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FLORIDA MINING & MATERIALS

CONSTRUCTION MATERIALS DIVISION

P. O. BOX 6, BROOKSVILLE, FLORIDA 34605-0006
TELEPHONE (904) 796-7241

C. M. COLEMAN, JR.
VICE PRESIDENT & GENERAL MANAGER

November 29, 1989

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

Dear Mr. Fancy:

Enclosed is an application to amend the existing construction permit for Florida Mining & Materials' number two kiln at its Brooksville, Florida cement plant. The amendments are requested in order to allow this kiln to operate at maximum efficiency, with slightly higher clinker production rates.

Stack test data shows that the kiln is operating in compliance with the permit's hourly emission limits for sulfur dioxide, nitrogen dioxide and particulates. Therefore, no changes are requested in the currently permitted hourly emission rates of those pollutants. The application includes a request for increased hourly emission levels for carbon monoxide and total hydrocarbons, to accurately reflect both current operating practices and operating at increased production rates. Increases in these two parameters are explained in the text of the application.

Please note that none of the amendments requested herein pertain to Florida Mining's proposal to burn waste fuels. Florida Mining requests these amendments to reflect operations with coal and conventional fuel and to enable the plant to step up production to meet the increased demand in the market.

Sincerely,

C. M. Coleman, Jr.
Vice President and General Manager

CMC,Jr:gm
Enclosure

FLORIDA MINING & MATERIALS
CEMENT DIVISION
P O BOX 6
BROOKSVILLE, FL 34605-0006

4438

63-134
631

November 30, 19 89

PAY TO THE ORDER OF Florida Department of Environmental Regulation $1,000.00

One thousand and 00/100 DOLLARS

Sun Bank and Trust Company
Brooksville Office
P.O. Box 156
Brooksville, FL 34605-0156

PETTY CASH ACCOUNT

FOR Modification Air Permit

Don B. Kelley

⑈004438⑈ ⑆063101344⑆013400299650 1⑈

APPLICATION TO AMEND AIR POLLUTION SOURCE PERMIT

FLORIDA MINING AND MATERIALS NO. 2 KILN

December 1, 1989

Volume I

Cross/Tessitore & Associates
4763 South Conway Road, Suite F.
Orlando, Florida 32812
(407) 851-1484
F03.178/R5092.Doc

TABLE OF CONTENTS

DEPARTMENT OF [illegible]

Accepted
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DER BAQM

AC 29-193774

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Portland Cement Plant [ ] New[1] [X] Existing[1]

APPLICATION TYPE: [ ] Construction [ ] Operation [X] Modification

COMPANY NAME: Florida Mining and Materials COUNTY: Hernando

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) No. 2 Cement Kiln

SOURCE LOCATION: Street U.S. Highway 98 City NW of Brooksville

UTM: East 17-356.00 North 3169.89

Latitude 28 ° 38 ' 34 "N Longitude 82 ° 28 ' 25 "W

APPLICANT NAME AND TITLE: C.M. Coleman, Jr., Vice President

APPLICANT ADDRESS: P.O. Box 6, Brooksville, Florida 34605-0006

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Florida Mining & Materials

I certify that the statements made in this application for a Modification permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: [signature]

C.M. Coleman, Jr., Vice President
Name and Title (Please Type)

Date: 11/15/89 Telephone No. (904) 796-7241

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed Joseph L Tessitore

Joseph L. Tessitore, P.E.
Name (Please Type)

Cross/Tessitore & Associates, P.A.
Company Name (Please Type)

4763 South Conway Road, Orlando, FL 32812
Mailing Address (Please Type)

Florida Registration No. 23374 Date: 12/6/89 Telephone No. (407) 851-1484

SECTION II: GENERAL PROJECT INFORMATION

Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

See Supplemental Information: Section II

Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction _____ Completion of Construction _____

Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.) The following information represents the initial costs associated with the existing baghouse system. No additional air pollution control equipment will be required for the subject modification.

Baghouse Equipment	$2,825,000.00
Erection	$2,800,000.00
TOTAL	$5,625,000.00

Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

See Supplemental Information: Section II

Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 50 ;

if power plant, hrs/yr _____; if seasonal, describe: _____

If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? NO

   a. If yes, has "offset" been applied? _____

   b. If yes, has "Lowest Achievable Emission Rate" been applied? _____

   c. If yes, list non-attainment pollutants. _____

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. YES [1]

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. YES [2]

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? YES

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? NO

Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? NO

   a. If yes, for what pollutants? _____

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

All supportive data is included in the Supplemental

Information Sections of this Application.

1 BACT has been determined for particulate emissions under the previous Permit AC 27-30450; BACT has been determined for Sulfur Dioxide and Nitrogen Dioxide (NOx) under the previous Permit AC 27-138850. No BACT review was required for Carbon Monoxide and volatile organic compound emissions.

2 PSD compliance for particulate, Sulfur Dioxide and Nitrogen Dioxide (NOx) was established under previous Permit AC 27-138850 (PSD-FL-124).

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Limestone	Particulate	0.02	207,640	
Sand/Clay	Particulate	0.08	20,774	SEE SUPPLEMENTAL
Fly Ash	Particulate	0.14	26,182	INFORMATION: SECTION V
Staurolite	Particulate	1.40	2,704	FIGURE V-1
Mill Scale	Particulate	1.40	2,704	

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 260,000 130 TPH VS 120 TPH

2. Product Weight (lbs/hr): 159,250 79.6 TPH VS. 73.5 TPH

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
	SEE SUPPLEMENTAL	INFORMATION:	SECTION III,	TABLE III-1			

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3] Calculated from operating rate and applicable standard.

[4] Emission, if source operated without control (See Section V, Item 3).

Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Fuller Reverse Air	Particulate	99.9%	0-60	Testing
(Variable Cycle)				

Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Coal	20,640 lb/hr	24,000 lb/hr	300
Diolite *	1,779 gal/hr	2,069 gal/hr	300

Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis: See Supplemental Information: Section III, Tables III-2 and III-3.

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

_____

If applicable, indicate the percent of fuel used for space heating.

Annual Average _____ Maximum _____

Indicate liquid or solid wastes generated and method of disposal.

Solids collected from the fabric filter during normal operation will be returned to the kiln feed and recycled through the system.

_____

_____

Form 17-1.202(1)
Effective November 30, 1982 Page 5 of 12

To be used during start-up of kiln operations and during periods when raw materials feed is stopped and kiln temperature must be maintained.

Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 90 ft. Stack Diameter: 16.0 ft.

Gas Flow Rate: 300,000 ACFM 199,000 DSCFM Gas Exit Temperature: ~386 °F.

Water Vapor Content: ~10 % Velocity: 24.87 FPS

SECTION IV: INCINERATOR INFORMATION N/A

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____

Manufacturer _____

Date Constructed _____ Model No. _____

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diamter: _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

See Supplemental Information: Section V

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

   An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

   An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY N/A

BACT levels have been previously determined in Permit AC 27-138850 and Previous Permit AC 27-3041

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [ ] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [ ] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

DER Form 17-1.202(1)
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5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1] Explain method of determining efficiency.
[2] Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION N/A

A. Company Monitored Data

1. _____no. sites _____ TSP _____( ) SO^{2*} _____ Wind spd/dir

Period of Monitoring _____/_____/_____ to _____/_____/_____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 0 / 01 / 70 to 02 / 08 / 74
month day year month day year

2. Surface data obtained from (location) Tampa/Station No. 12842

3. Upper air (mixing height) data obtained from (location) *

4. Stability wind rose (STAR) data obtained from (location) *

C. Computer Models Used

1. Industrial Source Complex - Short Term Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO^2	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

* For Complete output listing and modeling parameters see Supplemental Information: Section VII

SUPPLEMENTAL INFORMATION:

SECTION II

1. Project Description
2. Table II-1
   Permitting and Compliance Activities

SECTION II

PROJECT DESCRIPTION

The subject of this Permit Application is the revision of Florida Mining and Materials' (FM&M) current construction permit for the No. 2 Kiln (Source E-19). This application does not involve any physical modifications to the kiln. Rather, these permit amendments are requested to enable FM&M to operate at a higher rate of production to meet the market's increasing demands for cement, and to improve the efficiency of the operation. The change for the CO limit is proposed so that the parameter will cover all the CO emissions from the kiln, not merely those that result from burning coal.

The requested revisions to the permit include the following: 1) An increase in the permitted clinker production rate; 2) An increase in the permitted coal consumption rate; 3) An increase in the permitted maximum annual hours of operation; 4) The use of Flolite (a refined oil product) during start-up of the kiln; 5) Operation of the kiln without the raw mill; 6) Increases in the annual emissions for SO_2 and NO_x (the kiln is operating in compliance with the hourly emissions limits, but the increase in the number of operating hours will result in higher annual emissions); 7) increases in the permit's limits for emissions of CO and VOC's.

The permit's current CO limit is based solely on EPA's AP-42 emissions factor for coal combustion sources. The kiln exit gases, however, also contain non-combustion related CO that is generated in the process from the chemical reactions that occur in the calcination of calcium carbonate in the kiln. Therefore, stack testing and monitoring cannot accurately determine compliance with only the combustion source limit. For that reason, a revised CO limit is proposed to accurately reflect the CO that is generated from both coal combustion and the process. In addition, the proposed CO limit includes adjustments based on operations at the higher operating hours limit.

The revised CO limit would include an actual emissions increase of 15.3 tpy from combustion sources, reflecting the increased operating hours and increased coal feed rate. Except for that incremental increase, the proposed higher limit would reflect the kiln's current CO emissions from both coal combustion and the process. The actual emissions increase resulting from increased coal consumption and greater hours of operation is, therefore, well below the 100 tpy significance threshold.

The VOC limit included in the application is based on EPA's proposed limit for industrial furnaces and is representative of good operating practices. The proposed increase in VOC limit would result in an actual annual increase of 20.6 tons of emissions, which is significantly less than the significance threshold of 40 tpy for VOC's

Estimated emissions resulting from these source revisions and relating to the current Permit Number AC27-138850, are detailed in the supporting information for Sections III and V of this Application. The baghouse currently operated with

the No. 2 Kiln will remain as the air pollution control device, thus continuing to provide Best Available Control Technology (BACT), as previously determined.

The current permit for the No. 2 Kiln specifically prohibits kiln operation when the raw mill is down. This prohibition was based on the fact that the raw mill, which receives the hot kiln exhaust gases prior to the baghouse, provides some additional scrubbing for the removal of acid gases. This was especially critical during the operation under Permit A027-65207 which limited the SO_2 emissions from the kiln to 3 pounds per hour. However, the recent permit allows SO_2 emissions of 12 pounds per hour and the dependence on the raw mill scrubbing is no longer critical. Test results, provided in Exhibit V-1, show that SO_2 and NO_x emissions do not exceed the current allowable levels while the raw mill is down.

Further, in order to optimize the kiln productivity, it is necessary to operate the kiln when feed is available but the raw mill is inoperative due to maintenance and/or insufficient feed storage capacity. For these reasons a revision of the permit conditions is requested to allow kiln operation while the raw mill is down. A summary of the proposed permit revisions is provided below.

Parameter	Current Limit	Proposed Limit
1) Production Rate	120 T/hr	130 T/hr
2) Coal Consumption Rate	10.5 T/hr	12 T/hr
3) Operating Hours	7,896 hr/yr	8,400 hr/yr
4) Raw Mill	Up	Up/Down
5) Flolite * (Equivalent to No. 5 Oil Specification)	---	*250 hr/yr
6) Carbon Monoxide	8.9 lb/hr	79.2 lb/hr
7) Volatile Organic Compounds	2.7 lb/hr	7.4 lb/hr

* Used only during start-up of kiln operations and during periods when raw materials feed is stopped and kiln temperature must be maintained. Annual usage hours are approximate.

TABLE II-1

PERMITTING AND COMPLIANCE ACTIVITIES

Activity	Number	Issued	Expired
Construction Permit	AC27-30450	July 25, 1980	December 31, 1983
Operating Permit	A027-65207	August 16, 1983	August 16, 1988
Consent Order	OGC-86-1471	January 23, 1987	-------
Consent Order	OGC-87-1685	September 1, 1988	-------
Construction Permit	AC27-138850	November 3, 1988	January 1, 1990

SUPPLEMENTAL INFORMATION:

SECTION III

1. Table III-1 Regulated Air Pollutant Summary
2. Table III-2 Airborne Contaminants Emitted
3. Table III-3 Fuels Summary
4. Table III-4 Fuels Data
5. Exhibit III-1 Flolite Manufacturer's Data

TABLE III-1

AIRBORNE EMISSIONS SUMMARY

Parameter	Proposed Allowable Emissions lbs/hr	Proposed Allowable Emissions T/yr	Allowed Emission Rate Per Rule 17-2	Current Allowable Emissions lbs/hr	Potential Emissions lbs/hr	Potential Emissions T/yr	Relate to[1] Flow Diagram
Particulate	21.6	90.72	N/A[2]	21.6	21.6	90.72	E-19
Sulfur Dioxide	12.0	50.4	N/A[3]	12.0	12	50.4	E-19
Nitrogen Dioxide (NO_X)	244.0	1025	N/A[3]	250	244.0	1025	E-19
Volatile Organic Compounds	7.44	31.3	N/A[4]	2.7	7.44	31.3	E-19
Carbon Monoxide	79.2	332.6	N/A[4]	8.9	79.2	332.6	E-19
Opacity	10 %	--	Rule 17-2.660	20 %	10 %	--	E-19

(1) See Figure V-6.
(2) Allowable emissions for particulate were established by BACT determination as stated in original Construction Permit AC27-30450.
(3) Allowable emissions for these compounds have been previously established by BACT determination as stated in existing Construction Permit AC 27-138850.
(4) Current limits for these compounds have been previously established under the original Construction Permit AC 27-30450.

TABLE III-2

AIRBORNE EMISSIONS COMPARISON

Parameter	Current Permit Allowable lb/hr	Current Permit Allowable T/yr	Proposed Allowable lb/hr	Proposed Allowable T/yr	Actual Emissions Increase T/yr	Significant Net** Increase T/yr
Particulate	21.6	85.3	21.6	90.72	5.42	25
Sulfur Dioxide	12.0	47.4	12.0	50.4	3.0	40
Nitrogen Dioxide (NO_X)	250.0	987.0	244.0	1025	38	40
Volatile Organic Compounds	2.7	10.7	7.44	31.3	20.6	40
Carbon Monoxide	8.9	35.1	79.2	332.6	52.7 *	100

* See Calculations included in Supplemental Information: Section V of this application. Emissions of Carbon Monoxide from the process source which have not previously been considered are not included as an emissions increase.

** Based on PSD significance criteria.

TABLE III-3

FUELS SUMMARY

Fuel Type	Consumption Avg./hr	Consumption Max./hr	Maximum Heat Input (Btu/hr)
Coal	20,640 lb/hr	24,000 lb/hr	3.0×10^8
Flolite(1)	1,779 lb/hr	2,069 lb/hr	3.0×10^8

(1) Flolite will only be used during start-up of kiln operations and during periods when raw materials feed is stopped and kiln temperature must be maintained, and flolite is normally used only as a substitute for coal. In cases where flolite and coal are used cocurrently, the maximum heat input rate will not exceed 3.0×10^8 Btu/hr.

TABLE III-4
ADDITIONAL FUELS DATA

Fuel Type	Heat Capacity	Sulfur Content
Coal	12,500 Btu/lb	1.0 %
Flolite	145,000 Btu/gal	1.0 %

EXHIBIT III-1

FLOLITE MANUFACTURER'S DATA

Flolite is a blend of "on-specification" re-refined oil and virgin fuel oils which has the physical characteristics of #5 oil. Flolite will only be used during start-up of kiln operations and during periods when raw materials feed is stopped and kiln temperature must be maintained.

The precise formulation of Flolite is proprietary information of the International Petroleum Corporation (IPC); however, virgin fuel normally constitutes less than 50% of the blended product. The following items are presented as Flolite specifications:

- A release from the Federal EPA which states their position that IPC's finished product is equivalent to virgin fuel oil.
- A copy of a certified analysis which is indicative of IPC's typical specifications for finished product.
- A copy of the Department of Environmental Regulation's approval for use of IPC's Flolite.

Florida Department of Environmental Regulation

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

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

January 23, 1989

Mr. A. M. Malatino, President
International Environmental Services, Inc.
105 S. Alexander Street
Plant City, Florida 33566

Dear Mr. Malatino:

In reference to the analysis (enclosed) on the re-refined oil submitted on January 13, I do not have any objections to the use of this product as a phosphate flotation oil.

Phosphate companies using this re-refined oil annually would not be required to register with the Department as a used oil collection and recycling facility. Also, annual reports and recordkeeping would not be required of them.

If you have any further questions or comments, please let me know.

Sincerely,

David H. Kelley

David H. Kelley
Environmental Specialist
Bureau of Waste Planning
and Regulation

DHK/ps

Enclosure

cc: Clabe Polk

INTERNATIONAL ENVIRONMENTAL SERVICES, INC.

IES

105 South Alexander St. • Plant City, Florida 33566 • (813) 754-2373
Tampa (813) 229-0879 • Miami Office 1-800-637-9076 • FAX (813) 754-3709
Florida Wats 1-800-762-1104

CERTIFIED ANALYSIS

TO: INTERNATIONAL ENVIRONMENTAL SERVICES PROJECT NO. IES #5 OIL
ATTN: MR. TONY MALATINO
105 SOUTH ALEXANDER STREET SAMPLED BY: IES
PLANT CITY, FL. 33566

DATE COLLECTED: 1-04-89

IDENTIFICATION: RE-REFINED OIL DATE COMPLETED: 1-10-89

API GRAVITY AT 60 DEGREES F	25-28
SULFUR	0.50%
VISCOSITY SSU AT 100 DEGREES F	240
POUR POINT, DEGREES F	0 DEGREES F
ASPHALTINES	<1.0%
SEDIMENT BY EXTRACTION	TRACE
WATER BY DISTILLATION %	TRACE
TOTAL BOTTOM SEDIMENT AND WATER	1.0% MAX
CADMIUM PPM	<0.3
LEAD PPM (LEACHABLE) BY E. P. TOXICITY	<5.0
ARSENIC PPM	<1.0
CHROMIUM PPM	<1.3
POLYCHLORINATED BIPHENYLS (PCB'S)	BDL*
FLASHPOINT	150 DEGREES MIN

* BELOW DETECTION LIMIT (1.0 PPM)

Results expressed in: [ ] mg/l (ppm) [ ] ug/l (ppb) [ ] mg/kg (ppm) [ ] ug/kg (ppb)

Certified by: Authorized Official

State of Florida Certification: E84160 and HRS 84300

METHODS: "Standard Methods for the Examination of Water and Wastewater", Latest Edition, APHA, AWWA, and WPCF and/or other EPA approved methods which meet FDER protocol, unless otherwise designated.

QUALITY CONTROL: Quality Assurance Project Plan No. 870319Q.
Quality Assurance Quality Control No. 870319Q

NOTE NEXT TO EACH PARAGRAPHS ON PAGES 3 AND 5. D-12

INFORMATION BULLETIN FOR PUBLIC RELEASE:
EPA CONCERNS ABOUT THE USED OIL RECYCLING SYSTEM

The Environmental Protection Agency (EPA) is becoming increasingly concerned about disruptions in the used oil recycling system that are occurring because of the fall in virgin fuel oil prices and because of misunderstanding and confusion about EPA's regulations.

There are only a few presently effective requirements for used oil management. Used oil generators should not mix spent solvents with used oils. These mixtures must be managed as hazardous wastes. Used oil fuel dealers must register with EPA. They may sell off-specification used oil fuels (used oil fuels with high metals concentrations) only to industrial burners. On-specification used oil fuels may be sold to anyone. Off-specification used oil burners must register with the Agency.

Background

In 1980 and 1984 Amendments to the Resource Conservation and Recovery Act (RCRA), Congress directed EPA to consider regulating used oils to protect human health and the environment. At the same time, however, EPA must consider the impacts of regulations on used oil recycling, on small businesses, and small generators. EPA has divided the used oil regulatory program into three stages.

(1) EPA has begun regulation of used oil recycling with a rule to

- discourage mixing hazardous wastes, such as spent solvents, into used oils; and
- ban the combustion of used oil fuels with high metals concentrations in non-industrial facilities, such as schools and apartments.

This rule was proposed on January 11, 1985; promulgated on November 29, 1985; and became fully effective on May 29, 1986.

(2) We have also begun the next stage of regulating the used oil system with the proposed listing and management standards published on November 29, 1985. EPA is now evaluating the many public comments received in response to this notice (and a supplementary March 10, 1986 notice). We expect to make final decisions this fall. These final rules will be effective six months after publication.

(3) In a final stage, EPA expects to control combustion devices that burn used oil fuels with high metals content. The rules are expected to be proposed this fall, at the earliest. Final decisions should be completed by the end of 1987. Again, final rules will be effective six months after that.

Current Problems

There are two major problems in the used oil recycling system. First, generators are confused about the status of used oil. Many are surprised that they often must pay to have used oil hauled away. Second, industrial burners are confused about the status of used oil. Many have stopped burning used oil.

Used Oil Generators

Used oil is commonly produced from engine, machine, and vehicle maintenance. Used oils are typically recycled -- usually as fuel, either on-site or after sale to used oil collectors. In the past, generators were paid as much as forty cents per gallon for used oil (in mid-1985, twenty cents per gallon was most typical). The price paid to generators was high because virgin fuel prices were high. The recent fall in virgin fuel prices has depressed used oil prices. Because of this, some generators are now paying for used oil pickups.

The only Federal rule that currently applies to used oil generators is the prohibition on mixing hazardous wastes, such as spent solvents, with used oil. The resulting mixture (regardless of halogen concentrations) is regulated as a hazardous waste, and the facility has to comply with hazardous waste generator regulations. Used oil itself is not currently listed as a Federal hazardous waste. There are no other used oil rules that apply to used oil generators.

Used Oil Collectors, Processors, and Marketers

Used oil businesses have greater responsibilities under EPA's regulatory framework. When these facilities sell (or use) as fuel used oil that contains toxic metals, they are responsible for sending it to the proper type of burner. These "off-specification" used oils may be sold only to industrial burners. Used oil may be off-specification because of arsenic, cadium, chromium, lead, inorganic halogens, or flashpoint. Facilities selling off-spec used oils must notify EPA.

Used oil fuels that are on-specification are essentially equivalent to virgin fuels. Under the used oil rules, on-spec oil is totally exempt from regulation. Facilities that are the first to claim that used oil fuels meet the specification must also notify the Agency.

Because these used oil businesses control the quality and destinations of recycled used oils, EPA's upcoming regulatory strategy focuses on these facilities. The Agency is evaluating the comments received on the proposal.

Used Oil Burners

The final rule of November 29 required industrial facilities that wished to burn off-specification used oil to notify the Agency. We wanted to establish some accountability and a means of tracking the sale of off-specification fuels to the proper facilities. The notification is merely a one-time requirement that serves the limited purpose of aiding in implementation of the ban on burning off-specification used oil fuels in non-industrial boilers. By notifying, burners do not indicate that they are burning hazardous waste. Nor does notification bind burners to follow any particular standards for burning or storing the used oil fuel. For our convenience, we suggested that facilities notify the Agency using a modified hazardous waste notification form (Form 8700-12). Our intent was not to suggest that off-specification used oil fuels were hazardous wastes, nor that these facilities were hazardous waste facilities. Facilities are free to notify using other means, provided that all required information is provided.

The only Federal requirements from the November 29 final rule that apply to burners who purchase or receive off-specification used oil fuel are limited "paperwork" standards, namely:

1. to notify the Agency as an off-specification used oil burner (§266.44(b))(a one-time requirement),

2. to inform used oil suppliers that the burner has notified the Agency, and will burn off-spec oil in an industrial device only (§266.44(c)), and

3. to keep invoices of shipments received (§266.44(e)).

At this time, there are no other Federal requirements that apply. Used oil is not now a Federally-listed hazardous waste. The November 29 final rule does not impose any Federal storage requirements for used oils. EPA does not require used oil facilities to obtain liability insurance for storage or burning of used oil. The November 29 final rule does not require facilities burning off-spec used oil fuel to have air pollution control devices.

Used oil fuels that meet the fuel specifications are totally exempt from regulation. Burners of on-spec oil need not notify the Agency. We judge specification used oil fuels to be essentially equivalent to virgin fuel oils. There are no plans to change this finding.

For Further Information

EPA is concerned about the current state of the used oil recycling system. We will continue to consider impacts on used oil recycling in our deliberations. If you have additional questions, please contact the RCRA/Superfund Hotline (800/424-9346 or 202/382-3000).

SUPPLEMENTAL INFORMATION:

SECTION V

1. Table V-1 Current and Proposed Feed and Production Rates
2. Table V-2 Emissions Summary
3. Emissions Calculations
4. Figure V-4 Process Flow Diagram
5. Figure V-5 USGS Topographical Map
6. Figure V-6 Facility Plot Plan

TABLE V-1

CURRENT AND PROPOSED FEED PRODUCTION AND HEAT INPUT RATES

	Current	Proposed	
Kiln Minerals Feed	120 T/hr	130 T/hr	+ 8.3%
Clinker Production Rate	142,000 lb/hr	159,250 lb/hr	+ 12.1%
Maximum Heat Input	2.1×10^8 Btu/hr	3.0×10^8 Btu/hr	+ 42.8%

TABLE V-2

EMISSIONS SUMMARY

Parameter	Uncontrolled Emissions* (lb/hr)	Uncontrolled Emissions* (T/yr)	Basis	Proposed Maximum (lb/hr)	Proposed Maximum (T/yr)
Particulate	19,502	81,908	Permit AC27-138850	21.6	90.72
Sulfur Dioxide	1,295	4,705	Permit AC27-138850	12.0	50.4
Nitrogen Dioxide (NO_X)	244	1,025	Permit AC27-138850	244.0**	1,025 **
Volatile Organic Compounds	7.44	31.3	Proposed Limit	7.44**	31.3 **
Carbon Monoxide	79.2	332.6	Proposed Limit	79.2**	332.6 **

* These emissions assume no pollution control, are for calculation purposes only, and do not reflect actual operating conditions.

** It is assumed that no control is provided by the baghouse, but CO VOC's and NO_X are controlled by the system combustion controls, through the use of oxygen and hydrocarbon continuous monitoring of kiln combustion gases. For the case of CO, the limit of 79.2 lb/hr actually represents only 12.0 lb/hr from the combustion source. The process source accounts for an estimated 67.2 lb/hr of emissions. A complete discussion of CO emissions is provided on Page 36 of this application.

EMISSIONS CALCULATIONS

The calculations included in this section provide estimates of potential emissions, actual emissions, and control device removal efficiencies, where appropriate for the following parameters: 1) Particulate, 2) Sulfur Dioxide, 3) Nitrogen Dioxide (NO_X), 4) Carbon Monoxide, and 5) Volatile Organic Compounds.

EMISSIONS CALCULATIONS

(continued)

1. PARTICULATE

The proposed hourly actual emissions rate for particulate is the same as the currently permitted level. However, because this application includes an increase in hours of operation, the annual actual emissions rate (tons/yr) must increase proportionally. In order to determine the efficiency of the air pollution control device, the potential emission loading to the baghouse is calculated based on an emissions factor from the EPA Guidance Document AP-42, Table 8.6-1.

Calculation of Estimated Actual Emissions:

Estimated Actual Emissions	= 21.6 lb/hr (Permit AC27-138850)
	= (21.6 lb/hr x 8,400 hr/yr) ÷ (2',000 lb/ton)
	= 90.72 T/yr

Calculation of Potential Emissions:

Potential Emissions	= 21.6 lb/hr
	= 90.72 T/yr

Calculation of Control Device Removal Efficiency:

Uncontrolled Emissions Factor	= 245.0 lb/ton clinker
Proposed Production Rate	= 79.6 T/hr clinker
Potential Emission Loading to Baghouse	= (245 lb/ton) x (79.6 T/hr)
	= 19,502.0 lb/hr
Control Device Removal Efficiency	= (19,502 lb/hr - 21.6 lb/hr) ÷ (19,502 lb/hr)
	= 99.9%

EMISSIONS CALCULATIONS

(continued)

2. SULFUR DIOXIDE

The proposed hourly actual emissions rate for Sulfur Dioxide is the same as previously permitted. However, because this application includes an increase in hours of operation, the annual actual emissions rate (tons/yr) must increase proportionally. Sulfur Dioxide is generated in the cement kiln from two sources: 1) The minerals present in the raw process feed, and 2) The combustion of fuel (coal). Uncontrolled emissions factors for Sulfur Dioxide, found in the EPA Guidance Document AP-42, are used in calculating the potential loading to the baghouse from each source.

Calculation of Estimated Actual Emissions:

Estimated Actual Emissions = 12 lb/hr
(Permit AC27-138850)

= (12 lb/hr x 8,400 hr/yr)
÷ (2,000 lb/ton)

= 50.4 T/yr SO_2

Calculation of Potential Emissions:

Potential Emissions = 12 lb/hr

= 50.4 T/yr SO_2

Calculation of Control Device Removal Efficiency:

Mineral Source:

Sulfur Dioxide Emission Factor = 10.2 lb SO_2/ton clinker
(from AP-42)

Clinker Production Rate = 79.6 T/hr

Uncontrolled Emissions = (79.6 tons clinker/hr)
x (10.2 lb sulfur/ton clinker)

= 811.9 lb/hr

= (811.9 lb/hr x 8,400 hr/yr)
÷ (2,000 lb/ton)

= 3,410 T/yr SO_2

EMISSIONS CALCULATIONS

(continued)

Calculation of Control Device Removal Efficiency: (continued)

Fuel Source:

Maximum Fuel Consumption Rate	= 24,170 lb/hr
Maximum Fuel Sulfur Content	= 1%
Conversion Factor	= 2 lb SO_2/lb S

Fuel Source:

Uncontrolled Emissions	= (24,170 lb fuel/hr) x (0.01 lb sulfur/lb fuel)
	x (2 lb SO_2/lb S)
	= 483 lb/hr SO_2
	= (483 lb/hr x 8,400 hr/yr) - (2,000 lb/ton)
	= 2,029 T/yr SO_2
Estimated Total Potential Emissions Loading to Baghouse	= 483 lb/hr + 811.9 lb/hr
	= 1,295 lb/hr SO_2
	= 3,410 T/yr + 1,295 T/yr
	= 4,705 T/yr SO_2
Control Device Removal Efficiency	= (1,295 lb/hr - 12 lb/hr) ÷ (1,295 lb/hr)
	= 99.1%

EMISSIONS CALCULATIONS

(continued)

3. NITROGEN DIOXIDE (NO_X)

Nitrogen Dioxide (NO_X) emissions are a function of the kiln combustion process only. It is assumed that no control is provided by the fabric filter.

Calculations of Estimated Actual Emissions:

Estimated Actual Emissions	= 244 lb/hr NO_X
	= (244 lb/hr x 8,400 hr/yr) ÷ (2,000 lb/ton)
	= 1,025 T/yr

Calculations of Potential Emissions:

Potential Emissions	= 244 lb/hr
Control Device Removal Efficiency	= 0%
	= 1,025 T/yr

EMISSIONS CALCULATIONS

(continued)

4. CARBON MONOXIDE

Currently, the No. 2 Kiln is permitted for allowable Carbon Monoxide emissions of 8.9 lb/hr. The intent of this application is to modify this permitted allowable level in three ways: 1) To account for Carbon Monoxide generated as a result of chemical reactions inherent in the manufacturing process, 2) To increase the emissions level to account for an increase in the coal feed rate, and 3) To increase the emissions level (in tons per year) to account for an increase in annual operating hours. Calculations addressing each of these factors were conducted by considering the Carbon Monoxide from combustion and process sources separately.

4.1 Combustion Source

Carbon Monoxide formation occurs within the cement kiln in two ways: 1) From the combustion source, through the combustion of fuel (coal), and 2) From the process source, as a product of the chemical reactions inherent in the manufacturing process. The existing permit limit was based on calculations which were included in the original construction permit application, and which were based only on the coal combustion source of Carbon Monoxide. Using a published emissions factor of 1 lb CO/ton coal from EPA's AP-42 Guidance Document, the theoretical actual emissions were calculated corresponding to a coal feed rate of 8.9 tons/hr, based on original Construction Permit AC 27-30450. Because the modifications proposed in this permit application include an increase in coal feed rate, an increase in Carbon Monoxide emissions due to combustion is justified. This increased level is calculated as follows:

Calculation of Proposed Actual Emissions from Combustion Source:

CO Emission Factor = 1 lb/ton of coal burned
(AP-42 Table 1.1-1/2)

Actual Emissions = (1 lb CO/ton coal) x (12 T/hr)

= 12 lb/hr

= (12 lb/hr) x (8,400 hr/yr)
÷ (2,000 lb/ton)

= 50.4 T/yr

4.2 Process Source

As stated before, the current limit does not account for Carbon Monoxide generated as part of the chemical process reactions. Thus, the permitted allowable level has not accurately represented the true actual emissions of Carbon Monoxide. In order to determine what quantity of emissions results from this process source, the following analysis was developed.

EMISSIONS CALCULATIONS

(continued)

A. Development of Process Chemical Reactions

The basis of the cement manufacturing process is the calcination of Calcium Carbonate ($CaCO_3$), which is the main constituent of the raw materials feed to the kiln. This reaction is represented by the following equation:

$$CaCO_{3(s)} \text{ -------> } CaO_{(s)} + CO_{2(g)}$$

As the reaction occurs, the raw materials are processed and Carbon Dioxide is produced. However, in the high temperature kiln environment, a portion of this Carbon Dioxide decays to form Carbon Monoxide. This reaction occurs according to the following equation:

$$CO_2 \text{ <-------> } CO + 1/2\ O_2$$

In order to determine the quantity of Carbon Monoxide formed within the cement kiln, it is necessary to determine the equilibrium constant for this reaction corresponding to the average kiln temperature. The following section provides a derivation of the equilibrium constant expression.

B. Derivation of Equilibrium Constant (K_p) Expression

<u>Theoretical Reaction</u>

$$CO_2 \text{ <-------> } CO + 1/2\ O_2 \qquad \textbf{Equation 1}$$

An equation for the equilibrium constant, K_p, specific to this reaction can be written:

$$K_p = \frac{[N_{CO}]\ [N_{CO}]^{1/2}}{[N_{CO2}]} \times \frac{(P)^{1/2}}{(Nm)^{1/2}} \qquad \textbf{Equation 2}$$

Where N = Number of moles
Nm = Sum of moles of each compound
P = Pressure in atmospheres

EMISSIONS CALCULATIONS

(continued)

Incomplete Reaction

$$CO_2 \text{ -------> } ZCO_2 + XCO + YO_2 \qquad \textbf{Equation 3}$$

Using stoichiometry, the following relations can be developed from Equation 3:

C Balance: $1 = Z + X$ **Equation 4**

O Balance: $2 = 2Z + X + 2Y$ **Equation 5**

Solving Equation 4 for Z in terms of X:

$$Z = 1 - X \qquad \textbf{Equation 6}$$

Substituting Equation 6 for Z into Equation 5:

$$2 = 2\,(1-X) + X + 2Y \qquad \textbf{Equation 7}$$

Simplifying Equation 7 to solve for Y in terms of X:

$$2Y = X$$

$$Y = X/2 \qquad \textbf{Equation 8}$$

By definition, the following equation can be written for Nm:

$$Nm = X + Y + Z \qquad \textbf{Equation 9}$$

Substituting Equation 6 for Z and Equation 8 for Y into Equation 9:

$$Nm = X + 1 - X - X/2 \qquad \textbf{Equation 10}$$

Simplifying Equation 10:

$$Nm = 1 + X/2 \qquad \textbf{Equation 11}$$

Substituting Equation 11 into Equation 2 and simplifying:

$$K_p = \frac{X\ (Y)^{\frac{1}{2}}}{Z} \times \frac{(P)^{\frac{1}{2}}}{(X + Y + Z)^{\frac{1}{2}}}$$

$$K_p = \frac{X\ (X/2)^{\frac{1}{2}}}{(1 - X)} \times \frac{(P)^{\frac{1}{2}}}{(1 + X/2)^{\frac{1}{2}}}$$

$$K_p = \frac{X\ (X/2)^{\frac{1}{2}}}{(1 - X)} \times \frac{(P)^{\frac{1}{2}}}{(2 + X/2)^{\frac{1}{2}}}$$

$$K_p = \frac{(X)^{3/2}}{(1 - X)} \times \frac{(P)^{\frac{1}{2}}}{(2 + X)^{\frac{1}{2}}} \qquad \textbf{Equation 12}$$

Substituting P = 1 atm into Equation 12:

$$K_p = \frac{(X)^{3/2}}{(1 - X)\ (2 + X)^{\frac{1}{2}}} \qquad \textbf{Equation 13}$$

EMISSIONS CALCULATIONS

(continued)

C. Calculation of Current Actual Emissions from Process Source

In order to use the expression developed in Section B, values for K_p were obtained corresponding to a temperature range of 1,000°F to 3,500°F. Using the calcination reaction stoichiometry along with the current permitted raw material feed rate of 120 tons/hr, the following calculations were developed:

$$K_p = \frac{(X)^{3/2}}{(1 - X)(2 + X)^{1/2}} \qquad \textbf{Equation 1}$$

X = Moles of Carbon Monoxide

$CaCO_3$ Feed Rate = 120 tons/hr
(Assume 100% of Raw Materials) No!

$$= \frac{(120 \text{ tons/hr}) \times (2{,}000 \text{ lbs/ton})}{(100 \text{ lbs/mole})}$$

= 2,400 moles/hr $CaCO_3$

Theoretical CO_2 Generated = (2,400 moles $CaCO_3$/hr)
x (1 mole CO_2/mole $CaCO_3$)

= 2,400 moles/hr CO_2

CO Generated = (X) x (1 mole CO/mole CO_2) **Equation 2**
x (2,400 moles CO_2/hr)
x (28 lbs CO/mole)

Using the values of K_p obtained, as well as Equations 1 and 2, the graph shown in Figure V-1 was developed. This establishes the formation of Carbon Monoxide as a function of kiln temperature. Figure V-2 provides a temperature profile for the No. 2 Kiln. By calculating the mean temperature and narrowing the range to within 1,500°F and 3,000°F, the graph included in Figure V-3 was developed. This shows a Carbon Monoxide emissions rate of 62.0 lb/hr for the mean kiln temperature of 2,422°F. The emissions calculations for the current permitted conditions and this process source of Carbon Monoxide are therefore provided as follows:

EMISSIONS CALCULATIONS

(continued)

Process Source:

Kiln Mean Temperature = 2,422°F

CO Formation @ 2,422 °F (Figure V-3) = 62.0 lb/hr

= (62.0 lb/hr x 7,896 hr/yr) ÷ (2,000 lb/ton)

= 244.8 T/yr

D. Calculation of Proposed Actual Emissions from Process Source

Because the modifications proposed in this application include an increase in the raw materials feed rate, an increase in the actual emissions of Carbon Monoxide generated from the process source is therefore justified. A calculation of this increased level of actual emissions is provided below:

Current Actual Emissions (Process Source) = 62.0 lb/hr

Proposed Actual Emissions (Process Source) = (62.0 lb/hr)

$$\times \frac{\text{(130 T/hr proposed raw materials feed)}}{\text{(120 T/hr current raw materials feed)}}$$

= 67.2 lb/hr

= (67.2 lb/hr) x (8,400 hr/yr) ÷ (2,000 lb/ton)

= 282.2 T/yr

EMISSIONS CALCULATIONS

(continued)

CARBON MONOXIDE EMISSIONS SUMMARY

Table V-3 is provided as a summary of the emissions calculations presented for Carbon Monoxide. Estimated potential emissions are considered equal to proposed actual emissions. It is assumed that the baghouse provides no control of Carbon Monoxide emissions. A review of this table shows that, although the proposed actual emissions level of 79.2 lb/hr is significantly higher than the current permitted level, a large part of the difference between the two can be attributed to the process source of Carbon Monoxide, which has never been considered before. The net increase in actual emissions is insignificant, and is due simply to the proposed increases in coal feed rate and hours of operation.

In order to substantiate the calculated value of 79.2 lb/hr for proposed actual emissions of Carbon Monoxide, Exhibit V-1 provides a data summary sheet compiled during performance testing of the No. 2 Kiln, conducted on May 23, 1989. Exhibit V-2 provides additional data on typical levels of Carbon Monoxide emitted by a cement kiln.

Table V-4 provides a comparison of ground level concentrations, determined through air dispersion modeling, with applicable standards.

FIGURE V-1

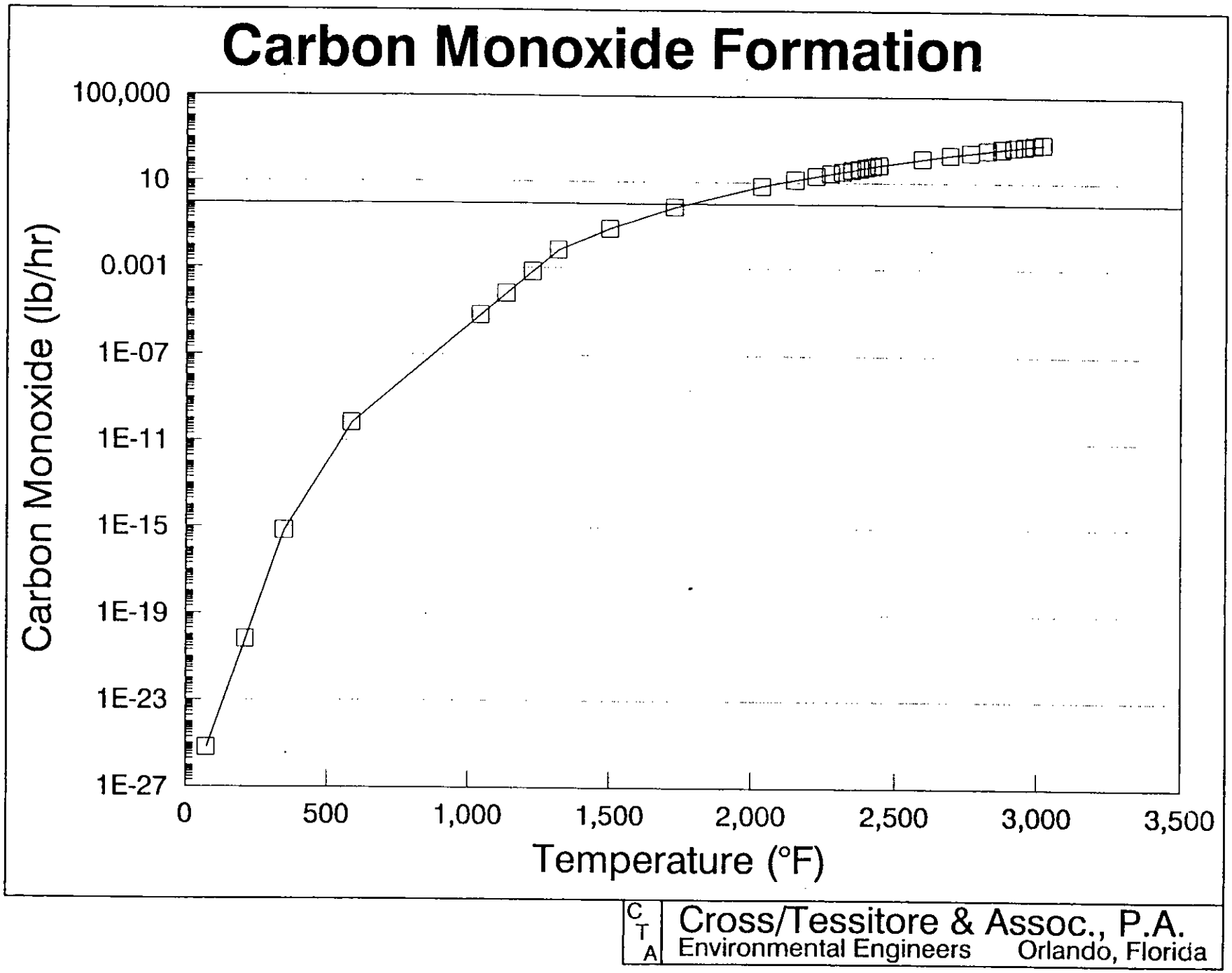

Carbon Monoxide Formation
100,000
10
0.001
1E-07
1E-11
1E-15
1E-19
1E-23
1E-27
Carbon Monoxide (lb/hr)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
Temperature (°F)
C T A
Cross/Tessitore & Assoc., P.A.
Environmental Engineers
Orlando, Florida

FIGURE V-2

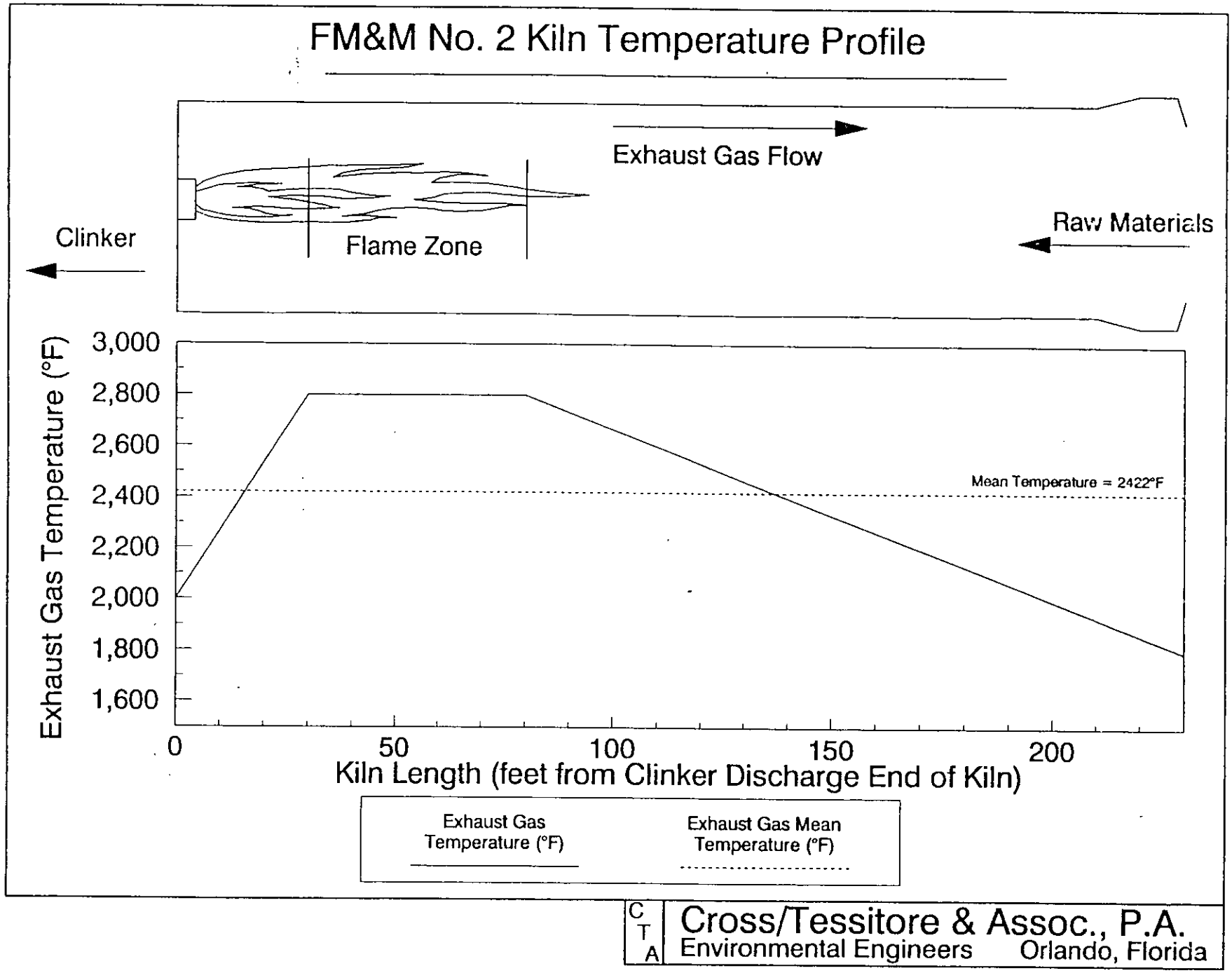

FM&M No. 2 Kiln Temperature Profile
Exhaust Gas Flow
Clinker
Flame Zone
Raw Materials
Exhaust Gas Temperature (°F)
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
Mean Temperature = 2422°F
0
50
100
150
200
Kiln Length (feet from Clinker Discharge End of Kiln)
Exhaust Gas Temperature (°F)
Exhaust Gas Mean Temperature (°F)
C T A
Cross/Tessitore & Assoc., P.A.
Environmental Engineers
Orlando, Florida

FIGURE V-3

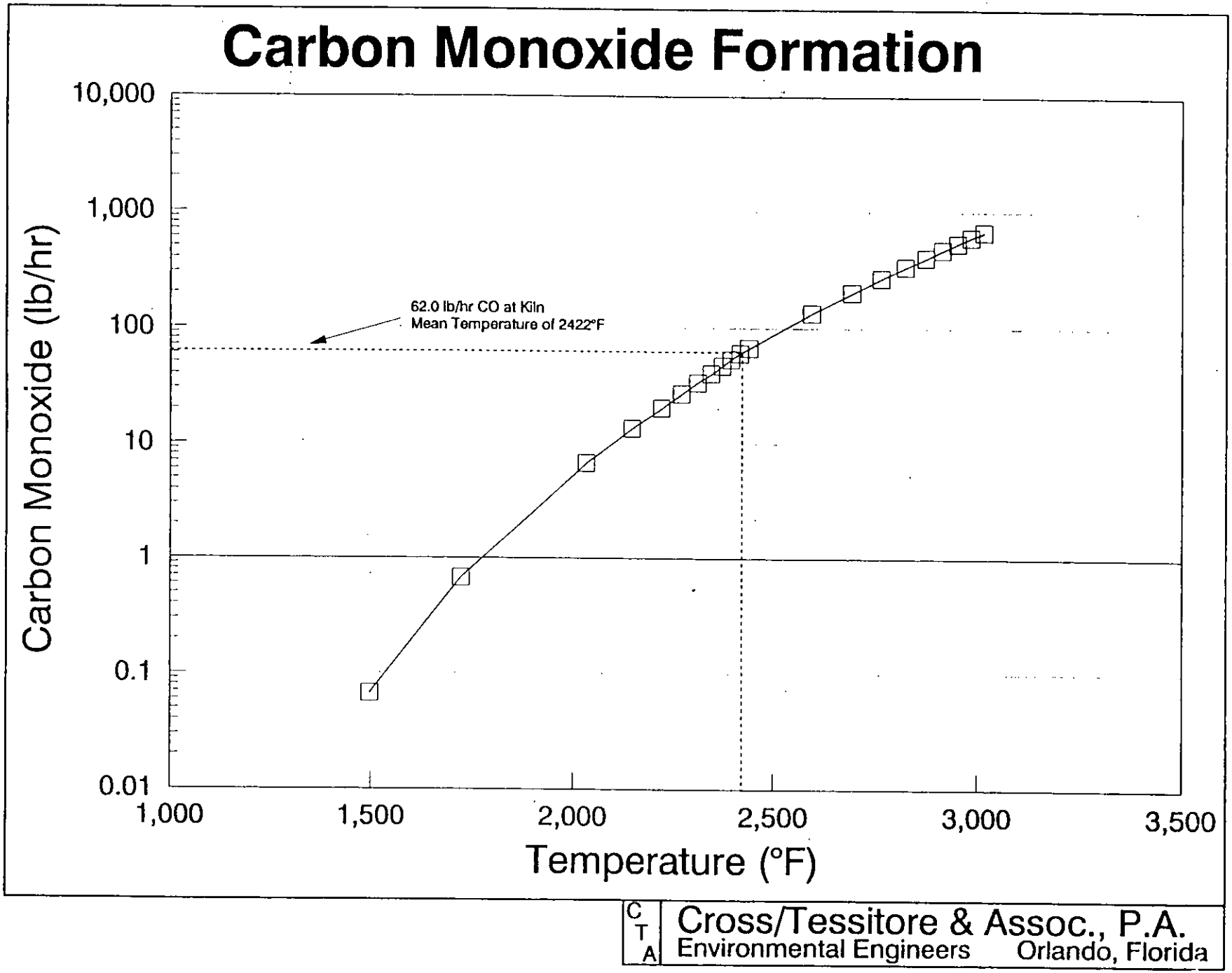

Carbon Monoxide Formation
10,000
1,000
100
10
1
0.1
0.01
Carbon Monoxide (lb/hr)
62.0 lb/hr CO at Kiln
Mean Temperature of 2422°F
1,000
1,500
2,000
2,500
3,000
3,500
Temperature (°F)
C T A
Cross/Tessitore & Assoc., P.A.
Environmental Engineers Orlando, Florida

TABLE V-3

CARBON MONOXIDE

EMISSIONS SUMMARY

	Current Permitted Level		Current Actual Emissions		Proposed Actual Emissions		Net Emissions Increase	
	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Combustion Source	8.9	35.1	8.9	35.1	12.0	50.4	3.1	15.3
Process Source	--	--	62.0	244.8	67.2	282.2	5.2	37.4
TOTAL	8.9	35.1	70.9	279.9	79.2	332.6	8.3	52.7
			41.4	172.7	49.7	182.2	8.3	11.5

EXHIBIT V-1

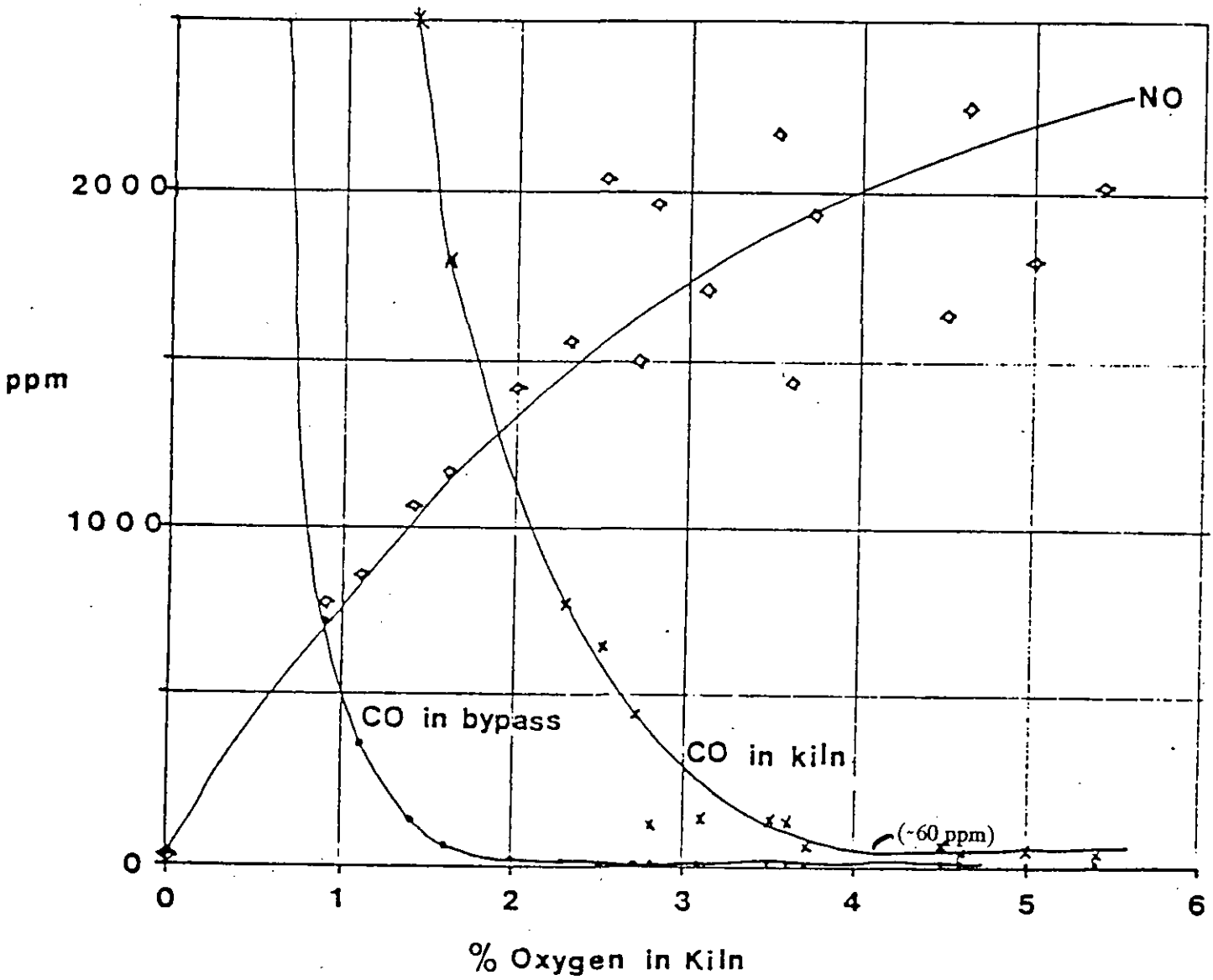
FLORIDA MINING AND MATERIALS TESTING SUMMARY

	Test Results		
	Kiln Feed Rate (ton/hr)	Emissions (lb/hr)	Current Allowable Emissions (lb/hr)
Particulate	130	7.51	21.6
Sulfur Dioxide	130	0.44 (1)	12.0
Nitrogen Dioxide (NO_x)	130	135 (1)	250
Carbon Monoxide	130	39.5 (1)	8.9
	130	44.8	
Volatile Organic Compounds	130	5.4	2.7

(1) These measured emissions represent kiln operation while the raw mill is down.

EXHIBIT V-2

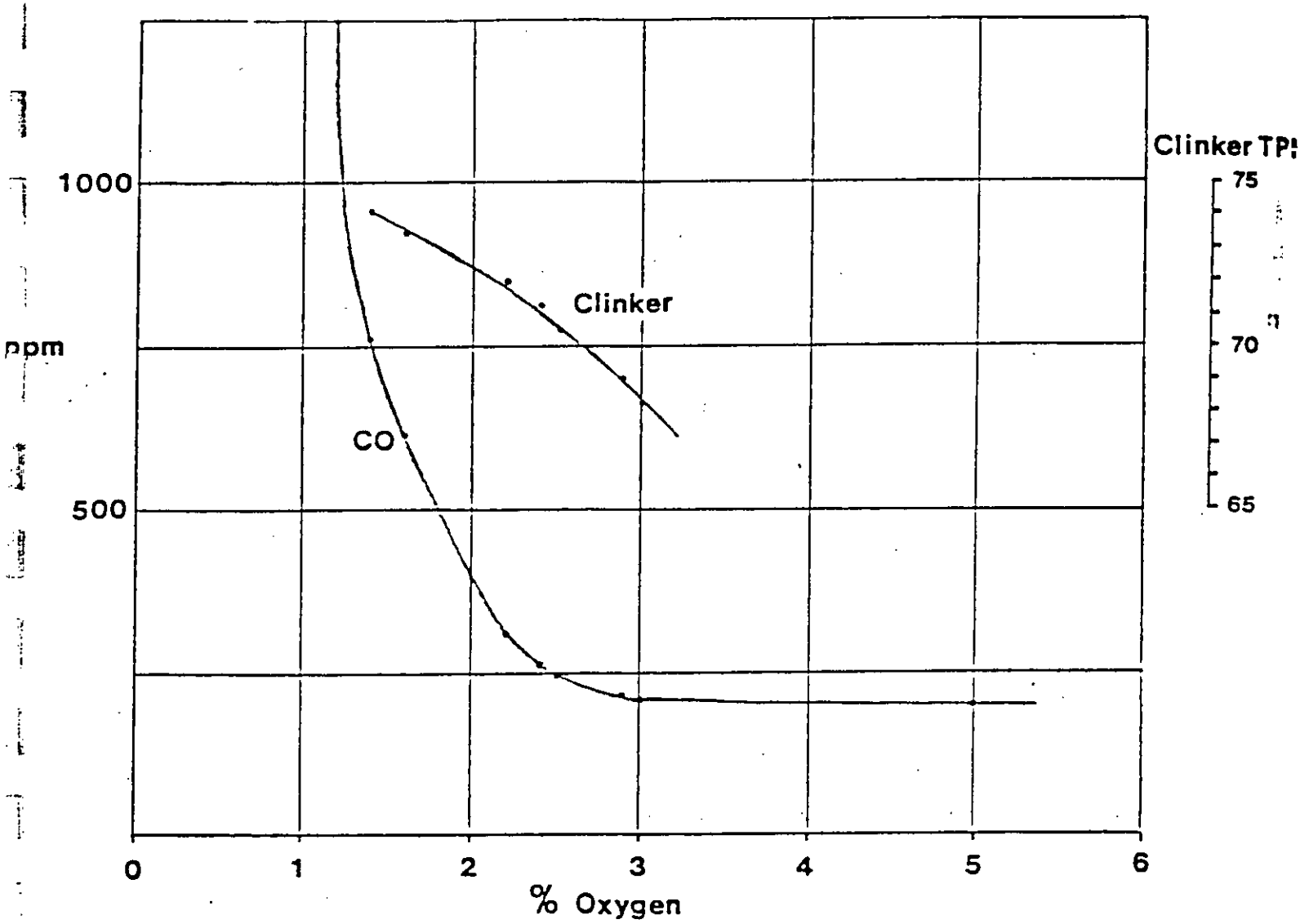
Fig. 3 CO and NO vs Oxygen in Kiln



From "The Use of Carbon Monoxide and Other Gases for Process Control", by Eric R. Hansen. Submitted for the 1985 I.E.E.E. Conference.

NOTE: CO in bypass can be considered representative of the combustion source. CO in kiln can be considered representative of both the combustion and process sources.

Fig. 4 CO and production vs % Oxygen at ID Fan



Feed STPH	O_2 %	CO ppm	NO ppm	SO_2 ppm	Clinker TPH
111	3.0	214	516	332	68.2
112	2.9	223	498	344	69
115	2.5	248	557	413	70.5
117	2.2	313	501	440	72
120	1.6	610	403	462	73.5
121	1.4	761	370	459	74.2

Gas concentrations corrected to 3% O_2

From "The Use of Carbon Monoxide and Other Gases for Process Control", by Eric R. Hansen. Submitted for the 1985 I.E.E.E. Conference.

TABLE V-4

COMPARISON OF CARBON MONOXIDE IMPACT LEVELS

Averaging Time	Maximum[1] Ground Level Impact (ug/m^3)	Location of[2] Maximum Impact East	North	Significant[3] Impact Levels (ug/m^3)	National[4] Ambient Air Quality Standard (ug/m^3)
1-Hour	832.79	356, 000	3, 168, 700	2,000	40,000
8-Hour	395.68	356, 000	3, 168, 700	500	10,000

(1) Calculated based on dispersion coeficients developed through ISCST dispersion modeling. For complete modeling output listing, see Volume II of this application

(2) UTM coordinates in meters (source location: East 356, 100 West 3, 168, 700).

(3) From DER 17-2.100 (180).

(4) From DER 17-2.300.

EMISSIONS CALCULATIONS

(continued)

5. VOLATILE ORGANIC COMPOUNDS (TOTAL HYDROCARBONS)

It is estimated that an achievable actual emissions concentration for the No. 2 Kiln is 20 ppm (as carbon). This level is consistent with the EPA's proposed level for industrial furnaces and believed to be representative of good operating procedures. Control of volatile organic compounds (hydrocarbons) is achieved through properly maintained combustion conditions within the kiln system. It is assumed that no control is provided by the fabric filter. The following provides a calculation of the estimated potential and actual emissions rate based on the EPA's proposed levels.

Estimated Potential Emissions

$$= \frac{(20 \text{ ppm}) \times (12 \text{ g/mole}) \times (199{,}000 \text{ cu. ft/min}) \times (60)}{(385 \text{ ft}^3) \times (10^{+6})}$$

$$= 7.44 \text{ lb/hr}$$

$$= \frac{(7.44 \text{ lb/hr}) \times (8{,}400 \text{ hr/yr})}{(2{,}000 \text{ lb/ton})}$$

$$= 31.3 \text{ T/yr}$$

Control Device Removal Efficiency

$$= 0\%$$

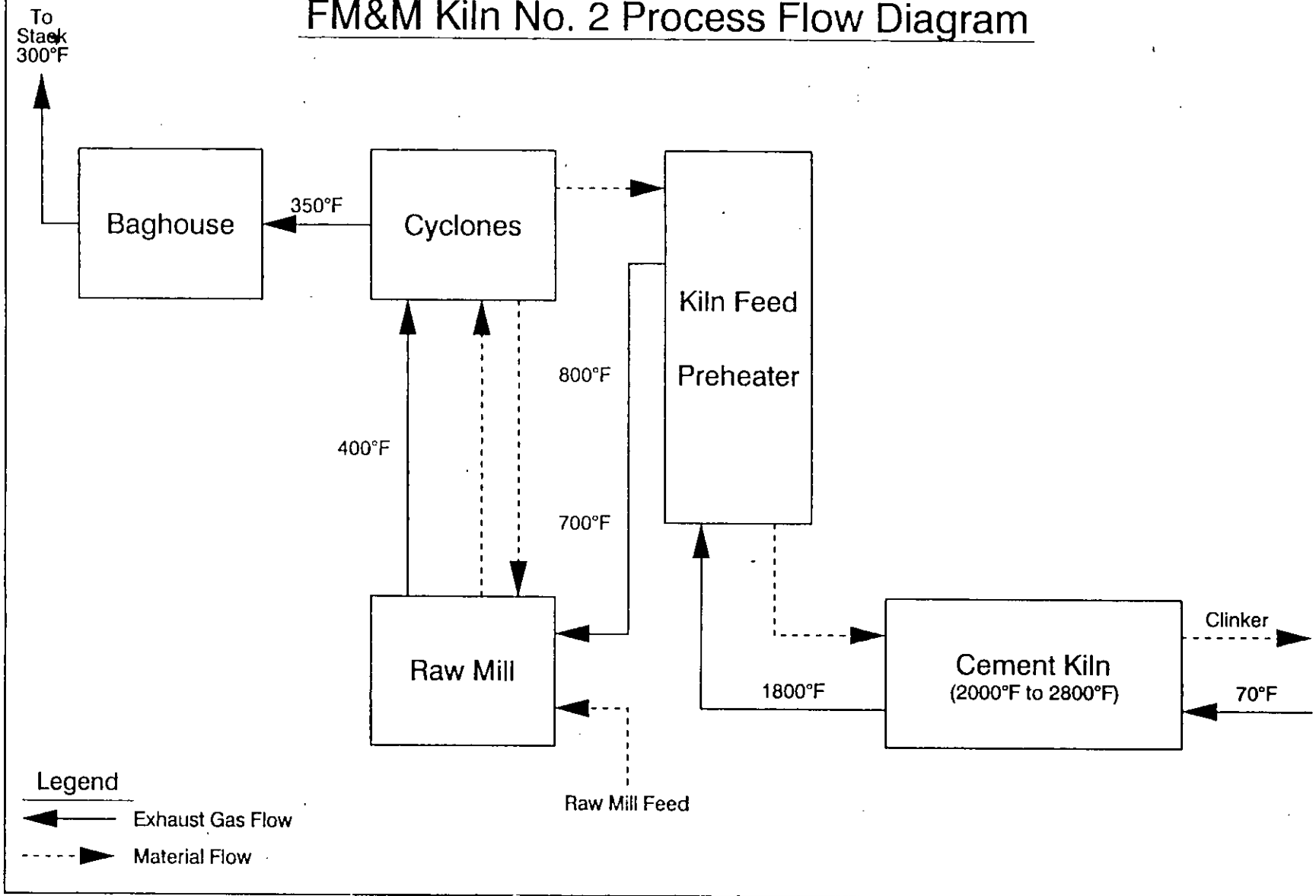
Estimated Actual Emissions

$$= 7.44 \text{ lb/hr} \qquad 2.4$$

$$= 31.3 \text{ T/yr} \qquad 22.7$$

Figure V-4

FM&M Kiln No. 2 Process Flow Diagram



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Environmental Engineers Orlando, Florida

FIGURE V-6

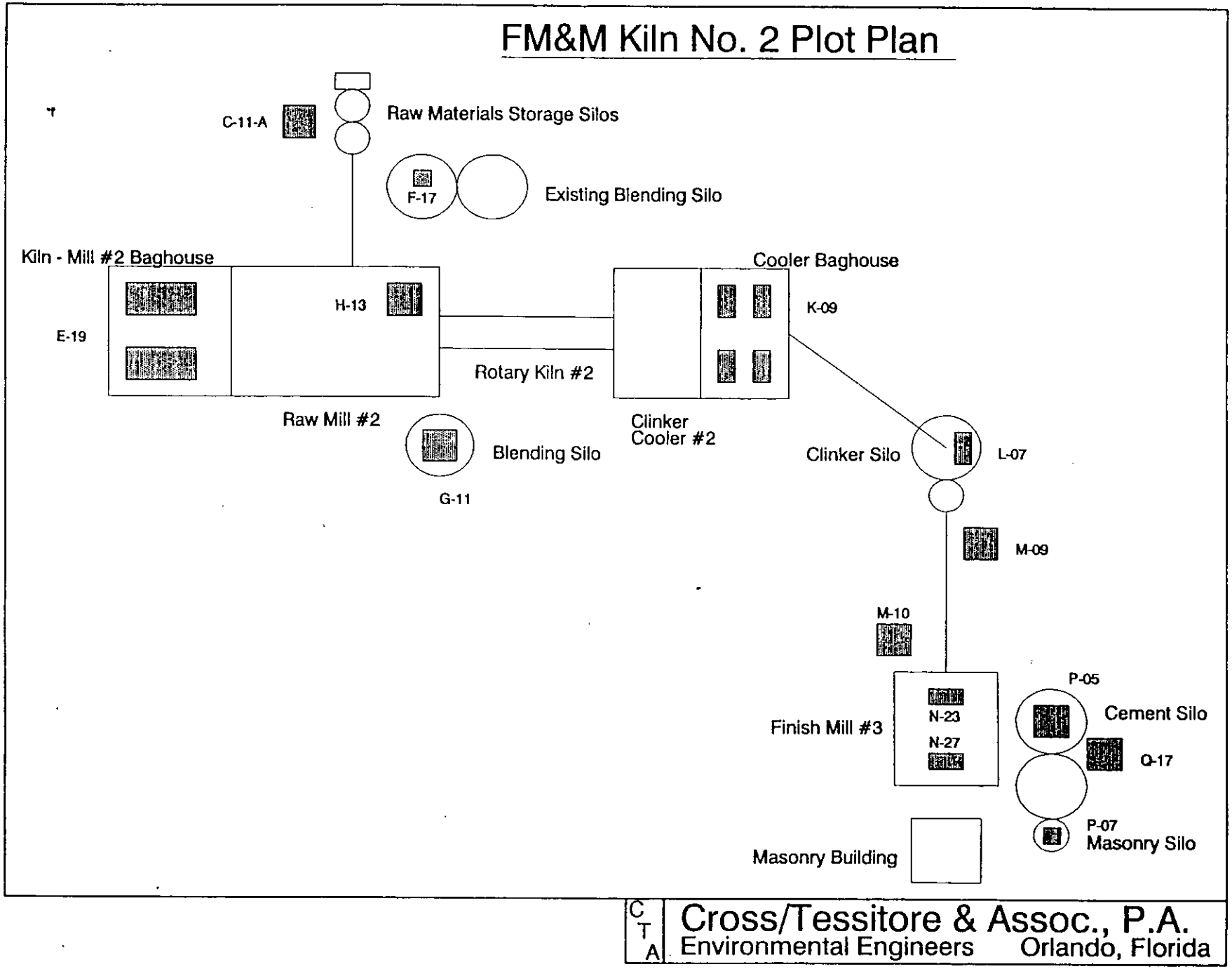
FM&M Kiln No. 2 Plot Plan
C-11-A
Raw Materials Storage Silos
F-17
Existing Blending Silo
Kiln - Mill #2 Baghouse
E-19
H-13
Rotary Kiln #2
Raw Mill #2
Blending Silo
G-11
Clinker Cooler #2
Cooler Baghouse
K-09
Clinker Silo
L-07
M-09
M-10
Finish Mill #3
N-23
N-27
P-05
Cement Silo
Q-17
P-07
Masonry Silo
Masonry Building
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FIGURE V-5

USGS TOPOGRAPHICAL MAP