-07 (223)	8.2933E-07 (334)	7.6451E-07 (124)	7.9668E-07 (204)	7.9785E-07 (157)
10	1.1464E-06 (141)	1.3687E-06 (15)	1.4708E-06 (15)	1.3861E-06 (15)	1.2410E-06 (15)
11	1.9698E-06 (123)	2.4392E-06 (299)	2.6652E-06 (299)	2.5494E-06 (299)	2.3143E-06 (299)
12	1.9082E-06 (123)	2.3579E-06 (222)	2.3062E-06 (298)	2.2944E-06 (298)	2.1480E-06 (298)
13	1.4589E-06 (96)	1.8562E-06 (338)	2.1083E-06 (338)	2.1741E-06 (338)	2.1546E-06 (338)
14	1.5931E-06 (82)	1.5505E-06 (96)	1.8007E-06 (168)	2.0179E-06 (96)	2.0579E-06 (96)
15	1.2679E-06 (326)	1.5843E-06 (28)	1.6059E-06 (79)	1.9908E-06 (79)	2.2466E-06 (79)
16	1.3115E-06 (168)	2.0192E-06 (28)	2.2764E-06 (28)	2.2562E-06 (28)	2.1340E-06 (28)
17	1.2001E-06 (83)	1.2748E-06 (29)	1.3973E-06 (16)	1.4330E-06 (352)	1.4790E-06 (352)
18	1.3093E-06 (1)	1.9043E-06 (326)	2.2440E-06 (326)	2.2433E-06 (326)	2.1505E-06 (68)
19	1.0536E-06 (237)	1.4938E-06 (269)	1.9225E-06 (269)	1.8517E-06 (86)	1.7027E-06 (86)
20	1.1655E-06 (237)	1.3343E-06 (237)	1.4851E-06 (316)	1.6650E-06 (311)	1.7710E-06 (241)
21	1.2892E-06 (105)	1.6729E-06 (138)	1.9340E-06 (268)	2.2943E-06 (357)	2.5050E-06 (357)
22	1.0672E-06 (138)	1.8276E-06 (153)	2.4516E-06 (153)	2.8543E-06 (153)	3.0857E-06 (153)
23	1.4323E-06 (80)	2.2022E-06 (153)	2.4744E-06 (236)	2.3233E-06 (139)	2.3915E-06 (266)
24	1.9010E-06 (230)	2.6176E-06 (233)	2.7359E-06 (125)	2.8069E-06 (319)	2.9365E-06 (233)
25	1.7801E-06 (191)	2.3695E-06 (105)	2.3666E-06 (125)	2.7417E-06 (363)	3.2136E-06 (191)
26	2.4002E-06 (169)	3.2369E-06 (169)	3.3820E-06 (169)	3.1759E-06 (169)	2.8579E-06 (169)
27	2.5427E-06 (194)	3.2756E-06 (194)	3.1989E-06 (194)	2.8452E-06 (194)	2.7080E-06 (231)
28	2.3236E-06 (198)	2.8848E-06 (140)	3.1195E-06 (140)	3.0559E-06 (140)	2.8745E-06 (34)
29	3.2096E-06 (129)	4.0423E-06 (128)	4.2477E-06 (208)	4.2082E-06 (208)	3.6757E-06 (193)
30	3.1566E-06 (129)	3.9686E-06 (129)	3.8527E-06 (129)	3.5393E-06 (208)	3.2640E-06 (132)
31	2.8577E-06 (111)	3.6037E-06 (184)	3.6715E-06 (118)	3.4633E-06 (185)	3.0334E-06 (185)
32	1.8652E-06 (108)	2.5506E-06 (287)	2.7002E-06 (287)	2.6398E-06 (118)	2.5737E-06 (59)
33	1.2926E-06 (113)	1.6979E-06 (218)	1.7062E-06 (113)	1.5456E-06 (113)	1.6087E-06 (218)
34	1.5049E-06 (113)	1.9053E-06 (113)	2.1501E-06 (8)	2.1431E-06 (8)	2.2874E-06 (61)
35	1.3698E-06 (73)	1.8380E-06 (7)	2.1840E-06 (7)	2.2717E-06 (7)	2.2122E-06 (7)
36	1.3520E-06 (250)	1.8656E-06 (174)	2.0819E-06 (174)	1.9026E-06 (133)	1.6196E-06 (133)

BEST AVAILABLE COPY

PLANT NAME: LONESTAR   POLLUTANT: SO2   AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM   3-HOUR CONC= 1.8055E-05 DIRECTION= 30 DISTANCE= 1.5 KM DAY=126   [I

YEAR= 71

SECOND HIGHEST   3-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 K
1	1.1136E-05 (9, 4)	1.3395E-05 (9, 4)	1.2282E-05 (9, 4)	1.0652E-05 (10, 5)	9.3916E-06 (
2	9.2671E-06 (174, 5)	9.7981E-06 (174, 5)	8.4252E-06 (174, 5)	7.3755E-06 (10, 4)	6.8248E-06 (
3	7.6712E-06 (167, 4)	7.6093E-06 (167, 4)	7.4989E-06 (256, 4)	7.7644E-06 (295, 4)	7.9703E-06 (
4	7.6114E-06 (150, 5)	9.5864E-06 (150, 5)	9.2403E-06 (150, 5)	8.1606E-06 (150, 5)	7.0019E-06 (
5	1.0381E-05 (166, 4)	1.1486E-05 (166, 4)	1.1248E-05 (75, 4)	9.9467E-06 (75, 4)	8.5660E-06 (
6	1.1198E-05 (166, 4)	1.4882E-05 (75, 4)	1.2302E-05 (223, 5)	9.7799E-06 (223, 5)	7.7763E-06 (
7	7.8081E-06 (171, 4)	7.9619E-06 (167, 3)	8.9140E-06 (167, 3)	8.8403E-06 (141, 4)	7.5487E-06 (
8	5.7371E-06 (104, 5)	6.0687E-06 (298, 5)	7.6309E-06 (165, 3)	8.6055E-06 (165, 3)	8.7154E-06 (
9	6.5038E-06 (104, 5)	6.2860E-06 (151, 4)	6.1160E-06 (124, 3)	5.8961E-06 (124, 3)	5.3538E-06 (
10	6.6887E-06 (240, 4)	7.5870E-06 (15, 5)	8.3261E-06 (124, 3)	8.1130E-06 (124, 3)	7.4370E-06 (
11	8.6350E-06 (240, 4)	9.0181E-06 (141, 5)	8.6341E-06 (299, 4)	8.4585E-06 (123, 3)	7.8382E-06 (
12	9.7210E-06 (123, 5)	1.2226E-05 (299, 4)	1.2922E-05 (299, 4)	1.2093E-05 (299, 4)	1.1127E-05 (
13	1.0687E-05 (168, 4)	9.7922E-06 (168, 4)	1.0722E-05 (75, 5)	1.1017E-05 (299, 3)	1.0710E-05 (
14	9.6363E-06 (82, 4)	9.7843E-06 (338, 4)	1.0065E-05 (168, 4)	9.5927E-06 (96, 4)	9.0861E-06 (
15	7.1790E-06 (220, 4)	8.0940E-06 (142, 3)	8.5689E-06 (142, 3)	8.3646E-06 (28, 4)	7.8357E-06 (
16	8.5550E-06 (168, 4)	1.0173E-05 (28, 4)	1.2489E-05 (28, 4)	1.2725E-05 (28, 4)	1.1981E-05 (
17	7.4057E-06 (29, 4)	9.8724E-06 (172, 4)	8.3888E-06 (172, 4)	7.2339E-06 (352, 4)	7.5125E-06 (
18	8.8527E-06 (172, 4)	1.0538E-05 (1, 5)	1.1537E-05 (1, 5)	1.1021E-05 (1, 5)	9.9934E-06 (
19	5.7828E-06 (64, 4)	9.1523E-06 (303, 3)	8.7165E-06 (76, 5)	8.1455E-06 (76, 5)	7.6932E-06 (
20	6.1672E-06 (142, 4)	7.6663E-06 (68, 4)	7.8531E-06 (311, 5)	8.4281E-06 (311, 5)	8.0065E-06 (
21	8.7991E-06 (244, 5)	9.4774E-06 (244, 5)	1.0494E-05 (264, 3)	9.9578E-06 (241, 4)	1.0189E-05
22	7.1864E-06 (239, 4)	8.1137E-06 (138, 4)	7.7309E-06 (236, 4)	7.5873E-06 (357, 5)	8.1671E-06
23	7.9237E-06 (342, 4)	8.4707E-06 (99, 5)	8.9866E-06 (346, 4)	9.9037E-06 (346, 4)	9.0340E-06
24	9.1238E-06 (233, 5)	1.1807E-05 (276, 4)	1.2418E-05 (305, 4)	1.1644E-05 (305, 4)	1.0418E-05
25	1.0927E-05 (142, 4)	1.2239E-05 (142, 4)	1.1558E-05 (190, 4)	1.0815E-05 (210, 3)	1.1235E-05
26	8.5415E-06 (106, 4)	1.2009E-05 (169, 5)	1.2390E-05 (169, 5)	1.1418E-05 (169, 5)	1.0413E-05
27	1.2059E-05 (169, 4)	1.1827E-05 (169, 4)	1.1849E-05 (189, 4)	1.1141E-05 (189, 4)	1.0424E-05
28	1.1629E-05 (168, 5)	1.3275E-05 (194, 4)	1.3773E-05 (140, 5)	1.2885E-05 (140, 5)	1.1500E-05
29	1.2863E-05 (196, 4)	1.6229E-05 (176, 5)	1.5960E-05 (176, 5)	1.4578E-05 (208, 5)	1.2641E-05
30	1.4472E-05 (184, 4)	1.7486E-05 (126, 4)	1.8055E-05 (126, 4)	1.6677E-05 (126, 4)	1.4772E-05
31	1.4024E-05 (109, 5)	1.4190E-05 (111, 5)	1.3697E-05 (111, 5)	1.2129E-05 (220, 5)	1.0885E-05
32	1.3151E-05 (273, 5)	1.4933E-05 (108, 5)	1.4821E-05 (74, 5)	1.3936E-05 (74, 5)	1.2258E-05
33	8.9787E-06 (287, 4)	1.0478E-05 (287, 4)	1.0521E-05 (238, 5)	9.4638E-06 (238, 5)	8.1207E-06
34	1.0581E-05 (331, 5)	1.1645E-05 (331, 5)	1.1622E-05 (8, 5)	1.1176E-05 (73, 4)	9.8635E-06
35	8.0040E-06 (73, 4)	1.0715E-05 (73, 4)	1.1883E-05 (8, 5)	1.1526E-05 (8, 5)	1.0528E-05
36	7.3001E-06 (228, 4)	1.0404E-05 (10, 5)	1.1254E-05 (10, 5)	9.9696E-06 (133, 4)	9.0990E-06

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 5.9729E-07 DIRECTION= 30 DISTANCE= 1.8 KM

YEAR= 72

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	5.57866E-08	7.76973E-08	8.77374E-08	9.09081E-08	9.05764E-08
2	5.43547E-08	7.41244E-08	8.37550E-08	8.77792E-08	8.89930E-08
3	5.95781E-08	8.05682E-08	9.02966E-08	9.35785E-08	9.36614E-08
4	6.48596E-08	8.82513E-08	9.77604E-08	9.92422E-08	9.71986E-08
5	6.60373E-08	9.09861E-08	1.02061E-07	1.05257E-07	1.04677E-07
6	8.05200E-08	1.14963E-07	1.32297E-07	1.39110E-07	1.40280E-07
7	5.60592E-08	8.10167E-08	9.43811E-08	9.99510E-08	1.00985E-07
8	3.96451E-08	5.34408E-08	6.02107E-08	6.26009E-08	6.26481E-08
9	4.45627E-08	5.90330E-08	6.58518E-08	6.78978E-08	6.74288E-08
10	4.43875E-08	5.65349E-08	6.14430E-08	6.23496E-08	6.13206E-08
11	5.90240E-08	8.27893E-08	9.27186E-08	9.49319E-08	9.34448E-08
12	7.05874E-08	1.14662E-07	1.39269E-07	1.50711E-07	1.54543E-07
13	6.94684E-08	1.14698E-07	1.40737E-07	1.54021E-07	1.59744E-07
14	6.92876E-08	1.14242E-07	1.40317E-07	1.54115E-07	1.60581E-07
15	4.92250E-08	8.15514E-08	9.92757E-08	1.07935E-07	1.11898E-07
16	4.73812E-08	8.19667E-08	1.02387E-07	1.13379E-07	1.18863E-07
17	4.35405E-08	7.04257E-08	8.25134E-08	8.63166E-08	8.63785E-08
18	3.55942E-08	6.04066E-08	7.40079E-08	8.05598E-08	8.33449E-08
19	2.46355E-08	4.32045E-08	5.36732E-08	5.84717E-08	6.00841E-08
20	2.57377E-08	4.48932E-08	5.64839E-08	6.31025E-08	6.67126E-08
21	4.39635E-08	7.96936E-08	1.05554E-07	1.23248E-07	1.34269E-07
22	5.77195E-08	1.05785E-07	1.42425E-07	1.68481E-07	1.85308E-07
23	6.97218E-08	1.25229E-07	1.68384E-07	1.99456E-07	2.19566E-07
24	1.05258E-07	1.78011E-07	2.28272E-07	2.60911E-07	2.80107E-07
25	1.30661E-07	2.08353E-07	2.56267E-07	2.84673E-07	3.00100E-07
26	1.72507E-07	2.69396E-07	3.25419E-07	3.56507E-07	3.72312E-07
27	1.97762E-07	3.07054E-07	3.71729E-07	4.08849E-07	4.28599E-07
28	2.10401E-07	3.11488E-07	3.65606E-07	3.93800E-07	4.07156E-07
29	2.87792E-07	4.10201E-07	4.56005E-07	4.64301E-07	4.56202E-07
30	3.75438E-07	5.36790E-07	5.92455E-07	5.97289E-07	5.81219E-07
31	3.54179E-07	4.89665E-07	5.25281E-07	5.15341E-07	4.88882E-07
32	2.74844E-07	3.65610E-07	3.83194E-07	3.69216E-07	3.45261E-07
33	1.87821E-07	2.41999E-07	2.49192E-07	2.37234E-07	2.20060E-07
34	1.28013E-07	1.62685E-07	1.66859E-07	1.59111E-07	1.48380E-07
35	9.54875E-08	1.29605E-07	1.40139E-07	1.38765E-07	1.32604E-07
36	7.56163E-08	1.13409E-07	1.33226E-07	1.41501E-07	1.43648E-07

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 4.7738E-06 DIRECTION= 31 DISTANCE= 1.2 KM DAY=112

YEAR= 72

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	1.6558E-06 (192)	1.8580E-06 (193)	1.9043E-06 (91)	2.0165E-06 (192)	1.7789E-06 (192)
2	1.5994E-06 (99)	2.0103E-06 (193)	1.8078E-06 (193)	1.7760E-06 (63)	1.6853E-06 (99)
3	1.3544E-06 (275)	1.6669E-06 (193)	1.7209E-06 (193)	1.7940E-06 (125)	1.6582E-06 (125)
4	1.4592E-06 (138)	1.7095E-06 (176)	1.7397E-06 (176)	1.8435E-06 (182)	1.8801E-06 (182)
5	1.7459E-06 (181)	1.5865E-06 (176)	1.6380E-06 (176)	1.5538E-06 (176)	1.4335E-06 (176)
6	2.0927E-06 (173)	3.0019E-06 (151)	3.2932E-06 (173)	3.5642E-06 (173)	3.7004E-06 (173)
7	1.2398E-06 (192)	1.5743E-06 (144)	1.6681E-06 (173)	1.8063E-06 (173)	1.8677E-06 (173)
8	9.1223E-07 (146)	1.2512E-06 (361)	1.4856E-06 (151)	1.4597E-06 (151)	1.3473E-06 (151)
9	1.4666E-06 (109)	1.7281E-06 (109)	1.5620E-06 (109)	1.4042E-06 (151)	1.3395E-06 (151)
10	1.9433E-06 (233)	1.4216E-06 (179)	1.5343E-06 (154)	1.6087E-06 (154)	1.5582E-06 (154)
11	1.6992E-06 (282)	1.9515E-06 (142)	2.1172E-06 (282)	2.1042E-06 (142)	1.9933E-06 (142)
12	1.5344E-06 (148)	2.6010E-06 (282)	2.5105E-06 (282)	2.8191E-06 (321)	2.7855E-06 (147)
13	1.5307E-06 (148)	1.9122E-06 (148)	2.2898E-06 (328)	2.5388E-06 (328)	2.7007E-06 (328)
14	1.9448E-06 (280)	3.0350E-06 (280)	3.2801E-06 (97)	3.1823E-06 (280)	2.9386E-06 (16)
15	1.4794E-06 (280)	1.9246E-06 (45)	1.9809E-06 (83)	1.9585E-06 (280)	1.8444E-06 (83)
16	1.2495E-06 (326)	1.6169E-06 (326)	1.7943E-06 (352)	2.2540E-06 (45)	2.3495E-06 (351)
17	1.1316E-06 (141)	1.7674E-06 (322)	1.9722E-06 (322)	1.7236E-06 (326)	1.5122E-06 (141)
18	9.3080E-07 (326)	1.4004E-06 (190)	1.6200E-06 (190)	1.3610E-06 (279)	1.4124E-06 (7)
19	5.7294E-07 (122)	1.1457E-06 (158)	1.2353E-06 (126)	1.2450E-06 (126)	1.1663E-06 (126)
20	7.2456E-07 (117)	1.3808E-06 (158)	1.4038E-06 (122)	1.4739E-06 (117)	1.5017E-06 (117)
21	1.2181E-06 (117)	1.4569E-06 (287)	1.6021E-06 (287)	1.7799E-06 (286)	2.0348E-06 (17)
22	1.1050E-06 (215)	1.5696E-06 (215)	1.6699E-06 (72)	2.3056E-06 (17)	2.5352E-06 (8)
23	1.5550E-06 (246)	1.4332E-06 (247)	2.0013E-06 (295)	2.5967E-06 (295)	2.7693E-06 (8)
24	1.9657E-06 (246)	2.0831E-06 (189)	2.1545E-06 (266)	2.3865E-06 (126)	2.8747E-06 (127)
25	1.9220E-06 (263)	2.4559E-06 (216)	2.5337E-06 (216)	2.4598E-06 (80)	2.5299E-06 (263)
26	1.9213E-06 (189)	2.5693E-06 (216)	2.7228E-06 (216)	2.8068E-06 (202)	2.9662E-06 (202)
27	1.8363E-06 (73)	2.5585E-06 (200)	2.8002E-06 (200)	2.8853E-06 (167)	3.2760E-06 (81)
28	2.3873E-06 (227)	3.0940E-06 (273)	3.1555E-06 (209)	2.9089E-06 (209)	3.0368E-06 (128)
29	2.6750E-06 (195)	3.0461E-06 (162)	3.1373E-06 (212)	3.1761E-06 (213)	3.0615E-06 (213)
30	3.0901E-06 (235)	3.9091E-06 (237)	3.9886E-06 (237)	3.6987E-06 (237)	3.8582E-06 (13)
31	3.7172E-06 (112)	4.7738E-06 (112)	4.3464E-06 (111)	3.7498E-06 (111)	3.2200E-06 (111)
32	2.8470E-06 (180)	3.4820E-06 (274)	3.6298E-06 (274)	3.4023E-06 (274)	3.0770E-06 (274)
33	2.5760E-06 (182)	2.8905E-06 (182)	2.6017E-06 (182)	2.3532E-06 (82)	2.2534E-06 (82)
34	2.6620E-06 (180)	3.1193E-06 (124)	2.8212E-06 (124)	2.3847E-06 (124)	1.9902E-06 (135)
35	1.9703E-06 (124)	2.3231E-06 (136)	2.3170E-06 (181)	2.1385E-06 (124)	1.9560E-06 (136)
36	1.3778E-06 (234)	1.5411E-06 (104)	1.7366E-06 (131)	1.8819E-06 (131)	1.9112E-06 (131)

BEST AVAILABLE COPY

PLANT NAME: LONESTAR   POLLUTANT: SO2   AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM   3-HOUR CONC= 1.5963E-05 DIRECTION= 31 DISTANCE= 1.2 KM DAY=131   TI

YEAR= 72

SECOND HIGHEST   3-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 K
1	9.8601E-06 (193, 4)	9.8013E-06 (137, 5)	8.4177E-06 (137, 5)	7.0791E-06 (130, 3)	6.4684E-06 (
2	9.2879E-06 (193, 4)	9.0345E-06 (192, 5)	9.5021E-06 (192, 5)	8.8830E-06 (192, 5)	8.0575E-06 (
3	1.0836E-05 (275, 4)	9.3250E-06 (181, 4)	1.0155E-05 (125, 4)	8.8901E-06 (152, 3)	7.7734E-06 (
4	7.4244E-06 (138, 4)	1.3005E-05 (144, 3)	1.1878E-05 (181, 4)	9.9882E-06 (181, 4)	8.4268E-06 (
5	1.2932E-05 (138, 4)	1.0614E-05 (138, 4)	1.0458E-05 (145, 3)	1.0265E-05 (176, 4)	9.3221E-06 (
6	9.1395E-06 (174, 4)	1.2112E-05 (151, 4)	1.2912E-05 (151, 4)	1.2201E-05 (151, 4)	1.0984E-05 (
7	7.3844E-06 (137, 4)	7.0829E-06 (146, 4)	6.6378E-06 (137, 4)	6.4840E-06 (145, 5)	6.8462E-06 (
8	6.5752E-06 (137, 5)	6.1453E-06 (160, 5)	6.2649E-06 (78, 4)	6.7133E-06 (48, 6)	6.9993E-06 (
9	7.4311E-06 (109, 5)	9.3639E-06 (44, 4)	9.8549E-06 (44, 4)	9.1829E-06 (44, 4)	8.1661E-06 (
10	9.5017E-06 (250, 4)	9.0730E-06 (233, 4)	1.0113E-05 (109, 4)	8.5696E-06 (109, 4)	7.5798E-06 (
11	8.8581E-06 (282, 4)	9.5210E-06 (154, 5)	9.9538E-06 (154, 5)	9.2685E-06 (154, 5)	8.2414E-06 (
12	8.4670E-06 (148, 4)	1.1176E-05 (97, 5)	1.1073E-05 (282, 5)	1.0812E-05 (240, 6)	1.0235E-05 (
13	8.6137E-06 (282, 5)	1.1018E-05 (148, 4)	1.0728E-05 (359, 4)	1.1752E-05 (282, 5)	1.0417E-05 (
14	8.3987E-06 (280, 4)	1.4316E-05 (280, 4)	1.4970E-05 (97, 4)	1.3690E-05 (97, 4)	1.2034E-05 (
15	6.1572E-06 (45, 4)	7.2443E-06 (362, 5)	7.3644E-06 (83, 5)	6.9812E-06 (36, 4)	6.8299E-06 (
16	6.3442E-06 (126, 3)	7.4641E-06 (36, 4)	8.6418E-06 (36, 4)	8.6454E-06 (36, 4)	8.1443E-06 (
17	8.4902E-06 (45, 4)	1.0550E-05 (45, 4)	1.1244E-05 (191, 3)	1.0590E-05 (326, 5)	9.3822E-06 (
18	6.9811E-06 (326, 5)	1.0800E-05 (190, 5)	1.1226E-05 (279, 4)	9.1022E-06 (279, 4)	7.3483E-06 (
19	4.5342E-06 (198, 3)	6.4862E-06 (198, 3)	6.4338E-06 (198, 3)	6.0710E-06 (265, 3)	5.8662E-06 (
20	5.3962E-06 (45, 5)	6.6488E-06 (122, 3)	6.1946E-06 (157, 4)	6.2086E-06 (157, 4)	6.5729E-06 (
21	6.5539E-06 (158, 4)	1.0185E-05 (158, 4)	1.0034E-05 (126, 5)	8.6190E-06 (126, 5)	7.2805E-06 (
22	7.3110E-06 (191, 4)	9.6276E-06 (332, 5)	8.9794E-06 (332, 5)	8.1035E-06 (117, 5)	7.9324E-06 (
23	1.0400E-05 (216, 4)	1.1211E-05 (246, 5)	1.1095E-05 (262, 4)	1.0464E-05 (262, 4)	9.3869E-06 (
24	1.4206E-05 (216, 4)	1.3268E-05 (216, 4)	1.2237E-05 (253, 6)	1.0932E-05 (189, 4)	9.7447E-06 (
25	1.0950E-05 (263, 4)	1.2642E-05 (191, 5)	1.2441E-05 (191, 5)	1.1133E-05 (191, 5)	9.6298E-06 (
26	1.0664E-05 (265, 5)	1.2009E-05 (265, 5)	1.1864E-05 (202, 4)	1.1225E-05 (202, 4)	1.0130E-05 (
27	1.3877E-05 (159, 5)	1.3780E-05 (200, 4)	1.2588E-05 (258, 5)	1.2615E-05 (186, 3)	1.1659E-05 (
28	1.3039E-05 (228, 5)	1.2228E-05 (317, 4)	1.1428E-05 (29, 5)	1.1063E-05 (273, 5)	9.9635E-06 (
29	1.2129E-05 (195, 5)	1.2974E-05 (211, 5)	1.2729E-05 (21, 4)	1.2587E-05 (21, 4)	1.1299E-05 (
30	1.3262E-05 (235, 4)	1.3735E-05 (237, 4)	1.3484E-05 (106, 4)	1.3309E-05 (32, 4)	1.2828E-05 (
31	1.3994E-05 (111, 5)	1.5963E-05 (131, 5)	1.4312E-05 (112, 4)	1.2510E-05 (109, 6)	1.1720E-05 (
32	1.4315E-05 (112, 4)	1.5189E-05 (112, 4)	1.4408E-05 (274, 5)	1.3413E-05 (274, 5)	1.1943E-05 (
33	1.2756E-05 (57, 4)	1.4685E-05 (57, 4)	1.2922E-05 (274, 4)	1.1189E-05 (57, 4)	1.0151E-05 (
34	1.3505E-05 (180, 5)	1.3910E-05 (180, 5)	1.1714E-05 (180, 5)	1.0659E-05 (57, 4)	9.7723E-06 (
35	9.5517E-06 (136, 5)	1.1825E-05 (181, 6)	1.1372E-05 (63, 5)	1.1025E-05 (63, 5)	1.0082E-05 (
36	9.5547E-06 (137, 5)	1.1513E-05 (330, 4)	1.1148E-05 (179, 6)	1.0643E-05 (179, 6)	1.1390E-05 (

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 5.3511E-07 DIRECTION= 31 DISTANCE= 1.8 KM

YEAR= 73

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	7.66084E-08	1.08503E-07	1.21850E-07	1.24525E-07	1.22395E-07
2	4.87912E-08	6.86569E-08	7.79862E-08	8.13206E-08	8.15020E-08
3	3.98934E-08	5.80068E-08	6.69915E-08	7.07238E-08	7.14496E-08
4	3.35991E-08	4.76401E-08	5.55227E-08	5.94875E-08	6.11569E-08
5	3.12012E-08	3.97702E-08	4.47706E-08	4.72737E-08	4.82376E-08
6	3.85407E-08	4.92388E-08	5.53082E-08	5.78825E-08	5.84420E-08
7	3.96170E-08	5.00549E-08	5.57603E-08	5.75230E-08	5.71783E-08
8	4.89757E-08	6.16074E-08	6.89681E-08	7.27458E-08	7.44602E-08
9	5.30239E-08	6.80130E-08	7.76575E-08	8.34103E-08	8.61343E-08
10	3.98466E-08	5.00342E-08	5.61113E-08	5.94252E-08	6.07813E-08
11	3.10115E-08	4.57422E-08	5.59941E-08	6.23496E-08	6.60264E-08
12	2.55751E-08	4.72184E-08	6.49470E-08	7.75993E-08	8.58364E-08
13	3.11422E-08	5.53491E-08	7.28393E-08	8.45478E-08	9.18929E-08
14	5.35214E-08	9.66070E-08	1.25428E-07	1.42949E-07	1.53027E-07
15	4.89001E-08	9.17967E-08	1.23071E-07	1.43858E-07	1.56774E-07
16	4.96920E-08	8.79855E-08	1.14123E-07	1.30078E-07	1.38980E-07
17	5.97986E-08	9.76606E-08	1.22565E-07	1.36659E-07	1.43712E-07
18	6.18953E-08	9.60630E-08	1.17612E-07	1.29205E-07	1.34688E-07
19	5.07067E-08	7.48593E-08	8.75137E-08	9.25436E-08	9.34755E-08
20	3.78212E-08	5.76175E-08	6.86750E-08	7.42147E-08	7.65355E-08
21	2.66169E-08	4.32143E-08	5.47305E-08	6.23401E-08	6.70004E-08
22	4.13188E-08	7.05232E-08	9.00216E-08	1.01924E-07	1.08407E-07
23	6.37073E-08	1.05887E-07	1.34269E-07	1.52717E-07	1.63853E-07
24	1.03670E-07	1.70699E-07	2.13919E-07	2.40731E-07	2.56153E-07
25	1.37460E-07	2.19457E-07	2.67340E-07	2.94364E-07	3.08505E-07
26	1.58190E-07	2.55005E-07	3.12539E-07	3.45698E-07	3.63408E-07
27	1.50408E-07	2.49805E-07	3.13151E-07	3.52105E-07	3.74589E-07
28	1.80166E-07	3.03024E-07	3.83379E-07	4.33071E-07	4.61078E-07
29	2.18105E-07	3.24265E-07	3.78633E-07	4.04543E-07	4.14633E-07
30	3.08490E-07	4.45416E-07	5.05739E-07	5.25885E-07	5.26152E-07
31	3.43020E-07	4.77675E-07	5.27592E-07	5.35115E-07	5.23700E-07
32	3.07977E-07	4.12300E-07	4.39937E-07	4.32079E-07	4.11183E-07
33	2.31048E-07	3.10743E-07	3.34481E-07	3.30664E-07	3.16127E-07
34	1.50391E-07	1.99362E-07	2.15395E-07	2.14262E-07	2.05908E-07
35	1.09666E-07	1.49447E-07	1.63563E-07	1.63231E-07	1.56578E-07
36	1.05119E-07	1.53595E-07	1.74591E-07	1.78842E-07	1.75381E-07

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 4.3392E-06 DIRECTION= 26 DISTANCE= 1.8 KM DAY=113

YEAR= 73

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	1.0755E-06 (177)	1.8459E-06 (192)	1.9057E-06 (186)	1.9305E-06 (267)	1.9753E-06 (267)
2	1.1267E-06 (192)	1.2213E-06 (186)	1.1814E-06 (261)	1.2402E-06 (94)	1.4577E-06 (94)
3	1.0752E-06 (141)	1.4597E-06 (235)	1.7223E-06 (192)	1.7141E-06 (117)	1.8234E-06 (98)
4	1.0590E-06 (181)	1.0401E-06 (6)	1.2946E-06 (6)	1.3139E-06 (174)	1.4664E-06 (174)
5	1.2995E-06 (181)	8.0661E-07 (190)	1.0299E-06 (6)	1.0524E-06 (6)	9.7856E-07 (6)
6	1.2229E-06 (259)	1.4867E-06 (132)	1.5171E-06 (132)	1.4386E-06 (347)	1.4351E-06 (347)
7	1.3791E-06 (259)	1.3384E-06 (234)	1.4383E-06 (258)	1.3205E-06 (258)	1.1974E-06 (234)
8	1.6249E-06 (258)	1.9667E-06 (258)	1.9185E-06 (258)	1.7463E-06 (258)	1.5487E-06 (258)
9	1.8256E-06 (234)	2.1195E-06 (253)	2.0921E-06 (253)	1.8940E-06 (253)	1.8774E-06 (254)
10	1.2351E-06 (234)	1.4484E-06 (191)	1.2245E-06 (191)	1.1993E-06 (181)	1.3379E-06 (29)
11	8.7810E-07 (181)	1.0512E-06 (181)	1.0285E-06 (86)	1.1841E-06 (99)	1.3171E-06 (99)
12	6.5752E-07 (78)	9.4262E-07 (355)	1.3397E-06 (53)	1.7687E-06 (12)	1.9867E-06 (355)
13	7.8379E-07 (100)	1.1591E-06 (100)	1.3389E-06 (100)	1.4275E-06 (100)	1.6306E-06 (47)
14	1.3107E-06 (15)	2.0568E-06 (136)	2.3391E-06 (131)	2.4213E-06 (303)	2.3601E-06 (303)
15	1.4457E-06 (101)	1.8520E-06 (356)	2.2120E-06 (346)	2.2592E-06 (346)	2.1608E-06 (346)
16	9.6455E-07 (356)	1.4885E-06 (77)	1.7701E-06 (77)	1.8010E-06 (77)	2.1500E-06 (333)
17	1.2891E-06 (131)	1.6718E-06 (9)	1.9889E-06 (9)	2.1019E-06 (9)	2.1065E-06 (9)
18	1.4910E-06 (118)	1.7471E-06 (30)	2.1382E-06 (118)	2.0543E-06 (297)	2.2171E-06 (30)
19	1.0852E-06 (30)	1.8736E-06 (30)	2.0976E-06 (30)	2.0337E-06 (30)	1.8755E-06 (30)
20	1.4583E-06 (188)	1.5545E-06 (101)	1.4463E-06 (30)	1.3396E-06 (30)	1.5621E-06 (296)
21	9.6485E-07 (101)	1.0066E-06 (282)	1.3257E-06 (294)	1.8813E-06 (294)	2.3061E-06 (294)
22	1.1139E-06 (102)	1.2223E-06 (102)	1.2706E-06 (294)	1.6102E-06 (294)	1.8039E-06 (294)
23	1.2858E-06 (36)	1.8706E-06 (36)	1.9610E-06 (36)	2.1809E-06 (315)	2.4846E-06 (315)
24	1.5423E-06 (153)	2.2042E-06 (265)	2.4708E-06 (265)	2.7179E-06 (153)	2.5660E-06 (153)
25	2.0269E-06 (126)	2.6845E-06 (126)	2.6932E-06 (105)	2.8447E-06 (126)	3.1041E-06 (121)
26	2.3865E-06 (264)	3.4836E-06 (107)	4.1121E-06 (107)	4.3392E-06 (113)	3.9414E-06 (113)
27	1.5175E-06 (188)	1.7834E-06 (112)	2.2470E-06 (122)	2.5669E-06 (199)	2.3984E-06 (199)
28	1.7693E-06 (199)	2.2264E-06 (1)	2.5749E-06 (162)	3.2010E-06 (32)	3.7126E-06 (32)
29	2.2174E-06 (195)	2.4580E-06 (1)	2.6887E-06 (198)	2.5082E-06 (162)	2.4883E-06 (1)
30	2.7104E-06 (218)	2.8708E-06 (218)	2.9090E-06 (128)	3.1409E-06 (128)	3.4063E-06 (74)
31	3.4645E-06 (218)	3.3730E-06 (256)	3.3826E-06 (226)	3.4676E-06 (329)	3.3338E-06 (329)
32	2.7769E-06 (218)	3.3202E-06 (167)	3.1926E-06 (216)	3.1234E-06 (75)	3.3205E-06 (148)
33	2.2572E-06 (212)	2.9029E-06 (167)	2.8301E-06 (40)	2.8460E-06 (40)	2.7261E-06 (40)
34	2.0021E-06 (217)	2.0779E-06 (361)	2.3743E-06 (361)	2.3203E-06 (361)	2.1263E-06 (361)
35	1.6924E-06 (147)	2.0270E-06 (213)	2.0434E-06 (267)	2.0493E-06 (267)	1.9278E-06 (267)
36	2.1776E-06 (180)	2.7202E-06 (262)	2.9066E-06 (180)	2.6763E-06 (180)	2.3791E-06 (180)

BEST AVAILABLE COPY

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 3-HOUR CONC= 1.6859E-05 DIRECTION= 26 DISTANCE= 1.2 KM DAY=264 (IM

YEAR= 73

SECOND HIGHEST 3-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	8.9543E-06 (186, 5)	1.0384E-05 (177, 4)	9.8695E-06 (186, 5)	8.7079E-06 (186, 5)	7.8627E-06 (
2	7.8429E-06 (141, 4)	8.8756E-06 (141, 4)	7.9438E-06 (186, 5)	7.2518E-06 (192, 4)	6.7662E-06 (1
3	7.9357E-06 (124, 4)	9.4787E-06 (349, 4)	1.0003E-05 (349, 4)	9.5925E-06 (349, 4)	8.7998E-06 (3
4	8.3402E-06 (117, 4)	7.9659E-06 (181, 4)	6.4800E-06 (181, 4)	6.8466E-06 (174, 4)	6.8889E-06 (1
5	6.4700E-06 (190, 5)	5.8478E-06 (8, 5)	6.3290E-06 (8, 5)	6.0103E-06 (8, 5)	6.0738E-06 (1
6	7.9393E-06 (190, 5)	8.0176E-06 (347, 5)	8.1105E-06 (99, 5)	7.4159E-06 (99, 5)	6.5298E-06 (
7	1.0061E-05 (132, 4)	6.9643E-06 (258, 4)	7.4429E-06 (132, 4)	6.9417E-06 (99, 5)	6.5626E-06 (
8	9.3907E-06 (132, 4)	7.4412E-06 (253, 4)	6.5400E-06 (253, 4)	6.2140E-06 (347, 5)	5.8342E-06 (1
9	1.0999E-05 (258, 5)	1.2365E-05 (253, 4)	1.1575E-05 (234, 4)	1.0095E-05 (253, 4)	9.4334E-06 (1
10	9.0150E-06 (138, 5)	7.2978E-06 (234, 4)	8.1355E-06 (234, 4)	7.8377E-06 (234, 4)	6.9406E-06 (1
11	6.6270E-06 (181, 5)	6.0939E-06 (86, 4)	6.0994E-06 (210, 5)	6.2550E-06 (76, 6)	6.0258E-06 (
12	4.0177E-06 (344, 5)	5.9348E-06 (344, 5)	6.7226E-06 (58, 5)	6.6890E-06 (58, 5)	7.4676E-06 (1
13	4.5759E-06 (100, 5)	6.1223E-06 (86, 5)	6.1754E-06 (86, 5)	5.8057E-06 (183, 5)	6.9630E-06 (
14	8.0723E-06 (343, 5)	1.0814E-05 (303, 4)	1.1699E-05 (303, 4)	1.1178E-05 (303, 4)	1.0661E-05 (1
15	7.9992E-06 (101, 5)	9.3139E-06 (343, 5)	1.0905E-05 (14, 5)	1.1255E-05 (14, 5)	1.0747E-05 (
16	6.1211E-06 (35, 5)	7.7283E-06 (78, 4)	8.1426E-06 (78, 4)	7.6015E-06 (78, 4)	7.8086E-06 (3
17	9.0700E-06 (187, 4)	1.0086E-05 (9, 5)	1.0408E-05 (9, 5)	9.7038E-06 (9, 5)	8.9378E-06 (
18	7.9353E-06 (189, 4)	1.0724E-05 (310, 4)	1.1520E-05 (310, 4)	1.1224E-05 (30, 4)	1.0386E-05 (
19	6.1022E-06 (78, 5)	8.3873E-06 (30, 4)	9.2957E-06 (30, 4)	8.7757E-06 (30, 4)	7.8207E-06 (
20	6.4168E-06 (101, 5)	9.2432E-06 (37, 4)	1.1349E-05 (37, 4)	1.0259E-05 (188, 4)	8.4157E-06 (1
21	5.6603E-06 (101, 5)	8.0031E-06 (282, 4)	7.9477E-06 (282, 4)	7.2158E-06 (188, 4)	7.1627E-06 (1
22	8.8102E-06 (102, 4)	9.6460E-06 (102, 4)	9.1754E-06 (282, 4)	8.0929E-06 (36, 5)	7.3772E-06 (2
23	7.9512E-06 (36, 5)	1.0277E-05 (36, 5)	1.0801E-05 (240, 4)	9.7493E-06 (102, 4)	7.9561E-06 (1
24	8.8969E-06 (265, 5)	1.1920E-05 (153, 5)	1.1634E-05 (265, 5)	1.0687E-05 (265, 5)	9.5517E-06 (2
25	1.0972E-05 (264, 4)	1.3458E-05 (153, 4)	1.2537E-05 (271, 5)	1.1703E-05 (271, 5)	1.0412E-05 (2
26	1.4995E-05 (113, 5)	1.6859E-05 (264, 4)	1.5233E-05 (252, 4)	1.5008E-05 (252, 4)	1.3181E-05 (1
27	1.0643E-05 (264, 4)	1.0254E-05 (264, 4)	1.1261E-05 (184, 5)	1.0945E-05 (184, 5)	1.0016E-05 (1
28	7.6529E-06 (289, 5)	8.5737E-06 (198, 4)	1.0247E-05 (255, 6)	1.0864E-05 (255, 6)	9.9645E-06 (2
29	1.0951E-05 (184, 4)	1.2896E-05 (78, 5)	1.2300E-05 (78, 5)	1.1307E-05 (169, 4)	1.0312E-05 (1
30	1.3469E-05 (280, 5)	1.3902E-05 (280, 5)	1.3757E-05 (274, 4)	1.2666E-05 (274, 4)	1.1422E-05 (
31	1.6213E-05 (256, 5)	1.5112E-05 (256, 5)	1.3179E-05 (115, 4)	1.1506E-05 (218, 4)	1.0713E-05 (2
32	1.3053E-05 (218, 4)	1.4209E-05 (362, 5)	1.4749E-05 (362, 5)	1.3737E-05 (362, 5)	1.2247E-05 (3
33	1.5394E-05 (150, 5)	1.3700E-05 (39, 5)	1.4252E-05 (361, 4)	1.3857E-05 (149, 3)	1.3170E-05 (3
34	1.3650E-05 (227, 5)	1.2309E-05 (364, 4)	1.1768E-05 (38, 5)	1.1203E-05 (38, 5)	1.1302E-05 (1
35	1.0664E-05 (262, 4)	1.1796E-05 (208, 5)	1.1364E-05 (208, 5)	9.9205E-06 (208, 5)	8.3801E-06 (2
36	1.1921E-05 (262, 4)	1.5553E-05 (180, 5)	1.4740E-05 (262, 4)	1.3377E-05 (262, 4)	1.1765E-05 (2

PLANT NAME: LONESTAR   POLLUTANT: SO2   AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 6.2677E-07 DIRECTION= 30 DISTANCE= 1.8 KM

YEAR= 74

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	5.46077E-08	7.34256E-08	8.14574E-08	8.37949E-08	8.34619E-08
2	4.84037E-08	6.61403E-08	7.30242E-08	7.41821E-08	7.29278E-08
3	4.56802E-08	5.93432E-08	6.36380E-08	6.33235E-08	6.12635E-08
4	4.92546E-08	6.72075E-08	7.35885E-08	7.39215E-08	7.16713E-08
5	4.44046E-08	6.11964E-08	6.80724E-08	6.97908E-08	6.91247E-08
6	4.69206E-08	6.76824E-08	7.71926E-08	8.02393E-08	8.01220E-08
7	4.54834E-08	6.32201E-08	7.21848E-08	7.66879E-08	7.88232E-08
8	4.20569E-08	5.67102E-08	6.20000E-08	6.32825E-08	6.31056E-08
9	3.76285E-08	5.23007E-08	5.83980E-08	6.03858E-08	6.07139E-08
10	3.55196E-08	4.82455E-08	5.28179E-08	5.33606E-08	5.21461E-08
11	3.76257E-08	5.37367E-08	6.12048E-08	6.40268E-08	6.44679E-08
12	4.53876E-08	6.70187E-08	7.77300E-08	8.19974E-08	8.28770E-08
13	4.85877E-08	7.15210E-08	8.24352E-08	8.63567E-08	8.67714E-08
14	5.09866E-08	8.09584E-08	9.78901E-08	1.06278E-07	1.09845E-07
15	5.43481E-08	9.40549E-08	1.19400E-07	1.32632E-07	1.37883E-07
16	5.32137E-08	8.53304E-08	1.04299E-07	1.14044E-07	1.18685E-07
17	5.82084E-08	9.70612E-08	1.23425E-07	1.40057E-07	1.50405E-07
18	5.71453E-08	9.57663E-08	1.21394E-07	1.36918E-07	1.45800E-07
19	4.81879E-08	7.70188E-08	9.51193E-08	1.05217E-07	1.10433E-07
20	3.70298E-08	5.63033E-08	6.90736E-08	7.63663E-08	8.01817E-08
21	3.65607E-08	6.04230E-08	7.76477E-08	8.84606E-08	9.43643E-08
22	5.66709E-08	9.98274E-08	1.32434E-07	1.54582E-07	1.67856E-07
23	7.98987E-08	1.35506E-07	1.77180E-07	2.06160E-07	2.23948E-07
24	9.53025E-08	1.60918E-07	2.09943E-07	2.44424E-07	2.66315E-07
25	1.15459E-07	1.92785E-07	2.45505E-07	2.79232E-07	2.98647E-07
26	1.39843E-07	2.34811E-07	3.01251E-07	3.46648E-07	3.75540E-07
27	1.51005E-07	2.57696E-07	3.35990E-07	3.91670E-07	4.28547E-07
28	1.95728E-07	3.03981E-07	3.68228E-07	4.06635E-07	4.28219E-07
29	2.93384E-07	4.22052E-07	4.73040E-07	4.86691E-07	4.83075E-07
30	3.85196E-07	5.54802E-07	6.17185E-07	6.26770E-07	6.12920E-07
31	3.38547E-07	4.75441E-07	5.16189E-07	5.11931E-07	4.89945E-07
32	2.57544E-07	3.58498E-07	3.85384E-07	3.78710E-07	3.59680E-07
33	1.96072E-07	2.69173E-07	2.86624E-07	2.79698E-07	2.64503E-07
34	1.51580E-07	2.05484E-07	2.18679E-07	2.13618E-07	2.02068E-07
35	1.02938E-07	1.37416E-07	1.48522E-07	1.48484E-07	1.43809E-07
36	6.96620E-08	9.40460E-08	1.05952E-07	1.10653E-07	1.11576E-07

PLANT NAME: LONESTAR   POLLUTANT: SO2   AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 3.9989E-06 DIRECTION= 30 DISTANCE= 1.5 KM DAY=159

YEAR= 74

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	2.0902E-06 (178)	2.4351E-06 (178)	2.4377E-06 (178)	2.3525E-06 (157)	2.0817E-06 (157)
2	9.7921E-07 (88)	1.4743E-06 (88)	1.5739E-06 (88)	1.6904E-06 (156)	1.7400E-06 (156)
3	1.2830E-06 (132)	1.4176E-06 (132)	1.2475E-06 (231)	1.1698E-06 (132)	1.0302E-06 (132)
4	1.1432E-06 (226)	1.5947E-06 (210)	2.0890E-06 (210)	2.1857E-06 (203)	1.9723E-06 (203)
5	1.1265E-06 (99)	1.7716E-06 (99)	1.9805E-06 (99)	1.9562E-06 (99)	1.8355E-06 (99)
6	1.5161E-06 (168)	1.8815E-06 (168)	1.8173E-06 (168)	1.8421E-06 (192)	1.7121E-06 (192)
7	2.1577E-06 (193)	2.2587E-06 (193)	1.9825E-06 (193)	1.8100E-06 (192)	1.5873E-06 (168)
8	1.3677E-06 (193)	1.4074E-06 (193)	1.3575E-06 (71)	1.3008E-06 (124)	1.3068E-06 (88)
9	1.1446E-06 (148)	1.1150E-06 (272)	9.5793E-07 (272)	9.4781E-07 (193)	9.0014E-07 (193)
10	1.1675E-06 (76)	1.3928E-06 (272)	1.4323E-06 (76)	1.3071E-06 (76)	1.1546E-06 (76)
11	9.6131E-07 (17)	1.0962E-06 (17)	9.7254E-07 (17)	8.2798E-07 (316)	1.0079E-06 (48)
12	1.3009E-06 (17)	1.6246E-06 (114)	1.7193E-06 (114)	1.5939E-06 (202)	1.2977E-06 (202)
13	1.4487E-06 (257)	2.1928E-06 (202)	1.9208E-06 (202)	1.5773E-06 (202)	1.3336E-06 (55)
14	1.4865E-06 (257)	1.7746E-06 (76)	1.7494E-06 (76)	1.7214E-06 (40)	2.0152E-06 (42)
15	1.0651E-06 (114)	1.5216E-06 (42)	1.7685E-06 (42)	1.8121E-06 (57)	2.1106E-06 (57)
16	1.1308E-06 (338)	1.4781E-06 (41)	2.0849E-06 (41)	2.2547E-06 (338)	2.3069E-06 (316)
17	1.5162E-06 (338)	2.0141E-06 (339)	2.2068E-06 (292)	2.4310E-06 (338)	2.2074E-06 (338)
18	1.4028E-06 (253)	2.1879E-06 (253)	2.3903E-06 (253)	2.2896E-06 (253)	2.0792E-06 (253)
19	1.0361E-06 (155)	1.2932E-06 (253)	1.4149E-06 (253)	1.5641E-06 (352)	1.6680E-06 (352)
20	1.1341E-06 (77)	1.4083E-06 (77)	1.4457E-06 (330)	1.5298E-06 (330)	1.5806E-06 (275)
21	9.7409E-07 (277)	1.3107E-06 (149)	1.4132E-06 (278)	1.8326E-06 (278)	2.0971E-06 (278)
22	1.0823E-06 (226)	1.6767E-06 (277)	2.0551E-06 (195)	2.0422E-06 (293)	2.3662E-06 (293)
23	1.7666E-06 (226)	1.7252E-06 (226)	2.3791E-06 (294)	2.9849E-06 (294)	3.0124E-06 (51)
24	1.3798E-06 (109)	1.9226E-06 (109)	2.3224E-06 (51)	2.6258E-06 (119)	2.9980E-06 (119)
25	1.6292E-06 (171)	1.9067E-06 (165)	2.0609E-06 (165)	2.0062E-06 (165)	2.2480E-06 (303)
26	2.0195E-06 (97)	2.6578E-06 (97)	2.5331E-06 (171)	2.2570E-06 (215)	2.5051E-06 (242)
27	1.5004E-06 (244)	2.2176E-06 (244)	2.5888E-06 (244)	2.9225E-06 (357)	3.4491E-06 (357)
28	2.0446E-06 (223)	2.8954E-06 (213)	3.1454E-06 (213)	3.1833E-06 (262)	3.4408E-06 (334)
29	2.5926E-06 (188)	3.3737E-06 (246)	3.4813E-06 (249)	3.6206E-06 (249)	3.1570E-06 (223)
30	3.0406E-06 (246)	3.9536E-06 (159)	3.9989E-06 (159)	3.7090E-06 (159)	3.3373E-06 (159)
31	3.0859E-06 (159)	3.8440E-06 (347)	3.9506E-06 (228)	3.4784E-06 (228)	3.1193E-06 (160)
32	2.9573E-06 (143)	3.6938E-06 (143)	3.5144E-06 (143)	3.0730E-06 (143)	2.8100E-06 (93)
33	2.0918E-06 (87)	2.8135E-06 (80)	3.0359E-06 (80)	2.9536E-06 (38)	2.7283E-06 (78)
34	2.5192E-06 (84)	3.0088E-06 (84)	2.8505E-06 (84)	2.6551E-06 (92)	2.5904E-06 (92)
35	1.5732E-06 (231)	1.9333E-06 (84)	2.1013E-06 (50)	2.4058E-06 (50)	2.5333E-06 (50)
36	1.1640E-06 (203)	1.3477E-06 (203)	1.4768E-06 (178)	1.6987E-06 (178)	1.8551E-06 (178)

BEST AVAILABLE COPY

PLANT NAME: LONESTAR POLLUTANT: SO2 AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 3-HOUR CONC= 1.6557E-05 DIRECTION= 29 DISTANCE= 1.2 KM DAY=223 (I

YEAR= 74

SECOND HIGHEST 3-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	1.0492E-05 (178, 5)	1.1231E-05 (169, 5)	1.0264E-05 (157, 4)	8.8053E-06 (157, 4)	7.4308E-06
2	1.1144E-05 (157, 5)	1.5505E-05 (157, 4)	1.3921E-05 (157, 4)	1.2036E-05 (157, 4)	1.0226E-05
3	7.7306E-06 (124, 4)	6.7988E-06 (230, 4)	6.4026E-06 (17, 5)	6.4791E-06 (269, 3)	6.4385E-06
4	7.0508E-06 (226, 5)	9.3958E-06 (81, 4)	1.0745E-05 (203, 5)	9.7797E-06 (203, 5)	8.6134E-06
5	7.2568E-06 (174, 4)	7.9666E-06 (203, 5)	8.0622E-06 (99, 4)	7.7148E-06 (99, 4)	7.2066E-06
6	7.8450E-06 (193, 5)	9.5824E-06 (193, 5)	9.3331E-06 (192, 4)	8.8484E-06 (192, 4)	9.3983E-06
7	1.1018E-05 (168, 4)	1.0571E-05 (193, 4)	8.5324E-06 (192, 4)	7.8043E-06 (192, 4)	6.4565E-06
8	1.0363E-05 (193, 4)	1.0583E-05 (193, 4)	9.7342E-06 (71, 4)	1.0237E-05 (124, 3)	8.7329E-06
9	6.1456E-06 (71, 4)	6.8912E-06 (192, 4)	7.5157E-06 (193, 4)	6.7749E-06 (71, 4)	5.9871E-06
10	7.4169E-06 (148, 4)	6.8032E-06 (76, 5)	6.4749E-06 (154, 4)	6.0874E-06 (173, 4)	5.9662E-06
11	6.8662E-06 (17, 4)	7.0792E-06 (272, 4)	6.5457E-06 (173, 5)	6.3215E-06 (291, 5)	6.0019E-06
12	1.0263E-05 (202, 4)	1.1388E-05 (202, 4)	9.9680E-06 (202, 4)	8.2674E-06 (17, 4)	6.7011E-06
13	1.0537E-05 (202, 4)	9.0005E-06 (316, 4)	9.8133E-06 (202, 4)	8.8730E-06 (203, 3)	8.5936E-06
14	9.3307E-06 (42, 5)	9.9073E-06 (107, 4)	9.2400E-06 (107, 4)	8.0625E-06 (107, 4)	8.5685E-06
15	7.2611E-06 (55, 5)	9.7744E-06 (55, 5)	9.6667E-06 (55, 5)	8.6397E-06 (55, 5)	7.4545E-06
16	6.7262E-06 (173, 5)	8.6287E-06 (100, 3)	9.6309E-06 (100, 3)	9.2919E-06 (100, 3)	8.4597E-06
17	7.6857E-06 (155, 4)	9.4108E-06 (51, 4)	1.0950E-05 (273, 4)	1.0901E-05 (338, 5)	1.0217E-05
18	8.3090E-06 (155, 4)	1.0812E-05 (282, 4)	1.2660E-05 (364, 4)	1.2893E-05 (253, 4)	1.1368E-05
19	7.6733E-06 (155, 4)	8.1870E-06 (253, 4)	8.5610E-06 (253, 4)	8.0784E-06 (282, 4)	7.6404E-06
20	6.7160E-06 (133, 4)	8.8429E-06 (330, 4)	8.3967E-06 (149, 4)	8.7097E-06 (276, 3)	8.7885E-06
21	6.4195E-06 (73, 4)	6.8503E-06 (97, 3)	6.4463E-06 (212, 5)	6.7852E-06 (115, 6)	6.2995E-06
22	5.7797E-06 (339, 5)	6.9719E-06 (339, 5)	7.0122E-06 (60, 4)	7.9437E-06 (60, 4)	8.1630E-06
23	9.2311E-06 (51, 5)	1.0811E-05 (116, 5)	1.1285E-05 (116, 5)	1.0860E-05 (116, 5)	1.0131E-05
24	7.3332E-06 (172, 5)	7.7527E-06 (109, 4)	7.7836E-06 (259, 4)	8.5855E-06 (362, 5)	8.6917E-06
25	1.0635E-05 (171, 4)	1.0169E-05 (181, 5)	1.0465E-05 (181, 5)	9.6040E-06 (181, 5)	8.4443E-06
26	1.1441E-05 (190, 4)	1.2964E-05 (12, 5)	1.3467E-05 (12, 5)	1.1946E-05 (171, 4)	9.9434E-06
27	8.7097E-06 (224, 4)	1.0223E-05 (261, 4)	1.0507E-05 (261, 4)	9.5957E-06 (241, 4)	8.5291E-06
28	1.2387E-05 (189, 5)	1.5855E-05 (189, 5)	1.4917E-05 (262, 4)	1.2944E-05 (262, 4)	1.0987E-05
29	1.3294E-05 (246, 4)	1.6557E-05 (223, 5)	1.6341E-05 (223, 5)	1.4266E-05 (329, 4)	1.2808E-05
30	1.4898E-05 (240, 4)	1.6423E-05 (246, 4)	1.5242E-05 (240, 4)	1.3826E-05 (227, 4)	1.2199E-05
31	1.2985E-05 (288, 5)	1.5732E-05 (228, 4)	1.6527E-05 (347, 5)	1.5750E-05 (219, 4)	1.3932E-05
32	1.1661E-05 (98, 4)	1.4622E-05 (80, 5)	1.4778E-05 (80, 5)	1.3436E-05 (79, 4)	1.1791E-05
33	1.0750E-05 (151, 4)	1.1952E-05 (38, 4)	1.2310E-05 (84, 4)	1.1496E-05 (84, 4)	1.0248E-05
34	1.2669E-05 (177, 4)	1.5242E-05 (84, 5)	1.5195E-05 (16, 5)	1.4794E-05 (177, 4)	1.3043E-05
35	9.3975E-06 (84, 5)	1.1257E-05 (84, 5)	1.0786E-05 (84, 5)	1.0132E-05 (33, 5)	9.2828E-06
36	7.3674E-06 (209, 4)	7.5303E-06 (268, 6)	8.5036E-06 (268, 6)	7.3572E-06 (203, 4)	6.7635E-06

COMPOSITE ANNUAL CONCENTRATION TABLE,UG/CU.M

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR / RANGE	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.
5	0.	0.	0.	0.	0.
6	0.	0.	0.	0.	0.
7	0.	0.	0.	0.	0.
8	0.	0.	0.	0.	0.
9	0.	0.	0.	0.	0.
10	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.
12	0.	0.	0.	0.	0.
13	0.	0.	0.	0.	0.
14	0.	0.	0.	0.	0.
15	0.	0.	0.	0.	0.
16	0.	0.	0.	0.	0.
17	0.	0.	0.	0.	0.
18	0.	0.	0.	0.	0.
19	0.	0.	0.	0.	0.
20	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.
22	0.	0.	0.	0.	0.
23	0.	0.	0.	0.	0.
24	0.	0.	0.	0.	0.
25	0.	0.	0.	0.	0.
26	0.	0.	0.	0.	0.
27	0.	0.	0.	0.	1.
28	0.	0.	1.	1.	1.
29	0.	0.	1.	1.	0.
30	0.	1.	1.	1.	1.
31	0.	0.	1.	1.	1.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	0.	0.	0.	0.	0.
36	0.	0.	0.	0.	0.

COMPOSITE HIGHEST,SECOND-HIGHEST 24-HOUR CONCENTRATION TABLE,UG/CU.M

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	2.	2.	2.	2.	2.
2	2.	2.	2.	2.	2.
3	1.	2.	2.	2.	2.
4	1.	2.	2.	2.	2.
5	2.	2.	2.	2.	2.
6	2.	3.	3.	4.	4.
7	2.	2.	2.	2.	2.
8	3.	2.	2.	2.	2.
9	2.	2.	3.	3.	2.
10	2.	3.	3.	3.	2.
11	2.	2.	3.	3.	2.
12	2.	3.	3.	3.	3.
13	2.	2.	2.	3.	3.
14	2.	3.	3.	3.	3.
15	1.	2.	2.	2.	2.
16	1.	2.	3.	3.	3.
17	2.	2.	2.	2.	2.
18	1.	2.	2.	2.	2.
19	1.	2.	2.	2.	2.
20	1.	2.	1.	2.	2.
21	1.	2.	2.	2.	3.
22	1.	2.	2.	3.	3.
23	2.	2.	2.	3.	3.
24	2.	3.	3.	3.	3.
25	2.	3.	3.	3.	3.
26	2.	3.	4.	4.	4.
27	3.	4.	5.	5.	4.
28	2.	3.	3.	3.	4.
29	3.	4.	4.	4.	4.
30	3.	4.	4.	4.	4.
31	4.	5.	4.	4.	3.
32	3.	4.	4.	3.	3.
33	3.	3.	3.	3.	3.
34	3.	3.	3.	3.	3.
35	2.	2.	2.	2.	3.
36	2.	3.	3.	3.	2.

COMPOSITE HIGHEST, SECOND-HIGHEST 3-HOUR CONCENTRATION TABLE,UG/CU.M

SECOND HIGHEST 3-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.9 KM	1.2 KM	1.5 KM	1.8 KM	2.1 KM
1	11.	13.	12.	11.	9.
2	11.	16.	14.	12.	10.
3	11.	9.	10.	10.	9.
4	8.	13.	12.	11.	10.
5	13.	11.	11.	10.	9.
6	11.	15.	13.	12.	11.
7	11.	11.	11.	9.	8.
8	10.	11.	11.	10.	9.
9	11.	12.	12.	10.	10.
10	12.	14.	13.	12.	10.
11	9.	13.	12.	11.	9.
12	10.	12.	13.	12.	11.
13	11.	11.	12.	12.	11.
14	10.	14.	15.	14.	12.
15	8.	10.	11.	11.	11.
16	9.	10.	12.	13.	12.
17	9.	11.	11.	11.	10.
18	9.	11.	13.	13.	11.
19	8.	9.	9.	9.	8.
20	8.	9.	11.	10.	9.
21	9.	10.	10.	10.	10.
22	9.	10.	9.	8.	8.
23	10.	11.	11.	11.	10.
24	14.	13.	12.	12.	10.
25	11.	13.	13.	12.	11.
26	15.	17.	15.	15.	13.
27	14.	16.	15.	13.	13.
28	13.	16.	16.	16.	14.
29	13.	17.	16.	15.	13.
30	15.	17.	18.	17.	15.
31	16.	18.	17.	16.	14.
32	14.	17.	17.	15.	14.
33	15.	15.	14.	14.	13.
34	15.	15.	16.	15.	13.
35	11.	12.	12.	12.	11.
36	12.	16.	15.	13.	12.

LONESTAR - KILNS 1,2,3 - 24 HR SO2 - MAX IMPACT - DAY 112,1972 - DIR 310 - 1.2 K

1. 7.0

* * * S O U R C E S * * *

NO	Q (G/SEC)	HP (M)	TS (DEG-K)	VS (M/SEC)	D(M)	R(KM)	S(KM)	
1.	7.15	61.0	472.0	16.9	2.10	562.920	2861.710	KILN #1
2.	7.15	61.0	455.0	15.5	2.10	562.920	2861.680	KILN #2
3.	3.31	61.0	472.0	10.8	4.27	562.990	2861.670	KILN #3

* * * R E C E P T O R S * * *

NO.	RREC(KM)	SREC(KM)	Z (M)
1.	561.530	2861.980	0.0
2.	561.530	2862.080	0.0
3.	561.530	2862.180	0.0
4.	561.530	2862.280	0.0
5.	561.530	2862.380	0.0
6.	561.530	2862.480	0.0
7.	561.530	2862.580	0.0
8.	561.530	2862.680	0.0
9.	561.530	2862.780	0.0
10.	561.530	2862.880	0.0
11.	561.630	2861.980	0.0
12.	561.630	2862.080	0.0
13.	561.630	2862.180	0.0
14.	561.630	2862.280	0.0
15.	561.630	2862.380	0.0
16.	561.630	2862.480	0.0
17.	561.630	2862.580	0.0
18.	561.630	2862.680	0.0
19.	561.630	2862.780	0.0
20.	561.630	2862.880	0.0
21.	561.730	2861.980	0.0
22.	561.730	2862.080	0.0
23.	561.730	2862.180	0.0
24.	561.730	2862.280	0.0
25.	561.730	2862.380	0.0
26.	561.730	2862.480	0.0
27.	561.730	2862.580	0.0
28.	561.730	2862.680	0.0
29.	561.730	2862.780	0.0
30.	561.730	2862.880	0.0
31.	561.830	2861.980	0.0
32.	561.830	2862.080	0.0

33.	561.830	2862.180	0.0
34.	561.830	2862.280	0.0
35.	561.830	2862.380	0.0
36.	561.830	2862.480	0.0
37.	561.830	2862.580	0.0
38.	561.830	2862.680	0.0
39.	561.830	2862.780	0.0
40.	561.830	2862.880	0.0
41.	561.930	2861.980	0.0
42.	561.930	2862.080	0.0
43.	561.930	2862.180	0.0
44.	561.930	2862.280	0.0
45.	561.930	2862.380	0.0
46.	561.930	2862.480	0.0
47.	561.930	2862.580	0.0
48.	561.930	2862.680	0.0
49.	561.930	2862.780	0.0
50.	561.930	2862.880	0.0
51.	562.030	2861.980	0.0
52.	562.030	2862.080	0.0
53.	562.030	2862.180	0.0
54.	562.030	2862.280	0.0
55.	562.030	2862.380	0.0
56.	562.030	2862.480	0.0
57.	562.030	2862.580	0.0
58.	562.030	2862.680	0.0
59.	562.030	2862.780	0.0
60.	562.030	2862.880	0.0
61.	562.130	2861.980	0.0
62.	562.130	2862.080	0.0
63.	562.130	2862.180	0.0
64.	562.130	2862.280	0.0
65.	562.130	2862.380	0.0
66.	562.130	2862.480	0.0
67.	562.130	2862.580	0.0
68.	562.130	2862.680	0.0
69.	562.130	2862.780	0.0
70.	562.130	2862.880	0.0
71.	562.230	2861.980	0.0
72.	562.230	2862.080	0.0
73.	562.230	2862.180	0.0
74.	562.230	2862.280	0.0
75.	562.230	2862.380	0.0
76.	562.230	2862.480	0.0
77.	562.230	2862.580	0.0
78.	562.230	2862.680	0.0
79.	562.230	2862.780	0.0

80.	562.230	2862.880	0.0
81.	562.330	2861.980	0.0
82.	562.330	2862.080	0.0
83.	562.330	2862.180	0.0
84.	562.330	2862.280	0.0
85.	562.330	2862.380	0.0
86.	562.330	2862.480	0.0
87.	562.330	2862.580	0.0
88.	562.330	2862.680	0.0
89.	562.330	2862.780	0.0
90.	562.330	2862.880	0.0
91.	562.430	2861.980	0.0
92.	562.430	2862.080	0.0
93.	562.430	2862.180	0.0
94.	562.430	2862.280	0.0
95.	562.430	2862.380	0.0
96.	562.430	2862.480	0.0
97.	562.430	2862.580	0.0
98.	562.430	2862.680	0.0
99.	562.430	2862.780	0.0
100.	562.430	2862.880	0.0

DAY= 112 YEAR= 72 HOURS= ALL   WD SHIFT ANGLE= 0

1.	210.	1.5	7	1338.	297.	0.
2.	210.	1.5	7	1341.	297.	0.
3.	296.	1.5	7	1345.	296.	0.
4.	197.	2.1	6	1348.	296.	0.
5.	300.	2.1	6	1352.	294.	0.
6.	307.	2.1	5	11.	295.	0.
7.	315.	2.1	4	182.	296.	0.
8.	131.	2.1	3	354.	298.	0.
9.	136.	3.1	2	525.	299.	0.
10.	134.	2.6	2	697.	300.	0.
11.	129.	3.6	2	868.	301.	0.
12.	141.	4.6	2	1040.	302.	0.
13.	105.	5.1	3	1211.	302.	0.
14.	124.	6.2	3	1383.	302.	0.
15.	130.	5.1	3	1383.	303.	0.
16.	131.	5.1	3	1383.	302.	0.
17.	119.	5.1	4	1383.	301.	0.
18.	143.	3.6	4	1383.	301.	0.
19.	139.	3.6	5	1383.	300.	0.
20.	154.	2.6	5	1384.	299.	0.
21.	166.	2.6	5	1385.	299.	0.
22.	148.	2.1	5	1386.	298.	0.
23.	144.	2.1	5	1387.	298.	0.

24.	137.	2.6	5	1388.	298.	0.

BEST AVAILABLE COPY

AVERAGE CONCENTRATIONS FOR 24 HOURS.

*** R E C E P T O R   N U M B E R ***

SOURCE	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.28	0.36	0.32	0.27	0.38	0.68	1.07	1.46	1.76	1.89
2.	0.35	0.39	0.32	0.31	0.50	0.86	1.28	1.68	1.96	2.02
3.	0.06	0.07	0.06	0.06	0.08	0.15	0.25	0.35	0.43	0.47
	TOTAL CONCENTRATION (UG/M**3)									
	0.68	0.82	0.70	0.63	0.97	1.69	2.60	3.49	4.15	4.37

*** R E C E P T O R   N U M B E R ***

SOURCE	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.30	0.36	0.29	0.30	0.53	0.94	1.39	1.78	1.96	1.92
2.	0.37	0.38	0.31	0.38	0.70	1.17	1.65	2.01	2.13	2.01
3.	0.06	0.06	0.05	0.06	0.11	0.20	0.31	0.41	0.46	0.48
	TOTAL CONCENTRATION (UG/M**3)									
	0.73	0.80	0.65	0.75	1.35	2.31	3.35	4.19	4.56	4.40

*** R E C E P T O R   N U M B E R ***

SOURCE	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.32	0.34	0.28	0.39	0.76	1.27	1.74	2.02	2.02	1.80
2.	0.38	0.35	0.32	0.53	1.00	1.55	2.02	2.23	2.13	1.84
3.	0.05	0.05	0.05	0.08	0.15	0.26	0.37	0.45	0.47	0.45
	TOTAL CONCENTRATION (UG/M**3)									
	0.75	0.74	0.64	0.99	1.91	3.08	4.13	4.69	4.63	4.10

* * * R E C E P T O R   N U M B E R * * *

SOURCE	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.31	0.30	0.29	0.56	1.08	1.65	2.03	2.10	1.90	1.5
2.	0.37	0.32	0.38	0.77	1.39	1.97	2.29	2.25	1.95	1.5
3.	0.04	0.04	0.05	0.10	0.20	0.32	0.41	0.45	0.44	0.4
	TOTAL CONCENTRATION (UG/M**3)									
	0.73	0.66	0.72	1.43	2.66	3.93	4.73	4.81	4.29	3.5

* * * R E C E P T O R   N U M B E R * * *

SOURCE	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.29	0.26	0.37	0.82	1.46	1.98	2.15	1.97	1.62	1.2
2.	0.33	0.30	0.53	1.13	1.83	2.30	2.34	2.05	1.63	1.2
3.	0.03	0.03	0.06	0.13	0.24	0.35	0.41	0.42	0.39	0.3
	TOTAL CONCENTRATION (UG/M**3)									
	0.65	0.58	0.96	2.09	3.54	4.63	4.90	4.44	3.64	2.8

* * * R E C E P T O R   N U M B E R * * *

SOURCE	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.24	0.24	0.53	1.17	1.81	2.12	2.00	1.66	1.28	0.9
2.	0.27	0.33	0.80	1.57	2.20	2.37	2.11	1.68	1.27	0.9
3.	0.02	0.03	0.07	0.16	0.27	0.35	0.38	0.36	0.31	0.2
	TOTAL CONCENTRATION (UG/M**3)									
	0.53	0.59	1.41	2.90	4.29	4.84	4.50	3.70	2.85	2.1

* * * R E C E P T O R   N U M B E R * * *

SOURCE	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.17	0.27	0.77	1.49	1.96	1.95	1.65	1.26	0.92	0.65
2.	0.22	0.45	1.17	1.95	2.29	2.12	1.69	1.26	0.90	0.6[illegible]
3.	0.01	0.03	0.09	0.18	0.26	0.31	0.31	0.28	0.23	0.19
	TOTAL CONCENTRATION (UG/M**3)									
	0.40	0.75	2.03	3.62	4.51	4.38	3.65	2.80	2.06	1.47

*** R E C E P T O R   N U M B E R ***

SOURCE	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.12	0.37	1.01	1.61	1.76	1.54	1.19	0.86	0.60	0.40
2.	0.19	0.66	1.48	2.02	2.00	1.63	1.21	0.85	0.57	0.37
3.	0.01	0.03	0.09	0.16	0.22	0.24	0.23	0.20	0.16	0.12
	TOTAL CONCENTRATION (UG/M**3)									
	0.32	1.06	2.58	3.79	3.98	3.42	2.63	1.91	1.32	0.89

*** R E C E P T O R   N U M B E R ***

SOURCE	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.10	0.46	1.04	1.37	1.31	1.04	0.75	0.50	0.32	0.20
2.	0.23	0.83	1.49	1.68	1.45	1.08	0.74	0.48	0.30	0.18
3.	0.01	0.03	0.07	0.13	0.16	0.17	0.15	0.13	0.09	0.07
	TOTAL CONCENTRATION (UG/M**3)									
	0.33	1.32	2.61	3.18	2.91	2.29	1.65	1.11	0.72	0.45

*** R E C E P T O R   N U M B E R ***

91.	92.	93.	94.	95.	96.	97.	98.	99.	100.

SOURCE	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.09	0.42	0.79	0.91	0.78	0.57	0.37	0.23	0.13	0.0
2.	0.24	0.75	1.11	1.09	0.85	0.58	0.36	0.21	0.12	0.0
3.	0.00	0.02	0.05	0.08	0.10	0.10	0.09	0.07	0.05	0.0

TOTAL CONCENTRATION (UG/M**3)

0.34	1.19	1.95	2.08	1.74	1.25	0.82	0.51	0.30	0.1

PARTICULATE MATTER

COMPUTER MODELING

RESULTS

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PLANT NAME: LONESTAR                    POLLUTANT:   TSP     AIR QUALITY UNITS: GM/M**3
FOUR NEW DUST COLLECTORS
MIAMI MET DATA - 1970-1974 - RURAL

                 MET FILE      REQUESTED
                STN NO. YR    STN NO. YR
 SURFACE        12839  70     12839  70
 UPPER AIR      12839  70     12839  70
PLANT LOCATION: RURAL
NO TAPE OUTPUT
MET DATA WILL NOT BE PRINTED

DAY-- 1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
      1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1


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        ALL TABLES, INCLUDING SOURCE CONTRIBUTION, THAT CONTAIN "ANNUAL" IN THE HEADING ARE BASED

        ONLY ON THOSE DAYS MARKED BY A "1" IN THE ABOVE TABLE
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BEST AVAILABLE COPY

RING DISTANCES(KM)= 0.30 0.60 0.90 1.20 1.50

STACK # 1--DC-1
STACK # 2--DC-2
STACK # 3--DC-3
STACK # 4--DC-4

STACK	MONTH	EMISSION RATE (GMS/SEC)	HEIGHT (METERS)	DIAMETER (METERS)	EXIT VELOCITY (M/SEC)	TEMP (DEG.K)	VOLUMETRIC FL (M**3/SEC)
1	ALL	0.0400	29.00	0.30	25.90	311.00	1.83
2	ALL	0.0400	20.70	0.30	25.90	311.00	1.83
3	ALL	0.3900	24.40	1.07	19.00	336.00	17.08
4	ALL	0.2600	24.40	0.85	19.80	336.00	11.24

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 6.9324E-07 DIRECTION= 28 DISTANCE= 0.6 KM

YEAR= 70

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	1.14036E-07	1.14500E-07	8.77335E-08	6.82391E-08	5.57213E-08
2	9.84829E-08	1.05716E-07	8.23507E-08	6.43429E-08	5.23388E-08
3	7.80588E-08	8.39561E-08	6.65300E-08	5.33398E-08	4.48437E-08
4	6.40535E-08	6.71363E-08	5.35446E-08	4.27098E-08	3.55892E-08
5	8.10371E-08	9.39798E-08	7.68717E-08	6.13848E-08	5.07340E-08
6	8.47434E-08	9.20067E-08	7.45530E-08	6.05573E-08	5.13345E-08
7	8.71839E-08	7.60661E-08	5.[illegible]4972E-08	4.44085E-08	3.69182E-08
8	9.84662E-08	9.23786E-08	7.18624E-08	5.81392E-08	4.96886E-08
9	9.88936E-08	9.50588E-08	7.68566E-08	6.45040E-08	5.65414E-08
10	9.09377E-08	8.50682E-08	6.49324E-08	5.20865E-08	4.42843E-08
11	8.78252E-08	8.58354E-08	6.51194E-08	5.10242E-08	4.21794E-08
12	1.00077E-07	1.13664E-07	9.00810E-08	7.19333E-08	6.02429E-08
13	1.05812E-07	1.41090E-07	1.20895E-07	1.01502E-07	8.83978E-08
14	1.16454E-07	1.82231E-07	1.60111E-07	1.33490E-07	1.14895E-07
15	1.19545E-07	1.83422E-07	1.60544E-07	1.32731E-07	1.12550E-07
16	1.54485E-07	2.40591E-07	2.10903E-07	1.74753E-07	1.48611E-07
17	1.44321E-07	2.08528E-07	1.81705E-07	1.50535E-07	1.27724E-07
18	1.37624E-07	2.13268E-07	1.94953E-07	1.67264E-07	1.46803E-07
19	8.58714E-08	1.01431E-07	8.20266E-08	6.57714E-08	5.52982E-08
20	7.62702E-08	8.50017E-08	7.25062E-08	6.09728E-08	5.27947E-08
21	7.44470E-08	9.06257E-08	7.55899E-08	6.12636E-08	5.13089E-08
22	5.74080E-08	7.00625E-08	5.73388E-08	4.51883E-08	3.66128E-08
23	5.60401E-08	7.33105E-08	6.09337E-08	4.92603E-08	4.10429E-08
24	9.19695E-08	1.32043E-07	1.11184E-07	8.95306E-08	7.41030E-08
25	1.58239E-07	2.19089E-07	1.74613E-07	1.33517E-07	1.05596E-07
26	2.58731E-07	3.02372E-07	2.87798E-07	2.20010E-07	1.74547E-07
27	4.00050E-07	5.55305E-07	4.49243E-07	3.53299E-07	2.88395E-07
28	4.82094E-07	6.93243E-07	5.73353E-07	4.56636E-07	3.75192E-07
29	4.30913E-07	5.52794E-07	4.42133E-07	3.47010E-07	2.83042E-07
30	4.73644E-07	5.90830E-07	4.73718E-07	3.73088E-07	3.05736E-07
31	4.37557E-07	4.67435E-07	3.50921E-07	2.63815E-07	2.08070E-07
32	4.02031E-07	4.11521E-07	3.04866E-07	2.27769E-07	1.78664E-07
33	3.25735E-07	3.27275E-07	2.40603E-07	1.79074E-07	1.40379E-07
34	2.91430E-07	3.14907E-07	2.36917E-07	1.78541E-07	1.41458E-07
35	2.12800E-07	2.21762E-07	1.67861E-07	1.28876E-07	1.03841E-07
36	1.59422E-07	1.75345E-07	1.36360E-07	1.06580E-07	8.72583E-08

PLANT NAME: LONESTAR   POLLUTANT: TSP   AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 4.3602E-06 DIRECTION= 28 DISTANCE= 0.6 KM DAY=153

YEAR= 70

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.3 KM		0.6 KM		0.9 KM		1.2 KM		1.5 KM	
1	1.7516E-06	(88)	1.3990E-06	(222)	1.1381E-06	(222)	8.7487E-07	(222)	6.8473E-07	(6)
2	1.5463E-06	(26)	1.4851E-06	(222)	1.2712E-06	(222)	9.9653E-07	(222)	9.1935E-07	(220)
3	1.3276E-06	(124)	1.2731E-06	(185)	1.1704E-06	(219)	9.4990E-07	(185)	7.5470E-07	(185)
4	1.3713E-06	(178)	1.5084E-06	(359)	1.2200E-06	(178)	9.4282E-07	(178)	7.5955E-07	(178)
5	1.4105E-06	(219)	1.3062E-06	(92)	1.0672E-06	(72)	8.5808E-07	(72)	7.3931E-07	(18)
6	1.0582E-06	(327)	1.4492E-06	(56)	1.0598E-06	(327)	7.8870E-07	(327)	6.1837E-07	(327)
7	1.8651E-06	(177)	1.2559E-06	(224)	8.9998E-07	(12)	7.6388E-07	(67)	5.9164E-07	(67)
8	2.2583E-06	(175)	1.4577E-06	(42)	9.9858E-07	(67)	7.5986E-07	(67)	6.0332E-07	(288)
9	2.9398E-06	(175)	2.5022E-06	(179)	1.9501E-06	(179)	1.6199E-06	(179)	1.4091E-06	(179)
10	2.7249E-06	(157)	2.3180E-06	(48)	1.4910E-06	(179)	9.9240E-07	(179)	7.2933E-07	(175)
11	1.9345E-06	(161)	1.2673E-06	(161)	9.1734E-07	(103)	7.6925E-07	(103)	6.1024E-07	(105)
12	1.6947E-06	(217)	1.7511E-06	(68)	1.5209E-06	(68)	1.1692E-06	(72)	8.7915E-07	(72)
13	2.2716E-06	(304)	2.7916E-06	(304)	2.3567E-06	(304)	1.9291E-06	(304)	1.6159E-06	(304)
14	1.4418E-06	(348)	2.7854E-06	(73)	2.3556E-06	(7)	1.7621E-06	(7)	1.3505E-06	(7)
15	1.4169E-06	(299)	2.1723E-06	(35)	1.8428E-06	(328)	1.4336E-06	(36)	1.1467E-06	(35)
16	2.0773E-06	(362)	2.8824E-06	(36)	2.6969E-06	(320)	2.0972E-06	(320)	1.6640E-06	(320)
17	1.7376E-06	(310)	2.5324E-06	(36)	2.4020E-06	(36)	1.8868E-06	(36)	1.4979E-06	(39)
18	1.5602E-06	(51)	2.2839E-06	(51)	2.0688E-06	(4)	1.6084E-06	(4)	1.2601E-06	(4)
19	1.2072E-06	(181)	1.1933E-06	(4)	9.6714E-07	(338)	7.3304E-07	(52)	5.9081E-07	(305)
20	1.2374E-06	(159)	1.0528E-06	(323)	9.6436E-07	(38)	7.6638E-07	(38)	6.7848E-07	(354)
21	1.0612E-06	(290)	1.4312E-06	(290)	1.3188E-06	(277)	1.1407E-06	(277)	9.7325E-07	(52)
22	8.3618E-07	(75)	1.0970E-06	(258)	1.1229E-06	(258)	8.6489E-07	(290)	6.5732E-07	(290)
23	9.9019E-07	(83)	1.1441E-06	(284)	9.3441E-07	(283)	7.3677E-07	(283)	5.9681E-07	(283)
24	1.4626E-06	(83)	1.6951E-06	(336)	1.3039E-06	(336)	1.0090E-06	(283)	8.5180E-07	(278)
25	1.6332E-06	(282)	2.0879E-06	(121)	1.6187E-06	(121)	1.2982E-06	(284)	1.0801E-06	(284)
26	2.0709E-06	(254)	3.1931E-06	(121)	2.5741E-06	(121)	1.9097E-06	(121)	1.4614E-06	(291)
27	3.9749E-06	(170)	3.8530E-06	(142)	3.3252E-06	(142)	2.6693E-06	(142)	2.2580E-06	(150)
28	2.5401E-06	(167)	4.3602E-06	(153)	3.6545E-06	(280)	2.8128E-06	(280)	2.2117E-06	(280)
29	2.4926E-06	(120)	3.6337E-06	(242)	3.2253E-06	(345)	2.6038E-06	(152)	1.9759E-06	(152)
30	3.6049E-06	(195)	4.2135E-06	(293)	3.5156E-06	(293)	2.6421E-06	(293)	2.0326E-06	(293)
31	2.9614E-06	(216)	3.0009E-06	(293)	2.4591E-06	(293)	1.8208E-06	(293)	1.4183E-06	(134)
32	3.0638E-06	(183)	2.3278E-06	(216)	1.8440E-06	(238)	1.5624E-06	(238)	1.3373E-06	(238)
33	2.3237E-06	(183)	2.4658E-06	(89)	2.1672E-06	(89)	1.8054E-06	(89)	1.5317E-06	(89)
34	2.3401E-06	(225)	2.9041E-06	(307)	2.3745E-06	(271)	1.8909E-06	(71)	1.6962E-06	(318)
35	1.9140E-06	(221)	2.1159E-06	(137)	1.7401E-06	(350)	1.3356E-06	(145)	1.0803E-06	(145)
36	2.2694E-06	(221)	1.8941E-06	(101)	1.5616E-06	(64)	1.2191E-06	(64)	9.5948E-07	(64)

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 4.9231E-07 DIRECTION= 30 DISTANCE= 0.6 KM

YEAR= 71

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	9.17219E-08	1.03909E-07	8.40274E-08	6.86185E-08	5.86652E-08
2	7.85075E-08	9.13531E-08	7.52857E-08	6.20731E-08	5.34998E-08
3	7.73209E-08	1.00466E-07	8.29278E-08	6.73031E-08	5.71267E-08
4	7.66694E-08	8.24704E-08	6.44620E-08	5.18439E-08	4.42776E-08
5	8.93585E-08	1.10549E-07	9.11581E-08	7.48812E-08	6.42701E-08
6	8.02528E-08	1.04199E-07	8.83599E-08	7.20510E-08	6.06410E-08
7	6.55666E-08	7.79766E-08	6.47632E-08	5.35284E-08	4.62943E-08
8	5.36726E-08	5.92497E-08	4.68762E-08	3.76384E-08	3.17949E-08
9	4.97334E-08	6.02556E-08	5.14962E-08	4.35347E-08	3.79531E-08
10	6.60236E-08	7.81034E-08	6.47918E-08	5.36390E-08	4.61429E-08
11	9.46644E-08	1.12706E-07	9.29524E-08	7.63960E-08	6.55344E-08
12	1.21853E-07	1.46171E-07	1.23670E-07	1.05464E-07	9.34361E-08
13	1.17342E-07	1.45383E-07	1.26809E-07	1.10700E-07	9.98076E-08
14	1.24875E-07	1.74991E-07	1.51966E-07	1.27523E-07	1.09968E-07
15	1.10349E-07	1.68454E-07	1.56078E-07	1.36356E-07	1.21268E-07
16	1.02365E-07	1.57410E-07	1.46193E-07	1.26440E-07	1.10968E-07
17	9.06862E-08	1.24226E-07	1.09220E-07	9.26093E-08	8.05514E-08
18	1.03382E-07	1.39408E-07	1.19807E-07	1.00288E-07	8.67055E-08
19	9.14019E-08	1.15424E-07	9.15837E-08	7.09383E-08	5.71612E-08
20	9.67236E-08	1.25098E-07	9.79059E-08	7.48701E-08	5.96111E-08
21	1.44186E-07	2.07175E-07	1.65778E-07	1.27430E-07	1.01467E-07
22	1.52320E-07	2.27337E-07	1.81688E-07	1.39013E-07	1.10095E-07
23	1.93146E-07	2.72190E-07	2.14187E-07	1.62385E-07	1.28125E-07
24	2.69767E-07	3.65960E-07	2.93191E-07	2.29219E-07	1.86282E-07
25	2.82724E-07	4.20212E-07	3.51283E-07	2.82940E-07	2.35064E-07
26	2.64553E-07	3.72348E-07	3.04454E-07	2.41516E-07	1.98907E-07
27	2.99967E-07	3.89585E-07	3.11077E-07	2.43110E-07	1.97971E-07
28	3.92632E-07	4.58047E-07	3.50967E-07	2.67269E-07	2.13165E-07
29	4.53051E-07	4.51952E-07	3.20687E-07	2.32099E-07	1.78052E-07
30	4.82321E-07	4.92306E-07	3.68272E-07	2.79642E-07	2.23249E-07
31	3.66640E-07	3.78612E-07	2.85913E-07	2.18616E-07	1.75201E-07
32	2.45464E-07	2.82943E-07	2.21880E-07	1.72164E-07	1.39091E-07
33	1.68495E-07	2.03888E-07	1.61206E-07	1.25309E-07	1.01264E-07
34	1.51051E-07	1.93795E-07	1.53001E-07	1.18120E-07	9.49687E-08
35	1.29003E-07	1.68634E-07	1.37289E-07	1.08985E-07	8.96543E-08
36	1.16640E-07	1.54214E-07	1.29629E-07	1.06016E-07	8.99241E-08

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 3.7079E-06 DIRECTION= 24 DISTANCE= 0.6 KM DAY=327

YEAR= 71

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	1.8792E-06 (10)	1.5013E-06 (226)	1.0484E-06 (226)	8.6090E-07 (114)	7.4075E-07 (114)
2	1.4054E-06 (226)	1.5967E-06 (115)	1.3693E-06 (115)	1.0432E-06 (226)	7.8102E-07 (226)
3	1.6763E-06 (173)	1.9017E-06 (256)	1.6405E-06 (115)	1.2767E-06 (115)	1.0019E-06 (115)
4	1.4785E-06 (166)	1.7931E-06 (256)	1.3042E-06 (256)	9.3475E-07 (256)	7.1159E-07 (166)
5	1.9995E-06 (166)	1.8979E-06 (149)	1.5128E-06 (95)	1.1607E-06 (95)	9.0346E-07 (95)
6	2.1765E-06 (223)	1.9077E-06 (149)	1.4827E-06 (149)	1.0995E-06 (149)	8.4249E-07 (149)
7	1.4152E-06 (141)	1.3408E-06 (122)	1.1420E-06 (122)	8.6346E-07 (122)	6.6369E-07 (122)
8	9.5708E-07 (334)	1.0449E-06 (216)	9.4050E-07 (211)	8.4836E-07 (211)	7.2180E-07 (211)
9	7.5813E-07 (173)	1.0335E-06 (244)	1.0544E-06 (244)	9.0685E-07 (244)	7.6656E-07 (244)
10	1.1545E-06 (15)	1.0222E-06 (44)	8.4176E-07 (123)	6.9521E-07 (123)	5.9206E-07 (301)
11	2.0003E-06 (299)	1.0633E-06 (123)	1.1069E-06 (123)	1.0192E-06 (19)	9.0525E-07 (19)
12	1.7934E-06 (325)	1.8483E-06 (338)	1.5056E-06 (338)	1.1281E-06 (338)	8.8201E-07 (184)
13	1.8327E-06 (338)	2.1857E-06 (315)	1.8558E-06 (338)	1.4130E-06 (338)	1.0978E-06 (338)
14	1.5702E-06 (220)	1.9003E-06 (79)	1.6075E-06 (79)	1.2312E-06 (79)	9.6316E-07 (79)
15	1.2663E-06 (28)	2.2492E-06 (79)	1.8416E-06 (79)	1.3763E-06 (79)	1.1432E-06 (40)
16	1.6413E-06 (28)	2.4803E-06 (317)	2.5902E-06 (317)	2.1337E-06 (40)	1.6643E-06 (40)
17	1.2243E-06 (170)	1.3242E-06 (317)	1.3281E-06 (317)	1.1606E-06 (22)	1.0929E-06 (22)
18	1.5063E-06 (326)	2.1373E-06 (1)	1.5916E-06 (1)	1.2450E-06 (41)	1.0600E-06 (41)
19	1.4423E-06 (86)	1.5501E-06 (41)	1.3314E-06 (41)	1.0172E-06 (41)	7.8805E-07 (269)
20	1.2587E-06 (316)	1.5685E-06 (316)	1.1667E-06 (316)	9.3276E-07 (359)	7.6121E-07 (359)
21	1.7628E-06 (13)	2.4786E-06 (358)	2.0186E-06 (359)	1.6689E-06 (359)	1.3983E-06 (359)
22	1.4678E-06 (357)	3.0940E-06 (335)	2.6543E-06 (153)	1.9316E-06 (153)	1.5398E-06 (155)
23	1.9839E-06 (236)	2.4216E-06 (290)	2.1552E-06 (290)	1.6599E-06 (266)	1.2637E-06 (266)
24	1.9316E-06 (125)	3.7079E-06 (327)	3.0406E-06 (319)	2.2614E-06 (319)	1.7276E-06 (319)
25	1.8662E-06 (232)	3.2007E-06 (322)	2.6196E-06 (322)	1.9528E-06 (322)	1.4956E-06 (322)
26	2.8748E-06 (169)	2.9085E-06 (190)	2.2499E-06 (144)	1.7434E-06 (144)	1.4335E-06 (211)
27	2.6977E-06 (194)	2.8222E-06 (231)	2.2751E-06 (48)	1.7788E-06 (48)	1.4283E-06 (48)
28	2.8327E-06 (140)	2.9961E-06 (34)	2.4262E-06 (34)	1.9846E-06 (209)	1.5846E-06 (209)
29	3.4957E-06 (208)	3.2708E-06 (208)	2.8766E-06 (50)	2.1234E-06 (132)	1.6068E-06 (132)
30	3.1090E-06 (129)	3.0757E-06 (132)	2.4037E-06 (91)	2.0759E-06 (245)	1.7672E-06 (282)
31	3.1104E-06 (185)	2.4034E-06 (92)	1.9525E-06 (92)	1.4582E-06 (92)	1.1179E-06 (92)
32	2.3734E-06 (118)	2.6787E-06 (58)	2.3554E-06 (84)	1.9696E-06 (84)	1.6650E-06 (84)
33	1.3931E-06 (287)	1.9665E-06 (9)	1.7378E-06 (9)	1.4243E-06 (9)	1.1686E-06 (9)
34	1.6307E-06 (8)	2.7545E-06 (73)	2.3301E-06 (61)	1.8640E-06 (61)	1.4915E-06 (53)
35	1.8763E-06 (73)	2.3948E-06 (283)	1.9846E-06 (283)	1.4911E-06 (283)	1.1468E-06 (283)
36	1.7645E-06 (133)	1.5367E-06 (297)	1.3522E-06 (297)	1.0583E-06 (254)	9.8604E-07 (174)

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 5.6489E-07 DIRECTION= 30 DISTANCE= 0.6 KM

YEAR= 72

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	9.30152E-08	1.02591E-07	8.04299E-08	6.38938E-08	5.34263E-08
2	9.09552E-08	1.09383E-07	9.31903E-08	7.75381E-08	6.66187E-08
3	9.47183E-08	1.07976E-07	8.99672E-08	7.48923E-08	6.46708E-08
4	1.00507E-07	1.06773E-07	8.64760E-08	7.10853E-08	6.10337E-08
5	1.07353E-07	1.24213E-07	1.02165E-07	8.26350E-08	6.93165E-08
6	1.23943E-07	1.52033E-07	1.24019E-07	1.00343E-07	8.47697E-08
7	9.40932E-08	1.12123E-07	9.06907E-08	7.38115E-08	6.27331E-08
8	6.72675E-08	7.99691E-08	6.89728E-08	5.82629E-08	5.05682E-08
9	6.77128E-08	7.49958E-08	6.22349E-08	5.14992E-08	4.40192E-08
10	6.85279E-08	7.02468E-08	5.54740E-08	4.44286E-08	3.74007E-08
11	9.34462E-08	1.00998E-07	7.97667E-08	6.39938E-08	5.41714E-08
12	1.31696E-07	1.65275E-07	1.35627E-07	1.10039E-07	9.33620E-08
13	1.34184E-07	1.77890E-07	1.48010E-07	1.20716E-07	1.02909E-07
14	1.29814E-07	1.79837E-07	1.53230E-07	1.26252E-07	1.07793E-07
15	1.03008E-07	1.45585E-07	1.31271E-07	1.13818E-07	1.01206E-07
16	9.39374E-08	1.34985E-07	1.17894E-07	9.94057E-08	8.63313E-08
17	7.90138E-08	1.02078E-07	8.71657E-08	7.30543E-08	6.32230E-08
18	7.50974E-08	1.04955E-07	9.07499E-08	7.53183E-08	6.41739E-08
19	5.88959E-08	7.61353E-08	6.07505E-08	4.66266E-08	3.70257E-08
20	6.43352E-08	9.24227E-08	7.74573E-08	6.14012E-08	4.99783E-08
21	1.00822E-07	1.59436E-07	1.31040E-07	1.01769E-07	8.12620E-08
22	1.32897E-07	2.17639E-07	1.79777E-07	1.39739E-07	1.11850E-07
23	1.58115E-07	2.60255E-07	2.15727E-07	1.67995E-07	1.34586E-07
24	2.00848E-07	3.05854E-07	2.50076E-07	1.94668E-07	1.56073E-07
25	2.34914E-07	3.36721E-07	2.76734E-07	2.18757E-07	1.78192E-07
26	2.93951E-07	4.09502E-07	3.35986E-07	2.67381E-07	2.19806E-07
27	3.38939E-07	4.78618E-07	3.95316E-07	3.17068E-07	2.63830E-07
28	3.51915E-07	4.67130E-07	3.79384E-07	2.99987E-07	2.45703E-07
29	4.18379E-07	4.58747E-07	3.48151E-07	2.67422E-07	2.16106E-07
30	5.28765E-07	5.64891E-07	4.25055E-07	3.22634E-07	2.57468E-07
31	4.85622E-07	4.69726E-07	3.39722E-07	2.50349E-07	1.94654E-07
32	3.65525E-07	3.30597E-07	2.39120E-07	1.78849E-07	1.41476E-07
33	2.48336E-07	2.16043E-07	1.55754E-07	1.17442E-07	9.40860E-08
34	1.71886E-07	1.50781E-07	1.09744E-07	8.31536E-08	6.66316E-08
35	1.41326E-07	1.31560E-07	9.43159E-08	7.07236E-08	5.66718E-08
36	1.35197E-07	1.63541E-07	1.36589E-07	1.11970E-07	9.47996E-08

PLANT NAME: LONESTAR   POLLUTANT: TSP   AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 4.2333E-06 DIRECTION= 28 DISTANCE= 0.6 KM DAY=169

YEAR= 72

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	1.7172E-06 (192)	1.3059E-06 (171)	1.2063E-06 (171)	1.0206E-06 (330)	8.7687E-07 (330)
2	1.5157E-06 (192)	1.4751E-06 (192)	1.1734E-06 (330)	1.0049E-06 (330)	8.3904E-07 (330)
3	1.6993E-06 (193)	1.6667E-06 (33)	1.3975E-06 (242)	1.0686E-06 (242)	8.2857E-07 (242)
4	1.5922E-06 (182)	1.8181E-06 (182)	1.4656E-06 (139)	1.1082E-06 (139)	1.0213E-06 (153)
5	1.4858E-06 (138)	1.7784E-06 (177)	1.5279E-06 (177)	1.2722E-06 (143)	1.1552E-06 (143)
6	2.3646E-06 (173)	3.5342E-06 (173)	2.7228E-06 (173)	1.9901E-06 (173)	1.5071E-06 (173)
7	1.3909E-06 (144)	1.6343E-06 (144)	1.2133E-06 (144)	9.7625E-07 (78)	7.3649E-07 (173)
8	1.1912E-06 (151)	1.4463E-06 (48)	1.1637E-06 (48)	9.0066E-07 (303)	7.2604E-07 (280)
9	1.4757E-06 (109)	1.2444E-06 (146)	1.0134E-06 (320)	9.2187E-07 (303)	8.2443E-07 (320)
10	1.7279E-06 (233)	1.1699E-06 (109)	8.6821E-07 (313)	6.5476E-07 (77)	5.6617E-07 (77)
11	1.8506E-06 (109)	1.7762E-06 (321)	1.3531E-06 (321)	1.0881E-06 (77)	8.5661E-07 (321)
12	2.2952E-06 (282)	2.2144E-06 (147)	1.6921E-06 (281)	1.3779E-06 (281)	1.1353E-06 (281)
13	1.9888E-06 (328)	3.0681E-06 (328)	2.6184E-06 (328)	2.0592E-06 (328)	1.6457E-06 (328)
14	2.3723E-06 (328)	2.4960E-06 (327)	2.3367E-06 (327)	1.8773E-06 (327)	1.5135E-06 (327)
15	1.5200E-06 (45)	1.8133E-06 (92)	1.9058E-06 (92)	1.5319E-06 (352)	1.2795E-06 (92)
16	1.3340E-06 (326)	2.2010E-06 (351)	1.7941E-06 (351)	1.3338E-06 (351)	1.1597E-06 (71)
17	1.4044E-06 (191)	1.3452E-06 (191)	1.0274E-06 (322)	9.1890E-07 (94)	7.3027E-07 (332)
18	1.1454E-06 (190)	1.3595E-06 (92)	1.1249E-06 (7)	8.6314E-07 (66)	6.8406E-07 (66)
19	1.0100E-06 (279)	1.2554E-06 (53)	1.0614E-06 (158)	8.5888E-07 (267)	7.7787E-07 (267)
20	1.0717E-06 (122)	1.4437E-06 (158)	1.2092E-06 (189)	9.8251E-07 (189)	7.8686E-07 (337)
21	1.3727E-06 (117)	2.1751E-06 (17)	1.8467E-06 (17)	1.4482E-06 (17)	1.1583E-06 (286)
22	1.5002E-06 (117)	2.0644E-06 (8)	2.2181E-06 (8)	1.6760E-06 (8)	1.2974E-06 (8)
23	1.4803E-06 (346)	3.1200E-06 (8)	2.6423E-06 (306)	2.0260E-06 (306)	1.5858E-06 (346)
24	1.6821E-06 (189)	3.2916E-06 (101)	2.7221E-06 (101)	2.0592E-06 (101)	1.6276E-06 (343)
25	2.2121E-06 (216)	2.4266E-06 (80)	1.9364E-06 (9)	1.5140E-06 (9)	1.2519E-06 (348)
26	2.2030E-06 (216)	3.3863E-06 (203)	2.8352E-06 (203)	2.1680E-06 (167)	1.6588E-06 (167)
27	2.1927E-06 (73)	4.0566E-06 (169)	3.2974E-06 (169)	2.4978E-06 (169)	1.9555E-06 (169)
28	2.6470E-06 (273)	4.2333E-06 (169)	3.5513E-06 (169)	2.7481E-06 (169)	2.1982E-06 (169)
29	2.9704E-06 (209)	2.9750E-06 (209)	2.3048E-06 (318)	1.7306E-06 (318)	1.3409E-06 (318)
30	3.3289E-06 (237)	3.6193E-06 (161)	2.8542E-06 (161)	2.2574E-06 (161)	1.9062E-06 (207)
31	3.7693E-06 (111)	2.7310E-06 (112)	1.8982E-06 (312)	1.4781E-06 (312)	1.1762E-06 (312)
32	3.2066E-06 (274)	2.3270E-06 (171)	1.6927E-06 (62)	1.4127E-06 (62)	1.1512E-06 (171)
33	2.4866E-06 (182)	1.9534E-06 (180)	1.8084E-06 (302)	1.3737E-06 (302)	1.0735E-06 (302)
34	2.3366E-06 (124)	1.7903E-06 (180)	1.2385E-06 (357)	1.1000E-06 (357)	9.2632E-07 (357)
35	1.9585E-06 (136)	1.7464E-06 (136)	1.2170E-06 (136)	8.5885E-07 (136)	6.3886E-07 (136)
36	1.6972E-06 (330)	2.2385E-06 (357)	2.1732E-06 (357)	1.6869E-06 (330)	1.3983E-06 (357)

PLANT NAME: LUNESTAR   POLLUTANT: TSP   AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 5.4241E-07 DIRECTION= 30 DISTANCE= 0.6 KM

YEAR= 73

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	1.44697E-07	1.56324E-07	1.24462E-07	9.94637E-08	8.28715E-08
2	9.86607E-08	1.08478E-07	8.60615E-08	6.89598E-08	5.80213E-08
3	7.81446E-08	8.87232E-08	6.84339E-08	5.21828E-08	4.16821E-08
4	6.62139E-08	8.02033E-08	6.63545E-08	5.34315E-08	4.44174E-08
5	5.69707E-08	6.26834E-08	5.03805E-08	4.11252E-08	3.51315E-08
6	6.61258E-08	7.48409E-08	6.02397E-08	4.86563E-08	4.11766E-08
7	6.99920E-08	7.55647E-08	6.35125E-08	5.32528E-08	4.61529E-08
8	8.79828E-08	1.04099E-07	8.90139E-08	7.36509E-08	6.25639E-08
9	9.33258E-08	1.11020E-07	9.12974E-08	7.39126E-08	6.20786E-08
10	7.17583E-08	8.20179E-08	6.61279E-08	5.22810E-08	4.28727E-08
11	6.54076E-08	9.02664E-08	7.99183E-08	6.73532E-08	5.79303E-08
12	6.48565E-08	1.07883E-07	9.66730E-08	8.10641E-08	6.97832E-08
13	7.41852E-08	1.21130E-07	1.07703E-07	8.90894E-08	7.51801E-08
14	1.16115E-07	1.81500E-07	1.60494E-07	1.34422E-07	1.15614E-07
15	1.25750E-07	2.06318E-07	1.84171E-07	1.52705E-07	1.29117E-07
16	1.20418E-07	1.76475E-07	1.51490E-07	1.24190E-07	1.04800E-07
17	1.30498E-07	1.77519E-07	1.50038E-07	1.22042E-07	1.02471E-07
18	1.25104E-07	1.71288E-07	1.49904E-07	1.26632E-07	1.09859E-07
19	9.63436E-08	1.15535E-07	9.49621E-08	7.68866E-08	6.44686E-08
20	7.52313E-08	9.78413E-08	8.06318E-08	6.41371E-08	5.26182E-08
21	6.30355E-08	8.86481E-08	7.23282E-08	5.58931E-08	4.44962E-08
22	8.61655E-08	1.25910E-07	1.01356E-07	7.73908E-08	6.10034E-08
23	1.27760E-07	1.94099E-07	1.57318E-07	1.20585E-07	9.52833E-08
24	1.93449E-07	2.88874E-07	2.36459E-07	1.84601E-07	1.48451E-07
25	2.42522E-07	3.46235E-07	2.82673E-07	2.22666E-07	1.80986E-07
26	2.76897E-07	3.97909E-07	3.23049E-07	2.53039E-07	2.04702E-07
27	2.93304E-07	4.33056E-07	3.59799E-07	2.89130E-07	2.39648E-07
28	3.52831E-07	5.21331E-07	4.25147E-07	3.33130E-07	2.70412E-07
29	3.67474E-07	4.74039E-07	3.79532E-07	2.96847E-07	2.41034E-07
30	4.67262E-07	5.42409E-07	4.18447E-07	3.20345E-07	2.56430E-07
31	4.98057E-07	5.22368E-07	3.88500E-07	2.92714E-07	2.32351E-07
32	4.34368E-07	4.15743E-07	3.06106E-07	2.31555E-07	1.85117E-07
33	3.47865E-07	3.37025E-07	2.54726E-07	1.95890E-07	1.57876E-07
34	2.41344E-07	2.37232E-07	1.82283E-07	1.41391E-07	1.14834E-07
35	1.79486E-07	1.70014E-07	1.24028E-07	9.31476E-08	7.41923E-08
36	1.87793E-07	2.03738E-07	1.62260E-07	1.29370E-07	1.07884E-07

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 3.8843E-06 DIRECTION= 30 DISTANCE= 0.6 KM DAY= 74

YEAR= 73

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.3 KM		0.6 KM		0.9 KM		1.2 KM		1.5 KM	
1	2.0041E-06	(192)	2.4347E-06	(267)	1.8222E-06	(94)	1.4087E-06	(193)	1.2318E-06	(261)
2	1.5576E-06	(178)	1.5452E-06	(305)	1.3448E-06	(175)	1.2148E-06	(175)	1.0587E-06	(94)
3	1.2381E-06	(117)	1.6374E-06	(98)	1.2657E-06	(98)	9.2397E-07	(98)	7.4939E-07	(92)
4	1.5255E-06	(117)	1.8081E-06	(117)	1.2853E-06	(117)	1.0677E-06	(231)	9.3778E-07	(231)
5	1.1924E-06	(190)	1.5721E-06	(80)	1.1507E-06	(259)	9.1589E-07	(80)	7.5974E-07	(259)
6	1.2971E-06	(190)	1.4660E-06	(130)	1.1759E-06	(175)	9.4921E-07	(139)	7.6054E-07	(139)
7	1.5760E-06	(258)	1.2875E-06	(257)	1.0304E-06	(258)	7.6808E-07	(258)	6.0588E-07	(80)
8	1.8919E-06	(258)	1.7235E-06	(234)	1.1398E-06	(234)	7.9777E-07	(234)	6.4051E-07	(190)
9	1.6773E-06	(191)	1.8975E-06	(254)	1.5887E-06	(254)	1.2637E-06	(41)	9.7906E-07	(41)
10	1.5023E-06	(189)	1.5854E-06	(189)	1.2800E-06	(124)	1.1388E-06	(124)	9.8057E-07	(124)
11	1.0545E-06	(20)	1.8073E-06	(99)	1.5690E-06	(99)	1.2658E-06	(99)	1.1065E-06	(355)
12	1.0369E-06	(355)	1.9886E-06	(355)	1.7751E-06	(34)	1.4113E-06	(34)	1.1299E-06	(34)
13	1.2886E-06	(20)	1.7594E-06	(51)	1.5488E-06	(13)	1.3178E-06	(13)	1.1257E-06	(13)
14	1.8153E-06	(136)	2.1413E-06	(131)	1.8557E-06	(52)	1.5395E-06	(342)	1.3775E-06	(11)
15	1.7028E-06	(14)	2.4078E-06	(14)	1.9527E-06	(293)	1.6903E-06	(293)	1.4480E-06	(54)
16	1.3777E-06	(77)	1.6933E-06	(278)	1.4679E-06	(278)	1.1955E-06	(54)	1.1857E-06	(15)
17	1.7811E-06	(77)	2.0705E-06	(77)	1.5331E-06	(137)	1.2462E-06	(196)	1.0055E-06	(196)
18	1.6127E-06	(30)	2.2032E-06	(9)	2.0179E-06	(298)	1.7126E-06	(297)	1.3869E-06	(297)
19	1.6654E-06	(30)	1.6871E-06	(30)	1.2044E-06	(220)	9.8244E-07	(220)	8.0284E-07	(220)
20	1.1310E-06	(294)	1.9745E-06	(295)	1.7167E-06	(295)	1.3899E-06	(295)	1.1614E-06	(295)
21	1.1864E-06	(295)	2.8029E-06	(295)	2.3051E-06	(295)	1.7208E-06	(295)	1.3182E-06	(295)
22	1.2555E-06	(315)	2.0967E-06	(294)	2.2518E-06	(335)	1.7496E-06	(315)	1.3388E-06	(315)
23	1.5010E-06	(102)	2.7155E-06	(335)	2.3662E-06	(111)	1.7607E-06	(111)	1.3484E-06	(111)
24	2.0357E-06	(265)	2.6470E-06	(316)	2.1250E-06	(154)	1.7330E-06	(316)	1.3646E-06	(316)
25	2.2787E-06	(126)	3.2048E-06	(121)	2.6718E-06	(287)	2.0670E-06	(287)	1.6178E-06	(287)
26	2.7837E-06	(264)	3.5498E-06	(271)	2.8100E-06	(271)	2.1253E-06	(271)	1.6572E-06	(271)
27	1.8247E-06	(122)	2.9359E-06	(286)	2.6251E-06	(286)	2.1211E-06	(286)	1.7294E-06	(286)
28	2.4281E-06	(162)	3.7699E-06	(32)	3.3989E-06	(244)	2.7900E-06	(244)	2.3048E-06	(244)
29	2.3147E-06	(201)	2.6836E-06	(162)	2.1684E-06	(123)	1.8912E-06	(123)	1.6250E-06	(123)
30	2.5827E-06	(263)	3.8843E-06	(74)	3.2787E-06	(74)	2.5283E-06	(74)	1.9924E-06	(74)
31	2.9659E-06	(203)	3.3656E-06	(21)	2.7437E-06	(203)	2.0003E-06	(203)	1.5608E-06	(251)
32	2.8455E-06	(167)	2.8718E-06	(148)	2.2137E-06	(33)	1.7423E-06	(33)	1.4572E-06	(360)
33	2.4835E-06	(147)	2.7410E-06	(116)	2.4082E-06	(116)	2.0791E-06	(116)	1.8162E-06	(116)
34	2.0924E-06	(40)	2.7572E-06	(97)	2.3826E-06	(40)	1.8517E-06	(57)	1.5433E-06	(40)
35	1.8717E-06	(208)	1.7279E-06	(79)	1.4981E-06	(79)	1.2706E-06	(79)	1.0995E-06	(79)
36	2.2748E-06	(262)	2.1233E-06	(231)	1.7626E-06	(231)	1.4503E-06	(231)	1.2303E-06	(260)

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

MAXIMUM MEAN CONC= 5.9012E-07 DIRECTION= 30 DISTANCE= 0.6 KM

YEAR= 74

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	8.84805E-08	1.02564E-07	8.28064E-08	6.62844E-08	5.55203E-08
2	7.95391E-08	9.06408E-08	7.50255E-08	6.15990E-08	5.24872E-08
3	6.78894E-08	6.84405E-08	5.47201E-08	4.52573E-08	3.94221E-08
4	7.69835E-08	8.05604E-08	6.40853E-08	5.19735E-08	4.44233E-08
5	7.21678E-08	7.74585E-08	6.21499E-08	5.09525E-08	4.37469E-08
6	7.54952E-08	8.30242E-08	6.73841E-08	5.61814E-08	4.89391E-08
7	7.82982E-08	9.72610E-08	8.15060E-08	6.62196E-08	5.53938E-08
8	7.14905E-08	8.56799E-08	7.42735E-08	6.26025E-08	5.40293E-08
9	6.85507E-08	7.88603E-08	6.55770E-08	5.33359E-08	4.47761E-08
10	6.10678E-08	6.20683E-08	4.84352E-08	3.82010E-08	3.15437E-08
11	7.01739E-08	7.98034E-08	6.39815E-08	5.04012E-08	4.13044E-08
12	8.62358E-08	1.04870E-07	8.66564E-08	6.97058E-08	5.82193E-08
13	8.81188E-08	1.05548E-07	8.95230E-08	7.50630E-08	6.50439E-08
14	9.99701E-08	1.32520E-07	1.15140E-07	9.76694E-08	8.56518E-08
15	1.13993E-07	1.50074E-07	1.22409E-07	9.82978E-08	8.24277E-08
16	1.06925E-07	1.48121E-07	1.32911E-07	1.15350E-07	1.02427E-07
17	1.23384E-07	1.92530E-07	1.73835E-07	1.47667E-07	1.28017E-07
18	1.23236E-07	1.85246E-07	1.61401E-07	1.32971E-07	1.12705E-07
19	9.74885E-08	1.36644E-07	1.16169E-07	9.41378E-08	7.86003E-08
20	7.30746E-08	1.00642E-07	8.56763E-08	7.02872E-08	5.93012E-08
21	7.76975E-08	1.12828E-07	9.08212E-08	6.97088E-08	5.52052E-08
22	1.15634E-07	1.82540E-07	1.47366E-07	1.13017E-07	8.93397E-08
23	1.52759E-07	2.47956E-07	2.01105E-07	1.54007E-07	1.21473E-07
24	1.87190E-07	3.01187E-07	2.46972E-07	1.92122E-07	1.53821E-07
25	2.20374E-07	3.31701E-07	2.68168E-07	2.08569E-07	1.67866E-07
26	2.70637E-07	4.34579E-07	3.61712E-07	2.86039E-07	2.32472E-07
27	3.04297E-07	4.99651E-07	4.27233E-07	3.48944E-07	2.93284E-07
28	3.39210E-07	4.81385E-07	3.95430E-07	3.14476E-07	2.58724E-07
29	4.34069E-07	4.97026E-07	3.79768E-07	2.90283E-07	2.33169E-07
30	5.50051E-07	5.90122E-07	4.40957E-07	3.32894E-07	2.64612E-07
31	4.74784E-07	4.64701E-07	3.38536E-07	2.54560E-07	2.03003E-07
32	3.60906E-07	3.40683E-07	2.42956E-07	1.78583E-07	1.39199E-07
33	2.76543E-07	2.60538E-07	1.89458E-07	1.41807E-07	1.12279E-07
34	2.13810E-07	1.99522E-07	1.43740E-07	1.07140E-07	8.50317E-08
35	1.53668E-07	1.53493E-07	1.13959E-07	8.55549E-08	6.74561E-08
36	1.15815E-07	1.35128E-07	1.10951E-07	9.02009E-08	7.63071E-08

PLANT NAME: LONESTAR POLLUTANT: TSP AIR QUALITY UNITS: GM/M**3

YEARLY SECOND MAXIMUM 24-HOUR CONC= 3.6286E-06 DIRECTION= 28 DISTANCE= 0.6 KM DAY=102

YEAR= 74

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE / DIR	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	1.8177E-06 (178)	2.1551E-06 (176)	1.7254E-06 (210)	1.3275E-06 (178)	1.0103E-06 (178)
2	1.4255E-06 (156)	1.5421E-06 (156)	1.2156E-06 (211)	9.9767E-07 (211)	8.4653E-07 (211)
3	1.2093E-06 (231)	1.1101E-06 (210)	9.7230E-07 (231)	8.1935E-07 (210)	6.9913E-07 (210)
4	1.7603E-06 (210)	1.4956E-06 (167)	1.4811E-06 (167)	1.1495E-06 (210)	8.8306E-07 (210)
5	1.4123E-06 (99)	1.4371E-06 (203)	1.0477E-06 (124)	7.9659E-07 (124)	6.1817E-07 (124)
6	1.6294E-06 (168)	1.4346E-06 (126)	1.3129E-06 (126)	1.1027E-06 (126)	9.3058E-07 (126)
7	1.9979E-06 (168)	1.5519E-06 (89)	1.2811E-06 (89)	1.0113E-06 (89)	8.3147E-07 (88)
8	1.4142E-06 (192)	1.1804E-06 (193)	1.0551E-06 (204)	9.2209E-07 (127)	8.4499E-07 (127)
9	1.0790E-06 (148)	1.1960E-06 (124)	1.3079E-06 (15)	1.1182E-06 (15)	9.2419E-07 (15)
10	1.3397E-06 (272)	1.2485E-06 (173)	7.1990E-07 (173)	5.8123E-07 (150)	4.8491E-07 (150)
11	1.1569E-06 (272)	1.3348E-06 (48)	1.0836E-06 (173)	8.9550E-07 (187)	7.3141E-07 (48)
12	1.3729E-06 (114)	1.5634E-06 (193)	1.4076E-06 (193)	1.1049E-06 (193)	8.7158E-07 (193)
13	1.7258E-06 (202)	1.6872E-06 (316)	1.2422E-06 (40)	9.7295E-07 (40)	7.7140E-07 (40)
14	1.5143E-06 (257)	2.1170E-06 (335)	1.7794E-06 (335)	1.3793E-06 (335)	1.0956E-06 (335)
15	1.4765E-06 (17)	2.0508E-06 (57)	1.7273E-06 (57)	1.2996E-06 (57)	9.9912E-07 (57)
16	1.4606E-06 (292)	2.2589E-06 (41)	1.8096E-06 (56)	1.4221E-06 (56)	1.1305E-06 (316)
17	1.8738E-06 (292)	2.3610E-06 (281)	2.0515E-06 (313)	1.9158E-06 (313)	1.7627E-06 (313)
18	1.8162E-06 (339)	1.8875E-06 (279)	1.6772E-06 (317)	1.3826E-06 (171)	1.2153E-06 (171)
19	1.3459E-06 (253)	1.8204E-06 (275)	1.4585E-06 (275)	1.0844E-06 (275)	8.2882E-07 (275)
20	1.2392E-06 (149)	2.3736E-06 (274)	2.1046E-06 (274)	1.6260E-06 (274)	1.2726E-06 (274)
21	1.2655E-06 (149)	1.9984E-06 (278)	1.6020E-06 (278)	1.1878E-06 (278)	9.0864E-07 (278)
22	1.4478E-06 (277)	2.4143E-06 (293)	1.9416E-06 (293)	1.4404E-06 (312)	1.1142E-06 (312)
23	1.5621E-06 (310)	2.9535E-06 (294)	2.3888E-06 (285)	1.8083E-06 (296)	1.4188E-06 (297)
24	1.6424E-06 (119)	3.1842E-06 (295)	2.4883E-06 (295)	1.8219E-06 (295)	1.3824E-06 (295)
25	1.6385E-06 (310)	2.0419E-06 (101)	1.7598E-06 (287)	1.4626E-06 (287)	1.1912E-06 (303)
26	1.9202E-06 (265)	2.8167E-06 (263)	2.6808E-06 (328)	2.2437E-06 (328)	1.7982E-06 (242)
27	1.9180E-06 (215)	3.6253E-06 (140)	2.9704E-06 (357)	2.3498E-06 (245)	2.0094E-06 (245)
28	2.4564E-06 (213)	3.6286E-06 (102)	2.8053E-06 (102)	2.1475E-06 (358)	1.7365E-06 (2)
29	3.0698E-06 (246)	2.9695E-06 (74)	2.4870E-06 (74)	2.0156E-06 (309)	1.7347E-06 (249)
30	3.4814E-06 (188)	3.1608E-06 (247)	3.0372E-06 (37)	2.5920E-06 (37)	2.2051E-06 (37)
31	3.4493E-06 (228)	2.8738E-06 (160)	2.1636E-06 (347)	1.6242E-06 (1)	1.4113E-06 (93)
32	2.9219E-06 (143)	2.4336E-06 (94)	1.9219E-06 (94)	1.5481E-06 (92)	1.2809E-06 (92)
33	2.4643E-06 (80)	2.4143E-06 (92)	1.7662E-06 (38)	1.2441E-06 (38)	9.9903E-07 (95)
34	2.3740E-06 (84)	2.0502E-06 (92)	1.5758E-06 (177)	1.2211E-06 (83)	1.0109E-06 (83)
35	1.6184E-06 (84)	2.4759E-06 (50)	1.9646E-06 (177)	1.4065E-06 (177)	1.0522E-06 (177)
36	1.2769E-06 (178)	2.1524E-06 (178)	1.7767E-06 (178)	1.3876E-06 (178)	1.1155E-06 (178)

COMPOSITE ANNUAL CONCENTRATION TABLE,UG/CU.M

ANNUAL MEAN CONCENTRATION AT EACH RECEPTOR

DIR \ RANGE	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.
5	0.	0.	0.	0.	0.
6	0.	0.	0.	0.	0.
7	0.	0.	0.	0.	0.
8	0.	0.	0.	0.	0.
9	0.	0.	0.	0.	0.
10	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.
12	0.	0.	0.	0.	0.
13	0.	0.	0.	0.	0.
14	0.	0.	0.	0.	0.
15	0.	0.	0.	0.	0.
16	0.	0.	0.	0.	0.
17	0.	0.	0.	0.	0.
18	0.	0.	0.	0.	0.
19	0.	0.	0.	0.	0.
20	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.
22	0.	0.	0.	0.	0.
23	0.	0.	0.	0.	0.
24	0.	0.	0.	0.	0.
25	0.	0.	0.	0.	0.
26	0.	0.	0.	0.	0.
27	0.	1.	0.	0.	0.
28	0.	1.	1.	0.	0.
29	0.	1.	0.	0.	0.
30	1.	1.	0.	0.	0.
31	0.	1.	0.	0.	0.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	0.	0.	0.	0.	0.
36	0.	0.	0.	0.	0.

CUMPOSITE HIGHEST,SECUND-HIGHEST 24-HOUR CUNCENTRATIUN TABLE,UG/CU.M

SECOND HIGHEST 24-HOUR CONCENTRATION AT EACH RECEPTOR

RANGE DIR	0.3 KM	0.6 KM	0.9 KM	1.2 KM	1.5 KM
1	2.	2.	2.	1.	1.
2	2.	2.	1.	1.	1.
3	2.	2.	2.	1.	1.
4	2.	2.	1.	1.	1.
5	2.	2.	2.	1.	1.
6	2.	4.	3.	2.	2.
7	2.	2.	1.	1.	1.
8	2.	2.	1.	1.	1.
9	3.	3.	2.	2.	1.
10	3.	2.	1.	1.	1.
11	2.	2.	2.	1.	1.
12	2.	2.	2.	1.	1.
13	2.	3.	3.	2.	2.
14	2.	3.	2.	2.	2.
15	2.	2.	2.	2.	1.
16	2.	3.	3.	2.	2.
17	2.	3.	2.	2.	2.
18	2.	2.	2.	2.	1.
19	2.	2.	1.	1.	1.
20	1.	2.	2.	2.	1.
21	2.	3.	2.	2.	1.
22	2.	3.	3.	2.	2.
23	2.	3.	3.	2.	2.
24	2.	4.	3.	2.	2.
25	2.	3.	3.	2.	2.
26	3.	4.	3.	2.	2.
27	4.	4.	3.	3.	2.
28	3.	4.	4.	3.	2.
29	3.	4.	3.	3.	2.
30	4.	4.	4.	3.	2.
31	4.	3.	3.	2.	2.
32	3.	3.	2.	2.	2.
33	2.	3.	2.	2.	2.
34	2.	3.	2.	2.	2.
35	2.	2.	2.	1.	1.
36	2.	2.	2.	2.	1.

LONESTAR - 4 NEW DUST COLLECTORS - DIR 280 - DIST 0.6 - DAY 153,1970

1. 7.0

* * * S O U R C E S * * *

NO	Q (G/SEC)	HP (M)	TS (DEG-K)	VS (M/SEC)	D(M)	R(KM)	S(KM)	
1.	0.04	29.0	303.0	25.9	0.30	0.0	0.0	DC-1
2.	0.04	20.7	303.0	25.9	0.30	0.0	0.0	DC-2
3.	0.39	24.4	336.0	19.0	1.07	0.0	0.0	DC-3
4.	0.26	24.4	336.0	19.8	0.85	0.0	0.0	DC-4

* * * R E C E P T O R S * * *

NO.	RREC(KM)	SREC(KM)	Z (M)
1.	-1.100	-0.400	0.0
2.	-1.100	-0.300	0.0
3.	-1.100	-0.200	0.0
4.	-1.100	-0.100	0.0
5.	-1.100	0.000	0.0
6.	-1.100	0.100	0.0
7.	-1.100	0.200	0.0
8.	-1.100	0.300	0.0
9.	-1.100	0.400	0.0
10.	-1.100	0.500	0.0
11.	-1.000	-0.400	0.0
12.	-1.000	-0.300	0.0
13.	-1.000	-0.200	0.0
14.	-1.000	-0.100	0.0
15.	-1.000	0.000	0.0
16.	-1.000	0.100	0.0
17.	-1.000	0.200	0.0
18.	-1.000	0.300	0.0
19.	-1.000	0.400	0.0
20.	-1.000	0.500	0.0
21.	-0.900	-0.400	0.0
22.	-0.900	-0.300	0.0
23.	-0.900	-0.200	0.0
24.	-0.900	-0.100	0.0
25.	-0.900	0.000	0.0
26.	-0.900	0.100	0.0
27.	-0.900	0.200	0.0
28.	-0.900	0.300	0.0
29.	-0.900	0.400	0.0
30.	-0.900	0.500	0.0
31.	-0.800	-0.400	0.0

32.	-0.800	-0.300	0.0
33.	-0.800	-0.200	0.0
34.	-0.800	-0.100	0.0
35.	-0.800	0.000	0.0
36.	-0.800	0.100	0.0
37.	-0.800	0.200	0.0
38.	-0.800	0.300	0.0
39.	-0.800	0.400	0.0
40.	-0.800	0.500	0.0
41.	-0.700	-0.400	0.0
42.	-0.700	-0.300	0.0
43.	-0.700	-0.200	0.0
44.	-0.700	-0.100	0.0
45.	-0.700	0.000	0.0
46.	-0.700	0.100	0.0
47.	-0.700	0.200	0.0
48.	-0.700	0.300	0.0
49.	-0.700	0.400	0.0
50.	-0.700	0.500	0.0
51.	-0.600	-0.400	0.0
52.	-0.600	-0.300	0.0
53.	-0.600	-0.200	0.0
54.	-0.600	-0.100	0.0
55.	-0.600	0.000	0.0
56.	-0.600	0.100	0.0
57.	-0.600	0.200	0.0
58.	-0.600	0.300	0.0
59.	-0.600	0.400	0.0
60.	-0.600	0.500	0.0
61.	-0.500	-0.400	0.0
62.	-0.500	-0.300	0.0
63.	-0.500	-0.200	0.0
64.	-0.500	-0.100	0.0
65.	-0.500	0.000	0.0
66.	-0.500	0.100	0.0
67.	-0.500	0.200	0.0
68.	-0.500	0.300	0.0
69.	-0.500	0.400	0.0
70.	-0.500	0.500	0.0
71.	-0.400	-0.400	0.0
72.	-0.400	-0.300	0.0
73.	-0.400	-0.200	0.0
74.	-0.400	-0.100	0.0
75.	-0.400	0.000	0.0
76.	-0.400	0.100	0.0
77.	-0.400	0.200	0.0
78.	-0.400	0.300	0.0

79.	-0.400	0.400	0.0
80.	-0.400	0.500	0.0
81.	-0.300	-0.400	0.0
82.	-0.300	-0.300	0.0
83.	-0.300	-0.200	0.0
84.	-0.300	-0.100	0.0
85.	-0.300	0.000	0.0
86.	-0.300	0.100	0.0
87.	-0.300	0.200	0.0
88.	-0.300	0.300	0.0
89.	-0.300	0.400	0.0
90.	-0.300	0.500	0.0
91.	-0.200	-0.400	0.0
92.	-0.200	-0.300	0.0
93.	-0.200	-0.200	0.0
94.	-0.200	-0.100	0.0
95.	-0.200	0.000	0.0
96.	-0.200	0.100	0.0
97.	-0.200	0.200	0.0
98.	-0.200	0.300	0.0
99.	-0.200	0.400	0.0
100.	-0.200	0.500	0.0

DAY= 153 YEAR= 70 HOURS= ALL WD SHIFT ANGLE= 0

1.	101.	7.7	4	1181.	299.	0.
2.	98.	6.7	4	1205.	299.	0.
3.	100.	8.7	4	1228.	298.	0.
4.	102.	5.7	4	1252.	298.	0.
5.	95.	4.6	5	1275.	298.	0.
6.	100.	5.1	4	77.	298.	0.
7.	93.	6.7	4	254.	298.	0.
8.	102.	8.2	4	430.	299.	0.
9.	109.	8.7	4	606.	300.	0.
10.	101.	7.2	4	783.	300.	0.
11.	100.	8.2	3	959.	301.	0.
12.	120.	7.7	3	1135.	301.	0.
13.	108.	8.7	3	1312.	301.	0.
14.	101.	7.2	3	1488.	301.	0.
15.	106.	6.7	4	1488.	302.	0.
16.	112.	6.2	4	1488.	301.	0.
17.	107.	6.2	4	1488.	301.	0.
18.	104.	6.7	4	1488.	300.	0.
19.	103.	6.7	4	1488.	300.	0.
20.	94.	5.1	5	1499.	299.	0.
21.	95.	4.6	4	1510.	299.	0.
22.	101.	4.6	5	1522.	299.	0.

23.	105.	5.1	5	1533.	299.	0.
24.	114.	4.1	5	1545.	299.	0.

BEST AVAILABLE COPY

AVERAGE CONCENTRATIONS FOR 24 HOURS.

* * * R E C E P T O R   N U M B E R * * *

SOURCE	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.00	0.00	0.00	0.00	0.04	0.12	0.18	0.15	0.08	0.0
2.	0.00	0.00	0.00	0.00	0.05	0.18	0.24	0.20	0.10	0.0
3.	0.00	0.00	0.00	0.02	0.27	0.89	1.48	1.27	0.65	0.3
4.	0.00	0.00	0.00	0.02	0.20	0.66	1.07	0.91	0.46	0.2
	TOTAL CONCENTRATION (UG/M**3)									
	0.00	0.00	0.00	0.05	0.56	1.85	2.97	2.53	1.29	0.6

* * * R E C E P T O R   N U M B E R * * *

SOURCE	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.00	0.00	0.00	0.00	0.04	0.14	0.20	0.14	0.07	0.0
2.	0.00	0.00	0.00	0.00	0.06	0.21	0.28	0.19	0.10	0.0
3.	0.00	0.00	0.00	0.02	0.29	1.04	1.66	1.17	0.54	0.2
4.	0.00	0.00	0.00	0.01	0.22	0.77	1.20	0.84	0.39	0.1
	TOTAL CONCENTRATION (UG/M**3)									
	0.00	0.00	0.00	0.04	0.61	2.15	3.34	2.34	1.09	0.4

* * * R E C E P T O R   N U M B E R * * *

SOURCE	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.00	0.00	0.00	0.00	0.04	0.16	0.22	0.12	0.06	0.0
2.	0.00	0.00	0.00	0.00	0.07	0.25	0.32	0.17	0.09	0.0
3.	0.00	0.00	0.00	0.02	0.31	1.21	1.80	1.01	0.40	0.1
4.	0.00	0.00	0.00	0.01	0.23	0.90	1.31	0.73	0.30	0.0

TOTAL CONCENTRATION (UG/M**3)

BEST AVAILABLE COPY

0.00	0.00	0.00	0.03	0.66	2.52	3.64	2.03	0.85	0.2

*** R E C E P T O R   N U M B E R ***

	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
SOURCE	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.00	0.00	0.00	0.00	0.05	0.19	0.23	0.10	0.04	0.0
2.	0.00	0.00	0.00	0.00	0.08	0.30	0.34	0.15	0.06	0.0
3.	0.00	0.00	0.00	0.01	0.33	1.44	1.82	0.81	0.25	0.0
4.	0.00	0.00	0.00	0.01	0.25	1.08	1.34	0.59	0.19	0.0
	TOTAL CONCENTRATION (UG/M**3)									
	0.00	0.00	0.00	0.02	0.71	3.00	3.73	1.64	0.54	0.1

*** R E C E P T O R   N U M B E R ***

	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
SOURCE	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.00	0.00	0.00	0.00	0.05	0.23	0.21	0.08	0.02	0.0
2.	0.00	0.00	0.00	0.00	0.09	0.37	0.33	0.13	0.03	0.0
3.	0.00	0.00	0.00	0.01	0.35	1.71	1.67	0.56	0.15	0.0
4.	0.00	0.00	0.00	0.00	0.27	1.30	1.25	0.41	0.11	0.0
	TOTAL CONCENTRATION (UG/M**3)									
	0.00	0.00	0.00	0.01	0.76	3.60	3.45	1.18	0.30	0.1

*** R E C E P T O R   N U M B E R ***

	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
SOURCE	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.00	0.00	0.00	0.00	0.05	0.26	0.16	0.04	0.01	0.0
2.	0.00	0.00	0.00	0.00	0.10	0.46	0.27	0.08	0.01	0.0
3.	0.00	0.00	0.00	0.00	0.36	1.97	1.31	0.32	0.10	0.0
4.	0.00	0.00	0.00	0.00	0.29	1.54	0.99	0.23	0.07	0.0
	TOTAL CONCENTRATION (UG/M**3)									

BEST AVAILABLE COPY

0.00	0.00	0.00	0.01	0.80	4.23	2.73	0.67	0.20	0.0

* * * R E C E P T O R   N U M B E R * * *

SOURCE	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.0	0.00	0.00	0.00	0.05	0.29	0.11	0.02	0.01	0.0
2.	0.0	0.00	0.00	0.00	0.11	0.56	0.20	0.03	0.01	0.0
3.	0.0	0.00	0.00	0.00	0.34	2.07	0.81	0.19	0.05	0.0
4.	0.0	0.00	0.00	0.00	0.29	1.67	0.63	0.13	0.04	0.0
	TOTAL CONCENTRATION (UG/M**3)									
	0.0	0.00	0.00	0.00	0.80	4.59	1.75	0.37	0.10	0.0

* * * R E C E P T O R   N U M B E R * * *

SOURCE	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.0	0.00	0.00	0.00	0.05	0.25	0.05	0.01	0.00	0.0
2.	0.0	0.00	0.00	0.00	0.13	0.59	0.10	0.01	0.00	0.0
3.	0.0	0.00	0.00	0.00	0.29	1.69	0.38	0.10	0.01	0.0
4.	0.0	0.00	0.00	0.00	0.26	1.44	0.30	0.07	0.01	0.0
	TOTAL CONCENTRATION (UG/M**3)									
	0.0	0.00	0.00	0.00	0.72	3.97	0.83	0.20	0.02	0.0

* * * R E C E P T O R   N U M B E R * * *

SOURCE	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.0	0.0	0.00	0.00	0.04	0.13	0.02	0.00	0.00	0.0
2.	0.0	0.0	0.00	0.00	0.12	0.39	0.04	0.00	0.00	0.0
3.	0.0	0.0	0.00	0.00	0.19	0.82	0.20	0.01	0.00	0.0
4.	0.0	0.0	0.00	0.00	0.17	0.73	0.15	0.01	0.00	0.0

TOTAL CONCENTRATION (UG/M**3)

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0.0	0.0	0.00	0.00	0.52	2.07	0.41	0.02	0.00	0.0

* * * R E C E P T O R   N U M B E R * * *

SOURCE	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
	PARTIAL CONCENTRATIONS (UG/M**3)									
1.	0.0	0.0	0.0	0.00	0.01	0.03	0.00	0.00	0.00	0.0
2.	0.0	0.0	0.0	0.00	0.08	0.11	0.00	0.00	0.00	0.0
3.	0.0	0.0	0.0	0.00	0.07	0.22	0.01	0.00	0.00	0.0
4.	0.0	0.0	0.0	0.00	0.07	0.19	0.01	0.00	0.00	0.0
	TOTAL CONCENTRATION (UG/M**3)									
	0.0	0.0	0.0	0.00	0.22	0.55	0.03	0.00	0.00	0.0(