

APPLICATION TO AMEND FDER  
AIR POLLUTION SOURCE PERMIT  
AC27-173474 FOR PERFORMANCE TESTING  
OF WASTE TIRES AND USED OIL  
IN CEMENT KILN NO. 2

and

~~AC27-173474~~

PSD-FL-124

+124A

PSD-FL-124B

FLORIDA MINING AND MATERIALS  
BROOKSVILLE, FLORIDA

September 14, 1990

Cross/Tessitore & Associates, P.A.  
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Orlando, Florida 32812  
(407) 851-1484  
F03.178/FMM2TIRE

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**Florida Department of Environmental Regulation**  
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

DER Form #	_____
Form Title	_____
Revision Date	_____
DER Approval No.	_____

Page 1 of 2 (2/81)

**APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES**

SOURCE TYPE: Portland Cement Plant     New<sup>1</sup>     Existing<sup>1</sup>  
 APPLICATION TYPE:     Construction     Operation     Modification  
 COMPANY NAME: Moore McCormack, Inc. d/b/a Florida Mining & 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 North 3169  
 Latitude 28° 38' 34"N Longitude 82° 28' 25"W  
 APPLICANT NAME AND TITLE: C. M. Coleman Jr., Vice President and General Manager  
 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 Moore McCormack Inc. d/b/a 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: *C. M. Coleman Jr.*  
C.M. Coleman Jr., Vice President and General Manager  
 Name and Title (Please Type)

Date: 09/14/90 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

<sup>1</sup> 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 S. Conway Rd., Ste. F, Orlando, Florida 32812  
Mailing Address (Please Type)

Florida Registration No. 23374 Date: 9/14/90 Telephone No. (407)851-1484

**SECTION II: GENERAL PROJECT INFORMATION**

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

See Supplemental Information: Section II

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

Start of Construction N/A Completion of Construction N/A

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.) 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

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

See Supplemental Information: Section II



**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 II
Staurolite	Particulate	1.40	2,704	
Mill Scale	Particulate	1.40	2,704	

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

- Total Process Input Rate (lbs/hr): 260,000
- Product Weight (lbs/hr): 159,250

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

Name of Contaminant	Emission <sup>1</sup>		Allowed Emission Rate per Rule 17-2	Allowable Emission <sup>3</sup> lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
	See Supplemental Information:			Section III			

See Section V, Item 2.

<sup>2</sup>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)

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).

D. 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	Particulate	99.9	0-60	Testing
Air (Variable Cycle)				
Fabric Filter				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
See Supplemental Information: Section III			

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

Fuel Analysis: See supplemental information: Section II

Percent Sulfur: \_\_\_\_\_ Percent Ash: \_\_\_\_\_

Density: \_\_\_\_\_ lbs/gal Typical Percent Nitrogen: \_\_\_\_\_

Heat Capacity: \_\_\_\_\_ BTU/lb \_\_\_\_\_ BTU/gal

Other Fuel Contaminants (which may cause air pollution): \_\_\_\_\_

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

Annual Average \_\_\_\_\_ Maximum \_\_\_\_\_

G. 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.

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

Stack Height: 90 ft. Stack Diameter: 14.0 ft.  
 Gas Flow Rate: 300,000 ACFM 199,000 DSCFM Gas Exit Temperature: ~ 380 °F.  
 Water Vapor Content: ~ 10 % Velocity: 24.87 FPS

SECTION IV: INCINERATOR INFORMATION  
 NOT APPLICABLE

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	NOT APPLICABLE						
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) <sup>3</sup>	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber	NOT APPLICABLE				
Secondary Chamber					

Stack Height: \_\_\_\_\_ ft. Stack Diameter: \_\_\_\_\_ Stack Temp. \_\_\_\_\_

Gas Flow Rate: \_\_\_\_\_ ACFM \_\_\_\_\_ DSCFM\* Velocity: \_\_\_\_\_ FPS

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

Type of pollution control device:  Cyclone  Wet Scrubber  Afterburner  
 Other (specify) \_\_\_\_\_



Brief description of operating characteristics of control devices: \_\_\_\_\_

NOT APPLICABLE

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

NOT APPLICABLE

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).  
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.)  
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).
4. 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.
5. 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).
6. 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.

NOT APPLICABLE

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

BACT levels have been previously determined in Permit AC 27-138850 and previous Permit AC27-30450. 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

Contaminant	Rate or Concentration

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

Yes  No

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

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

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

13. 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

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant

Rate or Concentration

NOT APPLICABLE

10. Stack Parameters

- a. Height: ft.      b. Diameter: ft.
- c. Flow Rate: ACFM      d. Temperature: °F.
- e. Velocity: FPS

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:<sup>1</sup>                              d. Capital Cost:
  - e. Useful Life:                              f. Operating Cost:
  - g. Energy:<sup>2</sup>                                      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:<sup>1</sup>                              d. Capital Cost:
  - e. Useful Life:                              f. Operating Cost:
  - g. Energy:<sup>2</sup>                                      h. Maintenance Cost:
  - i. Availability of construction materials and process chemicals:

<sup>1</sup> Explain method of determining efficiency.  
<sup>2</sup> Energy to be reported in units of electrical power - KWH design rate.

NOT APPLICABLE

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:<sup>1</sup>

d. Capital Cost: . . . . .

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:<sup>2</sup>

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

Explain method of determining efficiency.

Energy to be reported in units of electrical power - KWH design rate.

- (5) Environmental Manager:
- (6) Telephone No.:
- (7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration

NOT APPLICABLE

- (8) Process Rate:<sup>1</sup>

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration

NOT APPLICABLE

- (8) Process Rate:<sup>1</sup>

10. Reason for selection and description of systems:

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

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data Not Applicable NOT APPLICABLE

1. \_\_\_\_\_ no. sites \_\_\_\_\_ TSP \_\_\_\_\_ ( ) SO<sub>2</sub> \_\_\_\_\_ 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).

NOT APPLICABLE

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. \_\_\_\_\_ Year(s) of data from \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ to \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
month day year month day year
- 2. Surface data obtained from (location) \_\_\_\_\_
- 3. Upper air (mixing height) data obtained from (location) \_\_\_\_\_
- 4. Stability wind rose (STAR) data obtained from (location) \_\_\_\_\_

C. Computer Models Used

- 1. \_\_\_\_\_ 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 <sup>2</sup>	_____ 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.

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.

## SUPPLEMENTAL INFORMATION: SECTION II

1. Project Description
2. Table II-1  
Proposed Performance Test Matrix
3. Figure II-1  
Kiln No. 2 Process Flow Diagram
4. Figure II-2  
Kiln No. 2 Temperature and  
Retention Time Profile
5. Table II-2  
Permitting and  
Compliance Activities
6. Table II-3  
Summary of Test Parameters

## PROJECT DESCRIPTION

The subject of this application is to request that FDER Permit AC27-173474 be amended to allow Florida Mining and Materials to conduct performance tests on Cement Kiln No. 2 for the burning of waste tires, used oil, and coal in various combination as presented in Table II-1.

The purpose of this testing is to allow Florida Mining and Materials (FM&M) to:

- (1) Evaluate the energy conservation benefits of utilizing waste tires and used oil as a fuel supplement to coal.
- (2) Determine if the existing facility in its present physical configuration is capable of operating with these fuel combinations.
- (3) Determine emission levels from the cement kiln during operation with these various fuel combinations.

The proposed performance test would include emission testing for the four separate fuel combinations as presented in Table II-1. The proposed test parameters and methods are provided in Table II-2. The results of this emission testing will be reported to FDER and may be used as a basis for amending FDER permit AC27-173474 for permanent operation with waste tires and used oil as supplemental fuels.

The cement kiln system provides an excellent environment for utilization of waste tires and used oil as kiln fuels. Initially, thermal destruction of organic compounds is ensured by the available combustion conditions, including temperatures of at least 2800° F and retention times of up to four (4) seconds within the kiln itself. Turbulent gas flow is maintained throughout the kiln which further enhances the environment for thermal destruction. Further in the system, exhaust gases are exposed to a counter current flow of raw materials feed which consists largely of calcium carbonate. Thus conditions are present for effective neutralization of acid gases contained in the exhaust. The counter current flow includes a high concentration of particulate matter which provides substantial surface area for condensation of volatile metal species as well as any residual organic compounds. To complete the system, the fabric filter then provides for maximum removal of particulates from the gas stream. Each of these phases combine to make up an efficient industrial process which offers a perfect opportunity for use of these fuel resources with an insignificant impact on the environment.

Estimated emissions relating to the current permit FDER No. AC27-173474 are detailed in the supporting information for Sections III and V of this application. No increase in emissions for currently limited compounds is expected as a result of this permit amendment. The baghouses currently operated with the No. 2 Kiln will remain as the air pollution control device, thus continuing to provide Best Available Control Technology as previously determined.

No significant emission increases are expected for particulates and/or SO<sub>2</sub> due to the high removal efficiency of the system as demonstrated in the attached Section V. Also, NO<sub>x</sub> emissions are expected to decrease due to the use of waste tires since this would provide a better distribution of heat release and less fixation of atmospheric nitrogen. For the case of CO and HC, the emission rates are based on the process



combustion efficiency, and due to the high temperatures and long retention times, no decrease in combustion efficiency is expected.

For the case of the remaining compounds listed in Table II-3 (Metals, PCDDS/PCDFS, Polynuclear Aromatic Hydrocarbons, Benzene, Mercury) no substantial data base is available to estimate emission rates from the kiln No. 2 process. Although it can be generalized that the combination of high particulate removal, caustic scrubbing, and high combustion efficiency would minimize these emissions, exact emission rates for the various fuel combinations in Table II-1 cannot be determined. Therefore, it is the intent of the performance test to measure the baseline levels during coal combustion and subsequent emission changes for the various waste tire and used oil combinations.

In conclusion, it should be emphasized that this requested amendment does not include any significant and/or substantial change to the Kiln No.2 physical system and includes only the substitution of waste tires and used oil for coal. This amendment only includes the performance testing of Kiln No. 2 with these fuels and is not for operational purposes. It is also understood that any operation after the performance testing with these fuels would require a permanent amendment of Kiln No.2 Permit AC27-173474 by FDER and EPA.

**TABLE II-1**  
**PROPOSED PERFORMANCE TEST MATRIX**

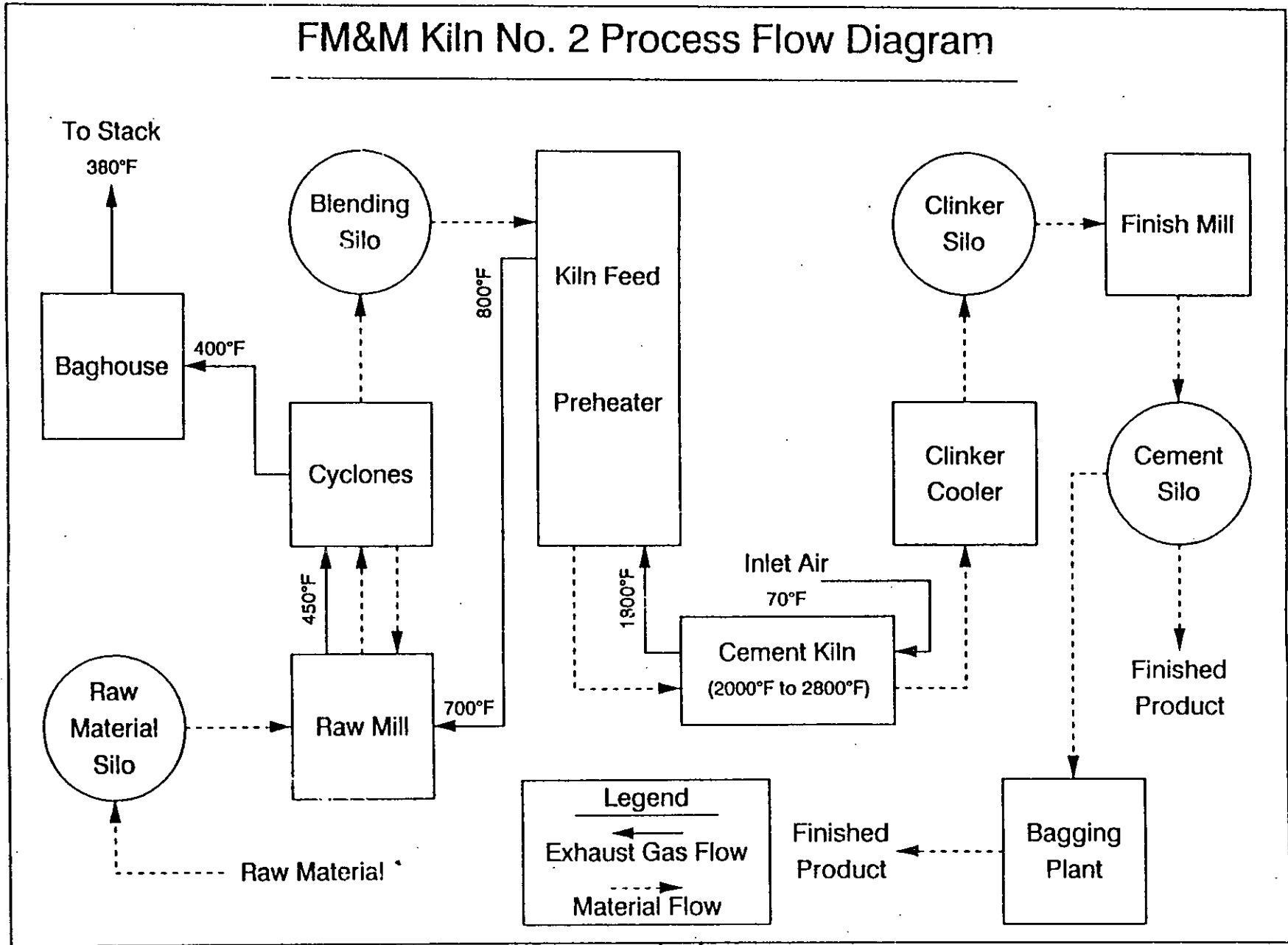
The proposed testing would include stack sampling during four separate cases for the kiln. These are represented in the following matrix.

Fuel Type	Test Conditions			
	1*	2	3	4
	% of Total Fuel Supply			
Coal (min.)	100	80	50	30
Waste Tires (max.)	0	20	0	20
Used Oil (max.)	0	0	50	50

\*Baseline

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FIGURE II-1



17

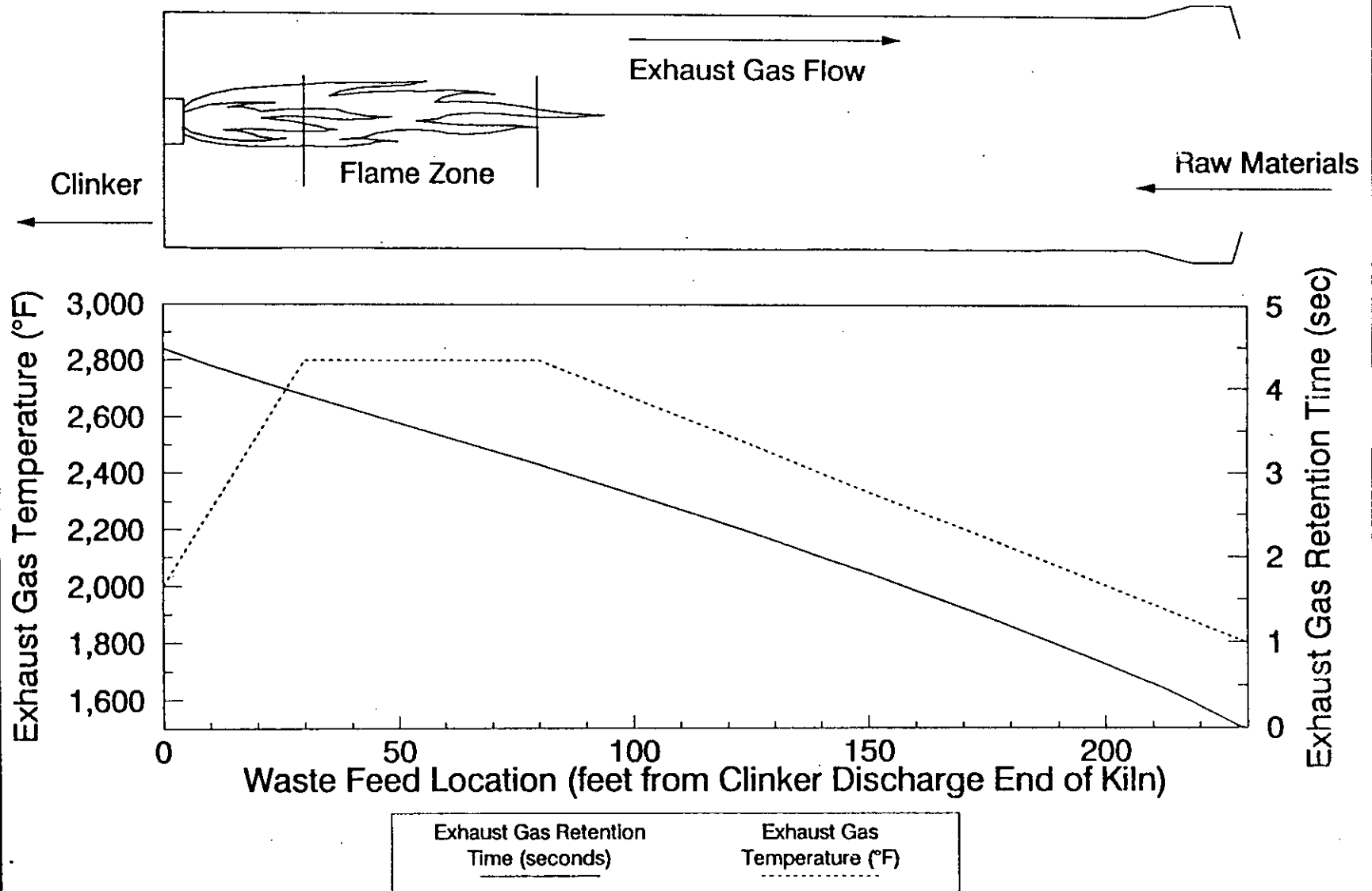
FMM2FLOW.DRW

C  
T  
A

Cross/Tessitore & Assoc., P.A.  
Environmental Engineers Orlando, Florida

FIGURE II-2

### FM&M Kiln No. 2 Temperature and Retention Time Profile



**TABLE II-2**  
**PERMITTING AND COMPLIANCE ACTIVITIES**

<u>Activity</u>	<u>Number</u>	<u>Issued</u>	<u>Expired</u>
Construction Permit	AC27-30450	July 25, 1980	December 31, 1983
Operating Permit	AO27-65207	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
Construction Permit	AC27-173474	July 20, 1990	December 31, 1991

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**TABLE II-3**  
**SUMMARY OF TEST PARAMETERS**

Particulate Matter	EPA Method 5
Visible Emissions	EPA Method 9
Metals:	EPA Method 5 (filter and probe rinse)
Aluminum	Barium
Arsenic	Copper
Cadmium	Nickel
Chromium (Total)	Iron
Lead	Vanadium
Zinc	
NO <sub>x</sub>	EPA Method 7
Sulfur Dioxide	EPA Method 6 (in back half of Method 5 train)
Carbon Monoxide	EPA Method 10
Volatile Organic Compounds	VOST
Semi-Volatile Organic Compounds	Modified Method 5
CO <sub>2</sub> /O <sub>2</sub>	EPA Method 3
Stack Gas Flow/Moisture/Temp.	EPA Methods 2 and 4 (in conjunction with EPA Method 5)
PCDDS/PCDFS	EPA Method 23
Polynuclear Aromatic Hydrocarbons	Modified Method 5
Benzene	EPA Method 18
Mercury	EPA Method 101 or 101A

FMMZTIRE

### **SUPPLEMENTAL INFORMATION: SECTION III**

1. Table III-1  
Regulated Emissions Summary
2. Table III-2  
Fuels Summary
3. Table III-3  
Additional Fuels Data

**TABLE III-1**  
**REGULATED EMISSIONS SUMMARY**

Parameter	Current Allowable Emissions		Allowed Emission Rate Per Rule 17-2	Potential Emissions		Relate to <sup>(1)</sup> Flow Diagram
	lbs/hr	T/yr		lbs/hr	T/yr	
Particulate	13.5	55.3	36 lb/hr (17-2.660)	13.5	55.3	E-19
Sulfur Dioxide	11.5	47.0	N/A <sup>(2)</sup>	11.5	47.0	E-19
Nitrogen Dioxide (NO <sub>x</sub> )	162.3	665.3	N/A <sup>(2)</sup>	162.3	665.3	E-19
Volatile Organic Compounds	7.4	31.2	N/A <sup>(2)</sup>	7.4	31.2	E-19
Carbon Monoxide	64.0	262.2	N/A <sup>(2)</sup>	64.0	262.2	E-19
Opacity	10 %	--	20% (17-2.660)	10 %	--	E-19

(1) See Figure V-6.

(2) Allowable emissions for these compounds have been previously established as stated in existing Construction Permit AC 27-173474.



**TABLE III-2**  
**FUEL COMBINATION SUMMARY DATA**

	<u>Current Fuels</u>		<u>Proposed Fuels</u>	
	<u>Coal</u>	<u>Flolite<sup>1</sup></u>	<u>Waste Tires</u>	<u>Used Oil</u>
<b>Case 1</b>				
Consumption	24,170 lb/hr	--	0	0
Heat Input (Btu/hr)	$3.0 \times 10^8$	--	0	0
Portion of Total Fuel Supply (%)	100	--	0	0
<b>Case 2</b>				
Consumption	19,336 lb/hr	--	4286 lb/hr	0
Heat Input (Btu/hr)	$2.4 \times 10^8$	--	$0.6 \times 10^8$	0
Portion of Total Fuel Supply (%)	80	--	20	0
<b>Case 3</b>				
Consumption	12,085 lb/hr	--	0	1034 gal/hr
Heat Input (Btu/hr)	$1.5 \times 10^8$	--	0	$1.5 \times 10^8$
Portion of Total Fuel Supply (%)	50	--	0	50
<b>Case 4</b>				
Consumption	7251 lb/hr	--	4286 lb/hr	1034 gal/hr
Heat Input (Btu/hr)	$0.9 \times 10^8$	--	$0.6 \times 10^8$	$1.5 \times 10^8$
Portion of Total Fuel Supply (%)	30	--	20	50

<sup>1</sup> Flolite will mainly 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 concurrently, the maximum heat input rate will not exceed  $3.0 \times 10^8$  Btu/hr.

**TABLE III-3**  
**ADDITIONAL FUELS DATA**

	Heat Capacity	Sulfur Content <sup>2</sup>
<b>Current:</b>		
Coal	12,500 Btu/lb	1.0 %
Flolite <sup>1</sup>	145,000 Btu/gal	1.0 %
<b>Proposed:</b>		
Used Oil	145,000 Btu/gal	1.5 %
Waste Tires	14,000 Btu/lb	<1.0 %

(1) Flolite will mainly 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 concurrently, the maximum heat input rate will not exceed  $3.0 \times 10^8$  Btu/hr.

(2) Values shown are approximate.

TABLE III-4

OFF-SPEC USED OIL CHARACTERISTICS\*

Arsenic	5 ppm maximum
Cadmium	2 ppm maximum
Chromium	10 ppm maximum
Lead	100 ppm maximum
Flash Point	100° F minimum
Total Halogens	4,000 ppm maximum

\* As specified in 40 CFR Part 266.40, "Used Oil Burned For Energy Recovery".

FMM2TIRE.Doc

## SUPPLEMENTAL INFORMATION: SECTION V

1. Table V-1  
Process Data (Feed, Production, Heat Input Rates)
2. Emissions Calculations
3. Figure V-1  
Process Flow Diagram
4. Figure V-2  
USGS Topographical Map
5. Figure V-3  
Facility Plot Plan

TABLE V-1  
PROCESS DATA

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Kiln Feed Rate	130 T/hr
Clinker Production Rate	79.6 T/hr
Maximum Heat Input	$3.0 \times 10^8$ Btu/hr

## EMISSIONS CALCULATIONS

### 1. PARTICULATE

The anticipated emissions rate for particulate is the same as the currently permitted level. 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 Allowable Emissions:

Allowable Emissions = 13.5 lb/hr  
(Permit AC27-173474)

= 55.3 T/yr  
(Permit AC27-173474)

#### Calculation of Potential Emissions:

Potential Emissions = 13.5 lb/hr

= 55.35 T/yr

#### Calculation of Control Device Removal Efficiency:

Uncontrolled Emissions Factor = 245.0 lb/ton clinker

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 - 13.5 lb/hr)

= 99.9%

## EMISSIONS CALCULATIONS

### 2. SULFUR DIOXIDE

The anticipated emissions rate for Sulfur Dioxide is the same as the current permitted level. 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. Uncontrolled emissions factors for Sulfur Dioxide, found in the EPA Guidance Document AP-42, are used in calculating the potential loading to the from each source.

#### Calculation of Allowable Emissions:

Allowable Emissions = 11.5 lb/hr  
(Permit AC27-173474)  
= 47.0 T/yr  
(Permit AC27-173474)

#### Calculation of Potential Emissions:

Potential Emissions = 11.5 lb/hr  
= 47.0 T/yr

#### Calculation of System Removal Efficiency:

##### Mineral Source:

Sulfur Dioxide Emission Factor = 10.2 lb SO<sub>2</sub>/ton clinker  
(from AP-42)  
Clinker Production Rate = 79.6 T/hr  
Potential Emissions Loading to the Fabric Filter = (79.6 tons clinker/hr)  
x (10.2 lb SO<sub>2</sub>/ton clinker)  
= 811.9 lb/hr

## EMISSIONS CALCULATIONS

### Calculation of System Removal Efficiency: (continued)

#### Fuel Source:

Sulfur dioxide emissions associated with fuels sources of sulfur are minimized through compliance with current permit specific condition No. 4. This condition restricts the sulfur content of the coal currently used to a maximum of 1.0 percent by weight assuming a heating value of 12,387 Btu/lb. Coals with heating values lower than 12,387 Btu/lb are restricted to a maximum of 0.83 pounds of sulfur per MMBtu of heat input. The following analysis is provided to calculate the typical sulfur characteristics of the proposed waste fuels.

#### Waste Tires:

Heating Value	= 14,000 Btu/lb
Sulfur Content	= 0.72% (Based on available analytical Data)
Sulfur/Btu Ratio	= $\frac{(0.0072 \text{ lb S/lb fuel})}{(0.014 \text{ MMBtu/lb fuel})}$
	= 0.51 lb S/MMbtu

#### Used Oil:

Heating Value	= 145,000 Btu/lb
API Gravity, 60/60 °F	= 30 (Based on available analytical data)
Specific Gravity	= $\frac{141,500}{1000 (30 + 131.5)}$
	= 0.88
Density	= (0.88) x (62.3 lb/ft <sup>3</sup> )
	= 54.8 lb/ft <sup>3</sup>
Sulfur Content	= 1.5%
Sulfur/Btu Ratio	= $\frac{(0.015 \text{ lb S/lb fuel})}{0.0145 \text{ MMBtu/gal}}$
Sulfur/Btu Ratio	= $\frac{(0.015 \text{ lb S/lb fuel}) \times (54.8 \text{ lb fuel/ft}^3)}{(0.145 \text{ MMBtu/gal}) \times (7.48 \text{ gal/ft}^3)}$
	= 0.76 lb S/MMBtu



This analysis shows that waste tires and used oil do not contain sulfur levels exceeding the maximum criteria for coal. Therefore the use of these fuels should not result in an increase in sulfur dioxide emissions beyond the allowable rate for baseline coal usage. Fuel source emissions of sulfur dioxide are calculated as follows:

Maximum Fuel Consumption Rate = 300 mmBtu/hr

Maximum Fuel Sulfur Content = 0.83 lb/mmBtu

Conversion Factor = 2 lb SO<sub>2</sub>/lb S

Potential Emissions Loading  
to the Fabric Filter = (300 mmBtu fuel/hr)  
x (0.83 lb sulfur/mmBtu fuel)  
x (2 lb SO<sub>2</sub>/lb S)  
= 498 lb/hr SO<sub>2</sub>

Total:

Estimated Total Potential Emissions  
Loading to the Fabric Filter = 498 lb/hr + 811.9 lb/hr  
= 1,310 lb/hr SO<sub>2</sub>

System Removal Efficiency = (1,310 lb/hr - 11.5 lb/hr)  
÷ (1,310 lb/hr)  
= 99.1%

## EMISSIONS CALCULATIONS

### 3. NITROGEN DIOXIDE (NO<sub>x</sub>)

Nitrogen Dioxide (NO<sub>x</sub>) emissions are a function of the kiln combustion process only. It is assumed that no control is provided by the fabric filter. The anticipated emissions are the same as the current permitted level.

Allowable Emissions	= 162.3 lb/hr NO <sub>x</sub> (Permit AC27-173474)
	= 665.3 T/yr (Permit AC27-173474)
Potential Emissions	= 162.3 lb/hr
	= 665.3 T/yr
Control Device Removal Efficiency	= 0%

## EMISSIONS CALCULATIONS

### 4. CARBON MONOXIDE

Carbon Monoxide emissions are a function of the kiln combustion and process reactions only. It is assumed that no control is provided by the fabric filter. The anticipated emission rate is the same as the current permitted level.

Allowable Emissions	= 64.0 lb/hr (Permit AC27-173474)
	= 262.2 T/yr (Permit AC27-173474)
Estimated Potential Emissions	= 64.0 lb/hr
	= 262.2 T/yr
Control Device Removal Efficiency	= 0%

## EMISSIONS CALCULATIONS

### 5. VOLATILE ORGANIC COMPOUNDS (TOTAL HYDROCARBONS)

Control of volatile organic compounds (hydrocarbons) is achieved through properly maintained combustion conditions within the kiln system. The proposed anticipated rate is the same as the current permitted level.

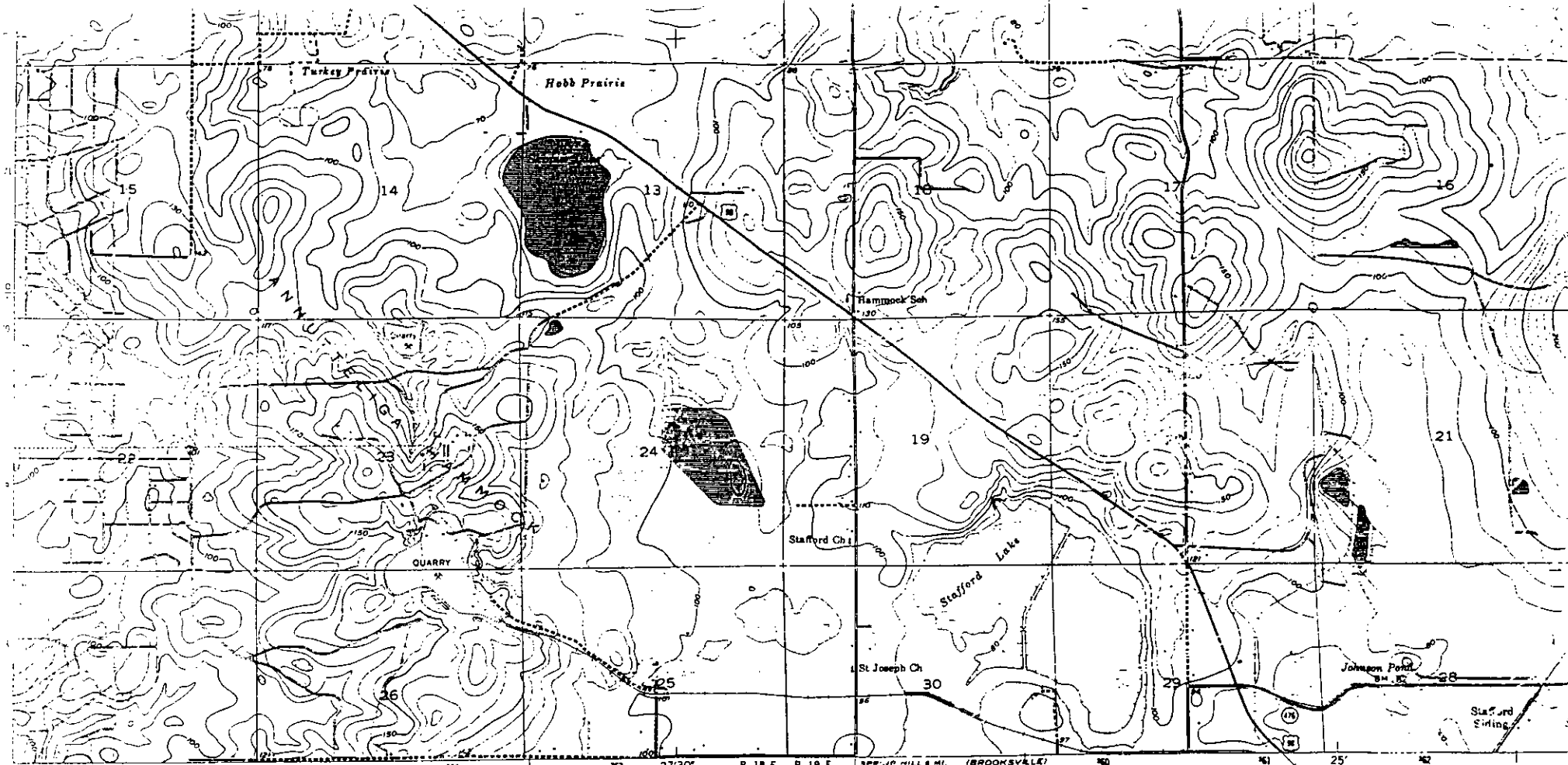
Allowable Emissions = 7.4 lb/hr  
(Permit AC27-173474)

= 31.2 T/yr  
(Permit AC27-173474)

Potential Emissions = 7.4 lb/hr

= 31.2 T/yr

Control Device Removal Efficiency = 0%



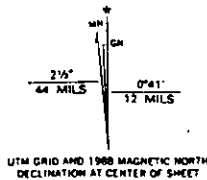
Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

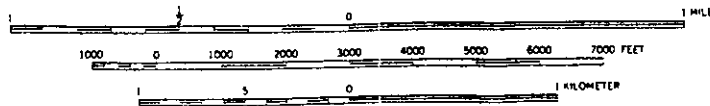
Topography from aerial photographs by Kersh plotter  
Aerial photographs taken 1951. Field check 1954

Lambert projection. 1927 North American datum  
10,000 foot grid based on Florida coordinate system,  
east zone  
3000 meter Universal Transverse Mercator grid ticks,  
zone 17 shown in blue

To place on the predicted North American Datum 1983,  
move the projection lines 27 meters south and  
15 meters west as shown by dashed corner ticks  
There may be private inholdings within the boundaries of  
the National or State reservations shown on this map



UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



SCALE 1:24,000  
CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

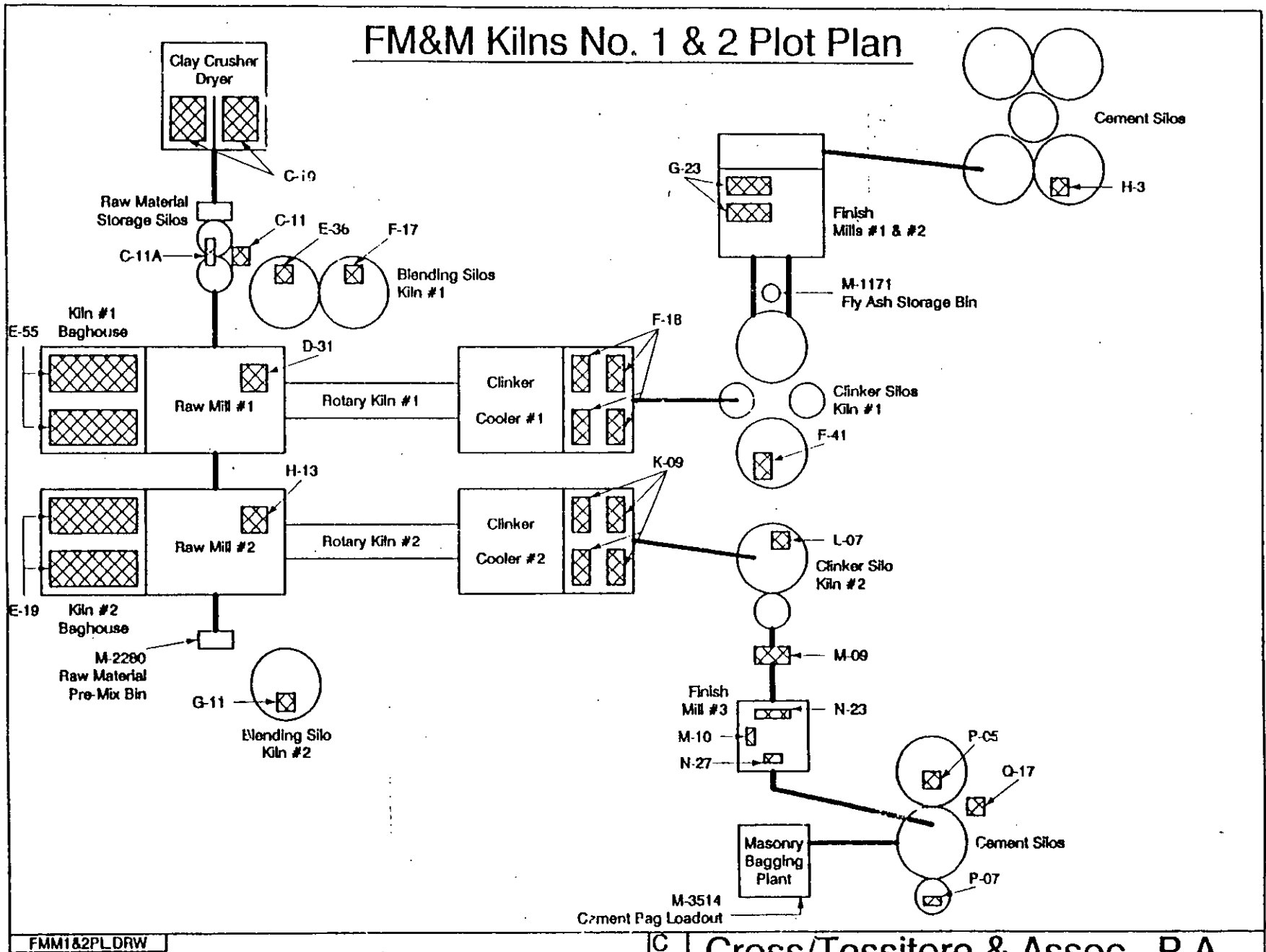
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U. S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



QUADRANGLE LOCATION

Revisions shown in purple compiled from aerial photographs  
other sources. This information not field checked. Mac 87

FIGURE V-3



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T  
A

**Cross/Tessitore & Assoc., P.A.**  
 Environmental Engineers Orlando, Florida