$4500 Pd.
10-26-93
Recpt. 180887

AC 27-240349

Brooksville Cement

A Southdown Company

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Division of Air
Resources Management

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1993 OCT 26 PM 1:55

October 22, 1993

0000662

Mr. Clair Fancy
Florida Department of
Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

April → June → Nov. 03
Correspondence

RE: Hernando County-AP
Southdown, Inc. dba Florida Mining & Materials
Permit Amendment to Allow the Use
of Tire Derived Fuel

Dear Mr. Fancy:

In reference to Mr. John Koogler's letter to you dated October 12, 1993, enclosed please find a check in the amount of $4,500. This is the fee required to amend permit numbers AC27-186923 and AO27-213207.

If you have any questions or comments, please do not hesitate to call me.

Sincerely,

Don Kelly

Don Kelly
Plant Manager

DK/sd
cc: B. Mitchell
B. Thomas, SW Dist.
K. Tiles, Hernando Co.
C. Hetrick, Hernando Co.
J. Cleveland, OHFC

Southdown, Inc.
P.O. Box 6 • Brooksville, Florida 34605-0006
(904) 796-7241 • Fax: (904) 754-9836

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

KA 521-92-01

October 12, 1993

VIA FAX AND MAIL

Mr. Clair Fancy
Florida Department of
Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Hernando County-AP
Southdown, Inc. dba Florida Mining
and Materials
Permit Amendment to Allow the Use
of Tire Derived Fuel

Dear Mr. Fancy:

Southdown, Inc. dba Florida Mining and Materials (FM&M) operates two dry process cement kilns at their Brooksville cement plant located on Highway 98 northwest of Brooksville in Hernando County, Florida. On behalf of FM&M, we are requesting authorization for a minor modification to the No. 1 cement kiln to allow the use of tire derived fuel (TDF) as a fuel supplement.

The No. 1 cement kiln was permitted by AC27-186923 to operate at a kiln feed rate of 130 tons per hour (equivalent to a clinker production rate of 79.6 tons per hour) and a maximum heat input rate of 300 MMBTU per hour. The primary fuel authorized by AC27-186923 is coal with a sulfur content of 1.0 percent. FM&M is also authorized by the referenced air construction permit to use No. 6 fuel oil as a backup fuel and to use Flolite (a re-refined oil blend) as a fuel supplement during normal kiln operations, for kiln preheating and during kiln idle times.

FM&M is presently operating Kiln No. 1 under Air Operating Permit A027-213207 issued June 16, 1992 and expiring June 15, 1997. On February 5, 1993, FM&M was granted an amendment to this permit authorizing performance tests for pollutant emissions on the No. 1 cement kiln while using TDF as a fuel supplement. The amendment authorized the use of TDF to provide up to 20 percent of the total heat input to the kiln; or up to 2.14 tons of TDF per hour.

FM&M is willing to accept and comply with the permit conditions set forth in the report prepared on behalf of Hernando County, with one exception. The County suggested that, "Any physical modification to the WTDF feed mechanism will require a modification to this permit, ..." It is our opinion that this proposed condition is unnecessary and unwarranted.

FM&M has considered physical changes to the tire feed system but, as discussed with Mr. Bruce Mitchell of your staff, the physical changes will not constitute a "modification" as defined by Department rule because there will be no change in emissions (Rule 17-212.200(46), FAC). Any feed system used by FM&M will result in the TDF being introduced to the No. 1 kiln at the base of the preheater through a double air lock feed system. This is the point where TDF was introduced during the compliance tests and this is the type of feed system used during the compliance tests. Any physical changes made to the feed system by FM&M will not change the point nor the manner in which the TDF is introduced nor the type of mechanism used to introduce the WTDF. There is no reason, therefore, to believe that any equipment change within these constraints will affect emissions. Hence, such changes should not require an amendment to the permit for the kiln.

There are no modifications or changes requested to the No. 1 kiln permits, other than those that have been addressed herein.

A check in the amount of $4,500 will be provided by Southdown under separate cover. This is the fee required for a non-PSD permit review when the emission rate increase is in the range of 50-100 tons per year.

We appreciate your consideration of this matter and will be happy to provide additional information should it be required.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:wa

c: Mr. Bruce Mitchell, FDEP, Tallahassee
Mr. Don Kelly, FM&M
Ms. Anetha Lue, Southdown
Mr. David Dee, Carlton et al

PM
10-13-93
Clearwater/FL

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

KA 521-92-01

October 12, 1993

VIA FAX AND MAIL

Mr. Clair Fancy
Florida Department of
Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Hernando County-AP
Southdown, Inc. dba Florida Mining
and Materials
Permit Amendment to Allow the Use
of Tire Derived Fuel

Dear Mr. Fancy:

Southdown, Inc. dba Florida Mining and Materials (FM&M) operates two dry process cement kilns at their Brooksville cement plant located on Highway 98 northwest of Brooksville in Hernando County, Florida. On behalf of FM&M, we are requesting authorization for a minor modification to the No. 1 cement kiln to allow the use of tire derived fuel (TDF) as a fuel supplement.

The No. 1 cement kiln was permitted by AC27-186923 to operate at a kiln feed rate of 130 tons per hour (equivalent to a clinker production rate of 79.6 tons per hour) and a maximum heat input rate of 300 MMBTU per hour. The primary fuel authorized by AC27-186923 is coal with a sulfur content of 1.0 percent. FM&M is also authorized by the referenced air construction permit to use No. 6 fuel oil as a backup fuel and to use Flolite (a re-refined oil blend) as a fuel supplement during normal kiln operations, for kiln preheating and during kiln idle times.

FM&M is presently operating Kiln No. 1 under Air Operating Permit A027-213207 issued June 16, 1992 and expiring June 15, 1997. On February 5, 1993, FM&M was granted an amendment to this permit authorizing performance tests for pollutant emissions on the No. 1 cement kiln while using TDF as a fuel supplement. The amendment authorized the use of TDF to provide up to 20 percent of the total heat input to the kiln; or up to 2.14 tons of TDF per hour.

The emission measurements to evaluate TDF were conducted during the periods May 4-5 (baseline tests) and June 8-9 (TDF firing tests), 1993. The results of these tests have been reported to the Department and to Hernando County (see reports by Koogler & Associates entitled, *Summary of Particulate Matter, Sulfur Dioxide, Total Hydrocarbons, Carbon Monoxide, Nitrogen Oxides, Hydrogen Chloride, Speciated Volatile Organics, Metals, Dioxins/Furans and Visible Emission Measurements under Baseline and Coal/TDF Firing Conditions* and *Comparison of Particulate Matter, Sulfur Dioxide, Total Hydrocarbons, Carbon Monoxide, Nitrogen Oxides, Hydrogen Chloride, Speciated Volatile Organics, Metals and Dioxins/Furans Emission Measurements and Opacities of Emissions Under Baseline and Coal/TDF Firing Conditions*; both dated May 4-5 and June 8-9, 1993). Comments prepared on behalf of Hernando County are included in the report entitled, *Whole Tire Derived Fuel Test Burn, Florida Mining and Materials, Brooksville, Florida*, prepared by KBN and dated September 1993. A copy of the KBN report has been submitted to the Department.

The emission measurements conducted in May and June of 1993 demonstrated that there were day-to-day fluctuations in the emission rates of many constituents from the No. 1 cement kiln. Further, the tests demonstrated that the use of TDF had no significant affect on most of the emissions from the kiln. However, the testing did indicate the possibility that there might be small increases in the emission rates of some non-regulated organic and inorganic constituents as well as a possible increase in the carbon monoxide emission rate.

The carbon monoxide emission rate averaged 49.1 pounds per hour during the two day test in June 1993 when TDF was used as a fuel supplement. This average was 17.5 pounds per hour greater than the average carbon monoxide emission rate measured during the two day test in May 1993 when the kiln was fired with 100 percent coal. The 17.5 pound per hour increase in carbon monoxide emissions, when annualized (8760 hours per year), results in a possible carbon monoxide emission rate increase of 76.6 tons per year. This potential increase is not "significant," as defined in Rule 17-212.400 and Table 17-212.400-2, FAC. The referenced rule and table define a carbon monoxide emission rate increase of 100 tons per year or more as significant for PSD purposes. An increase of 100 tons per year is equivalent to approximately 22.8 pounds per hour for 8760 hours per year.

For purposes of the permit amendment requested by this letter and for PSD tracking purposes, FM&M proposes to establish a carbon monoxide emission rate from the No. 1 cement kiln of 51.0 pounds per hour (31.6 pounds per hour measured during the baseline tests plus a 22.4 pound per hour increase). The 22.4 pound per hour increase would result in an annual increase in carbon monoxide emissions of 98.1 tons per year if the plant operated continuously for 8760 hours per year. This proposed increase is not significant and it takes into consideration and provides for normal fluctuations in the carbon monoxide emission rates such as those measured during the June 8, 1993, test period. The total annual carbon monoxide emission rate proposed for Kiln No. 1 for PSD tracking purposes is 223.4 tons per year. Of course, the kiln will experience scheduled and unscheduled outages which will reduce the actual operating time to less than 8760 hours per year and, hence, will reduce the actual annual carbon monoxide emissions.

FM&M is willing to accept and comply with the permit conditions set forth in the report prepared on behalf of Hernando County, with one exception. The County suggested that, "Any physical modification to the WTDF feed mechanism will require a modification to this permit, ..." It is our opinion that this proposed condition is unnecessary and unwarranted.

FM&M has considered physical changes to the tire feed system but, as discussed with Mr. Bruce Mitchell of your staff, the physical changes will not constitute a "modification" as defined by Department rule because there will be no change in emissions (Rule 17-212.200(46), FAC). Any feed system used by FM&M will result in the TDF being introduced to the No. 1 kiln at the base of the preheater through a double air lock feed system. This is the point where TDF was introduced during the compliance tests and this is the type of feed system used during the compliance tests. Any physical changes made to the feed system by FM&M will not change the point nor the manner in which the TDF is introduced nor the type of mechanism used to introduce the WTDF. There is no reason, therefore, to believe that any equipment change within these constraints will affect emissions. Hence, such changes should not require an amendment to the permit for the kiln.

There are no modifications or changes requested to the No. 1 kiln permits, other than those that have been addressed herein.

A check in the amount of $4,500 will be provided by Southdown under separate cover. This is the fee required for a non-PSD permit review when the emission rate increase is in the range of 50-100 tons per year.

We appreciate your consideration of this matter and will be happy to provide additional information should it be required.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:wa

c: Mr. Bruce Mitchell, FDEP, Tallahassee
Mr. Don Kelly, FM&M
Ms. Anetha Lue, Southdown
Mr. David Dee, Carlton et al

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822

FAX TRANSMITTAL FORM

TO: Bruce Mitchell

FROM: Julian Koogler

PROJECT: 52-92-01

SENT BY: Wendy

DATE: 10/13/93

FAX PHONE: 904-377-7158

The text being transmitted consists of 3 pages PLUS this one.

REMARKS: Southdown will be sending the check under separate cover.

D R A F T

KA 521-92-01

October 8, 1993

Mr. John Brown
Florida Department of
Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Hernando County-AP
Southdown, Inc. dba Florida Mining
and Materials
Permit Modification to Allow the
Use of Tire Derived Fuel

Dear Mr. Brown:

Southdown, Inc. dba Florida Mining and Materials (FM&M) operates two dry process cement kilns at their Brooksville cement plant located on Highway 98 northwest of Brooksville in Hernando County, Florida. This letter addresses a request for a minor modification to the appropriate air permits issued to FM&M for the operation of the No. 1 cement kiln allowing the use of tire derived fuel (TDF) as a fuel supplement in the No. 1 kiln.

FM&M is presently operating Kiln No. 1 under Air Operating Permit A027-213207 issued June 16, 1992 and expiring June 15, 1997. On February 5, 1993, FM&M was granted an amendment to the referenced air operating permit allowing performance tests for pollutant emissions on the No. 1 cement kiln while using TDF as a fuel supplement. The amendment authorized the use of TDF at a maximum firing rate of 20 percent of the total heat input

to the kiln or 2.14 tons of TDF per hour.

The No. 1 cement kiln was permitted by AC27-186923 to operate at a kiln feed rate of 130 tons per hour (equivalent to a clinker production of 79.6 tons per hour) and a maximum heat input rate of 300 MMBTU per hour. The primary fuel authorized by AC27 186923 is coal with a sulfur content of 1.0 percent. FM&M is also authorized by the referenced air construction permit to use No. 6 fuel oil as a backup fuel and to use Flolite (a re-refined oil blend) as a fuel supplement, for kiln preheating and during kiln idle times.

The emission measurements conducted to evaluate TDF were conducted during the periods May 4-5, 1993, and June 8-9, 1993. The results of these tests have been reported to the Department and have been reviewed by Hernando County. The comments prepared on behalf of Hernando County are included in the report entitled, *Whole Tire Derived Fuel Test Burn, Florida Mining and Materials, Brooksville, Florida*, prepared by KBN and dated September 1993.

The emission measurements conducted in May and June of 1993 demonstrated that there were day-to-day fluctuations in the emission rates of many constituents from the No. 1 cement kiln and further demonstrated that, for the most part, the use of TDF to provide up to 20 percent of the heat input to the No. 1 Kiln had no affect on emissions from the kiln. The testing did indicate possible slight increases in the emission rates of some non-regulated organic and inorganic constituents and a possible carbon monoxide emission rate increase. The measured carbon monoxide

emission rate averaged 49.1 pounds per hour during the two day period in June 1993 when TDF was used as a fuel supplement. This averaged was 17.5 pounds per hour greater than the average carbon monoxide emission rate measured during the two day test period in May 1993 when the kiln was fired with 100 percent coal. The possible 17.5 pounds per hour carbon monoxide increase, when annualized (8760 hours per year), results in a possible carbon monoxide emission rate increase of 76.6 tons per year. This potential increase is not significant as defined in Rule 17-212.400, FAC. The referenced rule defines carbon monoxide emission rate measures of 100 tons per year or more (22.8 pounds per hour for 8760 hours per year) as significant.

For purposes of the minor modifications requested by this letter, FM&M proposes to establish a carbon monoxide emission rate from the No. 1 cement kiln for PSD tracking purposes of 51.0 pounds per hour (31.6 pounds per hour measured during the baseline tests plus a 22.4 pound per hour increase). The 22.4 pound per hour increase will result in an annual increase in carbon monoxide emissions of 98.1 tons per year if the plant operated 8760 hours per year. This increase, while still not significant, will take into consideration fluctuations in the carbon monoxide emission rates as measured during the June 8, 1993, test period. The annual carbon monoxide emission rate from Kiln No. 1 for PSD tracking purposes will be 223.4 tons per year.

FM&M agrees to the conditions suggested in the report prepared on behalf of Hernando County with the exception to the suggestion that, "Any physical modification to the WTDF feed mechanism will require a

modification to this permit, ...". FM&M has considered some physical changes to the tire feed system but, as I discussed with Mr. Bruce Mitchell of your staff, the physical changes will not be a modification as defined by Department rule (no change in emissions) and should therefore not require a permit modification. Whatever feed system is finally decided upon by FM&M will result in the TDF being introduced to the No. 1 kiln at the base of the preheater through a double air lock feed system. This is the point where TDF was introduced during the compliance tests and the type of feed system used during the compliance tests. Any physical changes made to the feed system by FM&M will not change the point at which the TDF is introduced or the type of mechanism used to introduce the WTDF. Thus, the equipment change will not affect emissions and hence, should not require a modification to any kiln permit.

There are no other modifications or changes requested to the No. 1 kiln permits. Please review this request for modification and advise us of the permit fee required for the modification. We appreciate your consideration of this matter and will provide additional information should it be required.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:wa

c: Mr. Bruce Mitchell, FDEP, Tallahassee
Mr. Don Kelly, FM&M
Ms. Anetha Lue, Southdown
Mr. David Dee, Carleton et al

KOGGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

10-8-93
@5:30
Spoke to Wendy - edited #1 (mod. to reflect "mod. to existing #1 kiln" vs mod. result and fee is $4500.00 (≥50 < 100 TPY) Orig

FAX TRANSMITTAL FORM

TO: Bruce Mitchell

FROM: John Koogler

PROJECT: 521-92-02

SENT BY: Wendy

DATE: 10/8/93

FAX PHONE: 904-377-7158

The text being transmitted consists of 4 pages PLUS this one.

REMARKS: For your review and comments

OERTEL, HOFFMAN, FERNANDEZ & COLE, P. A.

ATTORNEYS AT LAW

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JOHN H. MILLICAN
ENVIRONMENTAL CONSULTANT
(NOT A MEMBER OF THE FLORIDA BAR)

J. P. SUBRAMANI, PH. D., P. E.
ENVIRONMENTAL CONSULTANT
(NOT A MEMBER OF THE FLORIDA BAR)

VIA HAND-DELIVERY

September 16, 1993

Mr. Bruce Mitchell
Bureau of Air Regulation
Florida Department of
Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Bruce:

KBN Engineering and Applied Sciences, Inc., has issued its report regarding the proposal of Florida Mining and Materials to utilize whole tire-derived fuel at its Brooksville, Florida facility. A copy of this report has been provided to Koogler and Associates, consultants for Florida Mining and Material. This morning, John Koogler telephoned me and asked that our office supply you with a copy of this report, which I enclose. Please give me a telephone call if you have any questions regarding it.

Sincerely,

C. Anthony Cleveland

CAC/dg/
C:\Work1\MitchLtr.CAC

Encl. a/s

WHOLE TIRE-DERIVED FUEL
TEST BURN
FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA

Prepared For:

Hernando County Board of County Commissioners
20 North Main Street
Brooksville, Florida 34601

Prepared By:

KBN Engineering and Applied Sciences, Inc.
1034 NW 57th Street
Gainesville, Florida 32605

September 1993
13076B1/R1

TABLE OF CONTENTS
(Page 1 of 2)

TABLE OF CONTENTS
(Page 2 of 2)

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Southdown, Inc., doing business as Florida Mining and Materials (FMM), has undergone a whole tire-derived fuel (WTDF) test burn program at its Brooksville cement plant. The purpose of the test burn was to determine conclusively if the firing of up to 20 percent WTDF in Kiln No. 1 at the cement plant would cause an increase in the emissions of any regulated air pollutant. The test burn was conducted during May and June 1993.

The Hernando County Board of County Commissioners (HCBCC), having the responsibility of protecting the interests of the citizens of Hernando County, has maintained involvement in FMM's activities to utilize waste tires as a supplemental fuel in their cement plant. In March 1993, HCBCC contracted with KBN Engineering and Applied Sciences, Inc. (KBN), to serve as a consultant to the county to evaluate the WTDF test burn. The scope of services to be provided by KBN included: 1) witness all activities during the test burn period to determine if proper and adequate data are collected, 2) review of the data and results of the test burn to ascertain beyond a reasonable doubt that burning WTDF can occur without an increase in allowable emissions, and 3) provide a final report to HCBCC concerning the adequacy of the test burn.

This report is a final report which addresses the adequacy of the test burn to demonstrate if an increase in emissions of any regulated pollutant will occur under WTDF firing conditions. An overview of the test program is presented in Section 2.0. Baseline and WTDF firing test results are presented in Section 3.0. A comparison of the baseline and WTDF firing results is presented in Section 4.0. Results of an air quality impact analysis conducted for emissions from Kiln No. 1 at the FMM cement plant are discussed in Section 5.0. Summary and conclusions of the TDF test program are presented in Section 6.0.

2.0 OVERVIEW OF TEST PROGRAM

The overall test program to demonstrate the feasibility and acceptability of WTDF firing in Kiln No. 1 at FMM was conducted over a period beginning on March 29, 1993, and ending on June 9, 1993. The testing period is summarized in Table 2-1. The first 30 days of the testing period was devoted to firing up to 20 percent WTDF and coal in the cement kiln to test kiln operation as well as the WTDF feed system. This 30-day period was followed by a 5-day period of 100 percent coal firing prior to the baseline emission tests. Baseline testing, with no WTDF being fired in the kiln, was conducted on May 4 and 5, 1993. A 5-day period to fire WTDF/coal in the cement kiln prior to WTDF emissions testing was initiated on May 6 and continued until May 13, at which time the cement kiln was shut down due to operational problems. The kiln was brought back on line on May 21 utilizing fuel oil and then 100 percent coal and continued to operate on coal until June 3, when WTDF/coal firing resumed. WTDF/coal firing continued through June 9, and emission testing for WTDF firing was conducted during June 8 and 9, 1993.

During the baseline and WTDF/coal firing emission testing, the test methods set forth in the approved test protocol were utilized. All methods used were the U.S. Environmental Protection Agency (EPA) reference methods as specified in the Code of Federal Regulations (CFR), Title 40, Part 60. Manual stack testing was performed for the following during each test:

- Particulate matter (PM)
- Dioxins/furans
- Hydrogen chloride (HCl)
- Metals:
  - Arsenic (As)
  - Chromium (Cr)
  - Lead (Pb)
  - Mercury (Hg)
  - Zinc (Zn)
  - Iron (Fe)
  - Aluminum (Al)
- Speciated volatile organic compounds:
  - Acetone
  - Benzene
  - Bromomethane
  - Carbon disulfide

Table 2-1. Summary of WTDF Test Burn Program; Kiln No. 1 at FMM

Period	Activity
03/29/93 to 04/26/93	Initial period for test firing of WTDF/coal.
04/27/93 to 05/03/93	100 percent coal firing.
05/04/93 to 05/05/93	Baseline emissions testing utilizing 100 percent coal.
05/06/93 to 05/12/93	WTDF/coal firing.
05/13/93 to 05/20/93	Kiln shut down for repairs and maintenance.
05/21/93 to 06/02/93	Kiln brought back on-line; 100 percent coal firing.
06/03/93 to 06/07/93	WTDF/coal firing.
06/08/93 to 06/09/93	WTDF/coal firing emissions testing.

Chlorobenzene
Ethylbenzene
Hexane
1,1,1-trichloroethane
Styrene
Toluene
Trichloroethylene
Xylene

Additional Pollutants:

Ammonia
Barium
Calcium
Magnesium
Sodium
Potassium

Each of these measurements were obtained during a total of three runs in each of the baseline and WTDF/coal firing emission test periods. The duration of each run was approximately 2 hours.

Continuous pollutant measurements were also performed for nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur dioxide (SO_2) during the baseline and WTDF/coal test periods. These measurements were performed continuously for two 12-hour periods (a total of approximately 24 hours) in the baseline and WTDF/coal firing emission test periods.

All emission measurements were made at the main stack exhaust for Kiln No. 1 at the FMM cement plant.

Several plant operating parameters were measured continuously throughout the entire testing period. These included cement plant operating parameters, and continuous stack measurements of opacity which are obtained by the plant using an in-stack monitor.

Based upon the testing program, Koogler & Associates (K&A) prepared emission test reports as well as a summary report comparing the baseline and WTDF/coal firing results. The summary

report concluded that the test data demonstrated that the use of up to 20 percent WTDF in Kiln No. 1 has no effect upon emissions from the kiln. An air quality screening analysis was also performed separately by K&A, which addressed the predicted ambient impacts of toxic pollutants from Kiln No. 1. This analysis concluded that impacts of all air toxics will be well below the Florida Department of Environmental Regulation's (FDER's) established no-threat levels (NTLs).

3.0 BASELINE AND WTDF TESTING

3.1 BASELINE TESTING

3.1.1 PLANT OPERATING CONDITIONS

The baseline testing, utilizing 100 percent coal to fire Kiln No. 1, was conducted on May 4 and 5, 1993. Kiln No. 1 was operating normally during the baseline test period. Prior to the baseline testing, Kiln No. 1 had been operating for 5 days with coal providing 100 percent of the heat input to the kiln. This assured that all plant operating parameters and emission test results would be representative of 100 percent coal firing. Following the conclusion of baseline testing on May 5, 1993, firing of up to 20 percent WTDF in the kiln was begun, ending the baseline test period.

Based on review of the plant operating data, baseline testing was conducted with Kiln No. 1 operating at or near its maximum operating rates. Plant operating data during the baseline testing are summarized in Table 3-1. The cement kiln averaged 140.5 tons per hour (TPH) feed rate, which represents 97 percent of the maximum permitted feed rate of 145 TPH. Heat input to the kiln averaged 212 million British thermal units per hour (MMBtu/hr), which is 71 percent of the maximum heat input of 300 MMBtu/hr. Coal feed rate to the kiln averaged 8.4 TPH, compared to a maximum firing rate of 12.0 TPH. Although the heat input rate to the kiln averaged only 71 percent of the maximum permitted heat input rate, the normal heat input to the kiln is stated to be in the range of 240 to 260 MMBtu/hr. The kiln was operating at about 85 percent of this normal heat input rate.

During the baseline testing period, FMM plant personnel were very cooperative in answering questions raised by KBN staff, in providing explanations to plant operations, conducting equipment inspections, and providing any other information requested by KBN staff during the baseline test period. Complete access to the plant control room was provided at all times, so that plant operations could be monitored. Hourly logs and computer printouts of plant operating data were witnessed being generated in the control room, and later provided to KBN for inspection. The WTDF feed system and monitoring equipment, coal feed systems, and clinker production systems were all inspected during the baseline testing.

Based on discussions with plant operating personnel, and a review of the plant operating data, Kiln No. 1 at FMM was operating normally during the baseline test period.

Table 3-1. Summary of Kiln No. 1 Operating Data During Emission Testing

Parameter	Permitted or Maximum Rate	Baseline Conditions (05/04/93 to 05/05/93) Test Average	Baseline Conditions (05/04/93 to 05/05/93) Percent of Maximum	TDF/Coal Firing (06/08/93 to 06/09/93) Test Average	TDF/Coal Firing (06/08/93 to 06/09/93) Percent of Maximum
Cement Plant					
Heat Input (MMBtu/hr)	300	212	71	234	78
Coal Feed (TPH)	12/9.6 *	8.4	70	7.5	78
WTDF Feed (TPH)	0/2.14 *	—	—	1.57	73
WTDF Heat Input (MMBtu/hr)	60	—	—	50.8	85
(% of total)	—	—	—	21.7	—
Kiln Feed (TPH)	145	140.5	97	136.7	94
Preheater Exit Temperature (°F)	—	755	—	756	—
Kiln Exit					
Temperature (°F)	—	1,632	—	1,741	—
Oxygen (%)	—	1.2	—	3.4	—
Burning Zone Temp (°F)	—	2,650	—	2,600	—
Bag House Inlet Temperature (°F)	—	240	—	245	—
Stack Opacity (%)	—	4.0	—	3.6	—
Gas Flow (dscfm)	—	187,236	—	175,902	—

Note: NR = not reported on hourly basis.

* For 100 percent coal and 20 percent TDF/coal firing, respectively.

3.1.2 STACK TEST PROCEDURES

KBN personnel were on-site during the baseline stack testing and witnessed K&A's testing procedures. Review of the stack test procedures employed by K&A indicate that proper procedures were followed during the stack testing. During the first day of baseline testing, representatives of Air Consulting & Engineering, Inc. (ACE), under subcontract to KBN, were on-site to witness the stack testing and to conduct concurrent testing of NO_x, CO, VOC, and O_2. The results of this testing were in very close agreement with K&A's monitored values, providing additional credibility to the K&A test procedures. ACE's field report on their on-site activities is contained in Appendix C.

3.1.3 BASELINE EMISSION TEST RESULTS

Baseline emission test results are summarized in Table 3-2. The only pollutant for which an allowable emission rate has been set in the operating permit for the kiln is PM. PM emissions averaged 7.05 lb/hr and were well below the allowable PM emission rate 36.0 lb/hr for the kiln. There is no allowable emission rate for other pollutants from Kiln No. 1. NO_x emissions averaged 198 lb/hr, while CO emissions averaged 31.6 lb/hr and total hydrocarbons (THC) averaged 3.4 lb/hr. Mercury emissions averaged 0.013 lb/hr. Emissions of SO_2 were less than 1.9 lb/hr, and lead emissions averaged less than 0.008 lb/hr.

Emissions of all non-criteria pollutants were below 1.3 lb/hr, except for ammonia. Ammonia emissions averaged 19.71 lb/hr. Emissions of all speciated VOC were also very low, less than 0.06 lb/hr.

Individual measurements for the baseline test runs can be found in Appendix A, or in the K&A test reports.

3.2 WHOLE TIRE-DERIVED FUEL (WTDF) TESTING

3.2.1 MAINTENANCE AND REPAIRS PERFORMED ON KILN NO. 1

Baseline testing on Kiln No. 1 at FMM utilizing 100 percent coal as fuel was conducted on May 4-5, 1993, while WTDF testing using up to 20 percent WTDF as fuel to the kiln was conducted on June 8-9, 1993. Due to operational problems with the kiln, the WTDF test was first delayed and then was postponed as the kiln was shut down for repairs and maintenance on May 13. Kiln No. 1 was restarted on May 21 after the preheater/kiln/cooler system underwent

Table 3-2. Summary of Emission Test Results for Baseline and WTDF/Coal Firing Conditions for Kiln No. 1 at Florida Mining & Materials

Pollutant	Baseline Conditions (100% Coal) Number of Observations	Baseline Conditions (100% Coal) Average (lb/hr)	WTDF/Coal Firing Number of Observations	WTDF/Coal Firing Average (lb/hr)	Test for Significant Change
Criteria Pollutants					
Particulate Matter	3	7.05	3	9.14	No Significant Change
Nitrogen Oxide	12	198.09	12	188.38	No Significant Change
Sulfur Dioxide	12	<1.85[a]	12	<0.78[a]	Below Detectable Limit
Lead	3	<0.00781[b]	3	<0.00201[a]	Below Detectable Limit
Total Hydrocarbon	12	3.36	12	3.26	No Significant Change
Carbon Monoxide	12	31.62	12	49.09	Significant Change
Non-Criteria Pollutants					
Hydrogen Chloride	3	0.443	3	<0.35[b]	No Significant Change
Arsenic	3	<0.001737[a]	3	<0.0014[a]	Below Detectable Limit
Chromium	3	<0.00202[a]	3	<0.00287[a]	Below Detectable Limit
Zinc	3	0.0058	3	0.01026	Significant Change
Mercury	3	0.013	3	<0.00036[a]	No Significant Change
Dioxin/Furan	3	--[a]	3	--[a]	Below Detectable Limit
Ammonia	3	19.71	3	10.77	No Significant Change
Iron	3	0.183	3	0.123	No Significant Change
Aluminum	3	0.103	3	0.103	No Significant Change
Barium	3	<0.03[a]	3	0.057	Significant Change
Calcium	3	1.26	3	0.753	No Significant Change
Magnesium	3	0.09	3	0.08	No Significant Change
Volatile Organic Compounds					
Acetone	6	<4.3E-05[a]	6	0.0210	Significant Change
Benzene	6	0.058	6	0.0412	No Significant Change
Bromomethane	6	<0.00027[b]	6	0.00127	Significant Change
Carbon Disulfide	6	<0.0039[b]	6	0.00575	No Significant Change
Chlorobenzene	6	0.016	6	0.0126	No Significant Change
Ethylbenzene	6	0.0058	6	0.00553	No Significant Change
n-Hexane	6	0.005	6	0.0023	No Significant Change
Toluene	6	0.0492	6	0.034	No Significant Change
1,1,1-Trichloroethane	6	<2.2E-05[a]	6	<2.2E-05[a]	Below Detectable Limit
Trichlorethene	6	<2.2E-05[a]	6	<2.2E-05[a]	Below Detectable Limit
Styrene	6	0.0267	6	0.0113	No Significant Change
m-\p-Xylene	6	0.0172	6	0.0112	No Significant Change
o-Xylene	6	0.0069	6	0.00445	No Significant Change

Notes:
[a] All observations were below the detection limit.
[b] Many observations were below the detection limit.

maintenance and repair. The kiln then continued to operate until June 2, when a short outage was experienced. Kiln 1 resumed operation on June 2, and WTDF firing began the morning of June 3. This schedule provided 5 days of WTDF firing prior to the WTDF testing period, as required by the test protocol.

Based on the course of events between the baseline and WTDF testing, there were several areas of concern related to the acceptability of the overall testing program. The first concern is that the baseline testing will have been conducted approximately 1 month prior to the WTDF testing, and that significant differences in raw feed composition, coal quality, and other operational parameters could make it difficult to compare baseline emissions to WTDF emissions on the same basis. The second concern was that the repairs and maintenance performed on Kiln No. 1 will have altered the air emissions associated with the kiln.

Based on these concerns, FMM was requested to provide information regarding kiln operational parameters during the baseline and WTDF testing in order to determine if parameters were sufficiently similar as to not jeopardize the comparison of test results. In addition, FMM was requested to provide a listing of the repairs and/or maintenance performed on Kiln No. 1 and a description of each, whether these were planned maintenance items or unplanned items, and the affects that each would have on kiln/preheater operation and associated air emissions. Subsequent to this request, FMM provided the requested information.

Based on the information and documentation provided by FMM, KBN concluded that the plant operating parameters from the baseline and WTDF test burns indicates no significant differences in plant operation for the two test periods. Furthermore, FMM plant personnel have stated that the repairs and maintenance activities performed on the Kiln No. 1 system should not have affected kiln operation. Based upon this analysis, it was concluded that the baseline and WTDF test burns were conducted under similar operating conditions, and the plant operations were suitable for determining if the utilization of WTDF in Kiln No. 1 results in an increase in emissions to the atmosphere. A copy of KBN's analysis and conclusions related to this issue are contained in Attachment B.

3.2.2 PLANT OPERATING CONDITIONS DURING WTDF TESTING

The WTDF/coal testing, utilizing up to 2.14 TPH WTDF or 20 percent WTDF on a heat input basis to fire the cement kiln, with remaining heat input supplied from coal, was conducted during

the period June 8 and 9, 1993. Prior to the WTDF testing, the cement kiln had been operating for approximately 5 days on WTDF/coal, with WTDF supplying approximately 20 percent of the heat input to the kiln. This assured that all plant operating parameters and emission test results would be representative of WTDF/coal firing.

Based on review of the plant operating data, WTDF/coal firing testing was conducted with the CPL plants operating at or near their maximum operating rates. Kiln feed averaged 136.7 TPH, which is 94 percent of the maximum permitted feed rate of 145 TPH. Heat input to the kiln averaged 234 MMBtu/hr, which is 78 percent of the maximum heat input of 300 MMBtu/hr. Coal feed rate to the kiln averaged 7.5 TPH, compared to a maximum firing rate of 9.6 TPH when firing WTDF/coal.

The WTDF feed rate to the kiln averaged 1.57 TPH, which is 73 percent of the maximum permitted rate of 2.14 TPH for WTDF firing. It is noted that WTDF firing is computer controlled, and by means of an automated weigh scale/feeder, the weight of WTDF introduced to the kiln can be controlled and monitored.

As during the baseline testing, FMM plant personnel were very cooperative in answering questions raised by KBN staff and providing other information during the WTDF/coal emission testing. Plant operations were explained and demonstrated, operations were witnessed, and other information requested by KBN staff were provided. Complete access to the plant control room was provided at all times, so that plant operations could be monitored. Hourly logs of plant operating data were witnessed being generated in the control room. These were later provided to KBN for review. The WTDF feed system and monitoring equipment, coal feed systems, and clinker production facilities were all inspected during the WTDF/coal firing testing.

Based on discussions with plant operating personnel, and a review of the plant operating data, Kiln No. 1 was operating normally during the WTDF/coal test period.

3.2.3 STACK TEST PROCEDURES

KBN personnel were on-site during the WTDF/coal testing and witnessed K&A's stack testing procedures. These procedures were found to be proper and conducted according to the reference methods. K&A personnel answered questions and allowed witnessing of the testing throughout the period.

3.2.4 WTDF/COAL EMISSION TEST RESULTS

WTDF/coal firing emission test results are summarized in Table 3-2. PM emissions averaged 9.1 lb/hr and were well below the allowable PM emission rate 36 lb/hr for the kiln. There is no allowable emission rate for other pollutants from Kiln No. 1. NO_x emissions averaged 188.4 lb/hr, while CO emissions averaged 49.1 lb/hr and THC averaged 3.3 lb/hr. SO_2, lead, and mercury emissions averaged less than the detectable limit for these pollutants.

Emissions of all non-criteria pollutants were below 0.8 lb/hr, except for ammonia. Ammonia emissions averaged 10.8 lb/hr. Emissions of all speciated VOC were also very low, less than 0.05 lb/hr.

Individual measurements for the WTDF/coal test runs can be found in Appendix A and in the K&A test reports.

Two unannounced site visits to the FMM plant were conducted when WTDF was being fired in Kiln No. 1. These visits were conducted on May 8, 1993, and May 11, 1993. During the May 8 visit, WTDF firing was normal, but the kiln experienced operating problems due to a clinker cooler drive problem. The kiln was shut down at approximately 12 noon to repair this problem. No operating problems with Kiln No. 1 or with WTDF firing were indicated by the FMM operating personnel during the May 11 visit. During both unannounced visits, the WTDF tire feed system and operating logs were witnessed to verify proper operation. Operations in the control room appeared normal, based on control room personnel actions and instrument readings.

4.0 COMPARISON OF EMISSIONS DURING BASELINE AND WTDF FIRING CONDITIONS

4.1 STACK TESTING RESULTS

A comparison of baseline emission test results and emission test results when firing WTDF/coal in Kiln No. 1 is presented in Table 4-1. In order to determine if a change in emissions occurred due to WTDF firing in the kiln, a statistical analysis was performed on the data according to 40 CFR 60, Appendix C, Determination of Emission Rate Change. This method allows comparison of the "before" and "after" emission rates to determine, based on a 95 percent confidence interval, if an increase in emissions to the atmosphere has occurred.

As indicated in Table 4-1, the average emission rates for four pollutants were determined to have increased with WTDF firing, based on the Appendix C method. These pollutants are CO, zinc, acetone, and bromomethane. For several pollutants (SO_2, lead, arsenic, chromium, 1,1,1-trichloroethane and trichloroethene), all or most test values were below the minimum detectable limit (MDL) of the sampling method for both baseline and WTDF firing conditions. For the pollutants PM and carbon disulfide, although higher emissions were measured for WTDF/coal firing conditions, the increase was not statistically significant.

For all other pollutants, the test data show a decrease in emissions when firing WTDF/coal as compared to 100 percent coal firing.

In the case of CO, comparison of the baseline and WTDF/coal firing emissions indicates a significant increase in CO emissions when firing WTDF. However, K&A has presented additional CO test data from FMM to support a claim that the CO emissions from the FMM plant are variable, and comparison of two sets of tests may not be indicative of overall emission levels (reference K&A letter to KBN dated August 13, 1993). The additional CO test data, as well as the data from the recent WTDF test burn, are presented in Table 4-2. K&A states that this data demonstrate that CO emissions from the kiln can be significantly different when operating under the same conditions, that there are significant fluctuations in emissions from cement plants resulting from operating factors, and that use of WTDF does not result in increased CO emissions.

Table 4-1. Comparison of Emission Test Results for Baseline and WTDF/Coal Firing Conditions for Kiln No. 1 at Florida Mining and Materials

Pollutant	Average Emission Rate (lb/hr) Baseline Conditions (100% Coal)	WTDF/Coal Firing	Change (lb/hr)	Change Percent	Test for Significant Change
Criteria Pollutants					
Particulate Matter	7.05	9.14	2.09	29.6%	No Significant Change
Nitrogen Oxide	198.09	188.38	-9.71	-4.9%	No Significant Change
Sulfur Dioxide	<1.85 [a]	<0.78 [a]	--	--	Below Detectable Limit
Lead	<0.00781 [b]	<0.00201 [a]	--	--	Below Detectable Limit
Total Hydrocarbon	3.36	3.26	-0.10	-3.0%	No Significant Change
Carbon Monoxide	31.62	49.09	17.47	55.2%	Significant Change
Non-Criteria Pollutants					
Hydrogen Chloride	0.443	<0.35 [b]	-0.093	-21.0%	No Significant Change
Arsenic	<0.001737 [a]	<0.0014 [a]	--	--	Below Detectable Limit
Chromium	<0.00202 [a]	<0.00287 [a]	--	--	Below Detectable Limit
Zinc	0.0058	0.01026	0.00446	76.9%	Significant Change
Mercury	0.013	<0.00036 [a]	-0.01264	-97.2%	No Significant Change
Dioxin/Furan	-- [a]	-- [a]	--	--	Below Detectable Limit
Ammonia	19.71	10.77	-8.94	-45.4%	No Significant Change
Iron	0.183	0.123	-0.06	-32.8%	No Significant Change
Aluminum	0.103	0.103	0	0.0%	No Significant Change
Barium	<0.03 [a]	0.057	0.027	90.0%	Significant Change
Calcium	1.26	0.753	-0.507	-40.2%	No Significant Change
Magnesium	0.09	0.08	-0.01	-11.1%	No Significant Change
Volatile Organic Compounds					
Acetone	<4.3E-05 [a]	0.0210	0.021	48837%	Significant Change
Benzene	0.058	0.0412	-0.0168	-29.0%	No Significant Change
Bromomethane	<0.00027 [b]	0.00127	0.0013	370.4%	Significant Change
Carbon Disulfide	<0.0039 [b]	0.00575	0.00548	140.5%	No Significant Change
Chlorobenzene	0.016	0.0126	-0.0034	-21.2%	No Significant Change
Ethylbenzene	0.0058	0.00553	-0.00027	-4.7%	No Significant Change
n-Hexane	0.005	0.0023	-0.0027	-54.0%	No Significant Change
Toluene	0.0492	0.034	-0.0152	-30.9%	No Significant Change
1,1,1-Trichloroethane	<2.2E-05 [a]	<2.2E-05 [a]	--	--	Below Detectable Limit
Trichlorethene	<2.2E-05 [a]	<2.2E-05 [a]	--	--	Below Detectable Limit
Styrene	0.0267	0.0113	-0.0154	-57.7%	No Significant Change
m-\p-Xylene	0.0172	0.0112	-0.006	-34.9%	No Significant Change
o-Xylene	0.0069	0.00445	-0.00245	-35.5%	No Significant Change

Notes:

[a] All observations were below the detectable limit.

[b] Many observations were below the detectable limit.

Table 4-2. Significance Test of Stack Test Results for Kiln No. 1 at Florida Mining & Materials: Carbon Monoxide

	Kiln Number	Fuel Type	CO emission lb/hr		Kiln Number	Fuel Type	CO emission lb/hr
BASELINE CO EMISSIONS (lb/hr)				WTDF CONDITIONS CO EMISSIONS (lb/hr)			
February 28, 1992	1	Coal	40.1	June 8th, 1993	1	Coal/TDF	64.2
			37.5				67.9
			40.7				32.9
February 28, 1992	1	Coal/Flolite	32.6				46.2
			37.5				52.4
			40.7				80.9
March 24, 1992	2	Coal	38.6				55.5
			40.7				43.9
			41.4				44.8
February 10, 1993	2	Coal	41.6				50.5
			47.3				71.3
			41.8				68.8
May 4, 1993	1	Coal	27.0	June 9th, 1993	1	Coal/TDF	56.1
			29.2				47.9
			31.5				37.7
			30.0				44.6
			32.0				39.6
			30.4				39.9
			32.8				35.1
			34.3				39.2
			35.1				38.6
			37.4				39.7
			33.5				34.8
			28.8				44.2
May 5, 1993	1	Coal	33.8				
			28.0				
			30.7				
			35.3				
			29.1				
			30.7				
			32.3				
			32.3				
			32.9				
			29.0				
			30.7				
			32.5				
Statistical summary				Statistical summary			
Average (lbs/hr)			34.44	Average (lbs/hr)			49.03
Standard deviation			4.912	Standard deviation			13.089
N			36	N			24
Test for Significance							
Pooled Standard Deviation (Sp)			9.083				
Degrees of Freedom			58				
Is Test Applicable (WTDF avg > Baseline avg)?			YES				
Test Statistic (t')			6.10				
t Table value			1.672				
Is Change Significant? [a]			YES				

Notes:

[a] Change is significant only if the average emission is increased and the test statistic is greater than the Table t-value.

Although these arguments may be valid, primary weight must be given to the analysis of the test data according to the EPA Appendix C method. This analysis is also presented in Table 4-2, and shows that, at the 95 percent confidence level, WTDF/coal firing results in an increase in CO emissions to the atmosphere. It is therefore concluded that WTDF firing results in increased CO emissions from Kiln No. 1.

Based on the test data from the test burn, the baseline CO emissions averaged 31.6 lb/hr and the WTDF/coal emissions averaged 49.1 lb/hr. This represents an increase of 17.5 lb/hr in actual CO emissions. Based on operating 8,760 hr/yr, this hourly increase would translate to an annual increase of 76.7 TPY.

Emissions of zinc were found to increase by 77 percent when firing WTDF/coal. Average baseline emissions were 0.0058 lb/hr whereas average WTDF/coal emissions were 0.0103 lb/hr. This result is expected because WTDF has a higher zinc content than coal. Emissions of barium were also found to increase, from less than 0.03 lb/hr to 0.057 lb/hr for WTDF/coal firing.

Emissions of two speciated VOCs were also found to increase due to WTDF/coal firing: acetone and bromomethane. However, these emissions are low—0.021 lb/hr for acetone and 0.0013 lb/hr for bromomethane.

Another indication of the potential air emissions associated with WTDF versus coal firing can be ascertained from fuel analysis data. Comparison of the coal and WTDF fuel analysis data obtained during the baseline and WTDF/coal testing shows WTDF to be lower in concentrations of chloride, arsenic, mercury, lead, and chromium compared to coal (refer to Appendix A). Only zinc was higher in WTDF compared to coal, which explains the higher zinc emissions when firing WTDF/coal compared to 100 percent coal firing.

4.2 CEMENT KILN OPERATION DURING TEST PERIOD

Several plant operating parameters were recorded for Kiln No. 1 during the test burn period. The period included 2 days of baseline operating conditions, i.e., with the kiln firing 100 percent coal, and 2 days of WTDF/coal firing.

4.2.1 CLINKER QUALITY

An important cement plant operating parameter is that of clinker quality. Clinker quality must be kept within certain specifications to insure a suitable finished cement product is produced. However, their is some additional flexibility in the process because blend silos are used to blend clinker which may be slightly out of specification in order to achieve the desired characteristics.

FMM obtained clinker quality analysis once a shift during the testing period. The primary indicator of the quality of the clinker is tricalcium silicate (C_3S). According to FMM plant specifications, Kiln No. 1 is used to produce Ashtow (DOT approved) cement, and the C_3S content of the cement must be less than 56%. Three blend silos are used to make this final product. A good clinker product would have a C_3S content generally between 60 and 70 percent. The finished cement product is generally maintained between 50 and 56 percent C_3S. FMM attempts to maintain clinker quality within these ranges on a daily (24-hr) average basis. Individual clinker or finished cement samples having C_3S values outside these ranges do not necessarily translate to a poor quality clinker or product. Blend silos within the finish mill allow off-specification material to be stored and blended with materials of higher or lower C_3S contents. However, a long-term trend of high or low C_3S values would indicate a potential problem.

The 8-hour composite clinker C_3S values for the 4-day test burn period are presented graphically in Figure 4-1. The baseline and WTDF/coal firing conditions are delineated by different symbols in the figure. Review of these figure indicates that clinker C_3S content was similar during both baseline conditions and WTDF/coal firing conditions. All values are in the 60 to 70 percent C_3S range. This indicates that acceptable clinker was being produced throughout the test period, including WTDF/coal firing periods. FMM personnel confirmed this observation during the testing periods, and KBN personnel witnessed clinker being conveyed and stored in the clinker silos, indicating suitable clinker being produced.

4.2.2 KILN EXIT TEMPERATURE

The temperature at the cement kiln exit (i.e., where raw feed is introduced into the kiln from the preheater) is an indicator of cement kiln operation. This parameter can be examined to determine if WTDF/coal firing adversely affects kiln operation. The recorded values of this parameter for

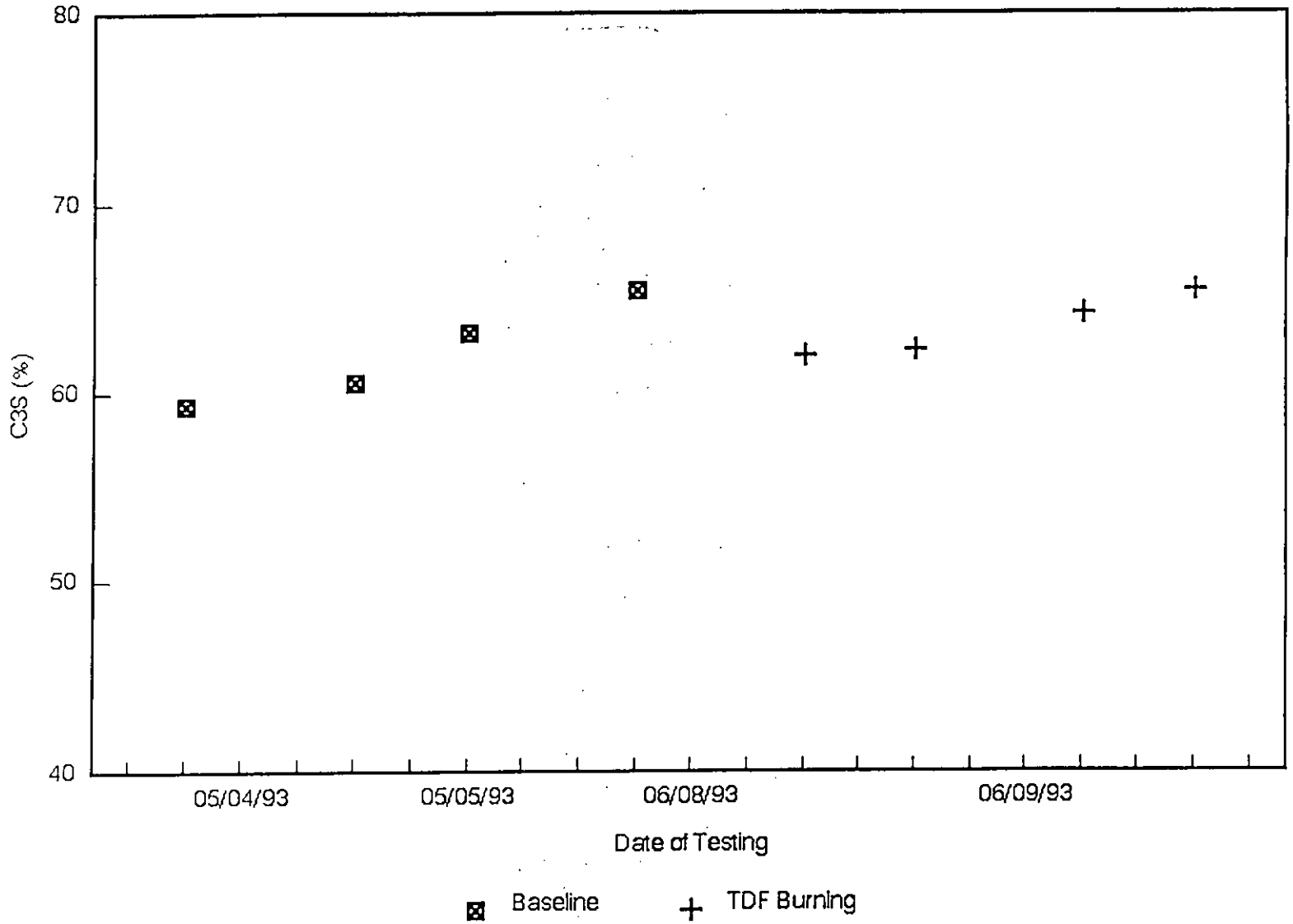


Figure 4-1
Clinker C3S: Baseline versus TDF Burning

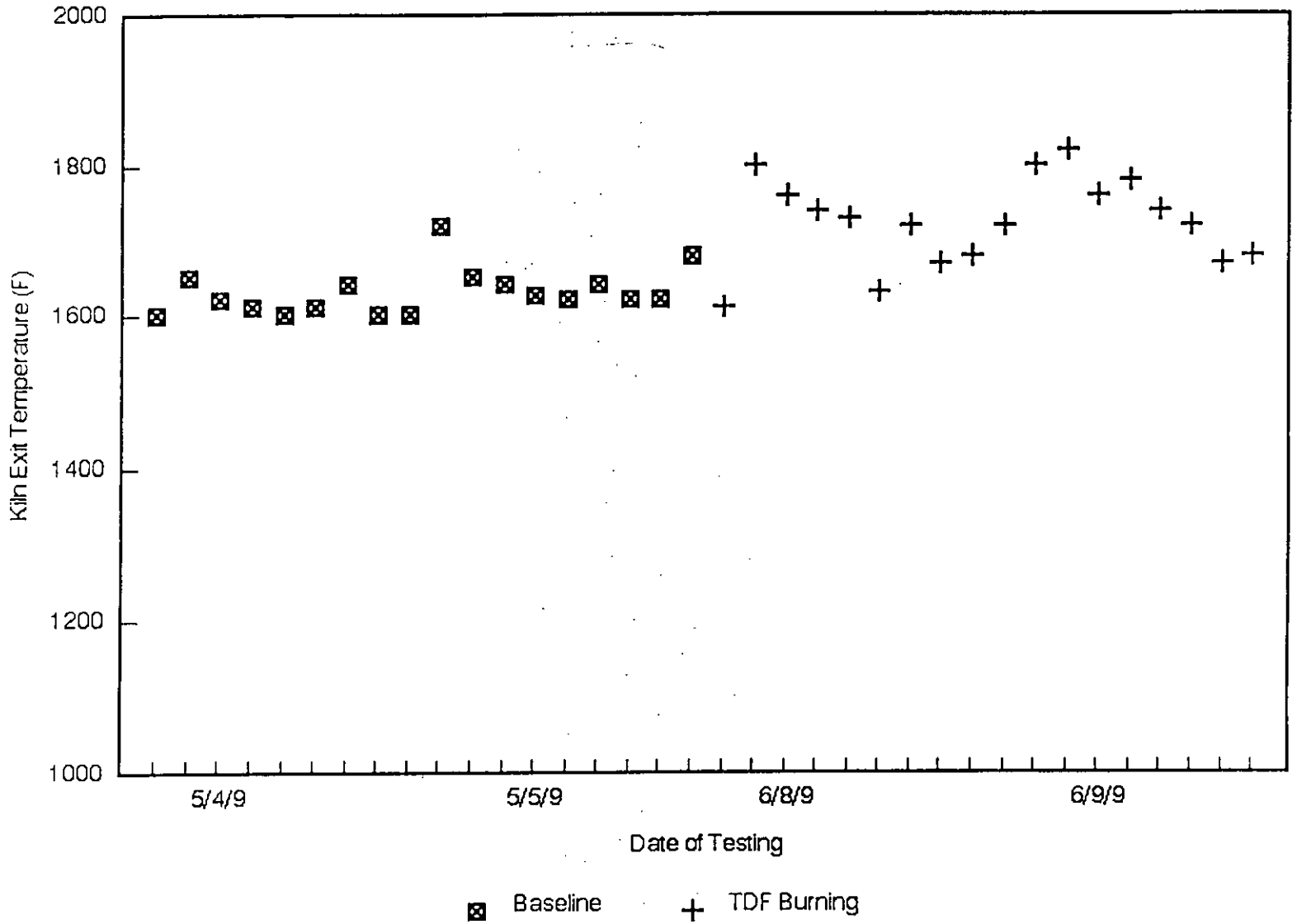


Figure 4-2
Kiln Exit Temperature: Baseline versus TDF Burning

the 4-day test period are shown graphically in Figure 4-2. Kiln exit temperature is shown to be vary between about 1,600°F and 1,700°F during the baseline test period. During the WTDF/coal test period, kiln exit temperatures are somewhat higher, between 1,600°F and 1,800°F. Although not a large difference, this is an expected result due to the WTDF firing, in which the WTDF is introduced to the kiln at the base of the preheater, which coincides with the kiln exit. Since the WTDF is being combusted in this area, local temperatures are higher than during 100 percent coal firing. Therefore, it is concluded that the kiln exit temperatures during baseline and WTDF/coal test periods are consistent.

4.2.3 BAGHOUSE OPERATING TEMPERATURE

The cement kiln baghouse at FMM controls PM emissions from the kiln exhaust gases. The exhaust gases first pass through the preheater and raw mill before passing through the baghouse and then exiting through the stack. The temperature at which the baghouse operates is an indicator of cement kiln operation and emissions. Emissions of certain volatile trace metals, such as mercury, are affected by baghouse operating temperature. As baghouse temperature decreases, more of these volatile metals will condense out onto the fine fly ash particles, and then be captured in the baghouse, thus decreasing the emissions of these metals. This parameter can be examined to ascertain if WTDF/coal firing adversely affects kiln operation. The recorded values of this parameter for the 4-day test period are shown graphically in Figure 4-3.

As shown in the figure, baghouse operating temperatures remained nearly constant throughout the baseline and WTDF/coal test periods. Temperature varied between about 220°F and 270°F. No difference is seen between the baseline and WTDF operating conditions.

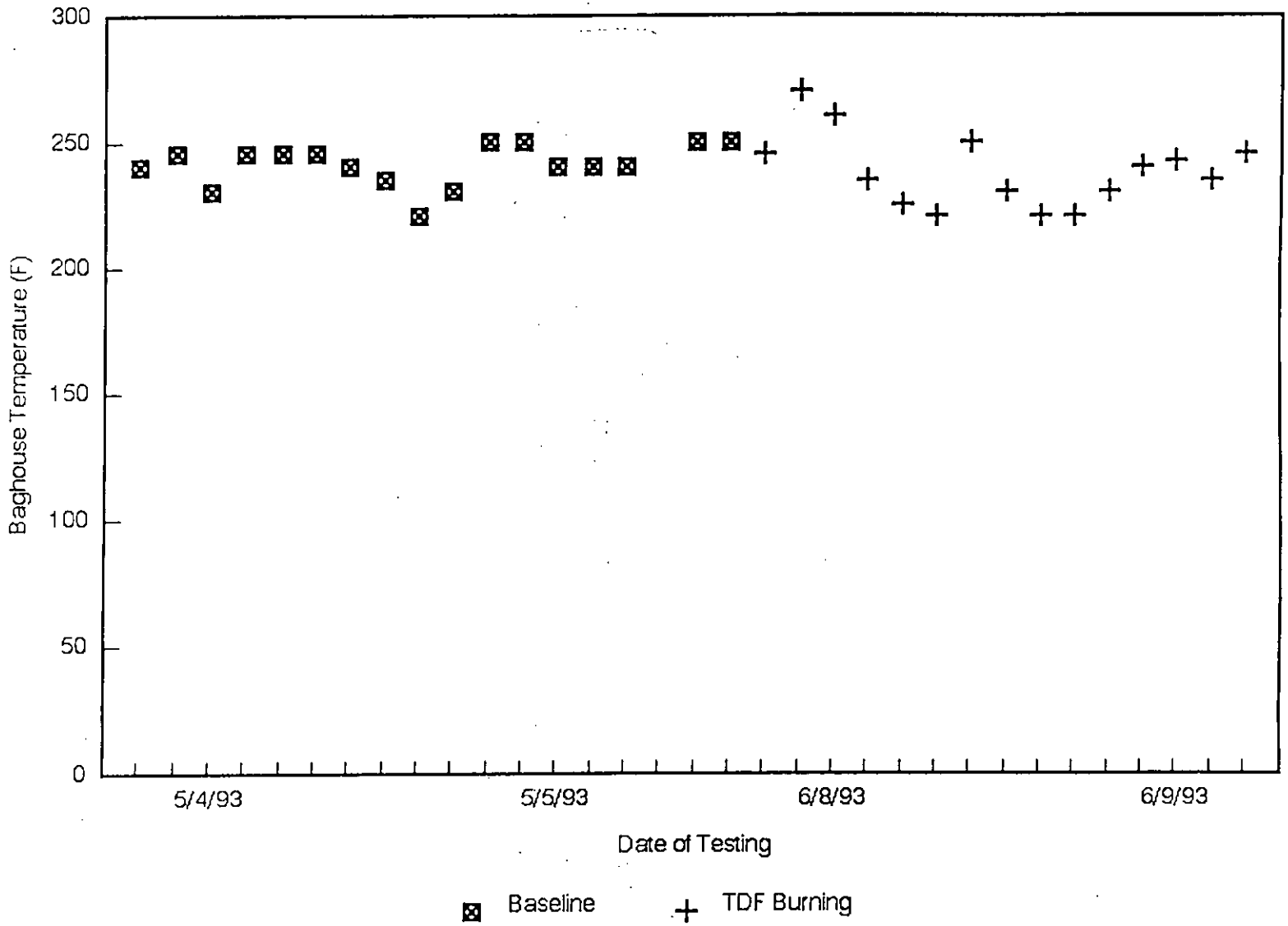


Figure 4-3
Baghouse Temperature: Baseline versus TDF Burning

5.0 AIR QUALITY MODELING ANALYSIS

K&A performed an air quality modeling analysis which evaluated the potential impacts of the air emissions from Kiln No. 1. The emission rate for each pollutant used in the analysis was the higher of the average emission rate during baseline conditions or during WTDF/coal firing emissions. Based on this analysis, it was demonstrated that the potential impacts of each pollutant were well below the respective FDER annual ambient air quality standard or no-threat level (NTL).

However, K&A did not evaluate these impacts against the FDER 8-hour or 24-hour standards and NTLs. In order to provide an assessment of impacts of air emissions for all pertinent averaging times, analysis were performed to determine the short-term impacts. The results of this analysis, along with the annual modeling results, are presented in Table 5-1. The ambient standard or NTL is shown for comparison.

As shown in Table 5-1, all predicted 8-hour maximum impacts are less than 5 percent of the respective standard/NTL, all predicted 24-hour impacts are less than 10 percent of the standard/NTL, and all annual impacts are less than 25 percent of the respective standard/NTL.

KBN has reviewed the K&A report and finds that the modeling analysis was performed in an appropriate manner, and has verified the results of the analysis. Based on the modeling results, it is concluded that emissions due to WTDF/coal firing in Kiln No. 1, if conducted in a manner consistent with the test burn program, will not cause a threat to the health and welfare of the citizens of Hernando County.

Table 5-1. Maximum Air Quality Impacts from Kiln No. 1 at Florida Mining & Materials

	Maximum Emission Rate (lb/hr)	8-Hour Average			24-Hour Average			Annual Average		
		Impact ($\mu g/m^3$)	AAQS/NTL ($\mu g/m^3$)	% of Standard	Impact ($\mu g/m^3$)	AAQS/NTL ($\mu g/m^3$)	% of of Standard	Impact ($\mu g/m^3$)	AAQS/NTL ($\mu g/m^3$)	% of Standard
Criteria Pollutants										
Particulate Matter	9.14	2.45	--	--	1.37	150	0.9%	0.062	50	0.1%
Nitrogen Oxide	198.1	53.16	--	--	29.70	--	--	1.35	100	1.5%
Sulfur Dioxide	2[a]	0.54	--	--	0.30	260	0.1%	0.014	60	0.02%
Lead	0.00781	0.0021	0.5	0.4%	0.0012	0.12	1.0%	0.000053	0.09	0.1%
Total Hydrocarbon	3.36	0.90	--	--	0.50	--	--	0.02	--	--
Carbon Monoxide	49.1	13.2	10000	0.2%	7.3	--	--	0.33	--	--
Non-Criteria Pollutants										
Hydrogen Chloride	0.44	0.12	75	0.2%	0.066	18	0.4%	0.0030	7	0.04%
Arsenic	0.00174	0.00047	2	0.02%	0.00026	0.48	0.1%	0.000012	0.00023	5.1%
Chromium (Total)	0.00287	0.00077	0.5	0.2%	0.00043	1.2	0.04%	0.000020	1,000	0.00%
Zinc	0.01026	0.0028	--	--	0.0015	--	--	0.000070	--	--
Mercury	0.01299	0.0035	0.5	0.7%	0.0019	0.12	1.6%	0.000088	0.3	0.03%
Dioxin/Furan	--	0	--	--	0	--	--	0	2.2E-08	0.00%
Ammonia	19.71	5.29	170	3.1%	2.96	40.80	7.2%	0.13	100	0.1%
Iron	0.183	0.049	10	0.5%	0.027	2.4	1.1%	0.0012	--	--
Aluminum	0.103	0.028	100	0.03%	0.015	24	0.1%	0.00070	--	--
Barium	0.057	0.015	5	0.3%	0.0085	1.2	0.7%	0.00039	50	0.00%
Calcium	1.26	0.34	--	--	0.19	--	--	0.0086	--	--
Magnesium	0.09	0.02	50	0.05%	0.013	1.2	1.1%	0.00061	0.4	0.2%
Volatile Organic Compounds										
Acetone	0.021	0.0056	35600	0.00%	0.0031	8544	0.00%	0.00014	--	--
Benzene	0.058	0.016	30	0.05%	0.0087	72	0.01%	0.00039	0.12	0.3%
Bromomethane	0.0013	0.00035	190	0.00%	0.00019	45.6	0.00%	8.8E-06	0.8	0.00%
Carbon Disulfide	0.0057	0.0015	310	0.00%	0.00085	74.4	0.00%	0.000039	200	0.00%
Chlorobenzene	0.016	0.0043	3450	0.00%	0.00240	828	0.00%	0.00011	--	--
Ethylbenzene	0.0058	0.0016	4340	0.00%	0.00087	1041.6	0.00%	0.000039	1000	0.00%
n-Hexane	0.005	0.0013	1760	0.00%	0.00075	422.4	0.00%	0.000034	200	0.00%
Toluene	0.049	0.013	3770	0.00%	0.0073	904.8	0.00%	0.00033	300	0.00%
1,1,1-Trichloroethane	0.0001	0.000027	38200	0.00%	0.000015	9168	0.00%	6.8E-07	--	--
Trichlorethene	0.0001	0.000027	2690	0.00%	0.000015	645.6	0.00%	6.8E-07	--	--
Styrene	0.027	0.0072	2130	0.00%	0.0040	511.2	0.00%	0.00018	--	--
Total Xylene	0.0239	0.0064	4340	0.00%	0.0036	1041.6	0.00%	0.00016	80	0.00%

Generic (10 g/s) Maximum Impacts:

Annual	0.54 $\mu g/m^3$
8-hour	21.3 $\mu g/m^3$
24-hour	11.9 $\mu g/m^3$

Notes:

[a] Maximum emission rate is below detection limit.

6.0 CONCLUSIONS AND RECOMMENDATIONS

FMM has conducted a test burn program utilizing WTDF to provide up to 20 percent of the heat input to Kiln No. 1 located at its Brooksville cement plant. The program was witnessed and evaluated by KBN, acting on behalf of the HCBCC. The FDEP also witnessed portions of the testing by sending staff representatives from the FDEP Tampa office. Based on the review of all available data, the major conclusions of the WTDF test burn are summarized below:

1. The test protocol developed for the test burn was adequate to demonstrate whether any increases in emissions of regulated air pollutants will occur due to WTDF firing in the cement kiln;
2. USEPA reference methods were used to measure stack emissions from Kiln No. 1. Proper stack test procedures were followed during the stack testing.
3. FMM plant personnel were cooperative throughout the test period. No indication was received of any intent to conceal or falsify any plant operating or test data. Two unannounced visits were conducted to verify proper operation when firing WTDF.
4. Both baseline and WTDF/coal testing were conducted with Kiln No. 1 operating at or near its maximum operating rate.
5. Kiln operating parameters during the test period were consistent with proper operation and expected differences due to WTDF firing. Equipment maintenance and repairs performed on Kiln No. 1 between the baseline and WTDF test periods did not affect kiln operating parameters.
6. Plant operating data indicate that acceptable clinker was being produced on a continuous basis throughout the test period, including WTDF/coal firing periods.
7. PM emissions from Kiln No. 1 were well below the allowable emission rate during both baseline and WTDF/coal firing conditions (PM is the only pollutant for which an allowable emission rate has been established for the kiln).
8. Emissions of CO were demonstrated to increase as a result of WTDF firing in the cement kiln. Actual CO emissions were found to be 49.1 lb/hr when burning WTDF/coal, which is an increase of 17.5 lb/hr over baseline conditions (76.7 TPY increase at 8,760 hr/yr operation). CO is a criteria pollutant and both FDEP and EPA have adopted ambient air quality standards for CO. This level of CO emission from Kiln No. 1 does not represent a concern from an air quality standpoint since predicted maximum CO impacts due to Kiln No. 1 firing WTDF/coal are less than 1 percent of the CO ambient air quality standard. This increase is also less than the 100

TPY threshold which would trigger new source review under the prevention of significant deterioration (PSD) regulations. However, since an increase in CO emissions is demonstrated, the FDEP rules require that FMM apply for and obtain a construction permit prior to conducting further burning of WTDF.

9. Emissions of zinc, barium, acetone and bromomethane were also found to increase as a result of WTDF/coal firing. However, actual emissions of these pollutants are low (less than 0.06 lb/hr and 0.3 TPY each, average). This level of emissions does not represent a concern from an emission or air quality impact standpoint for several reasons. There are no FDEP or EPA regulations applicable to these pollutants. These pollutants are not contained on EPA's list of 189 hazardous air pollutants as defined in Title III of the Clean Air Act Amendments of 1990. Under EPA's rules regulating the burning of hazardous wastes in boilers and industrial furnaces (BIF rule), there are no emission standards for these pollutants, although a reference air concentration (RAC) has been set for bromomethane of 0.8 $\mu g/m^3$, annual average and for barium of 50 $\mu g/m^3$, annual average. The only applicable requirements for these pollutants is contained in FDEP's air toxics policy. This policy requires that the impacts of toxic pollutants be assessed against certain ambient No-Threat Levels (NTLs). As presented in Section 5.0, the ambient impacts of the pollutants are all less than 1% of the respective NTL and EPA's RAC for bromomethane and barium.
10. Emissions of all other regulated and non-regulated pollutants were demonstrated to decreases as a result of the WTDF burning, and therefore WTDF burning represents an air quality improvement for these pollutants.
11. The analysis of coal and WTDF demonstrate that WTDF is overall a cleaner fuel than coal. Concentrations of nearly all trace elements measured in the TDF are lower than the concentrations in coal.
12. The modeling analysis demonstrates that the potential impacts of each criteria and air toxic pollutant are well below the respective ambient standard or FDER no-threat level (NTL).

In conclusion, the test burn satisfies beyond all reasonable doubts that WTDF firing in the Kiln No. 1 at FMM can occur without an increase in allowable PM emissions (the only pollutant for which an allowable emission rate exists). However, the test burn results demonstrate an increase in emissions of CO, zinc, barium, acetone, and bromomethane emissions.

These conclusions are valid for the range of conditions experienced during the test burn, which were the typical operating conditions for the kiln. Further, these conclusions are only valid for the specific WTDF feed mechanism utilized during the test burn. FMM has indicated through conversations that the present WTDF feed mechanism, which is labor intensive, will be replaced in the future with a more automated system. If a new feed system is installed on Kiln No. 1, WTDF/coal operating parameters could be significantly affected, and the present test results may no longer be valid. Therefore, any permit for FMM to utilize WTDF in Kiln No. 1 should stipulate that any changes to the WTDF feed mechanism be reviewed with FDEP and Hernando County prior to implementation.

It is concluded that WTDF firing in Kiln No. 1 at FMM, if conducted properly, can occur in an environmentally safe manner, and that the health and safety of the residents of Hernando County will not be jeopardized.

This conclusion is supported in part by the large number of cement kilns in the U.S. which have or are currently burning waste tires as a permitted supplemental fuel. Test data available from some of the dry process cement kilns in the United States that were burning TDF indicate emissions are not adversely affected and, in many cases, improve. The long residence times, high operating temperatures, and scrubbing action of cement kilns provide an ideal environment to burn waste tires as a supplemental fuel. Organics are efficiently destroyed, and many trace elements are incorporated into the clinker product.

In order to provide reasonable assurance that FMM conducts WTDF burning in an environmentally acceptable manner, the following conditions are recommended to be included in any air permit issued for WDF firing in Kiln No. 1 at FMM.

Specific Conditions:

1. The cement kiln's maximum utilization/firing rate of whole tire-derived fuel (WTDF) shall not exceed 20.0 percent of the total Btu heat input, or 2.14 tons per hour.
2. The utilization/firing rate of WTDF shall be quantified (weighed) continuously and recorded hourly, and the records shall be kept on file for a minimum of two years.
3. The quantity of all deliveries of WTDF shall be documented and kept on record/file for a minimum of two years.

4. WTDF may be introduced into the cement kiln only at a point at the base of the preheater (i.e., at the kiln exit).
5. This permit is valid for only the specific WTDF feed mechanism utilized during the test burn of WTDF/coal. Any physical modification to the WTDF feed mechanism will require a modification of this permit, and provide a clear point of entry for Hernando County and any other substantially affected parties. If the WTDF feed mechanism is to be physically modified, a description of such modifications shall be submitted to FDEP and HCBCC 90 days prior to actual modification. FDEP and HCBCC shall review this information and determine if further information or stack testing is required in order determine if such modifications will result in an increase in actual emissions, and it shall be FMM's burden to provide reasonable assurance that such modifications will not affect the conclusions derived from the test burn of May and June 1993.
5. WTDF firing in Kiln No. 1 shall not commence or be conducted unless the cement kiln has reached an operating temperature of at least 1,400°F for one hour. The operating temperature shall be measured at the cement kiln exit.

Recommendations to HCBCC

It is recommended that if the above specific conditions are incorporated into the FDEP permit for WTDF burning, the HCBCC should not challenge the issuance of the FMM permit. If such conditions are not incorporated into the permit, reasonable assurance will not be provided that WTDF fuel will be utilized in an environmentally acceptable manner, and the HCBCC should challenge the issuance of the permit in an administrative hearing.

REFERENCES

Buff, D.A. (KBN Engineering and Applied Sciences, Inc.). July 16, 1993. Letter to Mr. Segundo Fernandez. Re: Florida Mining and Materials WTDF Test Burn.

Buff, D.A. (KBN Engineering and Applied Sciences, Inc.). August 10, 1993. Letter to Mr. Segundo Fernandez. Re: Florida Mining and Materials WTDF Test Burn, Review of Koogler & Associates Stack Test Reports.

Koogler & Associates Environmental Services. 1993. Comparison of Particulate Matter, Sulfur Dioxide, Total Hydrocarbons, Carbon Monoxide, Nitrogen Oxides, Hydrogen Chloride, Speciated Volatile Organics, Metals and Dioxins/Furans Emission Measurements and Opacities of Emissions Under Baseline and Coal/TDF Firing Conditions, Kiln No. 1. Gainesville, Florida.

Stone, M. (Brooksville Cement). June 16, 1993. Letter to David A. Buff. Re: Florida Mining and Materials, No. 1 Kiln Shutdown Repairs.

APPENDIX A

STATISTICAL ANALYSIS OF EMISSION TEST RESULTS

Table A-1. Significance Test of Stack Test Results for Kiln No. 1 at Florida Mining & Materials: Criteria Pollutants

		Pollutant					
		PM	NO_x	SO_2	Pb	THC	CO
BASELINE EMISSIONS (lb/hr)							
May 4th, 1993 data	Run 1	6.15	205.95	1.71[b]	0.00763[b]	2.36	28.1
	Run 2	6.99	236.35	1.71[b]	0.00747[b]	3.54	30.73
	Run 3	8.00	205.38	1.78[b]	0.00834	4.06	31.21
	Run 4		193.97	1.78[b]		3.07	33.56
	Run 5		190.08	1.78[b]		3.07	36.24
	Run 6		166.42	1.78[b]		3.44	31.17
May 5th, 1993 data	Run 1		133.54	1.90[b]		2.75	30.9
	Run 2		185.79	1.90[b]		4.64	33.06
	Run 3		200.64	1.90[b]		3.92	29.9
	Run 4		242.86	1.98[b]		3.11	32
	Run 5		221.71	1.98[b]		3.48	30.97
	Run 6		194.41	2.06[b]		2.88	31.56
Statistical summary							
Average (lbs/hr)		7.05	198.09	1.85[b]	0.00781[b]	3.36	31.62
Standard deviation		0.926	29.485	0.114	0.00046	0.627	2.018
N		3	12	12	3	12	12
WTDF CONDITIONS EMISSIONS (lb/hr)							
June 8th, 1993 data	Run 1	11.33	118.78	1.05[b]	0.00201[b]	2.80	66.08
	Run 2	7.3	92.30	0.35[b]	0.00201[b]	2.62	39.91
	Run 3	8.75	133.50	0.84[b]	0.00201[b]	2.61	66.93
	Run 4		161.73	0.50[b]		3.37	49.70
	Run 5		227.33	1.42[b]		2.60	47.73
	Run 6		215.70	0.71[b]		2.90	70.04
June 9th, 1993 data	Run 1		166.34	0.90[b]		4.79	52.00
	Run 2		189.05	0.18[b]		3.69	41.16
	Run 3		244.46	1.25[b]		3.17	39.76
	Run 4		265.64	0.71[b]		3.24	37.11
	Run 5		243.96	0.70[b]		3.65	39.13
	Run 6		201.78	0.70[b]		3.63	39.51
Statistical summary							
Average (lbs/hr)		9.13	188.38	0.78[b]	0.00201[b]	3.26	49.09
Standard deviation		2.041	54.714	0.353	0.00	0.636	12.155
N		3	12	12	3	12	12
Test for Significance							
Pooled Standard Deviation (Sp)		1.585	43.949	0.262	0.00033	0.631	8.713
Degrees of Freedom		4	22	22	4	22	22
Is Test Applicable (WTDF avg > Baseline avg)?		YES	NO	NO	NO	NO	YES
Test Statistic (t')		1.61	N/A	N/A	N/A	N/A	4.91
t Table value		2.132	1.717	1.717	2.132	1.717	1.717
Is Change Significant?[a]		NO	NO	NO	NO	NO	YES

Notes: [a] Change is significant only if the average emission is increased and the test statistic is greater than the Table t-value.
[b] Value below detectable limit.

Table A-2. Significance Test of Stack Test Results for Kiln No. 1 at Florida Mining & Materials: Non-Criteria Pollutants.

		Pollutant											
		Hydrogen Chloride	Arsenic	Chromium	Zinc	Mercury	Dioxins / Furans	Ammonia	Iron	Aluminum	Barium	Calcium	Magnesium
BASELINE EMISSIONS (lb/hr)													
May 4-5th, 1993 data	Run 1	0.47	0.00176[a]	0.00205[a]	0.00558	0.02935	--[a]	17.35	0.29	0.12	0.03[a]	1.27	0.07
	Run 2	0.44	0.00172[a]	0.00201[a]	0.00546	0.00233	--[a]	21.60	0.14	0.10	0.03[a]	1.28	0.10
	Run 3	0.42	0.00173[a]	0.00201[a]	0.00633	0.00728	--[a]	20.18	0.12	0.09	0.03[a]	1.22	0.09
Statistical summary													
Average		0.443	0.001737[a]	0.00202[a]	0.0058	0.0130	--[a]	19.71	0.183	0.103	0.03[a]	1.26	0.087
Standard deviation		0.03	0.000021	0.000023	0.000471	0.014	--	2.16	0.093	0.015	0.00	0.032	0.015
N		3	3	3	3	3	3	3	3	3	3	3	3
WTDF CONDITIONS EMISSIONS (lb/hr)													
June 8-9th, 1993 data	Run 1	0.36	0.00143[a]	0.00287[a]	0.00832	0.00037[a]	--[a]	14.10	0.09	0.12	0.04	0.71	0.07
	Run 2	0.32[a]	0.00143[a]	0.00287[a]	0.01392	0.00035[a]	--[a]	9.73	0.18	0.07	0.08	0.59	0.08
	Run 3	0.38[a]	0.00143[a]	0.00287[a]	0.00853	0.00036[a]	--[a]	8.47	0.10	0.12	0.05	0.96	0.09
Statistical summary													
Average		0.35	0.0014[a]	0.00287[a]	0.01026	0.00036	--	10.77	0.123	0.103	0.057	0.753	0.080
Standard deviation		0.031	0.0000	0.00	0.00317	0.000010	--	2.95	0.049	0.029	0.021	0.189	0.010
N		3	3	3	3	3	3	3	3	3	3	3	3
Test for Significance													
Pooled Standard Deviation (Sp)		0.027988	0.000015	0.000016	0.002269	0.010172	--	2.590	0.074	0.023	0.015	0.135	0.013
Degrees of Freedom		4	4	4	4	4	4	4	4	4	4	4	4
Is Test Applicable (WTDF avg > Baseline avg)?		NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Test Statistic (t')		N/A	N/A	N/A	2.41	N/A	N/A	N/A	N/A	N/A	2.22	N/A	N/A
t Table value		2.132	2.132	2.132	2.132	2.132	2.132	2.132	2.132	2.132	2.132	2.132	2.132
Is Change Significant?[b]		NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO

Notes: [a] Change is significant only if the average emission is increased and the test statistic is greater than the Table t-value.
[b] Below detectable limit.

Table A-3. Significance Test of Stack Test Results for Kiln No. 1 at Florida Mining & Materials: Speciated Volatile Organic Compounds.

		Pollutant												
		Acetone	Benzene	Bromo-methane	C_2S	Chloro-benzene	Ethyl-benzene	n-Hexane	Toluene	1,1,1-Tri-Chloroethane	Trichloro-ethene	Styrene	m-\p-xylene	o-Xylene
BASELINE EMISSIONS (lb/hr)														
May 4th, 1993 data	Run 1	4.3e-05[b]	0.045	2.1e-05[b]	0.0055	0.014	0.005	0.0038	0.032	2.10e-05	2.10e-05	0.02	0.014	0.006
	Run 2	4.3e-05[b]	0.048	0.0015	0.0044	0.013	0.005	0.0047	0.045	2.10e-05[b]	2.10e-05[b]	0.02	0.015	0.006
	Run 3	4.5e-05[b]	0.057	2.2e-05[b]	0.006	0.015	0.0051	0.0044	0.047	2.20e-05[b]	2.20e-05[b]	0.03	0.016	0.006
	Run 4	4.5e-05[b]	0.063	2.2e-05[b]	0.0073	0.016	0.0058	0.005	0.054	2.20e-05[b]	2.20e-05[b]	0.031	0.019	0.0076
	Run 5	4.5e-05[b]	0.062	2.2e-05[b]	2.2e-05[b]	0.018	0.0068	0.0053	0.062	2.20e-05[b]	2.20e-05[b]	0.034	0.021	0.0084
	Run 6	4.5e-05[b]	0.073	2.2e-05[b]	2.2e-05[b]	0.019	0.0071	0.007	0.055	2.20e-05[b]	2.20e-05[b]	0.033	0.018	0.0077
Statistical summary														
Average		4.4e-05[b]	0.058	0.00027[b]	0.0039	0.016	0.0058	0.0050	0.049167	2.2e-05[b]	2.2e-05[b]	0.026667	0.017167	0.0069
Standard deviation		0.00	0.010	0.0006	0.00313	0.00232	0.00094	0.00109	0.010381	5.16e-07	5.16e-07	0.007062	0.002639	0.001163
N		6	6	6	6	6	6	6	6	6	6	6	6	6
WTDF CONDITIONS EMISSIONS (lb/hr)														
June 8th, 1993 data	Run 1	0.012	0.041	0.0013	0.0087	0.0096	0.005	0.0013	0.029	2.20e-05[b]	2.20e-05[b]	0.01	0.0091	0.0037
	Run 2	0.012	0.042	0.00094	0.0058	0.014	0.0061	0.0016	0.036	2.20e-05[b]	2.20e-05[b]	0.014	0.013	0.0049
	Run 3	0.049	0.039	0.0024	0.0056	0.013	0.0053	0.0023	0.031	2.10e-05[b]	2.10e-05[b]	0.013	0.011	0.0043
	Run 4	0.017	0.041	0.0013	0.0048	0.014	0.0059	0.0028	0.033	2.10e-05[b]	2.10e-05[b]	0.014	0.012	0.0049
	Run 5	0.017	0.041	0.00085	0.0045	0.012	0.0049	0.0029	0.04	2.20e-05[b]	2.20e-05[b]	0.0038	0.01	0.004
	Run 6	0.019	0.043	0.00082	0.0051	0.013	0.006	0.0029	0.035	2.20e-05[b]	2.20e-05[b]	0.013	0.012	0.0049
Statistical summary														
Average		0.02	0.0412	0.00127	0.00575	0.0126	0.00553	0.0023	0.034	2.2e-05[b]	2.2e-05[b]	0.0113	0.0112	0.00445
Standard deviation		0.014	0.0013	0.0006	0.00152	0.00165	0.00053	0.0007	0.003899	5.16e-07	5.16e-07	0.00396	0.00144	0.000528
N		6	6	6	6	6	6	6	6	6	6	6	6	6
Test for Significance														
Pooled Standard Deviation (Sp)		0.00991	0.00738	0.0006	0.00246	0.00201	0.00077	0.00092	0.007841	5.16e-07	5.16e-07	0.005724	0.002127	0.000903
Degrees of Freedom		10	10	10	10	10	10	10	10	10	10	10	10	10
Is Test Applicable (WTDF avg > Baseline avg)?		YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
Test Statistic (t')		3.66	N/A	2.89	1.32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
t Table value		1.812	1.812	1.812	1.812	1.812	1.812	1.812	1.812	1.812	1.812	1.812	1.812	1.812
Is Change Significant?[a]		YES	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Notes: [a] Change is significant only if the average emission is increased and the test statistic is greater than the Table t-value.8/27/93
[b] Below detectable limit.

TABLE 5
FUEL ULTIMATE ANALYSIS
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILE, FLORIDA

May 4-5, 1993
AND
JUNE 8-9, 1993

Parameter	UNIT	BASELINE COMPOSITE COAL 5/4-5/93	COAL/TDF COMPOSITE COAL 6/8-9/93	COAL/TDF COMPOSITE TDF 6/8-9/93
Moisture	(%)	6.34	7.75	0.47
Carbon	(%)	70.5	67.77	74.35
Hydrogen	(%)	4.69	4.55	7.08
Nitrogen	(%)	1.39	1.24	0.41
Sulfur	(%)	0.83	0.96	1.02
Ash	(%)	9.91	11.28	9.40
Oxygen	(%)	6.36	6.45	0.73
Heating Value	(Btu/lb)	12646	12186	15141

All parameters reported AS RECEIVED

TABLE 6
KILN FEED, COAL AND CLINKER METAL ANALYSES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIAL
BROOKSVILLE, FLORIDA

MAY 4-5, 1993
AND
JUNE 8-9, 1993

Metal	UNIT	BASELINE COMPOSITE KILN FEED 5/4-5/93	COAL/TDF COMPOSITE KILN FEED 6/8-9/93	BASELINE COMPOSITE COAL 5/4-5/93	COAL/TDF COMPOSITE COAL 6/8-9/93	BASELINE COMPOSITE CLINKER 5/4-5/93	COAL/TDF COMPOSITE CLINKER 6/8-9/93	COAL/TDF COMPOSITE TIRE 6/8-9/93
Arsenic	(ug/g)	16	25	6	16	29	34	<1
Chromium	(ug/g)	35	47	6	6	73	97	5
Lead	(ug/g)	66	66	8	4	83	100	5
Mercury	(ug/g)	0.24	0.24	0.10	0.18	<0.02	<0.02	0.04
Zinc	(ug/g)	38	59	10	6	92	82	4400
Chlorine	(% Wt)	0.12	0.12	0.16	0.16	0.07	0.07	0.07

APPENDIX B

CORRESPONDENCE

July 16, 1993

Mr. Segundo Fernandez
Oertel, Hoffman, Fernandez and Cole
2700 Blair Stone Road, Suite C
Tallahassee, FL 32301

RE: Florida Mining & Materials WTDF Test Burn

Dear Mr. Fernandez:

By letter dated June 3, 1993, from Mr. David Buff, P.E., to Mr. Larry Jennings, Manager of the Hernando County Planning Department, certain concerns over the baseline and WTDF testing at FMM/Southdown were expressed. Baseline testing on Kiln 1 at FMM utilizing 100 percent coal as fuel was conducted on May 4-5, 1993, while WTDF testing using up to 20 percent WTDF as fuel to the kiln was conducted on June 8-9, 1993. Due to operational problems with the kiln, the WTDF test was first delayed and then was postponed as the kiln was shutdown for repairs and maintenance. Testing conducted on May 12, just prior to the kiln shutdown, indicated large fluctuations in CO emissions from the kiln. These fluctuations were not observed during the baseline testing, and it is not clear if these were due to the equipment problems or due to other reasons.

According to FMM plant manager Don Kelly, the Kiln 1 was restarted on May 21 after the preheater/kiln/cooler system underwent maintenance and repair. The kiln was brought on-line while burning oil, which is the normal startup procedure, followed by 100 percent coal firing. The kiln then continued to operate until June 2, when a short outage was experienced. Kiln 1 resumed operation on June 2, and WTDF firing began the morning of June 3. This schedule provided 5 days of WTDF firing prior to the WTDF testing period, as required by the test protocol.

Based on the course of events between the baseline and WTDF testing, there were several areas of concern related to the acceptability of the overall testing program. The first concern is that the baseline testing will have been conducted approximately one month prior to the WTDF testing. During this period of time, significant differences in raw feed composition, coal quality, and other operational parameters may have occurred. These changes could in turn affect air emissions. Therefore, it may be more difficult to compare baseline emissions to WTDF emissions on the same basis. The test protocol allowed only 5 calendar days between baseline and WTDF testing. The 5 day period was considered to be the minimum time required to allow the entire system to reach equilibrium after the fuel switch. This relatively short period would result in the least chance for process and operational variability in the kiln system to occur, thus allowing easier comparison of coal and WTDF emissions.

The second concern was that the repairs and maintenance performed on Kiln 1 will have altered the air emissions associated with the kiln. Mr. Kelly mentioned that a kiln outage to perform needed maintenance had been scheduled for March 1993, but due to high cement sales and client demands, the outage was postponed. This apparently led to the operational problems with the kiln that resulted in the shutdown on May 13.

Based on these concerns, FMM was requested to provide information regarding kiln operational parameters during the baseline and WTDF testing in order to determine if parameters were sufficiently similar as to not jeopardize the comparison of test results. In addition, FMM was requested to provide a listing of the repairs and/or maintenance performed on Kiln 1 and a description of each, whether these were planned maintenance items or unplanned items, and the affects that each would have on kiln/preheater operation and associated air emissions.

FMM has provided the requested information. KBN has reviewed the information and our analysis of the data is provided below. Our conclusions regarding the acceptability of the test burns follow this analysis.

Effects of Kiln Maintenance/Repair

FMM provided a letter response dated June 16, 1993, along with supportive information regarding the repairs and maintenance performed on the Kiln 1 system. This letter is attached. Three major repairs were performed, all on the preheater: replacement of the preheater fan, the raw material feedpipe (spincast thimble), and the segmented thimble. All of these items were planned to be replaced in 1993 and are considered by FMM to be routine maintenance/repair. Other repairs and activities performed during the May kiln outage are shown in FMM's three-page graph. These included re-bricking the kiln, replacing the cyclones in the preheater, installing new grates in the cooler, and replacing some of the bags in the kiln baghouse.

Due to the nature of these repairs, it is possible kiln system operating parameters may have been altered. To investigate this possibility, several parameters were compared based on the baseline and WTDF test burns. These parameters are kiln feed rate, stack gas flow rate, kiln exit temperature, and baghouse operating temperature. During baseline testing (May 4-5), the average kiln feed rate varied between 133 and 145 tons per hour (TPH). During WTDF testing, the kiln feed rate ranged between 130 and 142 TPH. These rates are within the normal range experienced by the kiln, and indicate no significant difference between baseline and WTDF tests.

Stack gas flow rates are presented in Table 1. During baseline testing, the average stack gas flow rate for Kiln 1 was 187,200 acfm, and decreased to 175,900 acfm during WTDF testing. Although statistically this difference is significant at the 95 percent confidence level, it represents only a 6 percent change. This change could be due to the introduction of WTDF in the kiln, which, due to its characteristics and location, could change the air flow requirements. However, this difference is also expected to be within the normal operating fluctuations of the kiln.

Comparisons of kiln exit temperature and baghouse operating temperature for baseline and WTDF conditions are shown in the attached figure. The kiln exit temperature is seen to be slightly higher during WTDF conditions as compared to baseline conditions. This result is expected due to the introduction of WTDF at the base of the preheater, which would increase temperatures at the kiln exit, and is not considered to be a result of the kiln repairs. Also, baghouse operating temperatures were in the same range during the two test periods.

Other operating parameters as reported on FMM's Control Report for the baseline and WTDF periods were also reviewed. These control reports are attached. The ranges experienced by the kiln for each of these pertinent parameters were as follows:

	Baseline	WTDF
Cooler Exit Temp. (°F)	285 - 370	235 - 380
Secondary Air Temp. (°F)	1450 -1900	1630 -1980
Preheater Fan Temp. (°F)	740 - 820	720 - 770

The range of conditions as reflected in these data are generally consistent and do not indicated any substantial differences between baseline and WTDF conditions.

Kiln Feed and Clinker

Kiln feed raw material and clinker analysis were examined to determine if any significant differences in either were apparent during the two testing periods. Both sulfate (SO_3) content and tricalcium silicate (C_3S) content in both materials were evaluated. The results are presented in the attached figures (four figures in all). Kiln feed SO_3 and C_3S contents both reflect a good degree of variability, but baseline and WTDF contents are within the same range. In the case of Clinker C_3S, the results are similar for baseline and WTDF conditions. For clinker SO_3 content, the WTDF levels are somewhat higher than the baseline levels, although all values are below 1.0 percent. Since kiln feed SO_3 levels are similar for the baseline and WTDF conditions, the reasons for the differing clinker SO_3 levels are not known.

Conclusions

Review of the test data from the baseline and WTDF test burns indicates no significant differences in plant operating parameters for the two test periods. Furthermore, FMM plant personnel have stated that the repairs and maintenance activities performed on the Kiln 1 system should not have affected kiln operation. Based upon this analysis, it is concluded that the baseline and WTDF test burns were conducted under similar operating conditions, and the plant operations were suitable for determining if the utilization of WTDF in Kiln 1 results in an increase in emissions to the atmosphere.

This analysis does not address the suitability of the stack and emission testing conducted during the baseline and WTDF test periods. These aspects of the testing will be evaluated separately after receipt of the test data from Koogler & Associates.

Please call if you have any questions concerning this matter.

Sincerely,

David A. Buff

David A. Buff, M.E., P.E.
Principal Engineer

cc: File(2)

13076A1/3

Table 1. Statistical Analysis of Stack Test Results During Baseline and WTDF Test Burn.

		Stack Flow Rate (dscfm)
BASELINE EMISSIONS (lb/hr)		
May 4th, 1993 data	Run 1	171,832
	Run 2	
	Run 3	
	Run 4	178,987
	Run 5	178,483
	Run 6	
May 5th, 1993 data	Run 1	189,686
	Run 2	
	Run 3	197,855
	Run 4	
	Run 5	206,572
	Run 6	
Statistical summary		
Average		187,236
Standard deviation		13,226
N		6
WTDF CONDITIONS EMISSIONS (lb/hr)		
June 8th, 1993 data	Run 1	174,208
	Run 2	
	Run 3	168,693
	Run 4	
	Run 5	178,489
	Run 6	
June 9th, 1993 data	Run 1	180,315
	Run 2	
	Run 3	
	Run 4	178,588
	Run 5	
	Run 6	175,121
Statistical summary		
Average		175,902
Standard deviation		4,215
N		6
Test for Significance		
Pooled Standard Deviation (Sp)		9815.405
Degrees of Freedom		10
Is Test Applicable (WTDF avg > Baseline avg)?		YES
Test Statistic (t')		2.00
t Table value		1.812
Is Change Significant? [1]		YES*

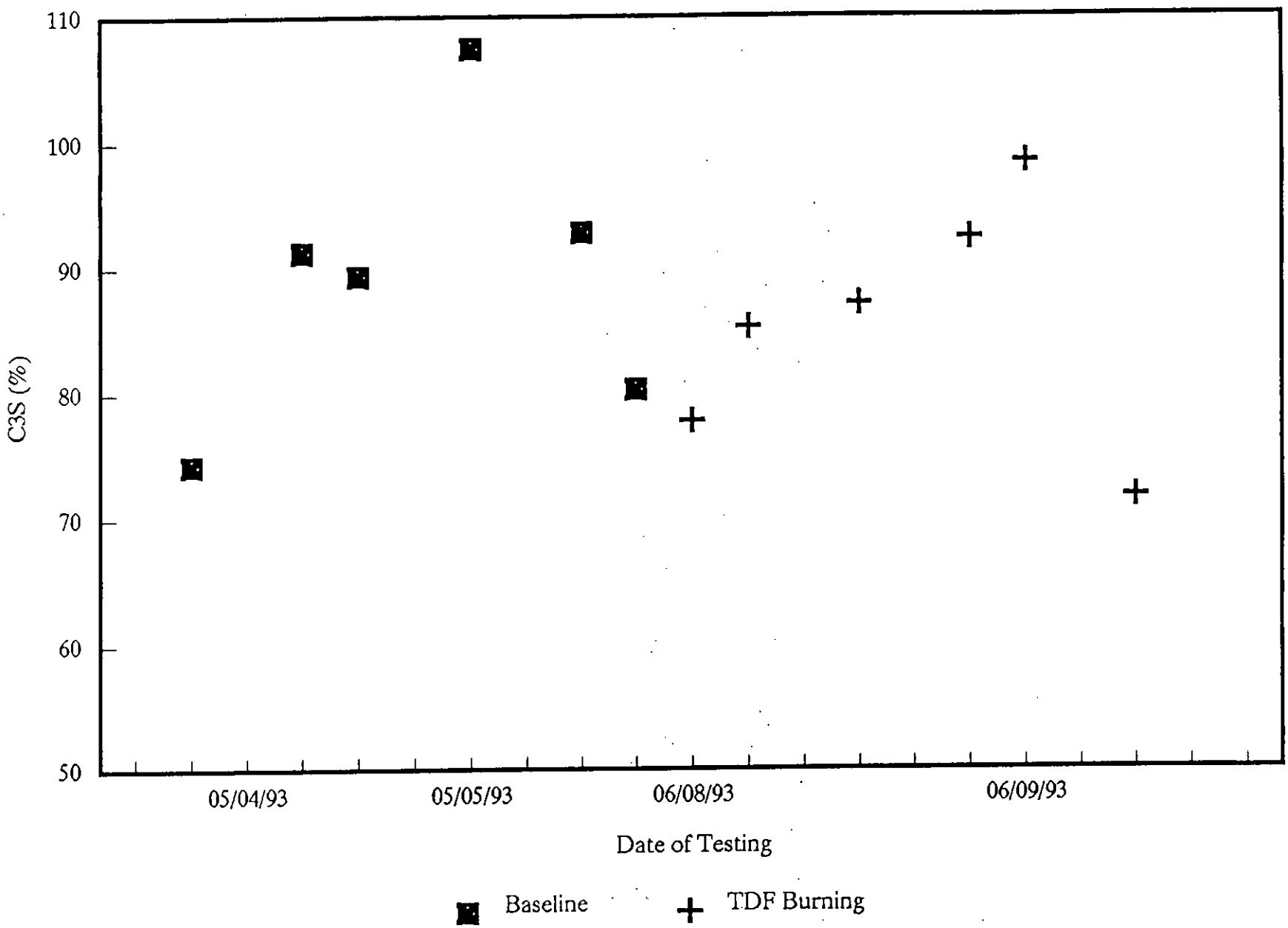
Notes:

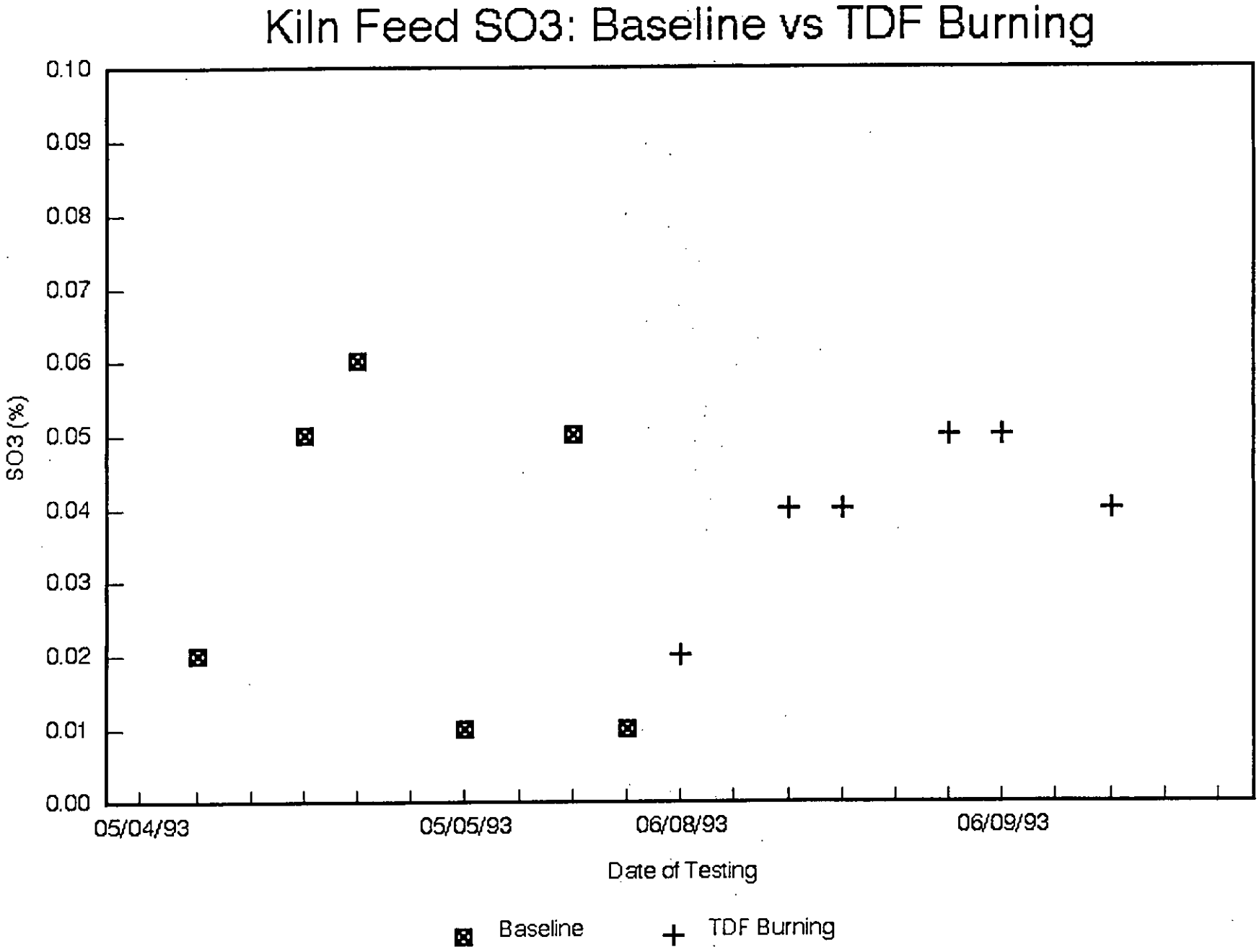
FMMSTAT2
7/15/93

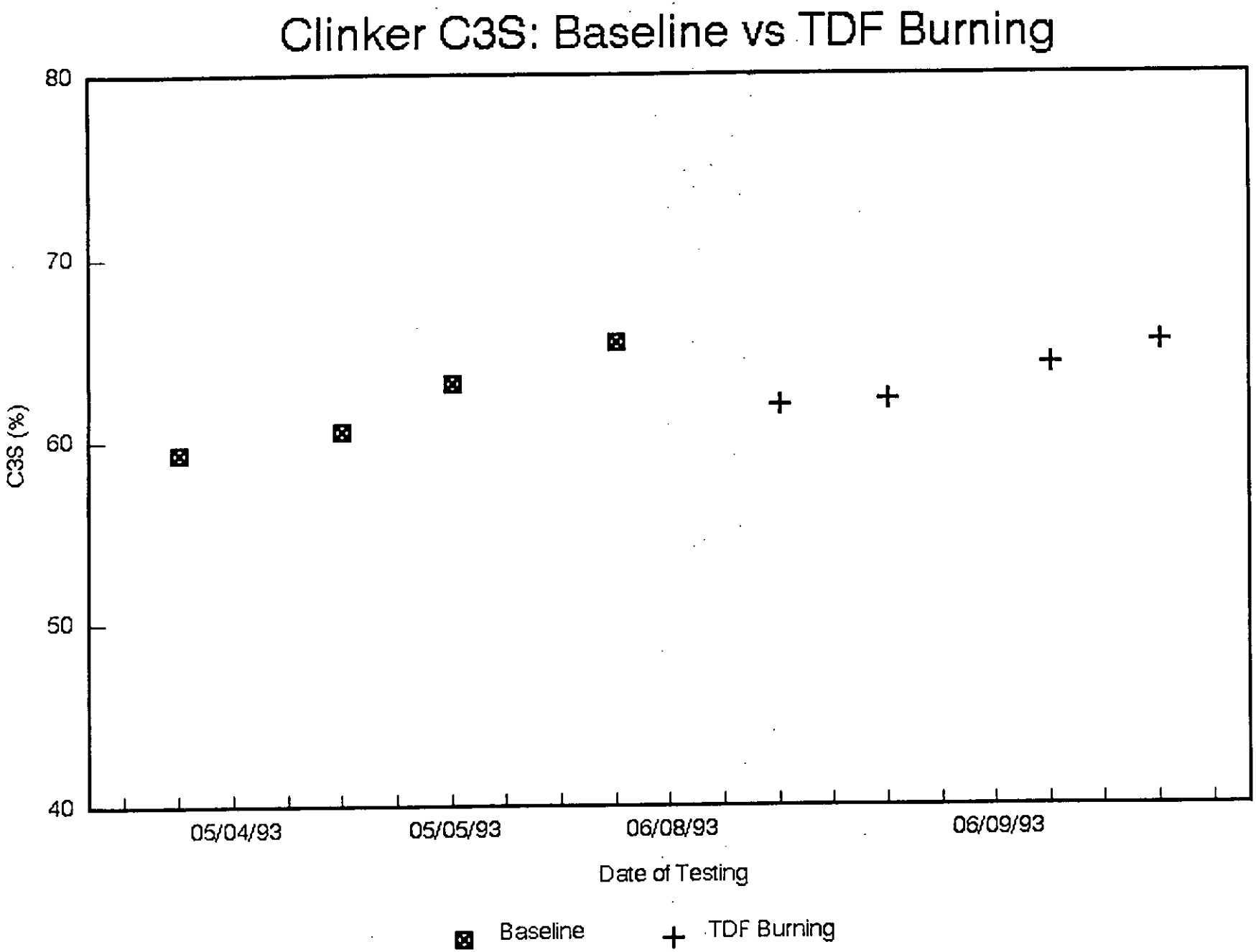
[1] Change is significant only if the average emission is increased and the test statistic is greater than the Table t-value.

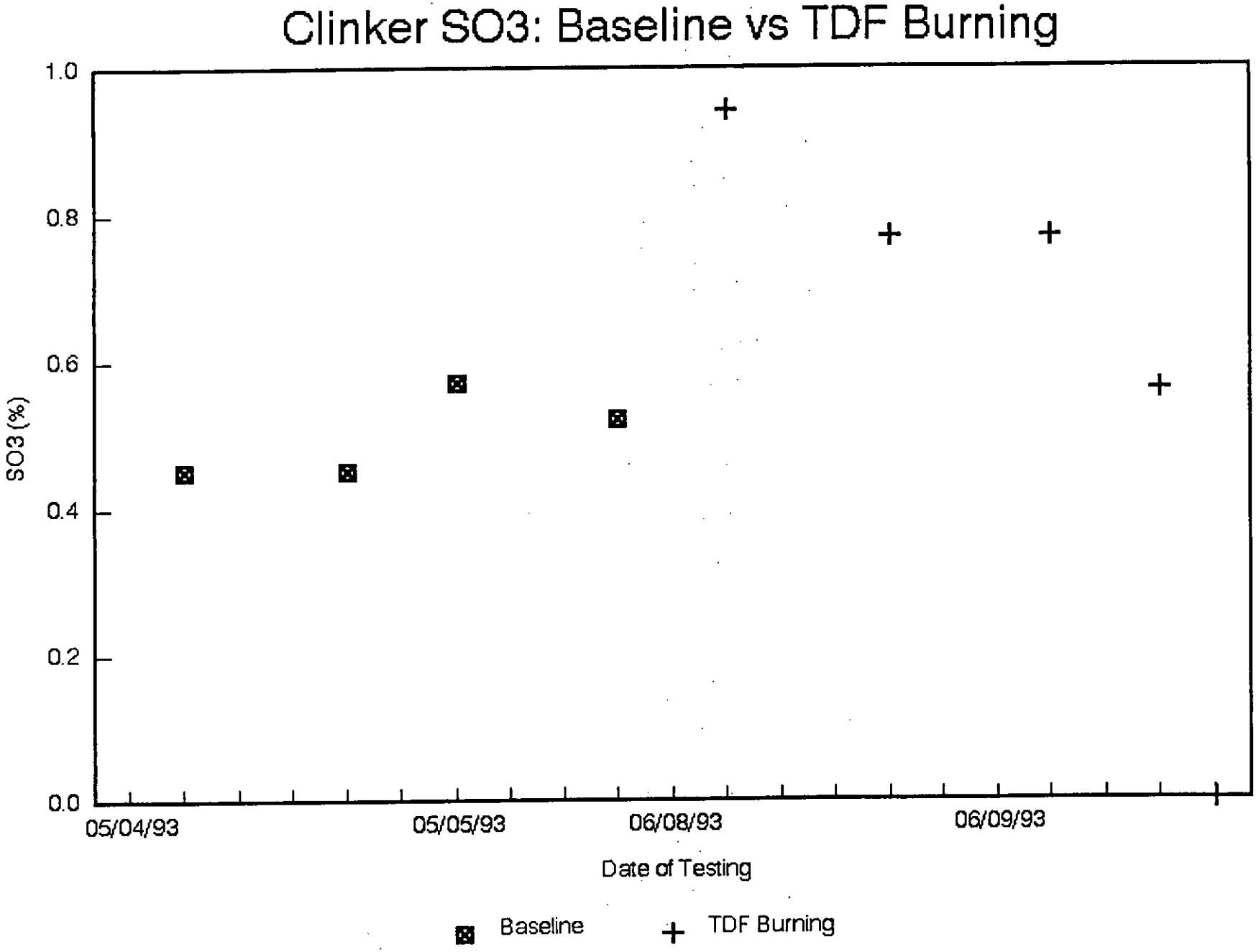
* Stack Flow Rate change is a significant decrease.

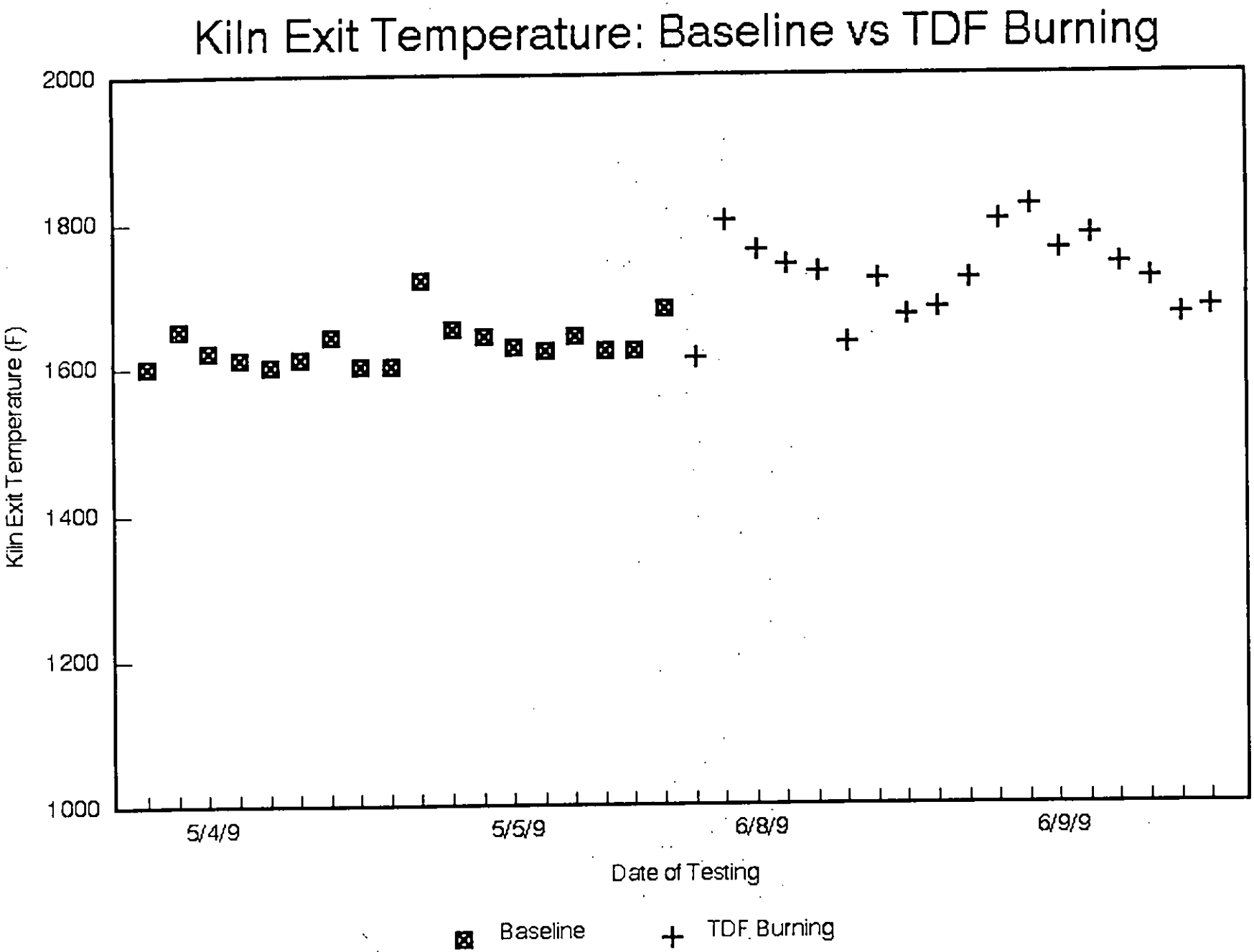
Kiln Feed C3S: Baseline vs TDF Burning

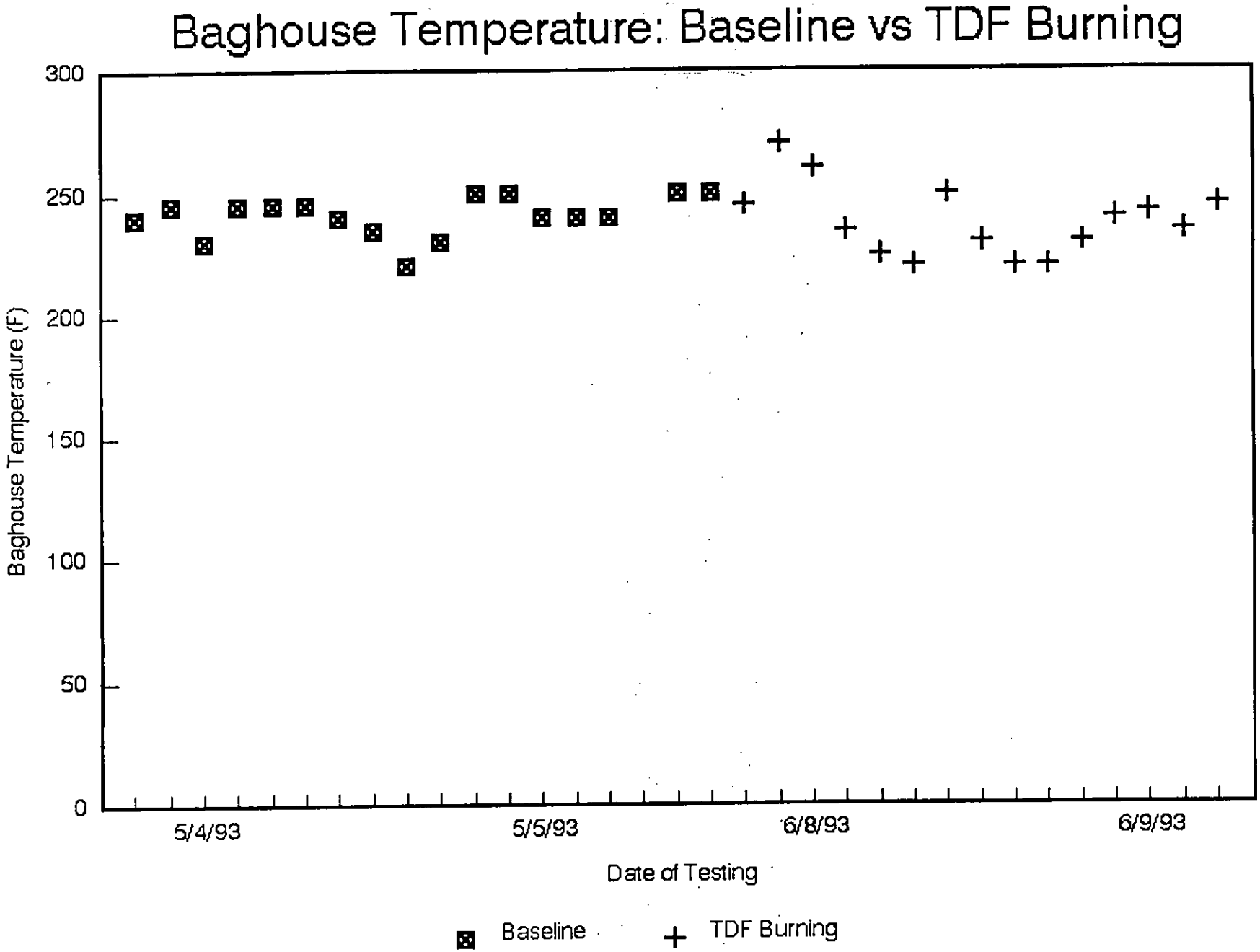



Kiln Feed SO3: Baseline vs TDF Burning
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
SO3 (%)
05/04/93
05/05/93
06/08/93
06/09/93
Date of Testing
Baseline
TDF Burning


Clinker C3S: Baseline vs TDF Burning
80
70
60
50
40
C3S (%)
05/04/93
05/05/93
06/08/93
06/09/93
Date of Testing
Baseline
TDF Burning


Clinker SO3: Baseline vs TDF Burning
1.0
0.8
0.6
0.4
0.2
0.0
SO3 (%)
05/04/93
05/05/93
06/08/93
06/09/93
Date of Testing
Baseline
TDF Burning


Kiln Exit Temperature: Baseline vs TDF Burning
2000
1800
1600
1400
1200
1000
Kiln Exit Temperature (F)
5/4/9
5/5/9
6/8/9
6/9/9
Date of Testing
Baseline
TDF Burning


Baghouse Temperature: Baseline vs TDF Burning
300
250
200
150
100
50
0
Baghouse Temperature (F)
5/4/93
5/5/93
6/8/93
6/9/93
Date of Testing
Baseline
TDF Burning

APPENDIX C

AIR CONSULTING & ENGINEERING, INC.
FIELD REPORT

ACE
AIR CONSULTING
& ENGINEERING, INC.

2106 N.W. 67th Place • Suite 4 • Gainesville, Florida • 32606
(904) 335-1889 FAX (904) 335-1891

August 23, 1993

Mr. David Buff
KBN Engineering & Applied
Sciences, Inc.
1034 NW 57th Street
Gainesville, Florida 32605

RE: Southdown Baseline and TDF Source Tests

Dear Dave:

I am sending my notes on the referenced project. I prepared these in the field so please excuse the brevity. Please send me a copy of the prior reports that are being quoted as evidence of normal CO emission ranges. CO appears to be the only questionable "significant increase" parameter for TDF so a review of that data is important.

I am sorry I was unable to compile CEM data concurrent to Koogler and Associates (KA) testing for TDF. My CEM data matched that of KA very well for the times that we monitored concurrently (5/11/93 aborted test day).

Respectfully,

AIR CONSULTING AND ENGINEERING, INC.

Stephen L. Neck, P.E.

SLN/cvt

Enclosures

ACE File: 163 93 03

STACK TEST REVIEW

1. VOC (EPA Method 25A) for both test series needs to be inflated for wet basis sampling by dividing by FDA (minor point as both series done the same way).

2. Should review prior reports Koogler and Associates (KA) used to determine the insignificance of "significant difference".

3. Report otherwise is acceptable. My inspections in the field revealed metals and VOST train as well as CEM monitors were all conducted according to the reference methods. I was not there for dioxin/furan testing.

4/19/93 - Arrive at 1015 met with Matt Stone. Tour facility. They were awaiting tires to be delivered so there was no TDF at this time. They have opacity monitor at stack and O_2 and combustibles monitor at kiln exit. Koogler and Associates personnel on site for preliminary testing. Sampling for gases conducted with heated probe, out-of-stack heated filter, heat traced line to heated manifold, VOC heated to Ratfisch 55 CA, rest to H_2O knockout then dry to Western Research 721 at SO_2 analyzer, Thermo Environmental 10S NO_x analyzer and 48H CO analyzer, plus Teledyne 320P O_2 analyzer. Leave site at 1130.

5/4/93 - Baseline test. Arrive 0838 while KA running gases along with PM and multi-metals train. Set-up my sample system completely independent with similar plumbing monitored from 1536-1706.

Baseline Test - 5/4/93

Time	O2 dry	CO dry	NOx dry	C3H8 wet
	Air Consulting and Engineering, Inc. - Values			
1536-1706	13.55	44.62	172.50*	2.08
	Koogler and Associates - CEM Run 4			
1512-1702	14.10 (orsat)	43.00	151.30	2.50

*Not Calibrated Fully

Leave plant approximately 1815

5/11/93 - Arrive 0700. Set up for monitor gases for TDF test. Kiln experiencing CO spiking. Test finally aborted leave at 1630. Observed TDF rate of 58 lbs/min. Monitored CEM 1024-1626. Matching with KA values very well on a spot check basis. KA values were not tabulated for comparison at test was aborted.

5/13/93 - Arrive 0700 for TDF test. Kiln coming on line. Trying to make adjustments in kiln parameters using my CEM system for feedback. Test aborted again. Pack up and leave at 1440.

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ▪ FAX 377-7158

RECEIVED
AUG 18 1993
Division of Air
Resources Management

KA 521-92-01

August 13, 1993

Patty
File w/
TDF
info. Bruce
Got a copy
Preston
8/18/93

Mr. David Buff
KBN Engineering & Applied Sciences, Inc.
1034 N.W. 57th Street
Gainesville, FL 32605

Subject: Supplemental Data for Reviewing
TDF/Baseline Test Report
Florida Mining & Materials
Hernando County, Florida

Dear Dave:

In accordance with our recent telephone conversation, I am providing the attached information to assist in your review of the TDF/baseline test report for Florida Mining & Materials.

1. Carbon monoxide emission data referenced in data comparison report

Carbon monoxide emission data from Kiln No. 1 for February 28, 1992 and from Kiln No. 2 for March 24, 1992 and February 10, 1993, were referenced in the data comparison report. Attached hereto are portions of the four test reports documenting the carbon monoxide emission rates referenced in the data comparison report.

2. Expected Carbon Monoxide Emission rate under coal and coal/TDF operating conditions

The maximum hourly carbon monoxide emission rate reported in the coal/TDF and baseline test reports was approximately 80 pounds per hour. The average hourly carbon monoxide emission rates of all data reported in the data comparison report was approximately 40 pounds per hour. Based upon these measured emission rates and the carbon monoxide fluctuations expected from a dry process Portland cement plant, I would estimate that the maximum hourly carbon monoxide emission rate would very seldom exceed 100 pounds per hour (equivalent to approximately 125 parts per million in the stack gas).

3. Heat input rate

Even though TDF provided slightly over 20 percent of the heat input during the test period, Florida Mining & Materials will accept the 20 percent TDF heat input limit requested in the application for the permit amendment.

Regarding the total heat input to the kiln, the 300 MMBTU per hour permitted rate was the maximum expected heat input rate anticipated at the time the kiln was permitted. The actual heat input rate to the kiln averages 240-260 MMBTU per hour.

4. Kiln oxygen levels.

During the baseline tests, the oxygen at the feed end of the kiln ranged from 0.2 percent to 2.2 percent. During the coal/TDF tests, the oxygen level ranged from 2.3 percent to 5.0 percent. The oxygen level at the feed end of the kiln was purposely increased during the coal/TDF test to improve combustion of the TDF which was added at the feed end. The presence of sufficient oxygen for the combustion of the TDF is an obvious necessity. As more experience is gained with the burning of TDF, oxygen levels will be reduced as much as practical.

It should be noted from all of the other data monitored during the two test periods demonstrated that the alteration of the combustion zones in the kiln had no affect on the quality of clinker, the operation of the kiln nor the emissions from the kiln.

5. Reporting of cations in conjunction with HCl emission data.

Southdown has developed information demonstrating that chlorides emitted from dry process Portland cement plants are not in the form of hydrogen chloride but in the form of salts of various cations. The reported cations were included to demonstrate that this was in fact the case at the Florida Mining & Materials facility.

6. Impact analysis

A screening model run was conducted to demonstrate that the impacts of emissions from the No. 1 cement kiln at Florida Mining & Materials were well below applicable air quality standards and No Threat Levels. The model run was the ISC-ST2, Version 93109, using Tampa meteorological data for calendar year 1986. The model was run with a hypothetical emission rate of 10 grams per second (79.4 pounds per hour). The impacts of the constituents measured during the coal/TDF and baseline test periods can be determined by multiplying the modeled impacts by a ratio of the measured

emission rates to the modeled emission rate. The model predicted the following maximum impacts for a 10 gram per second emission rate:

Annual	0.54 micrograms per cubic meter
8-hour	21.3 micrograms per cubic meter
24-hour	11.9 micrograms per cubic meter

The following table summarizes the highest average emission rates measured during the test period, the maximum expected annual impacts and the air quality standard or No Threat Level applicable to each measured constituent.

Constituent	Emission Rate (lbs/hr)	Maximum Annual Impact (micrograms per cubic meter)	Air Quality Standard or No Threat Level (micrograms per cubic meter)
PM	9.13	less than 0.1	50
Arsenic	0.00174	1.2×10^{-5}	2.3×10^{-4}
Chromium (total)	0.00287	2.0×10^{-5}	NA
Lead	0.00781	5.3×10^{-5}	0.09
Mercury	0.01299	8.8×10^{-5}	0.3
Zinc	0.01026	7.0×10^{-5}	NA
Nitrogen Oxides	197.4	1.3	100
Sulfur Dioxide	less than 2.0	less than 0.1	60
Carbon Monoxide	56.6	0.4	NA
Hydrogen Chloride	0.44	3.0×10^{-3}	7
Acetone	0.0210	1.4×10^{-4}	NA
Benzene	0.0580	3.9×10^{-4}	0.12
Bromomethane	0.0013	8.8×10^{-6}	NA
Carbon Disulfide	0.0057	3.9×10^{-5}	200
Chlorobenzene	0.0160	1.1×10^{-4}	NA
Ethylbenzene	0.0058	3.9×10^{-5}	1000
n-Hexane	0.0050	3.4×10^{-5}	200
Toluene	0.0490	3.3×10^{-4}	300
1,1,1-trichloroethane	less than 0.0001	6.8×10^{-7}	NA
Trichloroethylene	less than 0.0001	6.8×10^{-7}	NA
Styrene	0.0270	1.8×10^{-4}	NA
Xylene (total)	0.0239	1.6×10^{-4}	80

The impacts for the 8-hour and the 24-hour time periods were checked and were also found to be well below ambient air quality standards and No Threat Levels.

If, after reviewing the attached data, you have any further questions, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:wa

c: Mr. John Brown, FDEP, Tallahassee
Mr. Bruce Mitchell, FDEP, Tallahassee
Mr. Charles Hetrick, HCBC
Ms. A. Lue, P.E., Southdown, Inc.
Mr. J. Gill, P.E., Southdown, Inc.
Mr. T. Cleveland, Esq., OHF&C
Mr. D. Dee, Esq., CFWES&C
B. Thomas, SW Dist

```
CO STARTING
CO TITLEONE FLORIDA MINING & MATERIALS (SOUTHDOWN)        MET = TPA82
CO MODELOPT DFAULT CONC   RURAL
CO AVERTIME  PERIOD   8 24
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO RUNORNOT RUN
CO ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
** Source Location Cards:
**           SRCID SRCTYP          XS          YS          ZS
SO LOCATION     1 POINT          .0000       .0000       .0000

** Source Parameter Cards:
** POINT:   SRCID       QS          HS          TS          VS          DS

SO SRCPARAM     1    10.0000       39.9600   398.70000     11.000     3.94100

SO BUILDHGT     1     36*25.60
SO BUILDWID     1     36*24.00.

SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG    0.0       0.0
RE GRIDPOLR POL DIST    250.0  500.0  750.0  1000.0  1250.0  1500.0  1750.0
RE GRIDPOLR POL DIST    2000.0    2500.0    3000.0    4000.0    5000.0
RE GRIDPOLR POL GDIR    36  10.00   10.00
RE GRIDPOLR POL END
RE DISCCART    -13200.00     6300.00
RE FINISHED

ME STARTING
ME INPUTFIL  D:\ISC2\TAMPA86.ASC
ME ANEMHGHT  10.000 METERS
ME SURFDATA  12842  1986            TAMPA, FL
ME UAIRDATA  12842  1986            RUSKIN, FL
ME WINDCATS    1.54    3.09    5.14    8.23   10.80
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST  SECOND
OU MAXTABLE ALLAVE  50
OU PLOTFILE PERIOD ALL       D:\ISC2\SDWN6_AN.PRN
OU PLOTFILE 24 ALL FIRST     D:\ISC2\SDWN6_24.PRN
OU PLOTFILE 8  ALL FIRST     D:\ISC2\SDWN6_08.PRN
OU FINISHED

************************************
*** SETUP Finishes Successfully ***
************************************
```

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Model Is Setup For Calculation of Average CONCentration Values.

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
1. Final Plume Rise.
2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates 2 Short Term Average(s) of: 8-HR 24-HR
and Calculates PERIOD Averages

**This Run Includes: 1 Source(s); 1 Source Group(s); and 433 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.00 ; Decay Coef. = 0.0000 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10000E+07
Output Units = (MICROGRAMS/CUBIC-METER)

**Input Runstream File: SDWN_6.INP ; **Output Print File: SDWN_6.OUT
**Detailed Error/Message File: ERRORS.OUT

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
1	0	0.10000E+02	0.0	0.0	0.0	39.96	398.70	11.00	3.94	YES	

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	1 ,

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: 1

IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK
1	25.6,	24.0,	0	2	25.6,	24.0,	0	3	25.6,	24.0,	0	4	25.6,	24.0,	0	5	25.6,	24.0,	0	6	25.6,	24.0,	0
7	25.6,	24.0,	0	8	25.6,	24.0,	0	9	25.6,	24.0,	0	10	25.6,	24.0,	0	11	25.6,	24.0,	0	12	25.6,	24.0,	0
13	25.6,	24.0,	0	14	25.6,	24.0,	0	15	25.6,	24.0,	0	16	25.6,	24.0,	0	17	25.6,	24.0,	0	18	25.6,	24.0,	0
19	25.6,	24.0,	0	20	25.6,	24.0,	0	21	25.6,	24.0,	0	22	25.6,	24.0,	0	23	25.6,	24.0,	0	24	25.6,	24.0,	0
25	25.6,	24.0,	0	26	25.6,	24.0,	0	27	25.6,	24.0,	0	28	25.6,	24.0,	0	29	25.6,	24.0,	0	30	25.6,	24.0,	0
31	25.6,	24.0,	0	32	25.6,	24.0,	0	33	25.6,	24.0,	0	34	25.6,	24.0,	0	35	25.6,	24.0,	0	36	25.6,	24.0,	0

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

250.0, 500.0, 750.0, 1000.0, 1250.0, 1500.0, 1750.0, 2000.0, 2500.0, 3000.0,
4000.0, 5000.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0,
110.0, 120.0, 130.0, 140.0, 150.0, 160.0, 170.0, 180.0, 190.0, 200.0,
210.0, 220.0, 230.0, 240.0, 250.0, 260.0, 270.0, 280.0, 290.0, 300.0,
310.0, 320.0, 330.0, 340.0, 350.0, 360.0,

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

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1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
B	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
C	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
D	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
E	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00
F	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: D:\ISC2\TAMPA86.ASC FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1)
SURFACE STATION NO.: 12842 UPPER AIR STATION NO.: 12842
NAME: TAMPA, NAME: RUSKIN,
YEAR: 1986 YEAR: 1986

YEAR	MONTH	DAY	HOUR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	URBAN
86	1	1	1	351.0	4.12	291.5	4	416.0	416.0
86	1	1	2	348.0	3.60	292.6	4	416.0	416.0
86	1	1	3	174.0	4.63	291.5	4	416.0	416.0
86	1	1	4	293.0	3.09	289.8	4	416.0	416.0
86	1	1	5	3.0	1.54	289.8	4	416.0	416.0
86	1	1	6	322.0	2.57	289.8	4	416.0	416.0
86	1	1	7	345.0	3.60	289.8	4	416.0	416.0
86	1	1	8	343.0	2.57	290.4	4	416.0	416.0
86	1	1	9	337.0	3.09	290.9	4	416.0	416.0
86	1	1	10	341.0	3.09	292.6	3	416.0	416.0
86	1	1	11	4.0	2.57	294.3	3	416.0	416.0
86	1	1	12	356.0	3.09	294.8	2	416.0	416.0
86	1	1	13	23.0	2.57	295.9	2	416.0	416.0
86	1	1	14	59.0	2.57	294.8	3	416.0	416.0
86	1	1	15	42.0	3.09	293.2	4	416.0	416.0
86	1	1	16	54.0	1.54	293.7	4	416.0	416.0
86	1	1	17	51.0	2.06	293.2	4	416.0	416.0
86	1	1	18	47.0	0.00	293.2	5	419.0	418.0
86	1	1	19	134.0	2.06	291.5	6	428.0	424.0
86	1	1	20	127.0	0.00	290.9	6	437.0	430.0
86	1	1	21	130.0	0.00	290.9	6	447.0	435.0
86	1	1	22	132.0	0.00	289.8	6	456.0	441.0
86	1	1	23	270.0	1.54	290.9	6	465.0	447.0
86	1	1	24	290.0	2.06	290.4	6	474.0	453.0

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 250.00	500.00	750.00	1000.00	1250.00	1500.00	1750.00	2000.00	2500.00
10.00	0.18187	0.10384	0.11716	0.13630	0.14328	0.14317	0.13926	0.13343	0.11963
20.00	0.17508	0.09858	0.11433	0.13554	0.14335	0.14298	0.13828	0.13150	0.11605
30.00	0.18841	0.10490	0.12194	0.14454	0.15470	0.15634	0.15288	0.14679	0.13164
40.00	0.16858	0.10531	0.13063	0.15262	0.16103	0.16064	0.15497	0.14675	0.12851
50.00	0.17491	0.13376	0.16937	0.19735	0.20477	0.20070	0.19084	0.17880	0.15477
60.00	0.21901	0.17593	0.21646	0.25755	0.26711	0.25997	0.24525	0.22793	0.19410
70.00	0.24518	0.21071	0.24973	0.30390	0.31723	0.30809	0.28897	0.26649	0.22272
80.00	0.26645	0.24316	0.26986	0.33380	0.35138	0.34188	0.32033	0.29472	0.24461
90.00	0.33237	0.27698	0.28505	0.35942	0.38516	0.38014	0.36021	0.33444	0.28122
100.00	0.34419	0.23580	0.22978	0.28426	0.30482	0.30266	0.28916	0.27098	0.23202
110.00	0.29950	0.16989	0.15867	0.19390	0.21120	0.21399	0.20874	0.19965	0.17739
120.00	0.29712	0.13493	0.11910	0.13986	0.15182	0.15518	0.15361	0.14955	0.13799
130.00	0.31279	0.13003	0.11038	0.12593	0.13544	0.13822	0.13715	0.13410	0.12510
140.00	0.29183	0.12258	0.10197	0.11926	0.12958	0.13273	0.13168	0.12848	0.11905
150.00	0.21542	0.09071	0.07892	0.09400	0.10328	0.10660	0.10632	0.10409	0.09658
160.00	0.16570	0.06957	0.06033	0.07097	0.07776	0.08044	0.08054	0.07911	0.07353
170.00	0.14575	0.06404	0.06029	0.07455	0.08446	0.08919	0.09036	0.08929	0.08340
180.00	0.18986	0.07853	0.07204	0.08364	0.09179	0.09540	0.09593	0.09459	0.08881
190.00	0.21018	0.08050	0.07295	0.08257	0.08931	0.09269	0.09374	0.09331	0.08950
200.00	0.19668	0.07874	0.07540	0.08565	0.09148	0.09369	0.09352	0.09190	0.08618
210.00	0.23315	0.10370	0.10137	0.11653	0.12357	0.12518	0.12372	0.12061	0.11183
220.00	0.40300	0.16691	0.15583	0.17541	0.18504	0.18753	0.18617	0.18280	0.17262
230.00	0.53887	0.22557	0.20832	0.23461	0.24913	0.25428	0.25402	0.25067	0.23858
240.00	0.50011	0.23010	0.21803	0.25128	0.27090	0.27847	0.27889	0.27520	0.26067
250.00	0.45122	0.22848	0.22362	0.25479	0.27008	0.27296	0.26900	0.26157	0.24237
260.00	0.41680	0.20473	0.20386	0.23340	0.24687	0.24818	0.24309	0.23504	0.21572
270.00	0.45802	0.22020	0.21615	0.25145	0.26829	0.27145	0.26719	0.25936	0.23938
280.00	0.39312	0.19609	0.19710	0.22727	0.24049	0.24165	0.23646	0.22832	0.20887
290.00	0.39354	0.20205	0.20401	0.23336	0.24612	0.24713	0.24202	0.23405	0.21518
300.00	0.46148	0.21892	0.21906	0.25732	0.27634	0.28026	0.27589	0.26764	0.24699
310.00	0.41535	0.19189	0.19009	0.23339	0.25724	0.26420	0.26152	0.25419	0.23393
320.00	0.28639	0.12736	0.13000	0.16099	0.17830	0.18377	0.18232	0.17748	0.16373
330.00	0.19635	0.09412	0.10153	0.12334	0.13469	0.13820	0.13711	0.13373	0.12439
340.00	0.16115	0.08170	0.08998	0.10532	0.11149	0.11221	0.10993	0.10625	0.09737
350.00	0.15758	0.08102	0.09299	0.10615	0.11039	0.10988	0.10681	0.10252	0.09278
360.00	0.18185	0.09810	0.11001	0.12676	0.13356	0.13452	0.13213	0.12791	0.11686

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 3000.00	4000.00	5000.00
10.00	0.10685	0.08853	0.07659
20.00	0.10213	0.08281	0.07020
30.00	0.11739	0.09709	0.08371
40.00	0.11220	0.08907	0.07483
50.00	0.13438	0.10668	0.09017
60.00	0.16608	0.12791	0.10471
70.00	0.18674	0.13838	0.10936
80.00	0.20351	0.14755	0.11385
90.00	0.23611	0.17302	0.13429
100.00	0.19833	0.15014	0.11948
110.00	0.15696	0.12601	0.10528
120.00	0.12615	0.10829	0.09586
130.00	0.11562	0.10096	0.09108
140.00	0.10904	0.09408	0.08400
150.00	0.08870	0.07640	0.06786
160.00	0.06736	0.05756	0.05058
170.00	0.07622	0.06440	0.05590
180.00	0.08232	0.07118	0.06335
190.00	0.08471	0.07682	0.07084
200.00	0.07982	0.07027	0.06349
210.00	0.10269	0.08944	0.07999
220.00	0.16118	0.14568	0.13438
230.00	0.22356	0.20133	0.18504
240.00	0.24433	0.21764	0.19877
250.00	0.22333	0.19356	0.17505
260.00	0.19772	0.17086	0.15411
270.00	0.21981	0.19105	0.17259
280.00	0.19047	0.16401	0.14715
290.00	0.19667	0.17002	0.15288
300.00	0.22629	0.19691	0.17826
310.00	0.21342	0.18391	0.16416
320.00	0.14892	0.12742	0.11257
330.00	0.11446	0.09979	0.08973
340.00	0.08922	0.07750	0.06968
350.00	0.08385	0.07114	0.06297
360.00	0.10609	0.08977	0.07858

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 250.00	500.00	750.00	1000.00	1250.00
10.0	8.75124 (86031416)	4.39460 (86032016)	3.28094 (86063016)	4.36555 (86063016)	4.48779 (86063016)
20.0	8.69964 (86032016)	4.07188 (86072916)	3.45416 (86080216)	5.25367 (86080216)	5.83862 (86080216)
30.0	6.91294 (86022708)	2.56148 (86082916)	3.63864c(86090116)	3.75438 (86082816)	4.27191 (86080216)
40.0	8.24345 (86042108)	2.33200c(86060808)	4.02346c(86090116)	2.98289 (86022216)	3.14490 (86022216)
50.0	10.72973 (86022716)	4.46520 (86022716)	4.26333 (86090716)	3.88378 (86042016)	3.83488 (86042016)
60.0	13.63431 (86022716)	5.01167c(86071616)	6.97740c(86071616)	5.44594c(86071616)	4.61881 (86040716)
70.0	12.48035 (86040824)	4.89895c(86071616)	7.07317c(86071616)	5.77306 (86071516)	6.03068 (86042516)
80.0	5.35845 (86040916)	5.08890 (86081816)	5.49157 (86080716)	5.80195c(86100516)	6.49075c(86100516)
90.0	12.41634 (86070316)	7.92131 (86070316)	6.65918 (86081816)	8.12523 (86081816)	8.09344 (86081816)
100.0	16.95576 (86012716)	6.25230 (86012716)	5.64917 (86072016)	6.69599 (86050916)	6.78737 (86050916)
110.0	13.66447 (86012716)	5.98766 (86041616)	5.08805 (86041616)	6.08054 (86041616)	6.25748 (86041616)
120.0	15.95092 (86012716)	5.70509 (86012716)	4.22976 (86042216)	4.82914 (86042216)	4.89182 (86042216)
130.0	16.69277 (86030116)	5.63127 (86030116)	4.66393 (86042216)	5.21675 (86042216)	5.08244 (86042216)
140.0	15.22556 (86030116)	4.92638 (86030116)	3.46585 (86042216)	3.99763 (86042216)	4.08623 (86042216)
150.0	7.95243 (86032116)	3.33611 (86032116)	2.41742 (86061116)	2.72370 (86041016)	2.99417 (86041016)
160.0	21.28599 (86010516)	7.13671 (86010516)	3.94257 (86010516)	4.16635 (86010516)	4.66468 (86010516)
170.0	8.03473 (86011108)	2.82515 (86032116)	2.33869 (86021316)	3.03020 (86021316)	3.51135 (86021316)
180.0	10.97418 (86032108)	3.34182 (86032108)	2.45570 (86032216)	2.89610 (86032216)	3.19195 (86021316)
190.0	10.35961 (86011208)	3.82841 (86011116)	2.68365 (86011116)	3.23667 (86011116)	3.76634 (86011116)
200.0	11.04917 (86120524)	3.00382 (86120524)	2.53106 (86032816)	3.34562 (86112116)	3.94938 (86112116)
210.0	13.73897 (86120608)	3.66937 (86042316)	3.60186 (86042316)	4.15259 (86042316)	5.21947 (86011216)
220.0	13.91321 (86120708)	4.42509 (86032916)	3.84685 (86032916)	4.77530 (86032916)	5.02289 (86032916)
230.0	18.74781 (86120624)	6.09873 (86010816)	4.58349c(86082316)	5.34748 (86032916)	5.78920 (86032916)
240.0	12.36732 (86111408)	5.82175 (86051016)	4.38966 (86051016)	5.17524 (86101916)	6.21935 (86101916)
250.0	8.64165 (86011624)	4.70370 (86050416)	4.36621 (86050416)	5.99799 (86091516)	6.75631 (86091716)
260.0	10.92794 (86111416)	4.33001 (86111416)	3.98313 (86091716)	5.65397 (86091716)	6.15445 (86091516)
270.0	13.47992 (86040424)	4.59564 (86111016)	3.58776 (86091816)	4.93254 (86070716)	5.53854 (86070716)
280.0	11.60394 (86102408)	4.60677 (86052716)	4.43172 (86050516)	5.70903 (86111116)	6.51795 (86111116)
290.0	7.81073 (86042008)	4.92781 (86051516)	4.54063 (86082616)	5.38884 (86052716)	5.79125 (86111116)
300.0	9.44940c(86102424)	4.48160 (86081116)	4.73346c(86070816)	4.95979 (86051416)	5.39403 (86081116)
310.0	15.24276 (86031824)	5.23371 (86031816)	4.26466 (86112416)	6.01905 (86112416)	7.06338 (86112416)
320.0	9.62638 (86051908)	3.86482 (86031816)	2.78425 (86031816)	3.38994 (86082116)	3.56200 (86082116)
330.0	7.69654 (86031408)	3.87767 (86052816)	3.89344 (86052816)	4.68688 (86052816)	4.45418 (86052816)
340.0	8.74089 (86031408)	3.92500 (86050616)	3.64951 (86050616)	4.13027 (86050616)	3.87604 (86050616)
350.0	8.57409 (86020608)	5.17377 (86050616)	4.96471 (86050616)	5.60754 (86050616)	5.14668 (86050616)
360.0	7.86263 (86121116)	3.36239 (86050616)	3.83382 (86080616)	3.45434 (86050616)	3.44673 (86051916)

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 1500.00	1750.00	2000.00	2500.00	3000.00
10.0	4.68094 (86121216)	4.68601 (86121216)	4.56292 (86121216)	4.14581 (86121216)	3.73192 (86121216)
20.0	5.62198 (86080216)	5.07192 (86080216)	4.44683 (86080216)	3.83489 (86111716)	3.36308 (86111716)
30.0	4.19160 (86080216)	3.82136 (86080216)	3.37007 (86080216)	2.81649 (86070416)	2.71565 (86011016)
40.0	3.28257 (86030416)	3.30214 (86030416)	3.18936 (86030416)	2.79985 (86030416)	2.62061 (86112016)
50.0	3.72063 (86010416)	3.75603 (86010416)	3.63696 (86010416)	3.22159 (86010416)	2.77302 (86010416)
60.0	4.37039 (86040716)	3.99787 (86111716)	3.65870 (86111716)	3.33782 (86022716)	3.16457 (86022716)
70.0	5.75581 (86042516)	5.22689 (86042516)	4.64125 (86042516)	3.62595 (86040824)	3.61605 (86040824)
80.0	6.28512c(86100516)	5.69050c(86100516)	4.99842c(86100516)	3.97050 (86030316)	3.27068 (86030316)
90.0	7.53879 (86070316)	7.11780 (86070316)	6.62500 (86070316)	5.61790 (86070316)	4.80047 (86070316)
100.0	6.27480 (86050916)	5.68940 (86081716)	5.41991 (86081716)	4.68738 (86081716)	3.95938 (86081716)
110.0	5.92306 (86041616)	5.40515 (86041616)	4.85694 (86041616)	4.46694 (86030616)	4.15833 (86030616)
120.0	4.58229 (86042216)	4.22681 (86012016)	4.15831 (86012016)	3.82619 (86012016)	3.50512 (86012016)
130.0	4.58472 (86042216)	4.11535 (86041316)	3.89814 (86041316)	3.33018 (86041316)	2.78051 (86041316)
140.0	3.89275 (86042216)	3.67572 (86041316)	3.48673 (86041316)	3.02523 (86041316)	2.75075 (86040924)
150.0	3.11964c(86050724)	3.22341c(86050724)	3.26093c(86050724)	3.22605c(86050724)	3.06247c(86050724)
160.0	5.00299 (86010516)	5.20686 (86010516)	5.30443 (86010516)	5.15946 (86010516)	4.96604 (86010516)
170.0	3.58559 (86021316)	3.44250 (86021316)	3.20424 (86021316)	2.67603 (86021316)	2.21778 (86021316)
180.0	3.19396 (86021316)	3.05376 (86011116)	2.90565 (86011116)	2.78982 (86032108)	2.80133 (86032108)
190.0	4.00731 (86011116)	4.04638 (86011116)	3.96111 (86011116)	3.58601 (86011116)	3.18369 (86011116)
200.0	3.96477 (86112116)	3.68263 (86112116)	3.29994 (86112116)	2.56985 (86112116)	2.50547 (86120524)
210.0	5.79395 (86011216)	5.94379 (86011216)	5.83605 (86011216)	5.27520 (86011216)	4.60170 (86011216)
220.0	4.79560 (86032916)	4.56799 (86101716)	4.35308 (86101716)	3.77945 (86101716)	3.67782 (86120516)
230.0	5.69530 (86032916)	5.33953 (86032916)	4.88538 (86032916)	4.74737 (86010816)	4.60659 (86010816)
240.0	6.59600 (86101916)	6.53069 (86101916)	6.22764 (86101916)	5.36497 (86101916)	4.52775 (86101916)
250.0	6.77712 (86091716)	6.42937 (86091716)	5.94654 (86091716)	4.95003 (86091716)	4.09590 (86091716)
260.0	6.18895 (86091516)	5.90922 (86091516)	5.49920 (86091516)	4.60995 (86091516)	3.82101 (86091516)
270.0	5.37097 (86070716)	5.25719 (86111016)	5.16527 (86111016)	4.72423 (86111016)	4.26870 (86111016)
280.0	6.55154 (86111116)	6.19390 (86111116)	5.68355 (86111116)	4.62430 (86111116)	3.78782 (86112316)
290.0	5.68944 (86111116)	5.23699 (86111116)	4.67647 (86111116)	3.61763 (86111116)	2.94863 (86110716)
300.0	5.33476 (86081116)	5.02018 (86081116)	4.60557 (86081116)	3.76025 (86081116)	3.20399 (86030916)
310.0	7.39615 (86112416)	7.27262 (86112416)	6.90352 (86112416)	5.91611 (86112416)	4.95263 (86112416)
320.0	3.78495 (86112516)	3.86062 (86112516)	3.77280 (86112516)	3.36803 (86112516)	3.03123 (86081216)
330.0	4.34865 (86112516)	4.32131 (86112516)	4.13597 (86112516)	3.58203 (86112516)	3.01236 (86112516)
340.0	3.37776 (86050616)	2.87221 (86050616)	2.47871 (86100816)	2.64257 (86082024)	2.67746 (86082024)
350.0	4.38379 (86050616)	3.65021 (86050616)	3.12207 (86031616)	2.93266 (86031616)	2.64875 (86031616)
360.0	3.30259 (86051916)	3.18394 (86031616)	3.14569 (86031616)	2.90107 (86031616)	2.70998 (86121116)

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 4000.00	5000.00
10.0	3.07485 (86121216)	2.91024 (86021908)
20.0	2.64761 (86010424)	2.75277 (86010424)
30.0	2.73299 (86072924)	2.71478 (86072924)
40.0	2.35771 (86112016)	2.01440 (86112016)
50.0	2.05571 (86010416)	1.83862 (86022224)
60.0	2.75552 (86022716)	2.61056 (86073108)
70.0	3.66524 (86040824)	3.55073 (86040824)
80.0	2.32861 (86070208)	2.40019 (86070208)
90.0	3.60635 (86070316)	2.81786 (86070316)
100.0	2.83475 (86081716)	2.32893 (86042208)
110.0	3.53221 (86030616)	3.00069 (86030616)
120.0	2.91364 (86012016)	2.43808 (86012016)
130.0	2.73533c(86052124)	2.77016c(86052124)
140.0	2.56724 (86040924)	2.42413 (86040924)
150.0	2.82805c(86050724)	2.66905c(86050724)
160.0	4.40873 (86010516)	3.83731 (86010516)
170.0	1.76554 (86011108)	1.55519 (86011108)
180.0	2.64965 (86032108)	2.40977 (86032108)
190.0	2.93056c(86042308)	2.99170c(86042308)
200.0	2.39502 (86120524)	2.19995 (86120524)
210.0	3.44812 (86011216)	2.88641 (86102816)
220.0	3.41333 (86120516)	3.08230 (86120516)
230.0	4.28592 (86120624)	3.99222 (86120624)
240.0	3.24642 (86101916)	2.88532 (86111408)
250.0	2.88139 (86091716)	2.61314 (86092008)
260.0	2.67963 (86091516)	2.30180 (86111108)
270.0	3.45899 (86111016)	2.84949 (86111016)
280.0	2.83739 (86112316)	2.53269 (86102408)
290.0	2.31169c(86040408)	2.36991 (86112908)
300.0	2.51749 (86052524)	2.48751 (86052524)
310.0	3.82228 (86031308)	3.51289 (86031824)
320.0	3.12893 (86102608)	3.15374 (86102608)
330.0	2.26361 (86020508)	2.37463 (86080308)
340.0	2.85631 (86082024)	2.88748 (86082024)
350.0	2.08716 (86031616)	1.93261 (86020608)
360.0	2.71930 (86121116)	2.61405 (86121116)

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 250.00	500.00	750.00	1000.00	1250.00
10.0	3.36637 (86031924)	1.53480 (86032024)	1.14464 (86032024)	1.51845c(86063024)	1.56097c(86063024)
20.0	3.55838c(86072924)	1.99412c(86072924)	1.47225c(86080224)	2.24697c(86080224)	2.51469c(86080224)
30.0	3.60263c(86072924)	1.59633c(86072924)	1.41503c(86090124)	1.66862c(86082824)	1.95556c(86080224)
40.0	3.44948 (86042124)	1.29143c(86022224)	1.56468c(86090124)	1.51535c(86022224)	1.61065c(86022224)
50.0	6.15224 (86022724)	2.15208 (86022724)	1.89481c(86090724)	1.55264c(86022224)	1.58816c(86022224)
60.0	7.48804 (86022724)	2.39955 (86022724)	2.71343c(86071624)	2.11787c(86071624)	1.96549 (86072124)
70.0	5.83653c(86040824)	2.15937 (86072124)	2.75068c(86071624)	2.60151c(86071524)	2.68313c(86042524)
80.0	3.57895c(86040824)	2.26174c(86081824)	2.18242c(86080724)	2.51655c(86081824)	2.55874c(86060624)
90.0	5.71591 (86040924)	3.17997c(86081824)	2.96088c(86081824)	3.61195c(86081824)	3.59761c(86081824)
100.0	6.10958 (86011924)	2.68586 (86072024)	2.45956 (86072024)	2.91784 (86072024)	2.90717 (86072024)
110.0	5.70277 (86041624)	2.93153 (86041624)	2.23270 (86041624)	2.59299 (86041624)	2.70922 (86041624)
120.0	6.74806c(86012624)	2.30745c(86012024)	1.59373c(86012024)	1.84686c(86012024)	2.08932c(86012024)
130.0	8.95772c(86030124)	3.05746c(86030124)	2.02292 (86042224)	2.20490 (86042224)	2.18513 (86042224)
140.0	7.29429c(86030124)	2.16709c(86030124)	1.52918c(86052224)	2.12001c(86052224)	2.37235c(86052224)
150.0	5.80722c(86030124)	1.87759c(86030124)	1.29255c(86030124)	1.28929c(86030124)	1.36881c(86030124)
160.0	8.09030c(86010524)	2.60193c(86010524)	1.43659c(86010524)	1.50347c(86010524)	1.67146c(86010524)
170.0	4.02119 (86011124)	1.30854 (86011124)	0.97638c(86021324)	1.19765c(86021324)	1.36312c(86021324)
180.0	5.04897 (86032124)	1.95819 (86032224)	1.34119 (86032224)	1.51187 (86032224)	1.69195 (86032224)
190.0	6.96213 (86011124)	2.64190 (86011124)	1.73872 (86011124)	1.92132 (86011124)	2.15202 (86011124)
200.0	5.00059 (86120424)	1.32067 (86120424)	1.12777 (86120424)	1.37632c(86032824)	1.52675 (86120424)
210.0	4.68573 (86120624)	1.60197c(86032824)	1.42098c(86032824)	1.70517c(86032824)	1.81547c(86011224)
220.0	7.44949 (86101724)	2.88145 (86101724)	2.41056 (86101724)	2.68334 (86101724)	2.87961 (86101724)
230.0	11.86699 (86010824)	3.87566 (86010824)	2.12789 (86010824)	2.26377 (86010824)	2.56944 (86010824)
240.0	9.41365 (86111424)	3.11717 (86051024)	2.37360 (86051024)	2.57748 (86051024)	2.61761 (86051024)
250.0	5.09959 (86032524)	2.18979 (86041924)	2.00437 (86091724)	2.59977 (86091724)	2.84083 (86091724)
260.0	4.67350 (86041924)	2.10722 (86041924)	1.77499 (86083024)	2.13621c(86070724)	2.32691c(86070724)
270.0	6.70017 (86110824)	2.72205c(86040424)	2.08986 (86110824)	2.50155c(86040424)	2.76153c(86040424)
280.0	5.28646 (86040524)	2.63210c(86040424)	2.05510c(86040424)	2.57695c(86040424)	2.79475c(86040424)
290.0	3.87695 (86052724)	2.27054 (86052724)	2.02046c(86082624)	2.37823 (86052724)	2.51816 (86052724)
300.0	5.04451 (86052824)	2.25621 (86052724)	1.84388 (86052724)	2.18013 (86052724)	2.20789 (86052724)
310.0	8.18952 (86031324)	3.09602 (86031824)	2.05841 (86031824)	2.47191 (86031824)	2.79540 (86112424)
320.0	6.20065 (86031324)	1.86572 (86031824)	1.21223 (86031824)	1.36520 (86031824)	1.41215 (86031824)
330.0	4.06553 (86031924)	1.29391 (86052824)	1.34494 (86052824)	1.67360 (86052824)	1.67677 (86052824)
340.0	4.23589c(86031424)	1.40284c(86031424)	1.21650 (86050624)	1.37676 (86050624)	1.29201 (86050624)
350.0	3.26132 (86020624)	1.72471 (86050624)	1.65497 (86050624)	1.86923 (86050624)	1.71560 (86050624)
360.0	4.21180 (86020524)	1.54931 (86020524)	1.27794 (86080624)	1.27089 (86020524)	1.30787 (86020524)

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 1500.00	1750.00	2000.00	2500.00	3000.00
10.0	1.56031 (86121224)	1.56200 (86121224)	1.52097 (86121224)	1.38194 (86121224)	1.24397 (86121224)
20.0	2.44462c(86080224)	2.23015c(86080224)	1.97852c(86080224)	1.51969c(86080224)	1.17255c(86080224)
30.0	1.99922c(86080224)	1.91396c(86080224)	1.77934c(86080224)	1.67703 (86070424)	1.59705 (86070424)
40.0	1.54471c(86022224)	1.41415c(86022224)	1.26813c(86022224)	1.18930c(86081924)	1.16249c(86081924)
50.0	1.53410 (86010424)	1.55898 (86010424)	1.53247 (86010424)	1.41814 (86010424)	1.26285 (86010424)
60.0	1.94068 (86022724)	2.04118 (86022724)	2.10724 (86022724)	2.11501 (86022724)	2.06924 (86022724)
70.0	2.56046c(86042524)	2.37570 (86072124)	2.27227 (86072124)	2.05119 (86072124)	1.83053 (86072124)
80.0	2.37728c(86040824)	2.24512c(86040824)	2.08133c(86040824)	1.82469 (86070224)	1.65727 (86070224)
90.0	3.32883 (86072024)	3.11698 (86072024)	2.88641 (86072024)	2.46254 (86072024)	2.12335 (86072024)
100.0	2.69516 (86072024)	2.56084c(86081524)	2.39645c(86081524)	2.03783c(86081524)	1.73716c(86081524)
110.0	2.64053 (86041624)	2.49685 (86041624)	2.33122 (86041624)	2.01471c(86030624)	1.87460c(86030624)
120.0	2.21284c(86012024)	2.26037c(86012024)	2.26300c(86012024)	2.16840c(86012024)	2.04078c(86012024)
130.0	2.04403 (86042224)	1.87424 (86042224)	1.82810 (86012724)	1.78508 (86012724)	1.73567 (86012724)
140.0	2.36459c(86052224)	2.23179c(86052224)	2.05595c(86052224)	1.70907c(86052224)	1.44105 (86040924)
150.0	1.43061c(86030124)	1.47619c(86030124)	1.50809c(86030124)	1.51969c(86030124)	1.50245c(86030124)
160.0	1.78588c(86010524)	1.85448c(86010524)	1.88655c(86010524)	1.83287c(86010524)	1.76033c(86010524)
170.0	1.38929c(86021324)	1.33866c(86021324)	1.25298c(86021324)	1.05928c(86021324)	0.92688 (86011124)
180.0	1.75982 (86032224)	1.76253 (86032224)	1.72983 (86032224)	1.59095 (86032224)	1.46168 (86032224)
190.0	2.26777 (86011124)	2.30038 (86011124)	2.27901 (86011124)	2.12516 (86011124)	1.95967 (86011124)
200.0	1.66891 (86120424)	1.75791 (86120424)	1.80636 (86120424)	1.82378 (86120424)	1.70669 (86120424)
210.0	2.01529c(86011224)	2.06740c(86011224)	2.02993c(86011224)	1.83485c(86011224)	1.60059c(86011224)
220.0	2.95699 (86101724)	2.95938 (86101724)	2.92084 (86101724)	2.78693 (86101724)	2.57411 (86101724)
230.0	2.79221 (86010824)	2.94215 (86010824)	3.03216 (86010824)	3.00394 (86010824)	2.94207 (86010824)
240.0	2.55848c(86092124)	2.51679c(86092124)	2.53909 (86111424)	2.60265 (86111424)	2.61191 (86111424)
250.0	2.83702 (86091724)	2.71968 (86091724)	2.56322 (86091724)	2.24547 (86091724)	1.97838 (86091724)
260.0	2.20826c(86070724)	2.13237 (86110124)	2.05324 (86110124)	1.86588 (86110124)	1.69728 (86110124)
270.0	2.81806c(86040424)	2.83059 (86110824)	2.80148 (86110824)	2.65641 (86110824)	2.46402 (86110824)
280.0	2.77460c(86040424)	2.64023c(86040424)	2.46292c(86040424)	2.08616c(86040424)	1.81890 (86040524)
290.0	2.47373 (86052724)	2.34764 (86052724)	2.19446 (86052724)	1.89283 (86052724)	1.61507 (86052724)
300.0	2.09203 (86081124)	2.00857 (86081124)	1.90479 (86092924)	1.76710 (86092924)	1.62524 (86092924)
310.0	2.93682 (86112424)	2.92328 (86112424)	2.82447 (86112424)	2.53889 (86031824)	2.35626 (86031824)
320.0	1.52105c(86112524)	1.55797c(86112524)	1.53571c(86112524)	1.42379 (86081224)	1.37005c(86080324)
330.0	1.74232c(86112524)	1.74182c(86112524)	1.68378c(86112524)	1.49492c(86112524)	1.28428c(86112524)
340.0	1.17832 (86112624)	1.16143c(86031424)	1.20074c(86031424)	1.33116 (86082024)	1.38464 (86082024)
350.0	1.46130 (86050624)	1.21677 (86050624)	1.04069 (86031624)	0.97755 (86031624)	0.88292 (86031624)
360.0	1.31770 (86020524)	1.30747 (86020524)	1.28593 (86020524)	1.22275 (86020524)	1.16678 (86020524)

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): 1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 4000.00	5000.00
10.0	1.15240 (86021924)	1.13148 (86021924)
20.0	1.11704 (86010424)	1.11645 (86010424)
30.0	1.54438 (86070424)	1.49530 (86070424)
40.0	1.08744c(86081924)	1.01046c(86081924)
50.0	1.07039 (86022724)	0.91515c(86022224)
60.0	1.94043 (86022724)	1.76992 (86022724)
70.0	1.72477c(86040824)	1.62315c(86040824)
80.0	1.41640 (86070224)	1.27745 (86070224)
90.0	1.63802 (86072024)	1.36452 (86072024)
100.0	1.33222 (86011924)	1.19365 (86011924)
110.0	1.59098c(86030624)	1.35239c(86030624)
120.0	1.83311c(86012024)	1.64861c(86012024)
130.0	1.58071 (86012724)	1.40994 (86012724)
140.0	1.32548 (86040924)	1.21898 (86040924)
150.0	1.43778c(86030124)	1.37825c(86030124)
160.0	1.56140c(86010524)	1.35837c(86010524)
170.0	0.83153 (86011124)	0.72794 (86011124)
180.0	1.23512 (86032124)	1.11008 (86032124)
190.0	1.62899 (86011124)	1.37292 (86011124)
200.0	1.57279 (86120424)	1.43862 (86120424)
210.0	1.43731c(86102824)	1.33907c(86102824)
220.0	2.28590 (86101724)	2.08474 (86101724)
230.0	2.68725 (86010824)	2.39103 (86010824)
240.0	2.49312 (86111424)	2.30432 (86111424)
250.0	1.74603 (86092024)	1.72316 (86092024)
260.0	1.41451 (86110124)	1.27881 (86110124)
270.0	2.14647 (86110824)	1.92259 (86110824)
280.0	1.53707 (86040524)	1.33384 (86040524)
290.0	1.26830 (86052724)	1.06813c(86092724)
300.0	1.36383 (86092924)	1.25898c(86052524)
310.0	2.06950 (86031324)	1.80310 (86031324)
320.0	1.41759c(86080324)	1.38255c(86080324)
330.0	1.12297c(86080324)	1.12050c(86080324)
340.0	1.42903 (86082024)	1.37587 (86082024)
350.0	0.78861c(86010124)	0.74848c(86010124)
360.0	1.03054 (86020524)	0.95684 (86020524)

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	0.53887 AT (-191.51, -160.70, 0.00, 0.00)	GP	POL
	2ND HIGHEST VALUE IS	0.50011 AT (-216.51, -125.00, 0.00, 0.00)	GP	POL
	3RD HIGHEST VALUE IS	0.46148 AT (-216.51, 125.00, 0.00, 0.00)	GP	POL
	4TH HIGHEST VALUE IS	0.45802 AT (-250.00, 0.00, 0.00, 0.00)	GP	POL
	5TH HIGHEST VALUE IS	0.45122 AT (-234.92, -85.51, 0.00, 0.00)	GP	POL
	6TH HIGHEST VALUE IS	0.41680 AT (-246.20, -43.41, 0.00, 0.00)	GP	POL

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)				OF	TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	21.28599	ON 86010516: AT (	85.51,	-234.92,	0.00,	0.00)	GP	POL	
	HIGH 2ND HIGH VALUE IS	18.07550	ON 86010816: AT (	-191.51,	-160.70,	0.00,	0.00)	GP	POL	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)				OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	11.86699	ON 86010824: AT (	-191.51,	-160.70,	0.00,	0.00)	GP	POL
	HIGH 2ND HIGH VALUE IS	10.91032	ON 86120624: AT (	-191.51,	-160.70,	0.00,	0.00)	GP	POL

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

*** MODELING OPTIONS USED: CONC RURAL FLAT DFAULT

*** Message Summary For ISC2 Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 0 Warning Message(s)
A Total of 816 Informational Message(s)

A Total of 816 Calm Hours Identified

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********
*** NONE ***

****
*** ISCST2 Finishes Successfully ***
****

PARTICULATE MATTER, PARTICLE SIZE, TOTAL HYDROCARBONS, SULFUR DIOXIDE, NITROGEN OXIDES, CARBON MONOXIDE, AND VISIBLE EMISSION MEASUREMENTS

KILN NO. 1
FUEL: 70% COAL - 30% FLOLITE

PERMIT NO. AC27-186923

FLORIDA MINING AND MATERIALS, INC.
BROOKSVILLE, FLORIDA

February 28, 1992

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

5. SUMMARY OF RESULTS

The results of the particulate matter emission measurements conducted on February 28, 1992, are summarized in Table 1. During the test period, the particulate matter emission rate averaged 8.96 pounds per hour compared to the allowable of 39 pounds per hour, and the stack gas flow averaged 173967 dry standard cubic feet per minute at 240°F and 11.3 percent moisture. The nitrogen oxides emission rate averaged 26.14 pounds per hour; the carbon monoxide emission rate averaged 39.41 pounds per hour; the total hydrocarbons emission rate averaged 2.77 pounds per hour (as propane); and the sulfur dioxide emission rate averaged 1.44 pounds per hour as summarized in Table 2.

The opacity of visible emissions was zero percent for the one-hour observation period. The permit requires an opacity of less than 20 percent.

The particle sizing indicated that virtually all of the particles released from the Kiln No. 1 study are less than 10 micrometers in diameter.

All of the CEM emissions data are summarized in Table 2. Field and laboratory data sheets, field notes, emission calculations, and a list of project participants are included in the Appendix of the report.

TABLE 2

SUMMARY OF SOURCE VOC, NOx, CO AND SO2 EMISSION MEASUREMENTS

FLORIDA MINING & MATERIALS / BROOKSVILLE, FL
NO. 1 KILN / 70% COAL - 30% FLOLITE
FEBRUARY 28, 1992

Run No.	VOC		NOx		CO		SO2	
	ppm	lb/hr	ppm	lbs/hr	ppm	lbs/hr	ppm	lbs/hr
1	2	2.28	21	24.99	45	32.59	0.50	0.82
2	3	3.65	20	25.42	44	37.47	0.99	1.75
3	2	2.45	22	28.18	46	40.74	0.98	1.75
Avg.		2.77		26.14		39.41		1.44

Calculations: NOx, CO, VOC

$$lb/hr = ft^3/min \times 60\ min/hr \times (conc.\ ppm) \times MW/385 \times 10^{-6}$$

MW (NOx) = 46
MW (CO) = 28
MW (VOC) = 44 (as propane)

Calculation: SO_2 are separate in Appendix

KOOGLER & ASSOCIATES

TABLE 3

FUEL RATES AND PROCESS RATE

KILN NO. 1 - 70% COAL - 30% FLOLITE

FEBRUARY 26, 1992

Test 2 70% Coal(1) at 7.35 TPH

30% Flolite(2) at 8.35 GPM

Calculation: (1) 7.35 TPH x 12,500 BTU/lb x 2000 lb/ton

= 184 MMBTU/hr

(2) 8.35 GPM x 145,000 BTU/gal x 60 min/hr

= 73 MMBTU/hr

KOOGLER & ASSOCIATES

PARTICULATE MATTER, PARTICLE SIZE, TOTAL HYDROCARBONS, SULFUR DIOXIDE, NITROGEN OXIDES AND CARBON MONOXIDE

KILN NO. 1
FUEL: COAL

PERMIT NO. AC27-186923

FLORIDA MINING AND MATERIALS, INC.
BROOKSVILLE, FLORIDA

February 28, 1992

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

KOOGLER & ASSOCIATES

5. SUMMARY OF RESULTS

The results of the particulate matter emission measurements conducted on February 28, 1992, are summarized in Table 1. During the test period, the particulate matter emission rate averaged 6.15 pounds per hour (compared to the allowable of 39 lbs/hr) and the stack gas flow averaged 179538 dry standard cubic feet per minute at a temperature of 233°F and a moisture content of 9.1 percent. The nitrogen oxides emission rate averaged 321.8 pounds per hour; the carbon monoxide emission rate averaged 39.41 pounds per hour; the total hydrocarbons emission rate averaged 2.06 pounds per hour (as propane); and the sulfur dioxide emission rate averaged 1.16 pounds per hour as summarized in Table 2.

The opacity of visible emissions was zero percent for the one-hour observation period compared to the permit requirement of less than 20 percent.

The particle sizing indicated that virtually all of the particles released from the Kiln NO. 1 study are less than 10 micrometers in diameter.

Field and laboratory data sheets, field notes, emission calculations, and a list of project participants are included in the Appendix of the report.

TABLE 2

SUMMARY OF SOURCE VOC, NOx, CO AND SO2 EMISSION MEASUREMENTS

FLORIDA MINING & MATERIALS / BROOKSVILLE, FL
NO. 1 KILN / 100% COAL
FEBRUARY 28, 1992

Run No.	VOC		NOx		CO		SO2	
	ppm	lb/hr	ppm	lbs/hr	ppm	lbs/hr	ppm	lbs/hr
1	1	1.24	250	322.9	51	40.09	0.49	0.89
2	2	2.45	240	307.8	48	37.47	0.72	1.28
3	2	2.46	260	334.6	52	40.74	0.74	1.33
Avg.		2.06		321.8		39.41		1.16

Calculations: NOx, CO, VOC

$$lb/hr = ft^3/min \times 60\ min/hr \times (conc.\ ppm) \times MW/385 \times 10^{-6}$$

MW (NOx) = 46
MW (CO) = 28
MW (VOC) = 44 (as propane)

Calculation: SO_2 are separate in Appendix

KOOGLER & ASSOCIATES

TABLE 3

FUEL RATES AND PROCESS RATE

KILN NO. 1 - COAL

FEBRUARY 28, 1992

Run 3 Coal at 9.75 TPH

Calculation: 9.75 TPH x 12,500 BTU/lb x 2000 lb/ton

= 244 MMBTU/hr

130 TPH FEED TO KILN

KOOGLER & ASSOCIATES

PARTICULATE MATTER, PARTICLE SIZE, TOTAL HYDROCARBONS, SULFUR DIOXIDE, NITROGEN OXIDES, CARBON MONOXIDE, AND VISIBLE EMISSION MEASUREMENTS

KILN NO. 2
FUEL: COAL

PERMIT NO. A027-194660

FLORIDA MINING AND MATERIALS, INC.
BROOKSVILLE, FLORIDA

March 24, 1992

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

KOOGLER & ASSOCIATES

5. SUMMARY OF RESULTS

The results of the particulate matter emission measurements conducted on March 24, 1992, are summarized in Table 1. During the test period, the particulate matter emission rate averaged 4.12 pounds per hour compared to the allowable of 13.5 pounds per hour, and the stack gas flow averaged 163230 dry standard cubic feet per minute at a temperature of 197°F and a moisture content of 9.0 percent. The nitrogen oxides emission rate averaged 101.4 pounds per hour compared to the allowable of 162.3 pounds per hour; the carbon monoxide emission rate averaged 40.2 pounds per hour compared to the allowable of 64.0 pounds per hour; the total hydrocarbons emission rate averaged 2.2 pounds per hour (as propane) compared to the allowable of 7.4 pounds per hour; and the sulfur dioxide emission rate averaged 7.6 pounds per hour compared to the allowable of 11.5 pounds per hour (see Table 2).

The opacity of emissions was zero percent for the one-hour observation period. The permit requires an opacity of less than 10 percent.

The particle sizing indicated that approximately 65 percent of the particles released from Kiln No. 2 are less than 10 micrometers in diameter (see Figure 2).

Field and laboratory data sheets, field notes, emission calculations, and a list of project participants are included in the Appendix of the report.

TABLE 2

SUMMARY OF SOURCE VOC, NOx, CO AND SO2 EMISSION MEASUREMENTS

FLORIDA MINING & MATERIALS / BROOKSVILLE, FL
NO. 2 KILN / COAL
MARCH 24, 1992

Run No.	VOC		NOx		CO		SO2	
	ppm	lb/hr	ppm	lbs/hr	ppm	lbs/hr	ppm	lbs/hr
1	2	2.3	90	108.0	52.9	38.6	2.6	4.2
2	2	2.2	85	99.3	57.2	40.7	3.6	5.9
3	2	2.2	85	97.0	59.6	41.4	7.8	12.7
Avg.		2.2(1)		101.4		40.2		7.6

(1) As propane

Calculations: NOx, CO, VOC, SO_2

$$lb/hr = ft^3/min \times 60\ min/hr \times (conc.\ ppm) \times MW/385 \times 10^{-6}$$

MW (NOx) = 46
MW (CO) = 28
MW (VOC) = 44 (as propane)
MN (SO_2) = 64

TABLE 3

FUEL RATES AND PROCESS RATE

KILN NO. 2 - COAL

MARCH 24, 1992

COAL FEED RATE AVERAGED 7.79 TONS PER HOUR

HEAT INPUT = 7.79 tph x 12,500 BTU/pound x 2000 pounds/ton

= 195 MMBTU

KILN FEED RATE AVERAGED 139.4 TONS PER HOUR.

PARTICULATE MATTER, TOTAL HYDROCARBONS, SULFUR DIOXIDE, CARBON MONOXIDE, AND VISIBLE EMISSION MEASUREMENTS

NO. 2 CEMENT KILN
FUEL: COAL

FLORIDA MINING AND MATERIALS, INC.
BROOKSVILLE, FLORIDA

PERMIT NO. AC27-212252
(Expires December 31, 1993)

February 10, 1993

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

5. SUMMARY OF RESULTS

The results of the particulate matter emission measurements conducted on February 10, 1993, are summarized in Table 1. During the test period, the particulate matter emission rate averaged 6.36 pounds per hour compared to the allowable of 13.5 pounds per hour, and the stack gas flow averaged 155630 dry standard cubic feet per minute at a temperature of 197°F and a moisture content of 12.2 percent. The carbon monoxide emission rate averaged 43.8 pounds per hour compared to the allowable of 64.0 pounds per hour; the total hydrocarbons emission rate averaged 2.25 pounds per hour (as propane) compared to the allowable of 7.4 pounds per hour; and the sulfur dioxide emission rate averaged 1.55 pounds per hour compared to the allowable of 11.5 pounds per hour (see Table 2). The nitrogen oxides emission rate will be monitored over a 30-day period and a separate test report will be submitted at the end of that period.

The opacity of emissions was zero percent for the one-hour observation period. The permit requires an opacity of less than 10 percent.

Field and laboratory data sheets, field notes, emission calculations, and a list of project participants are included in the Appendix of the report.

TABLE 2

SUMMARY OF VOC, CO AND SO2 EMISSION MEASUREMENTS

FLORIDA MINING & MATERIALS / BROOKSVILLE, FL
NO. 2 KILN / COAL
FEBRUARY 10, 1993

Run No.	VOC		CO		SO2	
	ppm	lb/hr	ppm	lbs/hr	ppm	lbs/hr
1	2.45	2.62	61.3	41.6	1.0	1.6
2	1.98	2.12	69.4	47.3	1.0	1.6
3	1.91	2.03	61.9	41.8	1.0	1.6
Avg.		2.25(1)		43.8		1.6

(1) As propane

Calculations: CO, VOC, SO_2

$$lb/hr = ft^3/min \times 60\ min/hr \times (conc.\ ppm) \times MW/385 \times 10^{-6}$$

MW (CO) = 28
MW (VOC) = 44 (as propane)
MN (SO_2) = 64

KOOGLER & ASSOCIATES

TABLE 3

FUEL RATES AND PROCESS RATE

KILN NO. 2 - COAL

FEBRUARY 10, 1993

COAL FEED RATE AVERAGED 7.34 TONS PER HOUR

HEAT INPUT = 7.34 tph x 12,500 BTU/pound x 2000 pounds/ton

= 184 MMBTU

KILN FEED RATE AVERAGED 138.7 TONS PER HOUR.

KOOGLER & ASSOCIATES

11.0 DIOXIN AND FURAN EMISSION COMPARISON

Dioxin and furan emission rates were measured over three two-hour periods during the baseline test on May 5, 1993, and for the same duration during the coal/TDF firing period on June 9, 1993. The measurements were made in accordance with EPA Method 23 (40CFR60, Appendix A). Under both sets of operating conditions, the dioxin and furan concentrations in all samples were below the limit of detection of the analytical method.

It can therefore be concluded that dioxins and furans are not present in the stack gas from Kiln No. 1 under either baseline conditions or coal/TDF conditions.

12.0 OPACITY OF EMISSIONS

The opacity of emissions was observed during four one-hour periods during both the baseline tests and the coal/TDF tests. No visible emissions were observed during any of the observation periods. It can therefore be concluded that the use of TDF has no effect on the opacity of emissions from Kiln No. 1.

13.0 STACK GAS FLOW AND CHARACTERISTICS

The stack gas flow rate, temperature and moisture were measured during six test runs under baseline conditions and six test runs under coal/TDF firing conditions and oxygen and carbon dioxide concentrations were measured during each two-hour period during the 12 hours of monitoring conducted on each of the four test dates.

The stack gas flow rate averaged 187,443 dscfm under baseline conditions and 176,009 dscfm under coal/TDF firing conditions (Table 16). The stack gas temperature averaged 248°F under baseline conditions and 251°F under coal/TDF conditions (Table 17). The stack gas moisture averaged 9.6 percent under baseline conditions and 10.2 percent under coal/TDF firing conditions (Table 18). The oxygen (Table 19) and carbon dioxide (Table 20) concentrations averaged 14.0 and 13.7 percent and 11.6 and 11.6 percent, respectively, under baseline and coal/TDF conditions.

Although there was a slight difference in the stack gas flow rates (as a result of a higher flow rate measured on the second day of baseline testing [5/5/93]), there were no significant differences in the other parameters and all of the stack gas parameters were within ranges normally observed. It can be concluded that the use of TDF as a fuel supplement has no effect on stack gas characteristics.

TABLE 16
COMPARISON OF STACK GAS FLOW RATE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run		Baseline dscfm	TDF dscfm
	1	171750	175893
	2	178834	167984
	3	178597	178353
	4	190365	180008
	5	198498	178665
	6	206616	175148
Mean		187443	176009
S var		179398377	18739215
n		6	6
Pooled est		9953	
t stat.		1.99	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 17
COMPARISON OF STACK TEMPERATURE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run		Baseline F	TDF F
	1	251.20	258.00
	2	249.60	264.00
	3	241.30	240.00
	4	250.88	242.00
	5	247.83	255.00
	6	244.54	247.00
Mean		247.56	251.00
S var		15.36	90.40
n		6.00	6.00
Pooled est		7.27	
t stat.		0.82	
t' (95% C.I.)		1.812	

Difference is not significant

TABLE 18
COMPARISON OF STACK GAS MOISTURE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline %	TDF %
1	10.50	9.90
2	10.70	10.20
3	10.70	11.80
4	9.00	10.00
5	8.30	9.50
6	8.30	10.10
Mean	9.58	10.25
S var	1.39	0.64
n	6.00	6.00
Pooled est	1.01	
t stat.	1.15	
t' (95% C.I.)	1.812	

Difference is not significant

TABLE 19
COMPARISON OF STACK GAS OXYGEN CONCENTRATION
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline %	TDF %
1	13.03	14.20
2	12.50	14.30
3	14.13	13.10
4	14.10	12.30
5	13.13	13.30
6	13.20	13.80
7	14.27	14.50
8	14.57	14.00
9	14.43	13.10
10	15.00	13.90
11	15.00	13.80
12	15.17	13.70
Mean	14.04	13.67
S var	0.78	0.38
n	12.00	12.00
Pooled est	0.76	
t stat.	1.21	
t' (95% C.I.)	1.717	

Difference is not significant

TABLE 20
COMPARISON OF STACK GAS CARBON DIOXIDE CONCENTRATION
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline %	TDF %
1	12.37	11.80
2	12.83	9.70
3	12.20	11.90
4	12.57	11.70
5	12.20	11.70
6	11.47	12.20
7	10.85	10.50
8	10.86	12.00
9	10.57	11.90
10	11.00	12.10
11	11.00	12.20
12	10.83	12.10
Mean	11.56	11.65
S var	0.66	0.58
n	12.00	12.00
Pooled est	0.79	
t stat.	0.27	
t' (95% C.I.)	1.717	

Difference is not significant

14.0 CONCLUSIONS

Based on the comparison of emission data and plant operating data collected during the baseline period (100 percent coal firing) on May 4-5, 1993 and during the coal/TDF period on June 8-9, 1993, it can be concluded that the use of TDF to provide up to 20 percent of the heat input to Kiln No. 1 has no effect on emissions, operations or clinker quality.

KOOGLER & ASSOCIATES
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4014 NW THIRTEENTH STREET
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904/377-5822 ▪ FAX 377-7158

KA 521-93-03

July 22, 1993

RECEIVED
JUL 30 1993
Division of Air
Resources Management

Mr. Chisun Lee
Florida Department of
Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619-8318

Subject: Comparison Report and Summary Report of Air Pollutant Emission Measurements Conducted on Florida Mining & Materials Kiln No. 1 Under Baseline and Coal/TDF Firing Conditions

Dear Mr. Lee:

Enclosed are two reports which describe the results of air pollutant emission measurements conducted on Florida Mining & Materials' Kiln No. 1 under baseline (May 4-5, 1993) and coal/TDF (June 8-9, 1993) firing conditions. One report is a summary of the results of these tests and the other report provides a comparison of the test results.

If you have any questions concerning the enclosed reports, please do not hesitate to give me a call.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:mab

c: Mr. Bruce Mitchell, FDER, Tallahassee
Mr. Charles Hetrick, HCBC
Ms. Anetha Lue, P.E., Southdown, Inc.
Mr. Amarjit Gill, P.E., Southdown, Inc.
Mr. Don Kelly, Florida Mining & Materials
Mr. Tony Cleveland, Esq., Oertel, Hoffman, et al
Mr. David Dee, Esq., Carlton, Fields, et al
Mr. David Buff, KBN Engineering, Gainesville

COMPARISON OF PARTICULATE MATTER, SULFUR DIOXIDE, TOTAL HYDROCARBONS, CARBON MONOXIDE, NITROGEN OXIDES, HYDROGEN CHLORIDE, SPECIATED VOLATILE ORGANICS, METALS AND DIOXINS/FURANS EMISSION MEASUREMENTS AND OPACITIES OF EMISSIONS UNDER BASELINE AND COAL/TDF FIRING CONDITIONS

KILN NO.1

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA

MAY 4-5, 1993
AND
JUNE 8-9,1993

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

TABLE OF CONTENTS

To the best of my knowledge, all applicable field and analytical procedures comply with the Florida Department of Environmental Protection requirements and all test data and plant operating data are true and correct.

John B. Koogler, Ph.D., P.E.

State of Florida
Registration No. 12925

7/22/95
Date

KOOGLER & ASSOCIATES

1.0 INTRODUCTION

Southdown, Incorporated, doing business as Florida Mining & Materials (FM&M), operates two dry process cement kilns at the Brooksville facility located south of Highway 98 in Hernando County, Florida. On February 5, 1993, FM&M received approval from the Florida Department of Environmental Protection (FDEP) to conduct tests on the No. 1 cement kiln to evaluate the effect of burning a combination of coal and whole tire derived fuel (TDF).

Kiln No. 1 is presently operating under Permit A027-213207. The permit limits the feed rate to the kiln to 130 tons per hour (corresponding to a preheater feed rate of 145 tons per hour), limits the clinker production rate to 79.6 tons per hour and limits the heat input to the kiln to 300 MMBTU per hour. The permit also limits the emission rate of particulate matter from the kiln to 39.0 pounds per hour and limits the opacity of emissions to 20 percent, maximum six-minute average.

The primary heat input to Kiln No. 1 is pulverized coal. The amendment to Permit A027-213207, issued on February 5, 1993, allows FM&M to test using TDF to provide up to 20 percent of the heat input to the kiln. The TDF is fed through a double air lock feeder at the base of the preheater (near the point where feed material enters the kiln).

The TDF test was scheduled for a 43-day period; an initial 30-day period when TDF would be used to provide up to 20 percent of the heat input to the No. 1 kiln system, a four-day period for the plant to stabilize on coal, a two-day period for baseline testing (100 percent coal), a five-day period for the plant to stabilize on coal/TDF and a two-day test period with coal providing approximately 80 percent of the heat input and TDF providing approximately 20 percent of the heat input. The time periods proposed were operating days as opposed to calendar days.

The 30-day period of TDF firing began on March 29, 1993. The baseline tests were conducted on May 4-5, 1993 and the coal/TDF tests were conducted on June 8-9, 1993. Between the baseline test period (May 4-5, 1993) and the coal/TDF test period (June 8-9, 1993), the No. 1 kiln system was shut down for repair and maintenance. The extent of the repair and maintenance was documented in a separate transmittal to FDEP and Hernando County. The documentation demonstrated that the repairs had no effect on kiln operations.

During both test periods, the test protocol required the monitoring of certain plant operating conditions and the measurement of emission rates of various constituents from the Kiln No. 1 stack. The plant operating conditions included the preheater feed rate, the fuel feed rate (coal and TDF), the temperatures at the feed end of the kiln and at the preheater exit, and the oxygen concentration at the feed end of the kiln. Additionally, the raw material fed into the kiln, the clinker and the fuel were to be analyzed for specified constituents.

Emission measurements were to be made for particulate matter, certain metals, hydrogen chloride, nitrogen oxides, sulfur dioxide, carbon monoxide, total VOCs, speciated VOCs, dioxins and furans. Additionally, the stack gas characteristics were to be measured, including the carbon dioxide and oxygen concentration of the stack gas, and visible emission observations were to be conducted.

In the following sections, the results of the measurements and operating rates under baseline and coal/TDF conditions are compared.

2.0 PLANT OPERATING CONDITIONS

The plant operating conditions that were to be monitored during the two test periods were documented in an FDEP-approved Test Protocol. Plant operating parameters monitored during the baseline and coal/TDF periods are summarized in Tables 1 and 2. A comparison of these data demonstrates that Kiln No. 1 was operating under similar conditions during both test periods. The feed rates to the preheater and other kiln conditions were within the normal range of plant operations during the two test periods and the preheater feed rates were near the maximum permitted rate of 145 tons per hour. During the baseline period, 100 percent of the heat input to Kiln No. 1 (212 MMBTU/hr) was provided with coal. During the coal/TDF test period, coal provided about 78.3 percent of the heat input (182.8 MMBTU/hr) and TDF provided the remaining 21.7 percent (50.8 MMBTU/hr).

Clinker, raw feed and fuel analyses for the baseline and TDF test periods are included in Tables 3, 4, 5 and 6. These data demonstrate that there are no significant differences in the feed, clinker or fuel during the two test periods; other than variations within the normal day-to-day range of these parameters.

TABLE 1
PLANT OPERATING DATA
FLORIDA MINING & MATERIALS
KILN # 1 - BASELINE CONDITIONS

BROOKSVILLE, FLORIDA
MAY 4 AND 5, 1993

May 4, 1993

Time	Kiln Feed (tph)	Coal Feed (tph)	Coal Heat Input (MMBTU/hr)	Kiln Exit Temp. (oF)	Preheater Exit Temp. (oF)	Kiln Exit O2 (%)
0900	144.7	8.66	220.6	1600	750	2.2
1100	142.7	8.43	214.8	1650	760	0.6
1300	147.8	8.55	217.8	1620	750	0.1
1500	139.0	8.45	215.3	NR	NR	NR
1700	139.0	8.19	208.6	1610	750	1.5
1900	139.0	8.65	220.4	1600	740	2.2
2100	139.0	7.92	201.8	1610	750	2.0
Avg	141.6	8.41	214.18	1615	750	1.4

May 5, 1993

0900	104.8	8.32	208.9	1720	820	1.3
1100	141.5	7.08	177.8	1650	760	1.4
1300	146.7	9.29	233.3	1640	760	0.6
1500	145.7	8.67	217.7	NR	NR	NR
1700	145.7	8.50	213.4	1625	750	1.0
1900	145.7	8.31	208.7	1620	750	0.8
2100	145.7	8.31	208.7	1640	760	0.2
Avg	139.4	8.35	209.8	1649	767	0.9

NR - Not reported in control room log.

TABLE 2
PLANT OPERATING DATA
FLORIDA MINING & MATERIALS
KILN # 1 - COAL/TDF CONDITIONS

BROOKSVILLE, FLORIDA
JUNE 8 AND 9, 1993

June 8, 1993

Time	Kiln Feed (tph)	Coal Feed (tph)	Coal Heat Input MMBTU/hr	TDF Feed (tph)	TDF Heat Input MMBTU/hr	Kiln Exit Temp. (oF)	Preheat. Exit Temp. (oF)	Kiln Exit O2 (%)
0900	138.5	7.07	174.5	1.65	53.46	1610	760	5.0+
1100	101.9	7.07	174.5	1.64	53.14	1800	770	3.2
1300	142.6	7.07	174.5	1.34	43.42	1760	760	3.5
1500	133.3	7.39	182.4	1.60	51.84	NR	NR	NR
1700	133.3	7.39	182.4	1.64	53.14	1740	735	2.8
1900	136.3	7.39	182.4	1.64	53.14	1730	720	4.2
2100	140.3	7.39	182.4	1.72	55.73	1630	750	4.5
Avg	132.3	7.25	179.0	1.60	51.98	1712	749	3.9

June 9, 1993

0900	142.4	7.70	185.3	1.37	44.39	1720	760	2.3
1100	142.4	7.70	185.3	1.52	49.25	1800	770	2.4
1300	142.4	7.70	185.3	1.56	50.55	1820	760	3.1
1500	140.2	7.80	187.7	1.46	47.31	NR	NR	NR
1700	140.2	7.80	187.7	1.62	52.49	1760	755	2.6
1900	140.2	7.80	187.7	1.61	52.17	1780	765	3.4
2100	140.2	7.80	187.7	1.58	51.20	1740	760	3.2
Avg	141.1	7.76	186.7	1.53	49.62	1770	762	2.8

NR - Not reported in control room log.

TABLE 3
KILN FEED AND CLINKER ANALYSIS
FLORIDA MINING & MATERIALS
KILN # 1 - BASELINE CONDITIONS

BROOKSVILLE, FLORIDA
MAY 4 AND 5, 1993

Element	KILN FEED - 5/4/93 Conc. (%)		CLINKER - 5/4/93 Conc. (%)	
SiO2	20.42	C3S = 81.76	21.64	C3S = 62.24
Al2O3	4.90	C2S = -3.14	5.17	C2S = 15.10
Fe2O3	4.06	C3A = 6.12	4.35	C3A = 6.33
CaO	67.72	C4AF = 12.34	66.12	C4AF = 13.24
MgO	0.70	S/R = 2.28	0.68	S/R = 2.27
SO3	0.01	A/F = 1.21	0.52	A/F = 1.19
Na2O	0.10	LP = 26.49	0.15	LP = 26.50
K2O	0.10	LSF = 101.56	0.62	LSF = 93.58
	------	Na2O Equiv = 0.16	------	Na2O Equiv = 0.56
Total	98.01	Burn.F = 121.68	99.25	Burn.F = 111.96
		Burn.I = 4.43		Burn.I = 3.18
		Factor = 0.9856		Factor = 1.0000

Element	KILN FEED - 5/5/93 Conc. (%)		CLINKER - 5/5/93 Conc. (%)	
SiO2	19.32	C3S = 94.66	21.53	C3S = 64.43
Al2O3	4.86	C2S = -16.02	5.26	C2S = 13.13
Fe2O3	4.09	C3A = 5.96	4.42	C3A = 6.47
CaO	68.79	C4AF = 12.45	66.58	C4AF = 13.44
MgO	0.74	S/R = 2.16	0.73	S/R = 2.23
SO3	0.01	A/F = 1.19	0.45	A/F = 1.19
Na2O	0.10	LP = 26.48	0.15	LP = 26.87
K2O	0.09	LSF = 108.25	0.52	LSF = 94.41
	------	Na2O Equiv = 0.16	------	Na2O Equiv = 0.49
Total	98.00	Burn.F = 127.05	99.64	Burn.F = 112.47
		Burn.I = 5.14		Burn.I = 3.24
		Factor = 0.9837		Factor = 1.0000

TABLE 4
KILN FEED AND CLINKER ANALYSIS
FLORIDA MINING & MATERIALS
KILN # 1 - COAL/TDF CONDITIONS

BROOKSVILLE, FLORIDA
JUNE 8 AND 9, 1993

Element	KILN FEED - 6/8/93 Conc. (%)		CLINKER - 6/8/93 Conc. (%)	
SiO2	20.23	C3S = 81.48	20.88	C3S = 64.64
Al2O3	5.05	C2S = -3.47	5.37	C2S = 11.09
Fe2O3	4.20	C3A = 6.27	4.79	C3A = 6.13
CaO	67.61	C4AF = 12.79	65.70	C4AF = 14.56
MgO	0.71	S/R = 2.19	0.70	S/R = 2.06
SO3	0.03	A/F = 1.20	0.44	A/F = 1.12
Na2O	0.10	LP = 25.24	0.15	LP = 27.94
K2O	0.07	LSF = 101.75	0.49	LSF = 95.24
	------	Na2O Equiv = 0.15	------	Na2O Equiv = 0.47
Total	98.00	Burn.F = 120.97	98.52	Burn.F = 111.79
		Burn.I = 4.28		Burn.I = 3.12
		Factor = 0.9864		Factor = 1.0000

Element	KILN FEED - 6/9/93 Conc. (%)		CLINKER - 6/9/93 Conc. (%)	
SiO2	19.26	C3S = 92.45	20.78	C3S = 66.49
Al2O3	5.08	C2S = -14.52	5.26	C2S = 9.40
Fe2O3	4.23	C3A = 6.30	4.78	C3A = 5.84
CaO	68.53	C4AF = 12.87	65.82	C4AF = 14.56
MgO	0.72	S/R = 2.07	0.69	S/R = 2.07
SO3	0.00	A/F = 1.20	0.50	A/F = 1.10
Na2O	0.10	LP = 24.41	0.15	LP = 27.64
K2O	0.08	LSF = 107.44	0.53	LSF = 96.06
	------	Na2O Equiv = 0.15	------	Na2O Equiv = 0.50
Total	98.00	Burn.F = 125.43	98.51	Burn.F = 112.64
		Burn.I = 4.82		Burn.I = 3.26
		Factor = 0.9892		Factor = 1.0000

TABLE 5
FUEL ULTIMATE ANALYSIS
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILE, FLORIDA

May 4-5, 1993
AND
JUNE 8-9, 1993

Parameter	UNIT	BASELINE COMPOSITE COAL 5/4-5/93	COAL/TDF COMPOSITE COAL 6/8-9/93	COAL/TDF COMPOSITE TDF 6/8-9/93
Moisture	(%)	6.34	7.75	0.47
Carbon	(%)	70.5	67.77	74.35
Hydrogen	(%)	4.69	4.55	7.08
Nitrogen	(%)	1.39	1.24	0.41
Sulfur	(%)	0.83	0.96	1.02
Ash	(%)	9.91	11.28	9.40
Oxygen	(%)	6.36	6.45	0.73
Heating Value	(Btu/lb)	12646	12186	15141

All parameters reported AS RECEIVED

TABLE 6
KILN FEED, COAL AND CLINKER METAL ANALYSES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIAL
BROOKSVILLE, FLORIDA

MAY 4-5, 1993
AND
JUNE 8-9, 1993

Metal	UNIT	BASELINE COMPOSITE KILN FEED 5/4-5/93	COAL/TDF COMPOSITE KILN FEED 6/8-9/93	BASELINE COMPOSITE COAL 5/4-5/93	COAL/TDF COMPOSITE COAL 6/8-9/93	BASELINE COMPOSITE CLINKER 5/4-5/93	COAL/TDF COMPOSITE CLINKER 6/8-9/93	COAL/TDF COMPOSITE TIRE 6/8-9/93
Arsenic	(ug/g)	16	25	6	16	29	34	<1
Chromium	(ug/g)	35	47	6	6	73	97	5
Lead	(ug/g)	66	66	8	4	83	100	5
Mercury	(ug/g)	0.24	0.24	0.10	0.18	<0.02	<0.02	0.04
Zinc	(ug/g)	38	59	10	6	92	82	4400
Chlorine	(% Wt)	0.12	0.12	0.16	0.16	0.07	0.07	0.07

3.0 PARTICULATE MATTER EMISSION COMPARISON

Particulate matter emission rates were measured during the baseline period on May 4, 1993, and during the coal/TDF firing period on June 8, 1993. Under both sets of operating conditions, the particulate matter emission rates were well below the permitted emission rate of 39 pounds per hour and within the range of particulate matter emissions measured from the kiln on other occasions.

The data presented in Table 7 show an average emission rate of 9.13 pounds per hour during the coal/TDF period and an emission rate of 7.04 pounds per hour during the baseline period. These emission rates are not significantly different. Therefore, it can be concluded that the use of TDF to provide up to 20 percent of the heat input has no significant effect on the particulate matter emission rate of Kiln No. 1.

TABLE 7
COMPARISON OF PARTICULATE MATTER EMISSION RATES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline lb/hr	TDF lb/hr
1	6.15	11.33
2	6.98	7.30
3	8.00	8.75
Mean	7.04	9.13
S var	0.86	4.17
n	3.00	3.00
Pooled est	1.59	
t stat.	1.61	
t' (95% C.I.)	2.132	

Difference is not significant

4.0 METALS EMISSION RATES

The emission rates of arsenic, total chromium, lead, mercury, and zinc were measured with the EPA multi-metals train (EPA Method 29). The measurements under baseline operating conditions were made on May 4, 1993, and the measurements under coal/TDF conditions were made on June 8, 1993. The emission rates measured under the two sets of conditions are summarized in the following table:

Metal	Baseline Average Emissions (lb/hr)	TDF Average Emissions (lb/hr)
Date	May 4, 1993	June 8, 1993
Arsenic	<0.00174	<0.00143
Chromium	<0.00202	<0.00287
Lead	<0.00781	<0.00201
Mercury	0.01299	<0.00036
Zinc	0.00579	0.01026*

*Significantly greater

Comparisons of these data (Tables 8A-8E) demonstrate that the emission rates of arsenic, chromium and lead are below the detectable limit and are therefore of no concern under either operating condition. The data also show that there is no significant difference in the emission rate of

mercury. Statistically however, the emission rate of zinc measured under coal/TDF conditions was greater than the emission rate measured under the baseline firing conditions. The apparent increase in zinc emissions could be due to the zinc content of the TDF.

It can be concluded that the use of TDF to supply up to 20 percent of the heat input to Kiln No. 1 has no effect on metals emissions, with the possible exception of zinc.

TABLE 8A
COMPARISON OF METAL EMISSION RATES
ARSENIC
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	<0.00176	<0.00143
	2	<0.00172	<0.00143
	3	<0.00173	<0.00143
Mean		<0.00174	<0.00143

Emissions too close to detection limit.
No meaningful comparison possible.

TABLE 8B
COMPARISON OF METAL EMISSION RATES
CHROMIUM
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline lb/hr	TDF lb/hr
1	≤0.00205	< 0.00287
2	≤0.00201	< 0.00287
3	< 0.00201	<0.00287
Mean	≤0.00202	<0.00287

Emissions too close to detection limit.
No meaningful comparison possible.

TABLE 8C
COMPARISON OF METAL EMISSION RATES
LEAD
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline lb/hr	TDF lb/hr
1	<0.00763	<0.00201
2	<0.00747	<0.00201
3	0.00834	<0.00201
Mean	<0.00781	<0.00201

Emissions too close to detection limit.
No meaningful comparison possible.

TABLE 8D
COMPARISON OF METAL EMISSION RATES
MERCURY
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	0.02935	<0.00037
	2	0.00233	<0.00035
	3	0.00728	<0.00037
Mean		0.01299	<0.00036
S var		2.07E-04	1.33E-10
n		3.00	3.00
Pooled est		1.02E-02	
t stat.		1.52	
t' (95% C.I.)		2.132	

Difference is not significant

TABLE 8E
COMPARISON OF METAL EMISSION RATES
ZINC
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

	Baseline	TDF
Run	lb/hr	lb/hr
1	0.00558	0.00832
2	0.00546	0.01392
3	0.00633	0.00853
Mean	0.00579	0.01026
S var	2.22E-07	1.01E-05
n	3.00	3.00
Pooled est	2.27E-03	
t stat.	2.41	
t' (95% C.I.)	2.132	

Difference is significant

5.0 TOTAL HYDROCARBONS

The total hydrocarbon concentration in the stack gas of the plant was measured for two 12-hour periods under baseline conditions and for two 12-hour periods under coal/TDF firing conditions using EPA Method 25A as described in 40CFR60, Appendix A. These data were summarized as 12 two-hour average hourly emission rates for each test condition and were calculated from stack gas flow rates measured during each day of monitoring.

The average emission rate under baseline conditions was 3.36 pounds per hour while the average emission rate under coal/TDF firing conditions was 3.26 pounds per hour. The difference in the emission rates is not statistically significant (Table 9). It can be concluded that the use of TDF to provide up to 20 percent of the heat input does not affect total hydrocarbon emissions from Kiln No. 1.

TABLE 9
COMPARISON OF TOTAL HYDROCARBON EMISSION RATES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline lb/hr	TDF lb/hr
1	2.36	2.80
2	3.54	2.62
3	4.06	2.61
4	3.07	3.37
5	3.07	2.6
6	3.44	2.9
7	2.75	4.79
8	4.64	3.69
9	3.92	3.17
10	3.11	3.24
11	3.48	3.65
12	2.88	3.63
Mean	3.36	3.26
S var	0.39	0.40
n	12.00	12.00
Pooled est	0.63	
t stat.	0.40	
t' (95% C.I.)	1.717	

Difference is not significant

6.0 NITROGEN OXIDES

The nitrogen oxides concentration in the stack gas from the plant was measured for two 12-hour periods under baseline conditions and for two 12-hour periods under coal/TDF firing conditions. The method of sampling was EPA Method 7E, 40CFR60, Appendix A. The mass emission rates were calculated using stack gas flow rates measured during each day of monitoring and are reported as 12 two-hour average hourly emission rates.

These data, summarized in Table 10, show an average nitrogen oxides emission rate under baseline conditions of 197 pounds per hour and an average emission rate of 188 pounds per hour under coal/TDF firing conditions. Statistically, there is no difference in these emission rates. It can be concluded that the use of TDF to provide up to 20 percent of the heat input does not affect nitrogen oxides emissions from Kiln No. 1.

TABLE 10
COMPARISON OF NITROGEN OXIDE EMISSION RATES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline lb/hr	TDF lb/hr
1	205.95	118.78
2	236.35	92.30
3	205.38	133.55
4	193.97	161.73
5	190.08	227.33
6	166.42	215.70
7	134.01	166.34
8	185.79	189.05
9	200.64	242.46
10	242.86	265.64
11	212.71	243.96
12	194.41	201.78
Mean	197.38	188.22
S var	832.05	2973.08
n	12.00	12.00
Pooled est	43.62	
t stat.	0.51	
t' (95% C.I.)	1.717	

Difference is not significant

7.0 SULFUR DIOXIDE

The sulfur dioxide concentration in the stack gas from the cement plant was measured for two 12-hour periods under baseline conditions and for two 12-hour periods under coal/TDF firing conditions. The method of sampling was EPA Method 6C, 40CFR60, Appendix A. The mass emission rates were calculated using stack gas flow rates measured each day of monitoring and are reported as 12 two-hour average hourly emission rates. The data are summarized in Table 11 and show an average sulfur dioxide emission rate under baseline conditions of less than 1.9 pounds per hour and an average emission rate under coal/TDF firing conditions of less than 0.8 pounds per hour.

These emission rates were both below the detection limit of Method 6C and no statistical analysis was possible. It can be concluded, however, that the use of TDF in the cement plant does not affect sulfur dioxide emissions from Kiln No. 1.

TABLE 11
COMPARISON OF SULFUR DIOXIDE EMISSION RATES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline lb/hr	TDF lb/hr
1	<1.71	<1.05
2	<1.71	<0.35
3	<1.78	<0.84
4	<1.78	<0.5
5	<1.78	<1.42
6	<1.78	<0.71
7	<1.9	<0.9
8	<1.9	<0.18
9	<1.9	<1.25
10	<1.98	<0.71
11	<1.98	<0.7
12	<2.06	<0.7
Mean	<1.86	<0.78

Emissions too close to detection limit
No meaningful comparison posible.

8.0 CARBON MONOXIDE

The carbon monoxide concentration in the stack gas was continuously monitored for two 12-hour periods during the baseline tests and two 12-hour periods during the coal/TDF tests. The measurements were made in accordance with EPA Method 10, 40CFR60, Appendix A. The mass emission rates of carbon monoxide were calculated using stack gas flow rates measured during each day of monitoring and were initially reported as 12 two-hour average hourly emission rates for each of the two test periods. These data are summarized in Table 12.

The carbon monoxide emission data summarized in Table 12 show an average emission rate of 31.5 pounds per hour under baseline conditions and an average emission rate of 49.1 pounds per hour under coal/TDF firing conditions. Statistically, the carbon monoxide emission rate under coal/TDF firing conditions was greater than the emission rate measured under baseline conditions. This matter was further investigated as measurements made at other cement plants under coal and coal/TDF firing conditions have shown that TDF has no effect on carbon monoxide or other emission rates.

The carbon monoxide emission measurements made under baseline conditions (24 hours of monitoring) and under coal/TDF conditions (24 hours of monitoring) were reduced to one-hour average emission rates and carbon monoxide emission data for FM&M Kilns No. 1 and No. 2, measured on other

dates, were abstracted from previous reports. These hourly average emission rates are summarized in Table 13.

The carbon monoxide data from the previous tests were analyzed and no difference was found between emission rates from Kiln No. 1 while burning coal (2/28/92) and while burning coal and flolite (2/28/92). Likewise, there was no difference in the emission rates from Kiln No. 2 (a kiln identical to Kiln No. 1) on 3/24/92 and on 2/10/93. It was also determined that there was no difference in the carbon monoxide emission rates from Kiln No. 1 and Kiln No. 2. As a result of these analyses, the data from previous tests were treated as a single set of "baseline" data (i.e. operations without TDF).

When the data from previous tests were compared with carbon monoxide emission data from the current baseline tests (5/4/93, 5/5/93 and 5/4-5/93), it was determined that the previously measured emission rates were significantly greater than the emission rates measured on both 5/4/93 and 5/5/93 and on 5/4-5/93 (all current baseline dates handled collectively). The analysis further showed there was no significant difference between carbon monoxide emission rates measured on 5/4/93 and 5/5/93.

When comparing the previously measured "baseline" data with the coal/TDF carbon monoxide emission measurements, it was statistically determined that:

1. There was no difference between the previous baseline emission rate and the 6/9/93 coal/TDF emission rate;

2. The carbon monoxide emission rates measured on 6/8/93 (coal/TDF) were greater than those measured under previous baseline conditions; and

3. The carbon monoxide emission rate measured on 6/8/93 (coal/TDF) was greater than that measured on 6/9/93 (coal/TDF). In both cases, kiln operating conditions were the same.

In summary:

1. The carbon monoxide emission rate measured under 5/4-5/93 baseline (coal) conditions was less than the emission rates measured under "previous baseline" (coal and coal/flolite) conditions; demonstrating that there can be significant differences in carbon monoxide emission rates with the kiln operating under the same conditions.

2. The carbon monoxide emission rate measured on 6/8/93 with Kiln No. 1 fired with coal/TDF was significantly greater than that measured on 6/9/93 with Kiln No. 1 fired with coal/TDF. This again demonstrates that there can be significant differences in carbon monoxide emission rates with the kiln operating under the same conditions.

3. The carbon monoxide emission rate measured under coal/TDF conditions on 6/9/93 was no different than that measured under "previous baseline" conditions. This demonstrates that the use of coal/TDF does not result in increased carbon monoxide emissions.

4. These data collectively, and data reported from other cement plants, demonstrate that there are significant fluctuations in carbon monoxide emissions from cement plants. These fluctuations results from several factors that vary within the normal range of cement plant operating parameters and not, in this case, from the use of TDF.

TABLE 12
COMPARISON OF CARBON MONOXIDE EMISSION RATES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4-5 AND JUNE 8-9, 1993

Run	Baseline lb/hr	TDF lb/hr
1	28.10	66.08
2	30.73	39.91
3	31.21	66.63
4	33.56	49.7
5	36.24	47.63
6	31.17	70.04
7	30.9	52
8	33.06	41.16
9	29.9	39.76
10	30.32	37.11
11	30.97	39.13
12	31.56	39.51
Mean	31.48	49.06
S var	4.19	146.81
n	12.00	12.00
Pooled est	8.69	
t stat.	4.96	
t' (95% C.I.)	1.717	

Difference is significant

TABLE 13
CARBON MONOXIDE DATA REVIEW
FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 5 AND JUNE 9, 1993

Baseline Data - (No TDF)					Coal/TDF Data			
Kiln Number	Test Date	Fuel Type	Preheater Feed Rate (tph)	Hourly Average Carbon Monoxide (lb/hr)	Kiln Number	Test Date	Preheater Feed Rate (tph)	Hourly Average Carbon Monoxide (lb/hr)
1	02/28/92	Coal	144	40.1	1	06/08/93	140-142	64.2
				37.5				67.9
				40.7				32.9
1	02/28/92	Coal/Flolite	144	32.6				46.2
				37.5				52.4
				40.7				80.9
2	03/24/92	Coal	139	38.6				55.5
				40.7				43.9
				41.4				44.8
2	02/10/93	Coal	139	41.6				50.5
				47.3				71.3
				41.8				68.8
			Set Average	40.0			Set Average	56.6
1	05/04/93	Coal	139-145	27.0	1	06/09/93	101-143	56.1
				29.2				47.9
				31.5				37.7
				30.0				44.6
				32.0				39.6
				30.4				39.9
				32.8				35.1
				34.3				39.2
				35.1				38.6
				37.4				39.7
				33.5				34.8
				28.8				44.2
			Set Average	31.8			Set Average	41.5
1	05/05/93	Coal	105-146	33.8				
				28.0				
				30.7				
				35.3				
				29.1				
				30.7				
				32.3				
				32.3				
				32.9				
				29.0				
				30.7				
				32.5				
			Set Average	31.4				

9.0 HYDROGEN CHLORIDE

The emission rate of hydrogen chloride was measured under both baseline and coal/TDF firing conditions using EPA Method 26, as described in 40CFR60, Appendix A. The mass emission rates of hydrogen chloride were calculated using stack gas flow rates measured during each day of monitoring.

The hydrogen chloride emission data summarized in Table 14 show an emission rate of 0.44 pounds per hour under baseline conditions and an emission rate of less than 0.35 pounds per hour under coal/TDF firing conditions. Statistically, the hydrogen chloride emission rate under baseline firing conditions is greater than the emission rate measured under coal/TDF conditions.

Under neither condition would the emission rate of hydrogen chloride be of consequence; even if the chlorides present were as hydrogen chloride. The presence of several cations in the Method 26 sampling train (along with chloride) demonstrates that the chlorides are present as salts of the cations (aluminum, ammonia, sodium, etc.) and not as hydrogen chloride.

TABLE 14
COMPARISON OF HYDROGEN CHLORIDE EMISSION RATES
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 5 AND JUNE 9, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	0.47	0.36
	2	0.44	<0.32
	3	0.42	<0.38
Mean		0.44	<0.35
S var		6.33E-04	9.33E-04
n		3.00	3.00
Pooled est		2.80E-02	
t stat.		3.94	
t' (95% C.I.)		2.132	
Difference is significant			

10.0 SPECIATED VOLATILE ORGANIC COMPOUNDS

The emission rates of 13 specific volatile organic compounds were measured under both baseline and coal/TDF firing conditions using the VOST system as described in EPA Method M-0300. This method is also an equivalent EPA Method 18, 40CFR60, Appendix A. The mass emission rates of the compounds were calculated using stack gas flow rates measured during each day of monitoring.

The emission data in Tables 15A-15M are summarized below.

VOC	Emission Rate (lb/hr) Baseline	Coal/TDF
Acetone	<0.0001	0.0210*
Benzene	0.0580*	0.0410
Bromomethane	<0.0003	0.0013*
Carbon Disulfide	0.0039	0.0057
Chlorobenzene	0.0160*	0.0130
Ethylbenzene	0.0058	0.0055
n-Hexane	0.0050*	0.0023
Toluene	0.0490*	0.0340
1,1,1-Trichloroethane	<0.0001	<0.0001
Trichloroethylene	<0.0001	<0.0001
Styrene	0.0270*	0.0120
m-\p-Xylene	0.0170*	0.0110
o-Xylene	0.0069*	0.0044

* Significantly greater

The emission data show greater emission rates of two compounds (acetone and bromomethane) under coal/TDF conditions, greater emission rates of seven compounds under baseline conditions and either no change or concentrations below the detection limits for four compounds. A reasonable conclusion regarding the emission rates of these specific volatile organic compounds is that there is considerable fluctuation at very low emission rates of these organic compounds from cement kilns and that TDF as a fuel supplement has no effect on the magnitude of these emission rates.

TABLE 15A
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
ACETONE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	≤4.3E-05	1.2E-02
	2	<4.3E-05	1.2E-02
	3	<4.5E-05	4.9E-02
	4	<4.5E-05	1.7E-02
	5	<4.5E-05	1.7E-02
	6	<4.5E-05	1.9E-02
Mean		<4.4E-05	2.1E-02
S var		1.1E-12	2.0E-04
n		6	6
Pooled est		0	
t stat.		3.66	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15B
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
BENZENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	Coal/TDF lb/hr
	1	4.5E-02	4.1E-02
	2	4.8E-02	4.2E-02
	3	5.7E-02	3.9E-02
	4	6.3E-02	4.1E-02
	5	6.2E-02	4.1E-02
	6	7.3E-02	4.3E-02
Mean		5.8E-02	4.1E-02
S var		1.1E-04	1.8E-06
n		6	6
Pooled est		0	
t stat.		3.95	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15C
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
BROMOMETHANE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	<2.1E-05	1.3E-03
	2	1.5E-03	9.4E-04
	3	<2.2E-05	2.4E-03
	4	<2.2E-05	1.3E-03
	5	<2.2E-05	8.5E-04
	6	<2.2E-05	8.2E-04
Mean		<2.7E-04	1.3E-03
S var		3.6E-07	3.5E-07
n		6	6
Pooled est		0	
t stat.		2.89	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15D
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
CARBON DISULFIDE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	5.5E-03	8.7E-03
	2	4.4E-03	5.8E-03
	3	6.0E-03	5.6E-03
	4	7.3E-03	4.8E-03
	5	<2.2E-05	4.5E-03
	6	<2.2E-05	5.1E-03
Mean		3.9E-03	5.7E-03
S var		9.8E-06	2.3E-06
n		6	6
Pooled est		0	
t stat.		1.32	
t' (95% C.I.)		1.812	

Difference is not significant

TABLE 15E
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
CHLOROBENZENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	1.4E-02	9.6E-03
	2	1.3E-02	1.4E-02
	3	1.5E-02	1.3E-02
	4	1.6E-02	1.4E-02
	5	1.8E-02	1.2E-02
	6	1.9E-02	1.3E-02
Mean		1.6E-02	1.3E-02
S var		5.4E-06	2.7E-06
n		6	6
Pooled est		0	
t stat.		2.79	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15F
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
ETHYLBENZENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline lb/hr	TDF lb/hr
1	5.0E-03	5.0E-03
2	5.0E-03	6.1E-03
3	5.1E-03	5.3E-03
4	5.8E-03	5.9E-03
5	6.8E-03	4.9E-03
6	7.1E-03	6.0E-03
Mean	5.8E-03	5.5E-03
S var	8.9E-07	2.8E-07
n	6	6
Pooled est	0	
t stat.	0.60	
t' (95% C.I.)	1.812	

Difference is not significant

TABLE 15G
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
n-HEXANE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	3.8E-03	1.3E-03
	2	4.7E-03	1.6E-03
	3	4.4E-03	2.3E-03
	4	5.0E-03	2.8E-03
	5	5.3E-03	2.9E-03
	6	7.0E-03	2.9E-03
Mean		5.0E-03	2.3E-03
S var		1.2E-06	4.9E-07
n		6	6
Pooled est		0	
t stat.		5.16	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15H
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
TOLUENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	3.2E-02	2.9E-02
	2	4.5E-02	3.6E-02
	3	4.7E-02	3.1E-02
	4	5.4E-02	3.3E-02
	5	6.2E-02	4.0E-02
	6	5.5E-02	3.5E-02
Mean		4.9E-02	3.4E-02
S var		1.1E-04	1.5E-05
n		6	6
Pooled est		0	
t stat.		3.35	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15I
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
1,1,1-TRICHLOROETHANE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline lb/hr	TDF lb/hr
1	<2.1E-05	<2.2E-05
2	<2.1E-05	<2.2E-05
3	<2.2E-05	<2.1E-05
4	<2.2E-05	<2.1E-05
5	<2.2E-05	<2.2E-05
6	<2.2E-05	<2.2E-05
Mean	<2.2E-05	<2.2E-05

Emissions too close to detection limit.
No meaningful comparison possible.

TABLE 15J
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
TRICHLOROETHENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline	TDF
	lb/hr	lb/hr
1	<2.1E-05	<2.2E-05
2	<2.1E-05	<2.2E-05
3	<2.2E-05	<2.1E-05
4	<2.2E-05	<2.1E-05
5	<2.2E-05	<2.2E-05
6	<2.2E-05	<2.2E-05
Mean	<2.2E-05	<2.2E-05

Emissions too close to detection limit.
No meaningful comparison possible.

TABLE 15K
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
STYRENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run	Baseline lb/hr	TDF lb/hr
1	1.9E-02	1.0E-02
2	1.8E-02	1.4E-02
3	2.5E-02	1.3E-02
4	3.1E-02	1.4E-02
5	3.4E-02	9.8E-03
6	3.3E-02	1.3E-02
Mean	2.7E-02	1.2E-02
S var	5.0E-05	3.7E-06
n	6	6
Pooled est	0	
t stat.	4.81	
t' (95% C.I.)	1.812	

Difference is significant

TABLE 15L
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
m-\p-XYLENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	1.4E-02	9.1E-03
	2	1.5E-02	1.3E-02
	3	1.6E-02	1.1E-02
	4	1.9E-02	1.2E-02
	5	2.1E-02	1.0E-02
	6	1.8E-02	1.2E-02
Mean		1.7E-02	1.1E-02
S var		7.0E-06	2.1E-06
n		6	6
Pooled est		0	
t stat.		4.87	
t' (95% C.I.)		1.812	

Difference is significant

TABLE 15M
COMPARISON OF SPECIATED VOLATILE ORGANICS EMISSION RATES
o-XYLENE
BASELINE AND COAL/TDF CONDITIONS

FLORIDA MINING & MATERIALS
BROOKSVILLE, FLORIDA
MAY 4 AND JUNE 8, 1993

Run		Baseline lb/hr	TDF lb/hr
	1	5.7E-03	3.7E-03
	2	5.6E-03	4.9E-03
	3	6.4E-03	4.3E-03
	4	7.6E-03	4.9E-03
	5	8.4E-03	4.0E-03
	6	7.7E-03	4.9E-03
Mean		6.9E-03	4.4E-03
S var		1.4E-06	2.8E-07
n		6	6
Pooled est		0	
t stat.		4.70	
t' (95% C.I.)		1.812	

Difference is significant

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ▪ FAX 377-7158

KA 521-93-03

July 9, 1993

Mr. Chisun Lee
Florida Department of
Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619-8318

Subject: Southdown, Inc. dba FM&M
Cement Kiln No. 1 (A027-213207)
Baseline and Whole Tire Derived Fuel
Performance Testing

Dear Mr. Lee:

As mentioned in my letter of June 11, 1993, the Florida Department of Environmental Protection issued an amendment to Permit A027-213207 on February 5, 1993 which authorized Southdown, Inc. dba Florida Mining & Materials to conduct performance tests on the No.1 Cement Kiln to evaluate the effects of using whole tire derived fuel (TDF) as a fuel supplement. The amendment required testing under baseline conditions (100% coal) and under Coal/TDF firing conditions.

Baseline and Coal/TDF tests were conducted in May 4-5, 1993 and June 8-9, 1993, respectively. The amendment authorizing the testing requires a comparison of the results of measurements made during the two test periods and, as such, envisions the overall test program as a single test.

Condition No. 1 of the amendment states that a written report be must be submitted within 45 days of the completion of the last test run. The report preparation is proceeding on schedule. No problems are anticipated with submitting the report to the Department by July 23, 1993; or within 45 days of the completion of the Coal/TDF test on June 9, 1993.

Mr. Chisun Lee
Florida Department of
Environmental Protection

July 9, 1993
Page 2

If you have any questions, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:jg

c: Mr. Bruce Mitchell, FDEP, Tallahassee
Ms. Anetha Lue, P.E., Southdown, Inc.
Mr. Don Kelly, Florida Mining & Materials
Mr. Matt Stone, Florida Mining & Materials
Mr. David Dee, Esq., Calton, Fields et al

KOOGLER & ASSOCIATES
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FAX TRANSMITTAL FORM

TO: Bruce Mitchell

FROM: JBK

PROJECT: 521-93-03

SENT BY: J. Garcia

DATE: 7-9-93

FAX PHONE: 904-377-7158

The text being transmitted consists of 2 pages PLUS this one.

REMARKS:

PM
6-21-93
Gainesville, FL

MEMORANDUM

VIA FAX

TO: David Buff
KBN Engineering

FROM: John Koogler

DATE: June 21, 1993

SUBJECT: Preliminary Emission and Stack Gas Flow Rate Data from Baseline and TDF Tests
Florida Mining & Materials
Hernando County, Florida

Attached are tables summarizing preliminary emission data and stack gas flow data for the baseline and TDF test periods at Florida Mining & Materials. The baseline tests were conducted on May 4 and 5, 1993 and the TDF tests were conducted on June 8 and 9, 1993. The emission rates and stack gas concentrations of total hydrocarbons, carbon monoxide, nitrogen oxides and sulfur dioxide were determined in accordance with EPA Test Methods 25A, 10, 7E and 6C, respectively. Each "run" represents nominally a two-hour period. The six "runs" reported for each day represent a nominal 12-hour sampling period. The stack gas flow rate, temperature, moisture content, oxygen content and CO_2 content were measured during each of three two-hour test runs conducted on each of the four days. These parameters were measured in accordance with EPA Methods 2, 3 and 4. The measurements were conducted in conjunction with particulate matter/metals and dioxin/furans emission testing.

Also attached are statistical summaries of the measurements comparing the results measured during the baseline tests with results measured during the TDF tests. These summaries show no significant differences in emission rates of VOC, NOx or SO_2. The summaries also show no difference in the concentrations of oxygen, carbon dioxide or moisture in the stack gas and no difference in the stack gas temperatures between the two sets of test conditions. The summaries do show a higher carbon monoxide emission rate measured during the TDF test period and a slightly higher stack gas flow rate during the baseline period.

A summary of particulate matter emission rates measured during the two test periods is also attached but not included in the tables. These data

KOOGLER & ASSOCIATES

show an average particulate matter emission rate of 7.05 pounds per hour during the baseline period and 9.13 pounds per hour during the TDF period. A statistical comparison shows that there are no differences in these emission rates.

In our opinion, there is nothing in the attached data that would indicate the routine maintenance performed on the cement plant between the two test periods affected operations or emissions from the No. 1 kiln. It is my understanding that Florida Mining & Materials has forwarded to you information regarding kiln operations during the TDF test period and a description of the maintenance that was performed between the two test periods. We have requested comparable plant data for the baseline test period and will see that you receive a copy as soon as it is available. After reviewing the attached information and the information provided to you by Florida Mining & Materials, please give me a call.

c: Mr. Bruce Mitchell, FDEP, Tallahassee
Mr. Don Kelly, FM&M
Mr. Matt Stone, FM&M
Ms. Anetha Lue, Southdown

TABLE 1 - EMISSION TESTING SUMMARY

FLORIDA MINING & MATERIALS
KILN # 1 - BASELINE

BROOKSVILLE, FLORIDA

May 4, 1993

Parameter	Run 1 (ppm)	Run 1 (lb/hr)	Run 2 (ppm)	Run 2 (lb/hr)	Run 3 (ppm)	Run 3 (lb/hr)	Run 4 (ppm)	Run 4 (lb/hr)	Run 5 (ppm)	Run 5 (lb/hr)	Run 6 (ppm)	Run 6 (lb/hr)	Avg (ppm)	Avg (lb/hr)
THC	2.00	2.36	3.00	3.54	3.30	3.90	2.50	3.07	2.50	3.07	2.80	3.43	2.68	3.23
CO	37.50	28.12	41.00	30.74	40.00	29.99	43.00	33.58	46.50	36.32	40.00	31.15	41.33	31.65
NOx	167.27	206.05	191.96	236.46	160.20	197.34	151.30	194.14	148.46	190.49	129.98	166.31	158.20	198.47
SO2	< 1.00	<1.71	<1.00	<1.71	< 1.00	< 1.71	< 1.00	<1.79	<1.00	<1.79	<1.00	<1.78	< 1.00	< 1.75
O2 (orsat)	13.40 %		12.50 %		13.80 %		14.4 %		13.13 %		13.50 %		13.46 %	
CO2 (orsat)	12.38 %		12.80 %		12.20 %		12.6 %		12.20 %		11.50 %		12.28 %	
MOISTURE	10.50 %		10.50 %		10.50 %		10.7 %		10.70 %		10.70 %		10.60 %	
STACK TEMP.	251.20 F		251.20 F		251.20 F		249.6 F		249.60 F		241.30 F		249.02 F	
STACK FLOW RATE	171832 dscfm		171832 dscfm		171832 dscfm		178987 dscfm		178987 dscfm		178483 dscfm		175326 dscfm	

May 5, 1993

Parameter	Run 1 (ppm)	Run 1 (lb/hr)	Run 2 (ppm)	Run 2 (lb/hr)	Run 3 (ppm)	Run 3 (lb/hr)	Run 4 (ppm)	Run 4 (lb/hr)	Run 5 (ppm)	Run 5 (lb/hr)	Run 6 (ppm)	Run 6 (lb/hr)	Avg (ppm)	Avg (lb/hr)
THC	2.10	2.74	3.55	4.63	3.00	4.08	2.28	3.10	2.55	3.62	2.03	2.88	2.59	3.51
CO	37.20	30.79	39.80	32.94	36.00	31.08	35.00	30.22	35.75	32.23	35.00	31.55	36.46	31.47
NOx	98.20	133.54	136.14	185.13	147.02	208.53	170.67	242.08	149.48	221.36	131.25	194.37	138.79	197.50
SO2	<1.00	<1.89	<1.00	<1.89	<1.00	<1.97	<1.00	<1.97	<1.00	<2.06	<1.00	<2.06	<1.00	<1.98
O2 (orsat)	14.20 %		14.30 %		14.45 %		15.00 %		15.00 %		15.10 %		14.68 %	
CO2 (orsat)	10.80 %		10.80 %		10.55 %		11.00 %		11.00 %		10.85 %		10.83 %	
MOISTURE	9.00 %		9.00 %		8.30 %		8.30 %		8.30 %		8.30 %		8.53 %	
STACK TEMP.	250.88 F		250.88 F		247.83 F		247.83 F		244.54 F		244.54 F		247.75 F	
STACK FLOW RATE	189686 dscfm		189686 dscfm		197855 dscfm		197855 dscfm		206572 dscfm		206572 dscfm		198038 dscfm	

TABLE 2 - EMISSION TESTING SUMMARY

FLORIDA MINING & MATERIALS
KILN # 1 - TDF ***

BROOKSVILLE, FLORIDA

June 8, 1993

Parameter	Run 1 (ppm)	Run 1 (lb/hr)	Run 2 (ppm)	Run 2 (lb/hr)	Run 3 (ppm)	Run 3 (lb/hr)	Run 4 (ppm)	Run 4 (lb/hr)	Run 5 (ppm)	Run 5 (lb/hr)	Run 6 (ppm)	Run 6 (lb/hr)	Avg (ppm)	Avg (lb/hr)
THC	2.32	2.78	2.17	2.60	2.26	2.62	2.92	3.38	2.12	2.60	2.37	2.91	2.36	2.81
CO	86.10	65.45	52.00	39.53	90.90	66.91	67.80	49.91	61.20	47.67	90.00	70.10	74.67	56.59
NOx	94.20	117.64	73.20	91.42	110.90	134.11	134.30	162.41	177.80	227.51	186.70	238.89	129.52	162.00
SO2	< 0.60	<1.04	< 0.20	< 0.35	< 0.50	< 0.84	< 0.30	<0.50	< 0.80	<1.42	< 0.40	< 0.71	< 0.47	<0.81
O2 (orsat)	14.20 %		14.30 %		13.10 %		12.3 %		13.30 %		13.80 %		13.50 %	
CO2 (orsat)	11.80 %		9.70 %		11.90 %		11.7 %		11.70 %		12.20 %		11.50 %	
MOISTURE	9.90 %		9.90 %		10.20 %		10.2 %		11.80 %		11.80 %		10.63 %	
STACK TEMP.	258.00 F		258.00 F		264.00 F		264.0 F		240.00 F		240.00 F		254.00 F	
STACK FLOW RATE	174208 dscfm		174208 dscfm		168693 dscfm		168693 dscfm		178489 dscfm		178489 dscfm		173797 dscfm	

June 9, 1993

Parameter	Run 1 (ppm)	Run 1 (lb/hr)	Run 2 (ppm)	Run 2 (lb/hr)	Run 3 (ppm)	Run 3 (lb/hr)	Run 4 (ppm)	Run 4 (lb/hr)	Run 5 (ppm)	Run 5 (lb/hr)	Run 6 (ppm)	Run 6 (lb/hr)	Avg (ppm)	Avg (lb/hr)
THC	3.87	4.79	2.98	3.69	2.58	3.20	2.64	3.24	3.03	3.72	3.02	3.63	3.02	3.71
CO	66.20	52.09	52.40	41.23	51.00	40.13	47.60	37.09	51.20	39.90	51.70	39.51	53.35	41.66
NOx	128.90	166.62	146.50	189.37	189.30	244.70	207.40	265.53	194.30	248.76	160.70	201.74	171.18	219.45
SO2	< 0.50	< 0.90	< 0.10	< 0.18	< 0.70	< 1.26	< 0.40	< 0.71	< 0.40	< 0.71	< 0.40	< 0.70	< 0.42	< 0.74
O2 (orsat)	14.50 %		14.00 %		13.10 %		13.90 %		13.80 %		13.70 %		13.83 %	
CO2 (orsat)	10.50 %		12.00 %		11.90 %		12.10 %		12.20 %		12.10 %		11.80 %	
MOISTURE	10.00 %		10.00 %		10.00 %		9.50 %		9.50 %		10.10 %		9.85 %	
STACK TEMP.	242.00 F		242.00 F		242.00 F		255.00 F		255.00 F		247.00 F		247.17 F	
STACK FLOW RATE	180315 dscfm		180315 dscfm		180315 dscfm		178588 dscfm		178588 dscfm		175121 dscfm		178874 dscfm	

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run	Method 25A THC Baseline lb/hr	TDF lb/hr
1	2.36	2.78
2	3.54	2.60
3	3.90	2.62
4	3.07	3.38
5	3.07	2.6
6	3.43	2.91
7	2.74	4.79
8	4.63	3.69
9	4.08	3.2
10	3.1	3.24
11	3.62	3.72
12	2.88	3.63
Mean	3.37	3.26
S var	0.40	0.41
n	12.00	12.00
Pooled est	0.64	
t stat.	0.40	
t' (95% C.I.)	1.717	

Difference is not significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run	Method 10 CO Baseline lb/hr	TDF lb/hr
1	28.12	65.45
2	30.74	39.53
3	29.99	66.91
4	33.58	49.91
5	36.32	47.67
6	31.15	70.1
7	30.79	52.09
8	32.94	41.23
9	31.08	40.13
10	30.22	37.09
11	32.23	39.9
12	31.55	39.51
Mean	31.56	49.13
S var	4.26	144.73
n	12.00	12.00
Pooled est	8.63	
t stat.	4.99	
t' (95% C.I.)	1.717	

Difference is significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run	Method 7E NOx Baseline lb/hr	TDF lb/hr
1	206.05	117.64
2	236.46	91.42
3	197.34	134.11
4	194.14	162.41
5	190.49	227.51
6	166.31	238.89
7	133.54	166.62
8	185.13	189.37
9	208.53	244.7
10	242.08	265.53
11	221.36	248.76
12	194.37	201.74
Mean	197.98	190.73
S var	868.50	3224.02
n	12.00	12.00
Pooled est	45.24	
t stat.	0.39	
t' (95% C.I.)	1.717	

Difference is not significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run	Method 6C SO2 Baseline lb/hr	TDF lb/hr
1	<1.71	1.04
2	<1.71	0.35
3	<1.71	0.84
4	<1.79	0.5
5	<1.79	1.42
6	<1.78	0.71
7	<1.89	0.9
8	<1.89	0.18
9	<1.97	1.26
10	<1.97	0.71
11	<2.06	0.71
12	<2.06	0.7
Mean	<1.86	0.78

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run	Orsat O2 Baseline %	TDF %
1	13.40	14.20
2	12.50	14.30
3	13.80	13.10
4	14.40	12.30
5	13.13	13.30
6	13.50	13.80
7	14.20	14.50
8	14.30	14.00
9	14.45	13.10
10	15.00	13.90
11	15.00	13.80
12	15.10	13.70
Mean	14.07	13.67
S var	0.66	0.38
n	12.00	12.00
Pooled est	0.72	
t stat.	1.35	
t' (95% C.I.)	1.717	

Difference is not significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run	Orsat CO2 Baseline %	TDF %
1	12.38	11.80
2	12.80	9.70
3	12.20	11.90
4	12.60	11.70
5	12.20	11.70
6	11.50	12.20
7	10.80	10.50
8	10.80	12.00
9	10.55	11.90
10	11.00	12.10
11	11.00	12.20
12	10.85	12.10
Mean	11.56	11.65
S var	0.67	0.58
n	12.00	12.00
Pooled est	0.79	
t stat.	0.29	
t' (95% C.I.)	1.717	

Difference is not significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run		Stack Gas Moisture Baseline %	TDF %
	1	10.50	9.90
	2	10.50	10.20
	3	10.70	11.80
	4	9.00	10.00
	5	8.30	9.50
	6	8.30	10.10
Mean		9.55	10.25
S var		1.31	0.64
n		6.00	6.00
Pooled est		0.99	
t stat.		1.23	
t' (95% C.I.)		1.812	

Difference is not significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run		Stack Temperature Baseline F	TDF F
	1	251.20	258.00
	2	249.60	264.00
	3	241.30	240.00
	4	250.88	242.00
	5	247.83	255.00
	6	244.54	247.00
Mean		247.56	251.00
S var		15.36	90.40
n		6.00	6.00
Pooled est		7.27	
t stat.		0.82	
t' (95% C.I.)		1.812	

Difference is not significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

Run		Stack Flow Rate Baseline dscfm	TDF dscfm
	1	171832	174208
	2	178987	168693
	3	178483	178489
	4	189686	180315
	5	197855	178588
	6	206572	175121
Mean		187236	175902
S var		174918157	17766202
n		6	6
Pooled est		9815	
t stat.		2.00	
t' (95% C.I.)		1.812	

Difference is significant

Florida Mining & Materials
Comparison of Baseline and TDF Tests

PM

Run		Baseline lb/hr	TDF lb/hr
	1	6.15	11.30
	2	6.99	7.33
	3	8.00	8.75
Mean		7.05	9.13
S var		0.86	4.05
n		3.00	3.00
Pooled est		1.57	
t stat.		1.63	
t' (95% C.I.)		2.132	

Difference is not significant

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

FAX TRANSMITTAL FORM

TO: Bruce Mitchell

FROM: John Koogler

PROJECT: 521-93-03

SENT BY: Wendy

DATE: 6/21/93

FAX PHONE: 904-377-7158

The text being transmitted consists of 16 pages PLUS this one.

REMARKS:

OERTEL, HOFFMAN, FERNANDEZ & COLE, P. A.

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J. R. SUBRAMANI, PH. D., P. E.
ENVIRONMENTAL CONSULTANT
(NOT A MEMBER OF THE FLORIDA BAR)

June 9, 1993

Mr. Bruce Mitchell
Department of Environmental Regulation
Division of Air Resources
2600 Blair Stone Road
Tallahassee, FL 32399

Re: Southdown, Inc., d/b/a Florida Mining and Minerals; Tire-Derived Fuel Test Burn

Dear Mr. Mitchell:

As you know, Southdown, Inc., d/b/a Florida Mining and Minerals (FMM) is currently in the process of conducting a tire-derived fuel test burn in furtherance of a request to the Department of Environmental Regulation for permit authorization to burn tire-derived fuel as a partial substitute to coal. Enclosed is a letter to FMM with attached comments from David Buff, KBN Engineering, Inc., indicating the County's concerns with the validity of the plant's baseline testing. Our letter requests that the company perform additional baseline testing to ensure an appropriate comparison of tire-derived fuel test results.

Please contact me if you have any questions or comments.

Sincerely,

for Segundo J. Fernandez
C. Anthony Cleveland

SS:cjb/1579

Enclosure
cc: B. Thomas

OERTEL, HOFFMAN, FERNANDEZ & COLE, P. A.

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J. P. SUBRAMANI, PH. D., P. E.
ENVIRONMENTAL CONSULTANT
(NOT A MEMBER OF THE FLORIDA BAR)

June 9, 1993

John B. Koogler, Ph.D., P.E.
Koogler & Associates
Environmental Services
4014 NW Thirteenth Street
Gainesville, FL 32609

Re: Southdown, Inc., d/b/a Florida Mining and Minerals – Substitute Tire-Derived Fuel Testing

Dear Mr. Koogler:

As you know, an agreement was signed February 12, 1993, between the Board of County Commissioners and your client, Southdown, Inc., d/b/a Florida Mining and Minerals (FMM). Pursuant to the agreement, Mr. David Buff, with KBN Engineering, was hired by the County to observe the FMM tire-derived fuel testing and advise the Board of County Commissioners of the test results and their significance.

Baseline testing on Southdown kiln 1 was conducted on May 4 and 5, 1993, and testing with up to 20% tire-derived fuel was to be conducted on May 12, 1993, but was delayed. We understand that this testing has now commenced and is under way. Transmitted herewith is a letter prepared by Mr. Buff providing comments to the County concerning the adequacy of the testing.

Mr. Buff's letter indicates that there were several significant deviations from what he feels is the acceptable testing protocol and methodology for obtaining appropriate baseline test information to which tire-derived fuel test emissions may be compared. Accordingly, Mr. Buff recommends additional baseline testing be conducted subsequent to the date on which the tire-derived fuel testing is concluded. Mr. Buff feels that this will help to ensure that baseline and tire-derived fuel testing is conducted under the most similar conditions.

Accordingly, the County requests that the company implement Mr. Buff's recommendations and retest for baseline conditions beginning the sixth day after the tire-derived fuel testing is concluded. If for any reason you disagree with Mr. Buff's

assessment or otherwise decide not to conduct the additional recommended baseline testing, please so advise the County in writing.

If you have any questions or comments, please contact me.

Sincerely,

for Segundo J. Fernandez
C. Anthony Cleveland

SS:cjb/1579

cc: Don Kelly, Plant Manager

KBN

June 3, 1993

RECEIVED
JUN 8 1993
OERTEL, HOFFMAN, FERNANDEZ & COLE, P.A.

Mr. Larry Jennings, Manager
Hernando County Planning Department
20 North Main Street, Room 262
Brooksville, Florida 34601

Re: Florida Mining & Materials WTDF Test Burn

Dear Mr. Jennings:

The purpose of this correspondence is to bring to your attention certain concerns over the upcoming WTDF testing at FMM/Southdown. As you are aware, the baseline testing on Kiln 1 at FMM utilizing 100 percent coal as fuel was conducted on May 4-5, 1993. WTDF testing using up to 20 percent WTDF as fuel to the kiln was planned for May 11-12, 1993. However, due to operational problems with the kiln, this test was first delayed and then was postponed as the kiln was shutdown for repairs and maintenance. Testing conducted on May 12, just prior to the kiln shutdown, indicated large fluctuations in CO emissions from the kiln. These fluctuations were not observed during the baseline testing, and it is not clear if these were due to the equipment problems or due to other reasons.

According to FMM plant manager Don Kelly, the kiln system was restarted on May 21 after undergoing maintenance and repair. The kiln was brought on-line while burning oil, which is the normal startup procedure, followed by 100 percent coal firing. The kiln then continued to operate until June 2, when a short outage was experienced (cause not known by KBN at this time). Mr. Kelly expects the kiln to resume operation today (June 2), and for WTDF firing to begin the morning of June 3. This schedule would provide 5 days of WTDF firing prior to the WTDF testing period, as stated in the test protocol.

Based on the course of events since the baseline testing was conducted, there are several areas of concern related to the acceptability of the overall testing program. The first concern is that the baseline testing will have been conducted approximately one month prior to the WTDF testing. During this period of time, significant differences in raw feed composition, coal quality, and other operational parameters may have occurred. These changes could in turn affect air emissions. Therefore, it may be more difficult to compare baseline emissions to WTDF emissions on the same basis. The test protocol allowed only 5 calendar days between baseline and WTDF testing. The 5 day period was considered to be the minimum time required to allow the entire system to reach equilibrium after the fuel switch. This relatively short period would result in the least chance for process and operational variability in the kiln system to occur, thus allowing easier comparison of coal and WTDF emissions. We would like for FMM to provide reasonable assurance that kiln parameters during the baseline and WTDF testing will be sufficiently similar as to not jeopardize the comparison of test results. This information could include raw feed analysis, coal quality data, kiln operating data, etc.

13076A1/1

The second concern is that the repairs and maintenance performed on Kiln 1 will have altered the air emissions associated with the kiln. Mr. Kelly mentioned that a kiln outage had been scheduled for March 1993, but due to high cement sales and client demands, the outage was postponed. This apparently led to the subsequent operational problems with the kiln that resulted in the shutdown on May 13. We would like FMM to provide a listing of the repairs and/or maintenance performed on Kiln 1 and a description of each, whether these were planned maintenance items or unplanned items, and the affects that each would have on kiln/preheater operation and associated air emissions. Again, our concern is that the testing as now planned may not be comparing apples to apples.

As an option to providing the requested data and assurances, FMM may consider re-testing for baseline conditions beginning on the sixth day after WTDF testing is concluded. This would be the most valid way of insuring that baseline and WTDF testing is conducted under the most similar conditions.

Our goal is not to create additional, unnecessary requests or testing for FMM. However, this project will undergo review by the Florida Department of Environmental Regulation, and public scrutiny and evaluation before the Hernando County Board of Commissioners. Therefore, the testing program must have the highest level of credibility and acceptability.

Please call if you have any questions concerning this matter.

Sincerely,

David A. Buff

David A. Buff, M.E., P.E.
Principal Engineer

cc: Kathy Liles
Tony Cleveland

13076A1/1

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

KA 521-92-01

May 13, 1993

Mr. Chi-Sun Lee
Florida Department of
Environmental Regulation
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619-8318

Subject: WTDF Performance Test
Southdown, Inc. dba Florida Mining & Materials
Brooksville, Florida

Dear Mr. Lee:

Due to equipment failure at Kiln No. 1, the tests scheduled for this week have been postponed. Kiln No. 1 has been shutdown for repairs which may require one to two weeks. The performance tests will be rescheduled as soon as the plant is operational.

If you have any questions, please give me a call.

Very truly yours,

KOOGLER & ASSOCIATES

N. Mason Joye, Jr.

NMJ:wa

c: Mr. Clair Fancy, FDER, Tallahassee
Mr. Bruce Mitchell, FDER, Tallahassee
Ms. Jewell Harper, EPA, Atlanta
Mr. John Bunyak, National Park Service
Mr. Charles Hetrick, HCBC
Mr. D. Beason, Esq., OGC, FDER
Ms. Anetha Lue, P.E., Southdown, Inc.
Mr. Armajit Gill, P.E., Southdown, Inc.
Mr. Don Kelly, Florida Mining & Materials
Mr. Tony Cleveland, Esq., Oertel, Hoffman et al
Mr. David Dee, Esq., Carlton, Fields et al
Mr. David Buff, KBN Engineering, Gainesville

ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

FAX TRANSMITTAL FORM

TO: Howard Rhodes
Bruce Mitchell

FROM: John Koogler

PROJECT: 521-93-03

SENT BY: Sonja

DATE: 11 May 93

FAX PHONE: 904-377-7158

The text being transmitted consists of _____ pages PLUS this one.

REMARKS:

KOOGLER & ASSOCIATES
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4014 NW THIRTEENTH STREET
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KA 521-93-03

May 11, 1993

VIA FAX

Mr. Chi-Sun Lee
Florida Department of
Environmental Regulation
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619-8318

Subject: WTDF Performance Test
Southdown, Inc. dba Florida Mining and Materials
Brooksville, Florida

Dear Mr. Lee:

The performance test to evaluate the use of whole-tire derived fuel (TDF) at Florida Mining and Materials has been postponed until May 12, 1993.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:wa

c: Mr. Howard Rhodes, FDER, Tallahassee
Mr. Bruce Mitchell, FDER, Tallahassee
Ms. Jewell Harper, EPA, Atlanta
Mr. John Bunyak, National Park Service
Mr. Charles Hetrick, HCBC
Mr. D. Beason, Esq., OGC, FDER
Ms. Anetha Lue, P.E., Southdown, Inc.
Mr. Armajit Gill, P.E., Southdown, Inc.
Mr. Don Kelly, Florida Mining & Materials
Mr. Tony Cleveland, Esq., Oertel, Hoffman et al
Mr. David Dee, Esq., Carlton, Fields et al
Mr. David Buff, KBN Engineering, Gainesville

KOOGLER & ASSOCIATES
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4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ▪ FAX 377-7158

KA 521-92-01

May 3, 1993

RECEIVED
MAY 05 1993
Division of Air
Resources Management

VIA FAX

Mr. Bruce Mitchell
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Test Protocol for Use of WTDF
Southdown, Inc. dba Florida Mining & Materials
Brooksville, Florida

Dear Mr. Mitchell:

In accordance with the test protocol previously submitted, Florida Mining & Materials (FM&M) began burning coal in Kiln No. 1 on Tuesday, April 27, 1993, to stabilize the unit for baseline tests scheduled for May 4 and 5, 1993. The tests protocol, on page 5 states, "The No. 1 kiln system, will have a four day period for the plant to stabilize on coal, ... prior to the two day baseline tests period."

On Thursday, April 29, the kiln was down for 14.4 hours and on April 30, the kiln was down for 4.3 hours. Kiln No. 1 has been up and running on coal since 19:43 hours on April 30, 1993.

All of the above has been discussed with Mr. Dave Buff of KBN Engineering; the consultant for Hernando County. Mr. Buff agrees that the kiln will have had plenty of time to stabilize by May 4, 1993, and baseline tests can begin at that time (approximately 08:00 hours on May 4, 1993).

This memo is to clarify the stabilization period prior to the testing in case questions arise later.

If you have any questions, please do not hesitate to give me a call.

Very truly yours,

KOOGLER & ASSOCIATES

N. Mason Joye, Jr.

NMJ:wa

c: Mr. Howard Rhodes, FDER, Tallahassee
Mr. Charles Hetrick, HCBC
Mr. D. Beason, Esq., OGC, FDER
Mr. Chi-Sun Lee, FDER, Tampa
Ms. Anetha Lue, P.E., Southdown, Inc.
Mr. Armajit Gill, P.E., Southdown, Inc.
Mr. Don Kelly, Florida Mining & Materials
Mr. Tony Cleveland, Esq., Oertel, Hoffman et al
Mr. David Dee, Esq., Carlton, Fields et al
Mr. David Buff, KBN Engineering, Gainesville

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

KA 521-92-01

April 26, 1993

VIA FAX

Mr. Chi-Sun Lee
Florida Department of
Environmental Regulation
Southwest District Office
3804 Coconut Palm Drive
Tampa, FL 33619-8318

Subject: Air Emission Measurements
Southdown dba Florida Mining & Materials
No. 1 Cement Kiln (Permit No. A027-213207)

Dear Mr. Lee:

On April 23, 1993, Koogler & Associates Environmental Services scheduled the air emission measurements to be conducted on the No. 1 Cement Kiln at Florida Mining & Materials. In addition to the emission parameters scheduled by our letter dated April 23, 1993, emission measurements will be conducted for hydrogen chloride, dioxins and furans, in accordance with EPA Methods 26 and 23, as described in 40CFR60, Appendix A.

If you have any questions concerning this schedule, please do not hesitate to give me a call.

Very truly yours,

KOOGLER & ASSOCIATES

Megan E. Miner

c: Ms. Anetha Lue, Southdown
Mr. Jeet Gill, Southdown
Mr. Don Kelly, Florida Mining & Materials
Mr. Howard Rhodes, FDER-Tallahassee
Mr. Bruce Mitchell, FDER-Tallahassee
Ms. Jewell Harper, Environmental Protection Agency
Mr. John Bunyak, National Park Service
Mr. Charles Hetrick, Hernando County
Mr. D. Beason, FDER-OGC
Mr. David Buff, KBN Engineering
Mr. Anthony Cleveland, Oertel & Hoffman
Mr. David Dee, Carlton, Fields

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ENVIRONMENTAL SERVICES
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FAX TRANSMITTAL FORM

TO: ~~Mr. Howar Rhodes~~ Bruce Mitchell

FROM: Ms. Megan Miner

PROJECT: KA 521-92-01

SENT BY: Sonya

DATE: 26 Apr 93

FAX PHONE: 904-377-7158

The text being transmitted consists of 1 pages PLUS this one.

REMARKS:

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

KA 521-92-01

April 23, 1993

VIA FAX

Mr. Chi-Sun Lee
Florida Department of
Environmental Regulation
Southwest District Office
3804 Coconut Palm Drive
Tampa, FL 33619-8318

Subject: Air Emission Measurements
Southdown dba Florida Mining & Materials
No. 1 Cement Kiln (Permit No. A027-213207)

Dear Mr. Lee:

As per our telephone conversation, I would like to confirm that Koogler & Associates Environmental Services will conduct air emission measurements on the No. 1 Cement Kiln at Florida Mining & Materials, in Brooksville, Florida on May 4-5 and 11-23, 1993.

Emission measurements will be conducted for particulate matter, sulfur dioxide, nitrogen oxide, carbon monoxide and total hydrocarbons, in accordance with EPA Methods 5, 6, 7E, 10, and 25A. Visible emissions observations will be taken in accordance with EPA Method 9. All EPA methods are described in 40CFR60, Appendix A. Benzene emission measurements will be conducted with VOST-SW846-0030. Metals will be measured with the Multi-Metals Train Method SW846-0012.

The performance tests scheduled for May 4-5, 1993 will be conducted while the No. 1 Cement Kiln is burning 100% coal. The performance tests scheduled for May 11-12, 1993 will be conducted while the No. 1 Cement Kiln is burning coal and WTDF.

If you have any questions concerning this schedule, please do not hesitate to give me a call.

Very truly yours,

KOOGLER & ASSOCIATES

Megan E. Miner

c: Ms. Anetha Lue, Southdown
Mr. Jeet Gill, Southdown
Mr. Don Kelly, Florida Mining & Materials
Mr. Howard Rhodes, FDER-Tallahassee
Mr. Bruce Mitchell, FDER-Tallahassee
Ms. Jewell Harper, Environmental Protection Agency
Mr. Scott Bunyak, National Park Service
Mr. Charles Hetrick, Hernando County
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Mr. Anthony Cleveland, Oertel & Hoffman
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FAX TRANSMITTAL FORM

TO: ~~Mr. Howard Rhodes~~
Mr. Bruce Mitchell

FROM: Megan Minier

RECEIVED
APR 27 1993
Division of Air
Resources Management

PROJECT: 521-92-01

SENT BY: _____

DATE: 4/23

FAX PHONE: 904-377-7158

The text being transmitted consists of 2 pages PLUS this one.

REMARKS: Please disregard previous fax - Thank you